# CD Player Casebook

Reports from Mike Leach, Alfred Damp and J. Taylor

## Technics SLP8

This machine came into the workshop with the complaint that the tray operation was intermittent. It opened all right, so we inserted a disc. When the open/close button was pressed the tray shut partially then opened again. This happened several times before the tray finally shut. The TOC was read and all functions worked normally, including open/close.

The tray switch was clearly visible when the machine's top cover was removed. We left the machine to stand for several hours then tried again. Once more the tray partially closed then opened. This time we touched the tray switch contacts as the tray closed. Doing this cleared the fault, so we removed and dismantled the switch to clean the contacts. It's not easy to do this as the switch is very small. When the switch was replaced the fault had cleared – for three months.

When the machine came back with the same fault we found that the switch was working adequately but something mechanical was obstructing the tray's movement. So we stripped down the tray assembly to inspect the two runners at each side of the tray. They are located beneath two stainless steel strips, held in by three screws. The runners themselves are plastic, with plastic ball bearings inserted in them. These ball bearings had seized, causing erratic movement of the tray. We cleaned off the old grease and freed the bearings with thin oil. The tray itself was cleaned and regreased. After reassembly the unit worked perfectly. **M.L.**

## Yamaha CDX700

The fault report with this machine was "faulty left channel". When we played a disc we found that there was a certain amount of noise and distortion in the left-channel audio. The right-channel audio was o.k. The PCM56P AD converter chip IC503 was suspected and when this was replaced we had a complete cure.

I've had to change several DA converter chips in various machines. The fault symptom is often a wind-like noise in one or both channels – a sound rather like an off-tune f.m. tuner with no mute. **M.L.**

## Philips CD104

The customer complained that the right-channel sound was distorted. When we played a disc we noticed a small amount of distortion on loud music passages. The left channel output was affected, but not as much as the right channel output.

Scope checks were carried out around the audio stages but these led us nowhere. After the error correction stage there are several chips that could cause such a fault. The SAA7000 interpolation and muting chip has given us problems in the past, but our main suspect was the SAA7030 digital filter chip. We keep one of these in stock, so in it went as a substitution check. This made no difference. Bells then started to ring. We had had a very similar fault not long since with a Philips CD150. The −18V supply to the DA converter chips had crept up when the player was warm. When we made d.c. checks around the DAC chips in the faulty CD104 we found that pin 11 of IC6520 (TDA1540) was high at −25V instead of −16·8V. We traced the supply back to a 79 series regulator (IC6453) on the power supply board and found that this was leaky. A new 7918 restored the supply to −18V and cured the distortion in both channels completely. **M.L.**

## JVC XL-V2B

This player worked fine with some discs but not with others. We frequently encounter this fault symptom with many different types of players. There are various causes for it.

While this machine was apparently working all right the slider motor would suddenly send the laser assembly slam into its end stop then back again. It would do this sometimes at the TOC readout and sometimes when attempting to skip tracks. The first thing we had to do was to find a disc that the machine would play correctly, so that we could try the set-up procedure as laid down in the manual. We checked the laser power with a Leader LPM8000 laser power meter. It was slightly low but we were able to adjust it for the correct 0·25mW. This enabled us to maximise the amplitude of the EFM signal, using the focus offset control R209 as specified. The signal was somewhat distorted however, and the middle section of it was blurred. Next we adjusted the tracking offset control R370 for a 0V d.c. level at point TTE, with TTS and TTS connected to earth. See Fig. 1. For good, stable tracking this adjustment *must* be correct.

When we attempted to set up the focus and tracking gain adjustments, the slider motor kept throwing the laser assembly to and fro. This made it difficult, though only slight adjustment was required. The adjustment of the PLL coil L503 was next checked. We found that almost one complete turn was required to obtain the 50 per cent duty waveform shown in Fig. 2 (oscilloscope connected to pin 4 of the SAA7020 chip – MCES spindle motor waveform). This adjustment must be exact as it controls the rotation of the spindle and thus the bit rate recovered from the disc.

The EFM signal was still poor and the next step was to check the mechanical adjustments on the laser assembly. We connected a d.c. voltmeter to TF4 on the servo PCB and obtained a reading of 21mV. This showed that the turntable height was within specification. We lowered the turntable slightly to obtain a reading of 10mV. JVC states that ±50mV is within tolerance.

Adjustment of the tangential screw, underneath the laser assembly, produced a much clearer EFM signal. In fact the player produced slightly better results after this

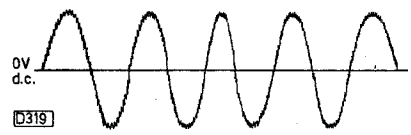



*Fig. 1 (left): Tracking offset o.k. with respect to the 0V level.*

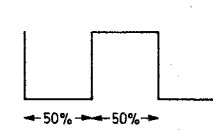



*Fig. 2 (right): The correct MCES spindle motor waveform at pin 4 of the SAA7020 error correction chip.*

adjustment had been carried out. The fault persisted however, and it was beginning to look as though the problem was caused by a worn laser. The focus and tracking offsets were checked again, following the mechanical adjustments, but the slider motor would still slam the laser assembly against the end stop. At this point we decided that a new laser assembly would have to be ordered. After obtaining one, fitting it and going through the whole setting up procedure again the fault had cleared.

This experience shows that though the laser power is correct the unit can be faulty for various other reasons, i.e. poor photodiodes, intermittent focus and tracking coils, laser spot too wide, etc. With the new laser assembly the player produced good results, the access time from first to last track being approximately four seconds. **M.L.**

## Kenwood DP840

No open/close was the fault report with this player. In fact it would do nothing at all – no functions, no display. After removing the top cover we carried out checks on the power supply rails. There were no problems here, so the front panel was removed. The player then began to function normally. As all connections on the front panel seemed to be o.k., attention was next turned to the main PCB.

Upon removal we found that plug J7 – main PCB to front control panel – was dry-jointed while Q602 (TA7354P) had one pin that was very poorly soldered and wasn't making a good connection. When we'd carried out some resoldering in this area normal results were restored. **M.L.**

## Sony CDP101

A fault that's becoming common with these machines is failure of the STK6922 sled motor drive chip IC304. The usual symptom is that the tray opens by itself during play: sometimes it won't open at all when the machine is warm. The chip contains an operational amplifier that's associated with the "chucking" motor for the open/close facility. Replacing it usually cures the fault.

It's also worth checking switch S905 for poor connections. It's on the main deck behind the tray assembly. Failure of this switch sometimes results in the tray staying closed when open has been selected. **M.L.**

## Sony CDP101

This player would work perfectly for about three quarters of an hour. It would then suddenly go into the stop mode and a fast rattling sound could be heard from the optical assembly. The fault was still present when the disc had been removed. This rattling sound was caused by the focus servo bouncing the lens up and down very quickly. Replacing the STK6922 focus/tracking servo chip IC204 cured the fault. **M.L.**

## Philips CD160

When we tried to play a disc on this machine it would start to rotate then "Err" would come up on the display. During the TOC reading you could see that the disc was rotating too fast. The usual cause of this situation is that the laser beam is not being focused.

We put the machine in the service mode. The initial position – 0 mode – could be obtained but the 1 position was unobtainable. In this position the laser emits light and is focused. When the lens is observed without a disc being inserted you should see it move up and down searching for the focused position. Voltage checks showed that the laser's supply was correct and that there was a feedback voltage from the monitoring diode. Attention was therefore turned to the focus circuitry. A scope check showed that the focus coil drive waveform was correct, and a resistance check then suggested that the coil was open-circuit. Further investigation showed that the ribbon connector from the servo board to the laser assembly was at fault. **A.D.**

## Philips CD150

There was no output from this player. Oscilloscope checks showed that the h.f. eye pattern was correct. In fact all the waveforms were correct through to the left- and right-channel DA converters. Voltage checks then showed that these two chips had no supplies. The cause was dry-joints on the supply voltage regulator. **A.D.**

## Sony D50 Discman

We had two of these models that wouldn't play. They have a service mode which is entered by shorting two solder pads together. We did this with the first one then started to go through the various service mode checks. The laser emission and focusing were correct, so the disc should have been rotating but wasn't. Investigation around the turntable motor then showed that it was trying to work but was being heavily loaded by the turntable. The cause was that the turntable's lower bearing was binding on its metal support. Lubricating this support and reassembling the unit provided a complete cure.

The symptoms were exactly the same with the second machine, and again a smear of grease on the turntable got it working. When all repairs have been completed don't forget to release the service mode before reassembling the player. It's easy to overlook this. **A.D.**

## Philips CD104

As a first measure for any servo fault or an oscillating output, check all the carry-through earth rivets on both the servo and the decoder panel. **A.D.**

## Hitachi MX-01/Opus 1

We've had the following fault on several occasions with this unit. The disc runs fast in the CD player section, the turntable motor running continuously. Check for −10V at pin 2 of PL902. If missing, check for dry-joints on the main board around Q805, Q806, R827 and ZD811. This usually cures the fault but getting to these components on the main board involves removal of about forty screws, both cassette units, the mode selector and fluorescent display panel and finally the main panel itself. **A.D.**

## Philips CD104

These players sometimes stop when hot. The usual cause is poor earth connections to the 5V regulator. A freezer check will show whether the regulators themselves are defective.

# CD Player Casebook

*Reports from Mike Leach and Nick Beer*

## Hinari DSK2 Midi System

A stock fault seems to be developing on the Hinari DSK2 midi system – we've had three of them in recently, all suffering from the same problem. The reported symptom is usually "won't play any disc". When you've finally managed to get the CD section into a position where you can service it, something that's not easy, you can see that when the tray is closed with a disc in it the turntable doesn't rotate. If the disc is removed and the tray is closed the optical assembly lens doesn't move up and down to achieve focus. I have to stress that you mustn't stare at the beam emitted from the lens: you can see from side viewing whether the lens moves or not.

Since the turntable won't rotate until focus has been achieved, one's first suspicion would be that there's a focus drive fault. You'll find IC803 (STA341M) mounted on the PCB beneath the laser assembly: a scope connected to pin 6 of this chip should show the focus drive waveform. In each of the cases we've had the waveform was present right the way through to the optical assembly, though no movement of the assembly was apparent. We found that in each case a delicate touch on the lens with a cotton bud produced three or four focus coil movements. In one case a tiny drop of thin oil applied to the focus coil pivot restored normal operation. It's not a good idea to go pouring oil into laser assemblies, but on this one occasion it did the trick.

As yet I've not been able to prove that the laser assemblies have been faulty. It would seem that the focus coil does give problems, but our customers have not accepted the repair estimate as the laser assembly is expensive. I'd be interested in any comments from other engineers with experience of these players. Maybe someone has actually replaced an optical unit to clear this fault. Other engineers have told me that the turntable motor gives problems. Usually the disc will start to rotate, but does so very slowly then stops. A replacement turntable motor should cure this fault.

**M.L.**

## Philips CD104

This one proved to be a difficult fault. It eventually turned out to be man made. The symptom was that the player wouldn't play past track five. There was variation from disc to disc, but towards the end of track four dropouts would occur and the machine would eventually shut down in the stop mode.

Our first move was to scope the h.f. eye pattern at pin 7 of the SAA7010 demodulator chip on the decoder panel. It was unstable, and I felt that the fault was probably mechanical rather than electrical. This was mistake number one.

Slight pressure applied to the centre of the disc clamp during play seemed to cure the trouble. I stripped the clamping mechanism to see if it was bent or disfigured in any way, then swapped over the whole clamping mechanism with one from a working machine, but no joy. As before however pressure on the clamp cured the fault. The next step was to scope the motor control waveform at pin 4 of the SAA7020 chip. It feeds the turntable motor control servo and in turn the motor, and was extremely unstable. Still suspecting a mechanical fault I changed the turntable motor, but the fault persisted.

Back to the servo board to take another look at the motor control waveform, which in Philips machines is referred to as MCES (*m*otor *c*ontrol from *e*rror correction to *s*ervo). This MCES waveform enters the turntable servo via a low-pass filter that consists of C2218, C2219, R3260, R3261 and the MC1458 dual operational amplifier chip IC6209. The voltages around this chip were all slightly wrong but were not too far out. There are two zener diodes in this circuit, and these are both critical for correct operation of the servo. They should both be 2V zener diodes but someone had replaced them with 2·5V types. Fitting 2V zener diodes cured the problem.

**M.L.**

## Philips CD150

The complaint with this one was poor tracking when warm. We played the machine for three-four hours and everything seemed to be o.k. In fact it wasn't until the machine had played for about six hours that a fault appeared – it started to skip and jump.

Next morning we checked the laser current when cold. To do this you connect a d.c. voltmeter across test points 1 and 2, i.e. across resistor R3102 on the servo panel underneath the turntable, and play track 1 of the Philips test disc. The meter should read 50mV ±5mV. If you don't get this reading, adjust potentiometer R3106 on the servo panel *carefully* until a reading of 50mV is obtained. As this setting was correct we ran the player again all day. Once more the fault appeared after about six hours. We checked the laser current again: bang on 50mV.

The TDA5708 photodiode signal processor produces the focus error signal for the focus drive circuit and also the RE1 and RE2 radial error signals for the TDA5709 radial error processor. It was this chip that turned out to be the culprit. A touch of freezer on it restored normal results for several minutes, a replacement providing a complete cure.

We were lucky with this one. It's been my experience that freezer doesn't always provide much help in this application. It was however a heat related problem, as we proved with the hairdryer before ordering the replacement chip.

Incidentally all the chips used in Philips players are available from CPC Ltd., 186-200 North Road, Preston, Lancs PR1 1YP.

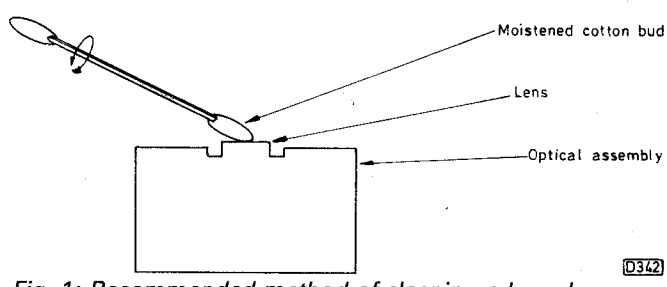



*Fig. 1: Recommended method of cleaning a laser lens.*

Note that you should be very careful when using a hairdryer for fault-finding. Keep the heat well away from the laser unit as excessive heat can damage it. Be careful of the flex print too. In the above case we were able to prove the cause of the fault only by disconnecting the servo board from the laser flex print, heating the chip and then reconnecting the board again. **M.L.**

## Marantz CD45

This Philips-based player was part of a midi system that had suffered lightning damage. Fortunately all the items in the system are separates, otherwise we wouldn't have even considered the repair. All items other than the record deck were faulty. We removed the CD player from the rest of the system and switched on. The result was that the tray opened by itself and the display resembled Blackpool illuminations! Then the tray wouldn't close. We checked the power supply rails which were all o.k., so the MAB8441 control and display microcomputer chip on the front control panel was the next suspect. Fitting a replacement restored normal operation. **M.L.**

## Cleaning Laser Lenses

I've discussed cleaning the optical assembly with several engineers. Some use a fine soft brush while some use a soft cloth with some sort of cleaning liquid, all with varying degrees of success. It's difficult to clean anything without applying pressure, but too much pressure can damage the optical lens, rendering it useless. The safest method I know of is as follows.

First try to remove the disc clamp which can get in the way. Then slightly moisten one end of a cotton bud in alcohol and lightly roll the bud over the lens. When the lens is clean, use the other end of the cotton bud to dry it completely to avoid smears etc. I've found this to be a very effective method as it requires very little pressure. See Fig. 1 **M.L.**

## Technics SLXP7

This portable CD player came into our workshop with no-play symptoms. Another servicing company had said a new laser assembly was required. The customer commented that it used to play some discs all right but on others it would mistrack and would not select tracks after the TOC had been read. When he got it back with the £85 estimate it wouldn't work at all.

A quick check revealed that the r.f. (eye pattern) waveform was present at pin 15 of IC301 (AN8371S). It was extremely poor however and the laser didn't read the TOC. I was beginning to suspect the laser myself when I spotted the cause of the problem – all the mechanical adjustments on the laser assembly had been twiddled. The seals on the turntable height and pickup angle adjustments had been broken. Luckily I was able to match up the position of the turntable height screw by the shape of the broken paint around the screw head. After this the machine played but the sound was poor, with dropouts, and it took some twenty seconds for the TOC to be read. The r.f. pattern was still very poor, but fine adjustment of the two angle settings produced a much better waveform. When we'd gone through the whole set-up procedure the player produced very good results. After about five minutes of play however the front display started to show incorrect track numbers and playing time, coupled with flashing numbers on the left-hand side. A small spray of freezer on the MN6617 digital signal processing chip IC601 corrected the display, so a new chip was ordered. When this had been fitted (all 84 pins . . .) the player was returned to a very happy customer with a bill for far less than the original quote.

Two weeks later the volume control fell to bits. Still, you can't win 'em all! **M.L.**

## Pioneer PD-M50

There was a shimmering display with a slow key scan – denoted by the very slow action of the buttons, i.e. having to keep your fingers on for ages. The cause was a faulty crystal oscillator timing circuit within IC3 (CXD1135QZ).

A similar fault but this time with a strobing rather than a flickering display (lower frequency) was caused by IC6 and its crystal X3 being faulty.

These faults could also occur with the PD-M40. **N.B.**

## Sony CDP35

The loading belt, part number 3-653-387-00, is a weakness in this model. Check it if the tray doesn't load or unload fully or the clamping arm doesn't lift fully.

If the main PCB is not screwed in, ensure that it's earthed at all four points, using jumper leads, when taking measurements or carrying out adjustments. **N.B.**

## Sony CDP-M20S

Intermittent low and very distorted sound was traced to IC9 (M515651) being thermally defective. A hairdryer and freezer were the most sophisticated items of test gear used for the diagnosis! Shame that this isn't the case every time. **N.B.**

## Sony D50

There are two versions of this player. This fault affects the Mk. 1 version which has a standard d.c. spindle motor. The symptoms are sluggish disc rotation or complete failure of the disc to rotate. Removal of the toothed belt will appear to show that there's plenty of torque, but nevertheless the motor is the cause of the trouble. **N.B.**

## Technics SLP-J22 Series

I've had one or two of these units with breaks in the optical unit's FPC. The symptoms have been no disc rotation due to no laser output, or intermittent skipping and/or returning to the TOC. **N.B.**

## Pioneer PD-X77

The disc went in and the display worked but the disc didn't rotate. A quick check using my new credit-card type detector showed that there was no laser output, though the LD-on signal from the syscon microcomputer chip was present. The logical conclusion was a broken FPC, and a new optical unit (PWY1003) got things going – the laser diode could have been faulty of course. When the machine was set up we found that the new optical unit also cured the playability faults the customer had complained about prior to the complete breakdown. **N.B.**

# CD Player Casebook

*Reports from Mike Leach, Ian Bowden, Alfred Damp and Nick Beer*

## Technics SL-P350

This machine came to us from another dealer, the symptom being no play. The display came up at switch on but the disc didn't rotate. Checks around the power supply showed that everything was in order here.

On removing the main PCB it was evident that several chips had already been changed. IC301 (84 pins) which controls the EFM decoding, error correction and turntable servo, IC401 (64 pins) the system control microcomputer and various others had been replaced, with the odd blob of solder here and there chucked in for good measure.

After cleaning up the PCB I resoldered several of IC301's pins that were obviously shorting across to one another. The fault symptom remained the same however, no turntable rotation. The question was do we carry on or send it back? As the boss (who controls the pennies) wasn't around at the time I decided to carry on.

Considering the nature of the problem, I got to the bottom of it rather quickly. With the "no light, no spin" rule of thumb in the back of my mind I checked the laser emission with a power meter. There was laser emission and plenty of it. When checking with a laser power meter you usually get about five-seven seconds of light during which to make checks before the system control shuts the laser off because focus hasn't been achieved. I got about five minutes of light emission – it wouldn't shut down!

Checks were next made around the auto power control circuit and the associated AN8370S optical servo chip IC101. Nothing here made any sense at all, the d.c. voltages being way out. A new chip was ordered therefore. When this was fitted the problem had been cured and the machine ran up, but with distorted sound. This problem was due to more poor connections around IC301. This time I resoldered it fully, after which the machine performed perfectly. **M.L.**

## JVC XLE300

Intermittent track skipping and TOC reading with this new machine turned out to be due to a faulty laser assembly. A new one was supplied free of charge by JVC. **M.L.**

## Technics SL-P10

A customer brought in this big, heavy early machine and wanted it repaired for under £30. Our receptionist gave a little cough when the customer said this and duly noted the details. Intermittent play was the reported fault: sometimes the disc wouldn't rotate.

On test we found that the machine played fine for a short while but when another disc was inserted the turntable wouldn't rotate at all. A quick examination revealed a tight spot in the turntable motor. Out came the manual to obtain the part number for a replacement turntable motor. It seems however that you have to order the complete assembly with laser! We had to advise the customer that he could buy a new machine for less than the cost of repairing his old one. **M.L.**

## Denon DCD300

This machine came in for a new loading belt to cure no TOC readout. A belt was fitted, the lens was cleaned and the machine was returned to the customer.

Two weeks later it was back again for skipping and jumping. This time we got the book of words out and set it up. Much better we thought – even played our much abused and scratched Philips 5A test disc. We ran it for a day or two then once more returned it.

A few weeks later it was back again, still skipping and jumping. A look at the r.f. waveform suggested that something was fundamentally wrong. The waveform was very poor and distorted and this time the machine wouldn't set up. We installed the laser assembly from a scrap machine we keep in the workshop for spares. This laser produced excellent results and after setting the machine up again the r.f. waveform display was perfect.

All we've got to do now is to explain to the customer that it didn't just need a loading belt, it also needed a new laser assembly. Are there any good PR men out there?! **M.L.**

## Marantz CD45

The complaint with this Philips-based machine was intermittent failure to play. When it did play everything was fine, but occasionally at TOC readout a scraping noise could be heard from within the machine and noughts would appear on the screen.

When I first had this fault on one of these machines some months ago the fault-finding was a bit laborious. The problem is usually caused by a faulty laser assembly however. Changing it cured the trouble in this particular machine.

Philips usually supply the complete unit for around £40 plus VAT, including the laser and servo board. When you've accumulated a few old ones you can interchange boards and lasers to establish where the fault lies, which in the long run is cost saving since you can use one unit to repair two machines! **M.L.**

## Pioneer PD-X99

Intermittent failure to play was the complaint with this machine – it wasn't confined to specific discs. With the top cover removed you could see that the optical assembly hunted at TOC readout. The machine would then go into the stop mode. This is a multiplay machine: it's easy to service the mechanical section of the optical unit as this is on the top of the deck assembly rather than underneath as with a conventional machine. When the optical unit was removed a slight film was visible on the lens. After cleaning this then relubricating the worm gear the intermittent operation was cured. **M.L.**

## Philips FCD463 Midi System

When either the stop or the open/close button was pressed the CD player section of this midi system would spin the disc at a phenomenally high speed, with no brake action. Dry-joints were evident on the servo control chip, which in this machine is on the decoder/power supply panel. Careful resoldering in this area restored normal results. **M.L.**

## Sharp DX450

The fault report with this popular machine was "no display". Sure enough the player didn't read the TOC, hence no display. With the top cover removed you could see that the disc didn't rotate.

There are many causes of this type of fault, i.e. no laser light, no focus, a faulty power supply or turntable motor or, something that's very common, a faulty microswitch indicating "disc loaded" to the microcomputer. In many machines fitting a new loading belt provides a simple cure. This case was different however. With the disc removed we found that the laser assembly was half way along its track, not close to the turntable for TOC reading. When we stripped the mechanism down we found that the slider motor had seized solid. A tiny drop of oil was applied to the top bearing and worked in. This restored normal operation. **M.L.**

## B and O CDX

When a disc was inserted and the lid was closed the disc could be seen just to start to spin then stop, the display showing the ? figure. On examination we saw that the radial arm didn't swing to the centre of the disc to try to read the table of contents. The cause was loss of drive to the motor. The reason for this was evident when we looked at the servo PCB: there was a dry-joint on a through-the-board earthing link, a problem these units suffer from on the decoding board. When this particular link goes open-circuit the earth connection for the radial motor driver operational amplifier chip is lost. As you can see from the relevant bit of circuit (Fig. 1), the i.c.'s output pin is earthed, the two supply connections being used as the outputs to drive the push-pull output transistors. Remove the solder from the hole and insert a single strand of wire through it. Bend the wire over at each end and solder to the print on both sides. **I.B.**

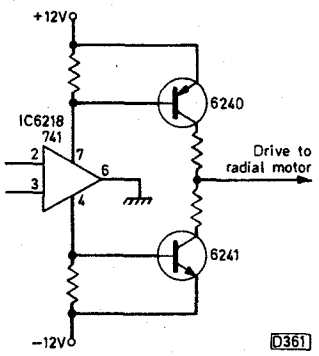



*Fig. 1 (left): Radial motor drive circuit used in the B and O CDX player.*

*Fig. 2 (below): Adding a small magnet in the Pioneer PD-X303 to assist with playability problems.*


## Sony D-10 Discman

The problem was no results when the a.c. adaptor was being used, also the batteries wouldn't charge. We found that R445, a chip resistor, had increased in value from 2·2Ω to 60Ω. **A.D.**

## Pioneer PD-X303

Playability problems, the machine being very sensitive to mechanical vibration, especially on the clamper arm, are the subject of a Pioneer modification/improvement. The first step to take is to add two strips of felt rubber (part numbers PEB-336 and PNM-054, large and small respectively) to the clamper arm. The second and far more effective step is to add a small magnet (PMF1001) as shown in Fig. 2. Note that the diagram on the modification sheet is incorrect – with the centre of the magnet alongside the motor's spindle the magnet would be ineffective. Another recommended step is to fit modified rubber floats to the mechanism, part numbers PEB-320 and PEB-321. You'll often find that the rubber strips have been added in production. **N.B.**

## B and O CDX

The following faults have occurred with several of these machines. A completely dead unit is usually caused by the ICP on the mains input panel being open-circuit. It's a 200mA Wickman fuse, part number 6600061.

For intermittent or permanent loss of one or both channels, suspect breaks in the output lead, usually around the exit from the cabinet. **N.B.**

## Pioneer PD7050

There seemed to be no display with this stock machine, though on close examination you could see slight illumination at the bottom right-hand corner of the digitron. The cause of the trouble was absence of the −25V supply. We found that Q18 (2SA1048) and D12 (a 5·1V zener diode) were short-circuit (3-5Ω) all ways round.

A point worth remembering with these machines is that if you reassemble the mechanism and find that the tray won't close when the disc clamp is fitted it's likely that ball bearing 04 in the hole in the metal rack at the rear left-hand side of the tray, underneath, has dropped out.

Another weak area is the soldering of the output phone sockets, while if these are handled heavily the print can break. **N.B.**

# CD Player Casebook

Reports from Mike Leach, Steve Byatt and C.E. East

## Sony CDPM20S

The job ticket said "no sound". Although the player ran up all right and elapsed time was displayed there was not a hint of sound. A scope check at pin 79 of the CXD1135 digital signal processor chip showed that there was no data output. Everything else was present, so a new chip was ordered. Fitting this made no difference – there was still no data output at pin 79. Further scope checks revealed very large variations in the level and shape of the waveforms into and out of the LC3516AML-15 RAM chip. A quick talk to those awfully nice people at Sony confirmed my suspicions – the RAM was duff. Apparently this is becoming a common fault.

The fault could be misleading since the symptom suggests that the player is in the mute state. As a result I spent some time chasing around in the system control section. **M.L.**

## Turntable Motor Problems

The fault report with a **Yamaha CD400** that came in recently was "intermittent failure to play". Sure enough, occasionally the disc wouldn't rotate. To cut a long story short, we noticed that the disc wouldn't rotate when its label was in a certain position after selecting the stop mode. Obviously the turntable motor had a poor spot. Out it came, after I'd made a small mark on the turntable spindle in order to make setting up easier with respect to turntable height. I stripped down the motor, cleaned and oiled it and retightened the connections. Then back it went, the spindle being carefully fitted to the turntable using the mark I'd made as a guide. After full reassembly perfect results were obtained.

An older machine, a **Pioneer PD1,** also had a turntable motor fault. This is one of those machines with a hinged front door that makes you think the disc will be bent in half while being loaded. The trouble was that the player would eject the disc while it was attempting to read the TOC. Each time that play was selected you could see the disc turn a quarter of a revolution before it was ejected. The problem was due to the turntable motor: a very small drop of oil down the top bearing provided a complete cure. **M.L.**

## Denon DCD500 etc.

No TOC readout is becoming a common problem with Denon CD players. Quite often the cause is the loading belt, which is normally underneath the tray assembly. Usually the fault symptom is no disc rotation when the tray has been closed. When you change the loading belt it's always worthwhile cleaning the leaf switches underneath the deck. If the tray-in switch makes poor contact it will produce the same fault symptom as a stretched loading belt. Also check the clamp mechanism. On some players part of the clamp locates into the tray when loading has been completed. If the tray hasn't been located properly the clamp can't lock into the tray: the result is no TOC readout as the mechanism isn't fully loaded.

Some early Denon players suffer from skipping and jumping. A modification kit consisting of a new tray, bracket and washers is available from Denon to provide a cure. The purpose of this modification kit is to ensure that the laser's movement across the disc is smooth. Basically what seems to happen is that the feed motor assembly gets so far then sticks and sometimes jumps too far. The modification kit cures most skipping and jumping problems with early Denon players. **M.L.**

## JVC XL-E300

The note attached to this machine read "drawer won't open and display shows 'no disc'". Its front panel had obviously received a good clout, possibly in a fit of temper. I removed the top cover and front panel (not easy when the tray doesn't open) and once the pressure had been released from the front display board the tray opened normally. Three or four of the front panel function switches were permanently pressed in: removing the front cover released them. This however was just the beginning of a fault-tracing exercise that involved much head scratching.

A disc was inserted. It started to rotate, but only very slowly. Then 'no disc' appeared on the front display. I tried again. This time the disc rotated at a greater speed before 'no disc' again appeared. Eventually, after five attempts, the machine worked perfectly. I stopped it after track four of 'Buster' and put in another disc. The same problem again: slow disc rotation followed by 'no disc'. Clearly the machine wasn't reading the disc's table of contents. This was because the feed motor didn't return the laser assembly to the centre of the disc when the open button was pressed. In fact the feed motor returned the laser assembly very slowly after the tray had been closed. Hence the problem of the disc rotating slowly. The laser was reading information from the outside of the disc instead of the inside.

My attention was drawn to the VC4090S servo signal processor chip IC502 which provides the feed motor plus and minus signals. Comparative voltage checks were made with a similar, working machine (we all cheat sometimes!) after which I decided to replace the chip. This made no difference. I studied the circuit for a good twenty minutes before I noticed the s-stop line to pin 22 of the chip. This pin detects the position of the laser for TOC reading: if necessary, the laser is returned to the centre of the disc. A switch initiates this action. It

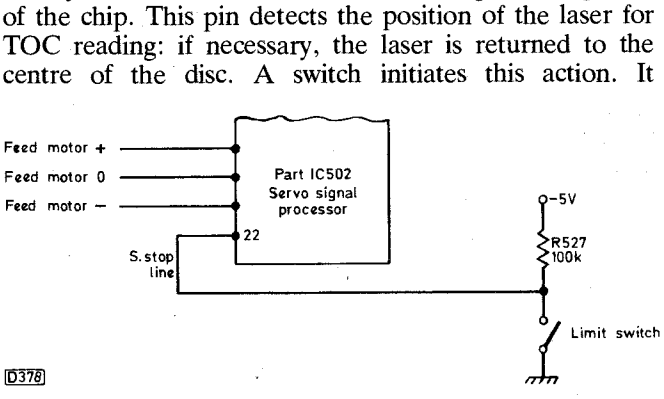



*Fig. 1: Connections to pin 22 of the servo signal processor chip IC502 in the JVC Model XL-E300.*

normally earths pin 22 (see Fig. 1). When the switch is open −5V is applied to pin 22 via R527. The problem was that R527 had never been fitted! The machine must have been new, because it could never have worked without R527. Fitting a 100kΩ resistor in this position cured the fault. **M.L.**

## Fisher AD823

All the usual problems with this one, i.e. won't play some discs, can't select tracks properly, etc., etc. The sound reproduction would deteriorate slowly, then the machine would start to jump and skip. Slight pressure on the clamp eased the problem but didn't clear it completely. The cause of the trouble was mechanical: the disc wasn't being fully lowered on to the turntable. This operation is achieved by part of the clamp assembly pushing down on to the two lever hold assemblies under the loading tray. These two assemblies weren't being properly engaged. I couldn't see any adjustment to put this right so I had to use a bit of initiative: a dob with the soldering iron on the part of the clamp that locates the lever hold into position during loading provided a cure.

During the following two weeks I had similar faults with Denon and JVC machines, though Denon supply a modification kit for machines that constantly skip and jump. **M.L.**

## JVC XL-V250

This player came to us from another dealer with a report that simply said "not working". It was almost in kit form! Someone had looked at it and come to the conclusion that the laser was faulty. It wouldn't read the TOC though it tried hard. There was a substantial amount of resoldering around the YM3815 signal processor chip and it looked as though all the potentiometers had been twiddled.

This particular player uses the JVC Optima-3 laser assembly, which is a vast improvement on the earlier types used in the XLV22 series of machines. I had a feeling that the laser was o.k. Just to be sure I swapped it over with the one in a JVC XLE3 that had come in with a different problem. As this had no effect on the fault I turned my attention to the resoldering around the YM3815 chip. Several of the pins must have been making poor or no contact while others were shorting to adjacent ones. It was a big task, and at the end of the day I had to order a new chip. The replacement got the machine working, but not very well as I had to set up the machine due to the phantom twiddler's efforts.

The YM3815 costs around £41 from JVC. I wonder why? Sony chips that, though different, perform very similar functions are half the price. With engineer's time and VAT it makes the cost of some repairs add up to almost the price of a new machine. **M.L.**

## Fidelity CD202

The fault report on the ticket said intermittent play. We ran the machine up and it worked fine for twenty minutes. A thump was then heard from the speaker and the machine shut down in the stop mode. It then started up again and finally stopped. "Oh dear", we muttered, "send it back to the manufacturer." "You can't" said a knowledgeable chap who was fighting with a stand under the bench, "they don't exist any more." So we had to get out the circuit and do our best.

We found that with the top cover removed the fault could be induced by applying slight pressure at roughly the centre of the main PCB. When the board was removed we saw a tiny blob of solder across two pins of IC403 (TC9200F). Resoldering and a quick scrape and clean up in this area cured the fault.

A word of warning when servicing these players. Ensure that you make good earth connections when running the player with the main board removed. The panel is earthed to the chassis at four or five different points where the self-tapping screws fix it in position. If any of these earthing points are poorly made or open-circuit the player won't work properly. **M.L.**

## Denon DCD300

During the first few minutes of play from cold this player would skip very badly. It happened with almost any disc that was inserted. We tried cleaning and setting up but got nowhere. A new laser cured the problem. These lasers are available direct from Denon, part no. 9960008101, in exchange for a lot of money! **M.L.**

## Sony CDP102

This machine would read only some discs. When working it played fine, but with some discs the turntable speed would increase at TOC and eventually the system control would initiate the stop mode.

This type of fault is quite often due to a faulty laser optical unit. This time the laser lens just needed cleaning. In addition, a small dob of grease on the tray guide rods improved disc loading significantly.

The general performance of these machines is excellent. A linear motor is used as the laser feed motor, making the access time from the first to the last track approximately one second. **M.L.**

## Philips CD100

The problem with this player was that the sound would drop out and the track indicator would flicker at the same time. A scope used to monitor the eye pattern showed that there were bursts of h.f. interference on the otherwise satisfactory waveform. The source of this interference was traced back to a noisy guard diode in the photodiode array. A small piece of Sellotape over the guard diode connection at the end of the flexible lead from the photodiode array cured the problem by removing the guard diode connection. The player has worked perfectly ever since this modification was carried out, saving the cost of a new laser diode assembly. **S.B.**

## Sony HSTD3CD/CDFM20S

A wiring fault in the Sony main amplifier type HSTD3CD resulted in twice the correct voltage being presented to the power regulators in the CDFM20S compact disc player. The wiring from the mains transformer to the a.c. output socket was found to be brown to the left-hand pin, grey to the centre pin and green to the right-hand pin. The brown lead should go to the centre pin. Because the centre tap was misplaced, voltage doubling took place, giving 16V, 0V, −16V across the main reservoir capacitors instead of 8V, 0V, −8V. Check this if the CD player stops after some minutes. **C.E.E.**

# CD Player Casebook

*Reports from Mike Leach, Philip Blundell, AMIEIE and Keith H.C. Parker*

## Technics SLPJ1

This was a good one. The customer complained that the machine wouldn't play past track four or five. When we tried the machine it played tracks one and two all right but when it reached track three it started to mute briefly. As the machine continued to play the symptom got worse until it eventually shut down in the stop mode. A quick inspection of the eye pattern revealed the source of the problem, but tracing it to component level was a little more difficult. The eye pattern waveform appeared to jitter at the right-hand side. I've seen this before, and it usually indicates that there's a fault in the CLV (turntable motor) section of the player. Without thinking any more about it I ordered an AN6638 turntable motor drive chip (IC501) – I've known failure of this chip cause identical symptoms in the past with this type of machine. So in went the new chip and, you've guessed it, the fault remained. I next stripped the turntable motor, cleaned the spindle and lightly oiled the top bearing. Still the same! When faced with a problem like this I often find that a good swear works wonders. So I went through all the four-letter words I'd not used recently, got out the circuit and proceeded to fix the machine.

To start with I checked the voltages at pins 12-16 of the AN6638 drive chip. These pins are connected to two Hall i.c.s, H501 and H502, on the turntable motor stator board. The voltages at pins 14 and 15 were high at 5·1V instead of 3·8V. These two pins are connected to H502. All the voltages around H501 were o.k. I removed H502 from the board and replaced it with a similar chip from a scrap Aiwa machine. The player then worked perfectly – H502 was open-circuit.

When this Hall i.c. is open-circuit there will be a slight glitch with each revolution of the disc. At the beginning of the disc the error is only slight but as the laser moves outwards the glitch error increases so that for a brief moment the turntable motor's speed is wrong. This interrupts the data flow from the disc, causing the brief mute. **M.L.**

## Sanyo CP59

No go said the report on the ticket. Sure enough the disc didn't rotate. A quick check with the laser power meter showed that there was no light emission at all from the laser assembly. While making checks on the main panel however the machine started to work. Dry-joints and poor print were evident in the area of plugs CN1 and CN2. Some light soldering on these plugs restored normal operation. **M.L.**

## Yamaha CD29

There had been a burn-up around the turntable motor drive circuit. Q103 and Q104 had both been damaged and we thought that a faulty turntable motor might have been the cause. So a new turntable motor, drive transistors and drive chip (IC106) were ordered. When these items had been fitted however there were no functions and no display.

R203 and R212 in the + and −13V supplies to the turntable drive transistors were both open-circuit, but when replaced with Yamaha specified parts there were still no functions and no display. We then found that the mains transformer was open-circuit, a replacement restoring full operation. I can't help thinking that two circuit-protection devices in place of R203 and R212 would have provided better power supply protection in the event of a short-circuit being present in the output stage. **M.L.**

## Marantz CD873

The turntable motor ran excessively fast and there was no TOC readout. Fitting a replacement laser assembly cured the problem. **M.L.**

## JVC XLV220

If you have one of these or a similar player that doesn't read the TOC you could well find that the pattern is as follows. The focus search is completed, the spindle motor starts, but no TOC is read and the spindle motor isn't braked. If you follow the spindle motor fault-finding tree you will start changing all sorts of perfectly good components. Try resetting the tracking offset control (after marking its initial position) then starting the machine again. Often this step coaxes the player into life. You've not found the fault yet however! If you are sure that no one has been twiddling, you'll probably find that a new Optima-2 is needed. With a good Optima-2 and the machine playing you can often turn the tracking offset control from one end to the other without any dropouts occurring. As a rough guide for setting the tracking offset, the better the eye pattern the faster the spindle motor is braked when you go from play to stop.

While you've got the player apart, check that it's got the latest (small) type of sled home switch. **P.B.**

## Philips CD160

Problems with the CD tray are common with this range. Usually the tray gears go out of sync, as a result of which the disc clamper won't operate. If the gears need retiming, remove lever 123 and gear 119 (after removing the brass pin and circlip). Press the tray right in, position the disc clamper at the correct side of the main cam gear, then refit gear 119, the pin and circlip. If gear 119 is a sloppy fit on the tray gears, an oversize one (white coloured) is available, part no. 4822 522 32329.

Electrical problems with the tray usually mean that it

will move in one direction but not the other. You'll have to carry out resistance checks on all five of the motor drive transistors on the front panel and replace R3074 (1Ω) if it's burnt. Models that use the Motorola 40-pin microcomputer chip on the control/display panel can be modified to prevent the microcomputer "hanging up" if one of the drive transistors fails. This is explained in supplement 4822 725 42251. **P.B.**

## Philips CD380

For intermittent play or no TOC reading, check for dry-joints on the pins of the surface-mounted chips 6501 and 6503. **P.B.**

## Philips CD150

No display or an incorrect one, the player working all right in all other respects, is a common fault with these machines. Usually the display itself is faulty. If you don't have one in stock you can prove the point by applying freezer to the display PCB. **P.B.**

## Philips CD471/CD582

The fault report with this machine read "stops playing and resets; reads TOC when first loud sound on disc is reached". This was confirmed: the player would sometimes fail within seconds but could play a complete disc without failure. Having checked the inputs and outputs to and from IC6522 and IC6540 and found no faults I came to the conclusion that the DAC IC6541 must be at fault, but the problem remained when this had been replaced. After much searching I probed the part of the mute circuit identified as point 93 on the circuit diagram and found that I could induce the fault at will. The actual component failure was intermittent base-collector breakdown in transistor 6544. I suspect that the failure was caused by a voltage applied via the output sockets, as there are no output isolating capacitors in this design. **K.H.C.P.**

## Yamaha CD Players

Should the fault complained about be skipping or jumping, here's a useful tip to check for sled or disc motor operation with most Yamaha players. Remove the motor from the player and connect it across an Avo Model 8 on the low ohms range – or alternatively use an Alkaline D cell. A good motor should rotate slowly, and if stopped by hand should continue after the load has been removed. The motor should be tested in the same way with the supply polarity reversed. If the motor fails fit a replacement, don't try to renovate it. **K.H.C.P.**

## Philips CD104

If this player, or one of its clones, intermittently fails to focus or spin up it's worth looking at the motor assembly. Failure is possibly due to the fact that the turntable is not at the correct height. This can be adjusted, though the manual doesn't mention it. To set the height correctly, play a known good disc (or Philips 5A) track one and, with a DVM connected across R3240, adjust the threaded thrust bearing in the base of the motor until the voltage across R3240 is as close as possible to zero (±50mV). This assumes that you've corrected all dry-joints and resoldered all the through-board connections. **K.H.C.P.**

# CD Player Casebook

Reports from Mike Leach and Philip Blundell, AMIEIE

### Philips CD150

The problem with this machine was intermittent sound: both channels went off at the same time though the time display kept going. The mute line didn't go low as you might have expected, but the right and left data (DRCF, DLCF) disappeared. When the preceding stage (CIM) was checked we found that the data flag (UNEC) was unreliable. It went high when the sound went off. A new SAA7020 ERCO chip cured the problem. **P.B.**

### Pioneer PDZ-72T

This machine wouldn't read the TOC. The disc rotated and a waveform was available at the r.f. test point but the waveform was extremely erratic and misshapen. During the attempted TOC reading the laser would chatter and the machine would eventually go into the stop mode.

I noticed that the feed motor didn't move the laser assembly to the table of contents after focus had been achieved. We tried going through the setting up procedure, but the fault remained. I was about to condemn the laser assembly when I decided to try the diffraction grating adjustment procedure. The machine then started to work. After going through the rest of the adjustments it performed perfectly. Hopefully it'll stay that way.

Normally I go for the grating adjustment only when all else has failed. Usually, like this one, when I suspect the laser anyway and the customer has agreed to pay. I've found from experience that a player which has been tweaked (offsets etc.) can usually be set up by following the manufacturer's instructions. But if the grating adjustment has been got at as well you've a big task in front of you to get the machine to work correctly. Grating can be very difficult to set up, and you have to be pretty sure in your own mind that the rest of the player is in order before attempting it. **M.L.**

### Sanyo CP17

The problem here was that the disc tray didn't open. R691 (10Ω) in the tray drive circuit was open: it's in the 9V supply to the drive chip and provides protection should the drive chip become stressed.

The loading mechanism hadn't quite lowered the disc clamp when the fault originally occurred. To be on the safe side we changed the loading motor as well as the LB1645N drive chip 1C691. The machine then operated normally. **M.L.**

### Philips CD304

Although this player had been dropped no physical damage was apparent. The complaint was of very bad distortion on both channels. An inspection of the decoder and servo boards showed that all the through-earth connections had previously been resoldered. I decided to resolder them just in case, since distortion with these machines is generally due to bad earth connections on the decoder board. Most of the connections I checked bubbled, indicating poor earthing.

After carrying out this resoldering operation I ran up the machine and discovered a multitude of problems – in fact a different problem appeared each time the machine was switched on. Sometimes the whole display would be lit brightly; sometimes there would be no display at all; occasionally only one segment would light; the drawer would open and close by itself; and so it went on. The slightest movement of the servo board would briefly rectify the fault, so I checked all my soldering. Everything appeared to be in order. Power supply next, but this was o.k. Then the front panel. All connections were o.k., so were the connections from the decoder to the servo board. Throw manual in the air and retreat to the pub.

Some time later I started again from scratch. The +2 (5V) supply from the servo board to the control/display board turned out to be intermittent. So I linked across. Still no go, even with this 5V supply now permanent. It comes from plug 27 on the servo board, and I discovered that four out of the five connections here were intermittently open-circuit. The wires had been crimped too tightly during manufacture, so I cut the plug off and soldered the connections to the board directly.

At last the machine worked properly. Two of the poor connections were data lines to the front panel, which would account for the odd symptoms. But there was still distorted sound. This turned out to be due to a poor earth connection on the decoder board – to be precise the earth connection between C2513 (22μF) and crystal 1504. After cleaning the lens and setting up the laser power the player worked perfectly. **M.L.**

### Pioneer PDZ-72T

There was no light output from the laser assembly, the result being that the disc failed to rotate. When the laser had been replaced and the machine set up the TOC was read in the normal way. Pioneer supply these lasers for only £27 plus VAT. Other manufacturers please note! **M.L.**

# CD Player Casebook

*Reports from Mike Leach and Keith H. C. Parker*

## Sony Laser Problems

I've had a few problems recently with Sony laser assemblies. The type concerned is the KSS-150, which is used in various machines from different manufacturers. Various symptoms have been present. The first time I had trouble was with a Sony CDM20S that suffered from focus problems (jumping and skipping, etc.). Next there was a Denon DCD920 which spun the disc backwards at TOC readout. A Yamaha CDX630XE came in with the focus offset control at one end, while a Samsung CD ghetto blaster had no light emission at all. All these machines were fitted with variants of the KSS-150. Replacements cured the various faults. **M.L.**

## Technics 5LP-420

Amongst the domestic machines available, Technics, Sony and Philips players are my favourites. When working correctly they knock spots off many other makes, especially the cheaper ones. This particular Technics player however produced all the signs of having a nasty fault: the laser assembly wouldn't return to the centre of the disc for TOC readout. I tried the plugs and sockets, to no avail, then took the main board out to check circuit protectors IC4 and IC5. As everything seemed to be all right I replaced the panel and ordered a service manual. Thought I'd just check again – and the machine worked! When I took the board out a second time I saw the cause of the problem. There were bad dry-joints around the regulators. A good old solder up and the machine worked very well. So there you are madam: your CD player is repaired but now weighs 3lb more than when you brought it in! **M.L.**

## Pioneer Laser Problems

I've had problems getting the right laser unit for recent Pioneer models. Pioneer now supply revised versions of their lasers and until I discovered the code we were putting the wrong laser in certain machines. Most of these assemblies look exactly alike and all use the same method of fitting. They also have the same pin connections to the flexi PCB. The original part numbers were:

PWY1003, used in Model PDM-50 for example
PWY1007, used in Model PDX-940 for example

The correct replacements are type PWY1010 for the PWY1003 and type PWY1009 for the PWY1007. The two different types of laser are not interchangeable. If you fit a PWY1010 in place of a PWY1009 or vice versa it will not work and you could end up with the same fault symptom you had before. It's easy to do, I've done it and believe me you can be chasing your tail for hours. So check the part number with the manual first, then when the new one arrives check it against the replacement part numbers above. **M.L.**

## Pioneer Multiplay PDM-610

This machine wouldn't eject the CD magazine fully. Instead of ejecting it by a couple of inches there would be partial ejection with the magazine jammed inside the player. I watched the operation of the mechanism for some while before I realised what was going on. Basically, the machine didn't return the disc into the magazine fully when eject was pressed. Thus the machine couldn't carry out the full eject operation.

The mechanism is rather complicated and difficult to explain. What was happening was that the lever that returns the disc into the magazine moved too slowly. It's driven by two sliding plastic plates beneath the top half of the mechanism. These two drive plates are separated by two ball bearings, presumably to reduce friction, and the problem was that one of the ball bearings was missing.

Stripping the mechanism is easy. Putting it back together isn't! But I was pleased that when everything had been reassembled after replacing the ball bearing the machine played and ejected perfectly. **M.L.**

## Yamaha CDX2

We've had many of these machines with the complaint that the drawer will not open, close, does so intermittently or produces an occasional smell of burning. In all cases we've found that transistors TR220/1/2/3 have failed. Yamaha recommended that in addition to these motor-control transistors the 7V regulator TR232 and the mechacon control chip IC401 (MSM6404A-42RS) should be replaced. It seems that the chip can on occasions produce open and close control signals at the same time. Following this advice has cured the problem on all the machines I've had until recently when a player that had previously suffered from the problem was returned. There was a bit of additional information however – the player hadn't been used for some time.

After much thought I recalled that an almost identical circuit is used in the Yamaha CD2. My records showed that we'd not had failures of this type with the CD2. The difference is that with the CD2 the mechacon chip is on the main PCB while in the CDX2 it's on a small subpanel (operation 2). The problem turned out to be due to dirty contacts on the three- and four-pin plugs associated with the drawer limit switch and the logic drive betwen IC401 and TR220/1/2/3. **K.H.C.P.**

## Denon DCD1300/1500/1700

On examination you may find that when the complaint with one of these machines is skipping and jumping the motor drive to the laser sled is very erratic in direction and seems to move with large jumps. In almost every case we've found that the cause of the fault is not the sled motor or its control but a laser with very low output. So check this first before ordering a very expensive motor. If the laser is poor I suggest you give the customer a quote as the laser assembly is even more expensive at approximately £150. **K.H.C.P.**

## Interference from CD Players

Since the introduction of low-power Band II Community radio stations I've started to receive f.m. tuners for checking with the complaint that the local stations are sometimes "noisy" or "slightly unstable". No fault has

been found with the tuners but on house calls to several customers I've discovered that they sometimes switch from playing a CD to the tuner in their hi-fi separates system without stopping the disc, allowing it to play to the end. The "unstable" interference is caused by the harmonics of the player's PLL, as it tracks the data from the disc, getting out of the player and into the tuner. If the player is on but stopped the interference is not apparent or at worst there's a slight hiss. The best cure is physical separation of the tuner/aerial lead and the CD player. I've found that Philips machines in particular give rise to this complaint. **K.H.C.P.**

# CD Player Casebook

*Reports from Mike Leach, Philip Blundell, AMIEIE, Joe Cieszynski, Nick Beer, Ronald Aranha and Keith H.C. Parker*

## Pioneer PD4100

This machine would read the TOC all right but wouldn't play. When play was selected the sled moved the laser assembly to the approximate section of the track that had been selected. Then after several seconds the machine returned to the stop mode. There are various causes of this problem, as engineers will know, e.g. a poor laser, a misadjusted PLL, poor tracking etc. In this case I cleaned the laser lens and checked the grating adjustment which was found to be at the optimum point. So I ruled out the laser for the time being. I next checked the tracking drive waveform at pin 1 of the TA8410K tracking drive chip IC17. It was very low while the chip itself was very hot. Replacing the chip restored normal operation. **M.L.**

## Pioneer PDX99M

This machine wouldn't play at all. The disc rotated but very little else happened. Fitting a new PWY006 laser got the machine working but for one problem – it wouldn't play track one of any disc. Subsequent tracks played all right, but not track one. I went through the set-up procedure a second time and found that the PLL adjustment was slightly out. Setting this up cured the problem. I can only assume that the PLL's pull-in range is critical when the disc is rotating fast, i.e. track one. There was only very slight misadjustment. **M.L.**

## Hinari DSK14

Distorted left-hand channel sound was the complaint with this machine. Its decoder section incorporates an LC7860N postage-stamp 80-pin chip. Some of these multipin decoder chips have a built-in digital filter while some don't. With this chip the filter is internal. I've found that the digital filter is more prone to being faulty than the digital-to-analogue converter. Some engineers may disagree with this and say that the chances are fifty-fifty, but I've found that most DAC chips are reasonably reliable. A can of freezer worked wonders here, confirming that the LC7860N chip was the cause of the trouble. Replacement put matters right – and no broken print! **M.L.**

## Marantz CD54

The disc rotated but the machine would no nothing else – there was no play and no TOC reading. Slight pressure on the servo board restored normal operation and I could see that there were dry-joints on the tracking drive transistors Q243/4. I mention this straightforward fault because the joints were so bad that it could become a common problem with these machines now that they've seen several years' use. Maybe one to watch out for. **M.L.**

## Philips CD160

The right-hand channel sound was distorted. In this case I suspected the DAC chip as it was running rather warm. A replacement didn't provide a cure however. I knew it wouldn't. I'd had a bad fortnight – a JVC camcorder out of sync, three Philips rack sliders, a microwave oven that couldn't tell the time and our tea machine ran out of water. A bad scene.

Anyway I went farther back in the circuit and tried slapping in a new SAA7220P digital filter chip. Same results! D.C. checks were then carried out around this chip but everything appeared to be in order. I then found that when heat was applied to C2331 (0·22$\mu$F) the fault cleared for a minute or two. I took one off a scrap panel and carefully fitted it – it's a surface-mounted component. This cured the fault. C2331 is part of the current divider network in the right-hand channel section of the DAC circuit. It may have been just a dry-joint, but I changed the capacitor as a precaution. **M.L.**

## Pye TR8829

Early versions of this model had a disc hold-down cover made of a hard material. If dirt gets sandwiched between the disc and the hold-down the result can be damage on the disc's label side, causing track jumping. A soft, self-adhesive cover is available, part no. 4822 529 10258. With later machines this cover was fitted during production. **P.B.**

## Pye CST428/35

We've had several cases where the machine intermittently stops playing and won't restart unless the disc is ejected and the TOC is read again. Check for dry-joints on X102. It's by the SAA7210 chip. **P.B.**

## Grundig Party Centre PC3100

Beware of faults in the servos damaging the d.c.-d.c. converter. The problem with this player was that the disc wouldn't spin at all. There was the usual dim red glow in the lens, indicating that the laser was lit, but a laser power meter check showed that its output was very low. There was a break next to the laser power control. Attending to this cured the problem of failure to start up, but the disc took off at great speed as soon as the tray was closed. Attention was therefore turned to the focus and tracking servos. It was then that smoke signals started to emerge from the d.c.-d.c. converter.

To cut a long story short, when the disc motor runs at full speed TR4 in the d.c.-d.c. converter cannot sustain the current for any length of time and begins to burn up. A BD132 in this position lasted a little longer, but in the end I had to resort to replacing the +9V rail with an external power supply while carrying out the repair. Normal operation was obtained when the tracking offset had been reset. **J.C.**

## Sony Discman D20

This machine came in with the complaints that the disc wouldn't spin and there was track jumping. On opening up the player we found that the laser assembly wasn't in its home position (centre). So we moved the sled mechanism manually to the centre. While doing this we found that there were broken teeth in one of the sled mechanism drive gears. You can't order this gear separately: it comes along with the sled motor/chassis assembly. When the new assembly arrived we mounted the spindle motor and optical block on it. The disc then

started to spin, the TOC was read out but the skipping fault persisted. So we checked the laser emission by measuring the voltage across R511 (10Ω). The reading was 0·8V, suggesting a laser current of 80mA. A label stuck on the laser unit indicated that the current should have been 49mA. After fitting a new KSS-162A laser unit and carrying out the necessary adjustments the machine worked perfectly. **R.A.**

### Sony CDP-205ESD

Even though the player was usually able to read the TOC there was severe skipping. We connected the scope to test point TP(RF) to check the eye pattern which was just 0·35V peak-to-peak. According to the manual it should have been 1·2V ± 0·2V p-p. We suspected the KSS-150A laser assembly and after fitting a replacement and doing the E-F balance adjustment the player worked perfectly. A check on the r.f. waveform showed that the eye pattern was 1·1V p-p. **R.A.**

### Sony CDP-S37

This new machine wouldn't read the TOC. On inspection we found that there was a problem with the focus search – the lens assenbly didn't come upwards sufficiently. When we compared the search voltage swing across the focus coil with the swing in a correctly working player it was very poor. As the search voltage is generated by IC3 we replaced this chip, but the symptoms remained the same. Checks around IC3 then revealed that C215 (3·3μF, 50V) had been inserted with reversed polarity. Taking it out and putting it back the right way round restored normal operation. **R.A.**

### Sony CDP-S37

This machine was under guarantee. There was a "cur-cur" sound from both channels. All other functions, such as display, track jumps and search, worked perfectly. We thought that the RAM might be at fault, then suspected the digital filter chip, but the fault was still present after replacing them. We then brought out the scope to check the address and data in/out lines from the RAM chips, using another machine as a guide. Not much difference could be seen. The CXD1125 digital signal processor/CLV servo chip IC7 was then suspected, though with only 50 per cent expectation that we were right. One was ordered and fitted and after that the sound came up. **R.A.**

### Sony Discman D55T

The complaint was that this player didn't work – the LCD didn't come on. We found that there was a 9V input to the d.c.-d.c. converter but there were no ±5V outputs. Pin 30 of the CXP-5024H-003Q system control chip IC801 is the power on/off control output to the d.c.-d.c. converter. It was permanently high. We checked IC801's supply and found that it was 9V instead of 5V. The cause was that the 2SA412 transistor Q412 had gone short-circuit. Replacing it restored the 5V supply to IC801 but there were still no results. We had to replace IC801 – presumably the 9V had killed it. **R.A.**

### Yamaha CDX810/910

If the reported fault is a "loud crunching sound over the signal" the usual cause is excessive voltage on the +5A power line. Changing zener diode D31 to a tighter-tolerance type so that the +5A regulator's output is less than 5V usually provides a cure, but Yamaha now advise that in addition to changing the zener diode L14 is changed from 60μH to 40μH (part no. VB817900). These players also suffer from a switch-on thump caused by movement of the screening material over the mains transformer. This can be cured by inserting a spacer to trap the screen between the transformer and the case. **K.H.C.P**

### Panasonic RX-DS30

This ghetto-blaster incorporates a CD player. The complaint was that the disc would speed up after about track eight or nine, but only if it had been played from the start. What the customer meant of course was that the machine skipped, giving the impression of playing too fast.

With a portable CD mechanism stability is obviously crucial. With this fault it would therefore be logical to direct attention to the mechanical components. Experience has shown me that there's a common problem with portable units. It can occur with non-portable machines, but is less common with them. The problem is poor playability at the outer tracks because of the greater tangential and tracking error possible due to the warping factor of the disc. In this case, as in many others, the cause of the trouble was misalignment of the optical unit's tangential or mechanical adjustment. I suspect that after an initial period of use the suspension components bed-in and the tangent shifts slightly – the fault usually occurs within the guarantee period. **N.B.**

### Technics SLP770

This elaborate machine was accused of skipping but didn't unless it was asked to play the error discs. A check was carried out on the setting up. This revealed a reluctant tracking servo due to a faulty laser unit. Replacement and realignment put matters right. **N.B.**

### Pioneer PD6050

The customer had had a few problems with this machine from new. Apparently it had been repaired on two or three occasions previously because of skipping and sticking, but as the problem was intermittent it hadn't been rectified. A check on the r.f. waveform showed that it was poor and that the alignment was all slightly off. Resetting this produced little improvement however. The famous PWY1003 laser unit was at fault, a replacement providing a terrific improvement. I was still not happy however as its traverse seemed to be erratic. This is common when a d.c. brush motor is worn. A new motor finally gave us excellent performance. **N.B.**

### Pioneer PDM500

This six-disc multiplayer was accused of skipping. Even the customer admitted that it didn't happen very often. Combined with the fact that it lived on a farm I thought that maybe dirty discs would have something to do with it. On test it played our badly scratched Fleetwood Mac and Belinda Carlisle discs faultlessly. The faithful check with the Technics "spotty" disc revealed very poor performance however. The tracking servo couldn't be set up to perform satisfactorily because the PWY1008 laser unit was faulty. **N.B.**

# CD Player Casebook

*Reports from Mike Leach, Nick Beer and Joe Cieszynski*

## Yamaha CDX-630E

This one came in with the usual CD symptom, skipping and jumping on the outside tracks. It played my Philips 5A test disc up to track 17 then jumped forward to track 19 or 20 and so on. Cleaning the lens made very little difference, though it did increase the peak-to-peak amplitude of the r.f. waveform. Setting up also made no difference to the fault symptom, so a new laser unit was ordered. When this was fitted and set up the machine played all discs normally. The original laser unit was a Sony K55-150A (see comments in the July Casebook). This time the replacement supplied was a K55-210A. It came without a modification sheet so I assume that it's a direct replacement. **M.L.**

## Sanyo CP667

The complaint with this machine was no sound. When I tried it there were all the symptoms of an upset microcomputer control chip (CPU). The drawer wouldn't open. If it was operated manually it immediately closed and the laser came on for just a couple of seconds but the focus search routine didn't take place. These symptoms were intermittent in that the drawer would occasionally open at switch on but when a disc was loaded the TOC would not be read.

I began by checking the reset pulse, then the CPU clock. These were o.k. The scope showed that data reached the CPU when the open/close button was depressed, but the control logic output to the loading motor didn't alter. Finally I checked the logic level at pin 24 of IC301 – this pin is connected to the sled position switch. The voltage at this pin proved to be high when, after the initial switch-on, it should be low. The cause of all this trouble was that the sled assembly didn't quite return to the centre of the disc, due to a tiny piece of solder that was wedged in a tooth in the gear mechanism.

The player now functioned – but with no sound. The front display indicated that the disc was playing correctly, i.e. the time elapsed was being clocked, and the player obeyed track skip commands without difficulty. That chap in the recent CD player servicing series suggested that if this is the case the stages beyond the decoder are suspect. So I moved to the DA converter's input. Data was present, but was clearly not correct. Over to the RAM, IC402. Scope checks on the address lines showed that address data was present, but when I came to check the eight data ports I found that data was missing from one of them – pin 11. The cause of the trouble was a dry-joint at this pin. It's a surface-mounted chip, and the leg was laying on a dry solder bed. Strange: the chap who wrote that series said that RAM faults are usually associated with "rushing water" sounds. Well, you can't win every time! **J.C.**

## Sony D50

Here's a word of warning for anyone who has to dismantle one of these personal CD players for the first time. Your initial step will be to remove the four screws that secure the cabinet bottom, and this is the correct thing to do. Next you'll probably remove the cabinet bottom itself. This might be where you make your big mistake. At the rear of the player, inside, there's a piece of flexible print that connects the two-axis device of the laser assembly to the main PCB. As you remove the cabinet bottom this piece of print can get snagged and tear. The sad news is that the print is not replaceable: the only cure is to fit an entire new laser assembly, at considerable expense.

The correct way of removing the case's bottom panel is to lift the front just slightly so that the lip clears the front panel, then gently slide the bottom back a little so that it doesn't snag the print. This method is not outlined clearly in the dismantling instructions given in the service manual.

If you have to remove the main PCB you must first unsolder the flexiprint from the board, otherwise it will certainly tear.

Many engineers have already come unstuck whilst handling these players. Here's an example. A telecom engineer brought me one of these machines. He said that it had worked all right but the control knob had become detached. He'd managed to dismantle the unit and fix the knob himself, but now it didn't seem to work at all. Cutting a long story short, the broken knob cost him over £100. **J.C.**

## Technics SL-PJ11

The complaint with this machine was of poor playability, notably sticking and skipping. The procedure I use with all the machines in this range is first to check which type of laser unit is fitted. There's a later type, the 6P, that employs a tracking offset compensation PCB. You can identify this unit by the presence of a "6P" sticker on the optical flexiprint connector and on the main PCB beside the mechanism. In this case the unit was of the 6P type. I next check the condition of the laser assembly's guide shafts and ensure correct lubrication. I also clean the laser unit's objective lens. In this case I replaced the shafts, which is a quick job. The result was a slight improvement. Next I check all the alignment, notably the tangential and PD balance as these can give a very good idea of the laser unit's condition.

When it was set up correctly the machine performed much better, but it was still not up to specification as the laser was worn. Indications of this had been present throughout the alignment process: the r.f. waveform was low and mucky, the PD balance had to be set at one end for optimum alignment, and so on. As the customer accepted our estimate for a new laser unit I found myself fitting one – on the anti-static bench of course!

When it had been fitted I found that the linear traverse motor banged from one end of its travel to the other at high speed. The "potention unit" was working correctly, a worthwhile check as sometimes the fine contact fins can be bent during laser unit replacement. In fact the new unit was faulty, another one producing smashing results when set up.

In my experience the procedure outlined above works well with this type of fault in Technics players. Alignment may seem to be an unnecessary procedure when experience tells you that the laser unit is usually the basic cause, but experience also enables you to carry it out in just a few minutes – especially when you use the superb servo

gain adjuster, which is a delight. The benefit of alignment is that you may be able to keep the unit going for a few weeks or months more, giving the customer time to decide what to do next. If not approached in the correct manner however this "basic" repair can cause headaches. **N.B.**

## Technics SLP – 222

This machine, like the SLP202 and the Panasonic SL-PJ24 and SL-PJ26 amongst others, uses the Philips radial arm mechanism interfaced with its own electronics. The result is very good. The only trouble I've had is that after a period of use the machine won't read the TOC or play. Its cause is that the radial arm physically sticks at the turntable end of its travel. This appears to be due to the rubber-type compound at this point becoming tacky when warm. When we first discovered this problem Panasonic was unaware of it. We gave their TLO a demonstration and the only suggestion he could make was to replace the laser assembly, a CMD4 drivative. Serial numbers of machines that subsequently exhibited this fault were sent to Panasonic and a small modification has now been introduced to overcome it. The part no. is RMQ0042. **N.B.**

## Technics SLP-110

These machines were very popular and are relatively reliable. This one had the usual Technics FF1 affliction of poor playability. I say usual because we see a lot of Technics machines, really they are amongst the most reliable on the market. The machine was carefully set up and there was certainly no need for a new laser unit. Another dealer appeared to have lubricated the guide shafts but had overdone it – oil was dripping all over the place. This was attended to.

An interesting point was the customer's complaint that the machine would play all discs normally, skipping aside, but that one disc in a Vivaldi pair would not spin or read the TOC. We found that the reason for this was incorrect turntable height – it was appreciably on the low side. Confirmation was provided by the fact that the player wouldn't play when on its end. This is not an essential feature but is quite normal when an engineer is setting the turntable height and tangential adjustments.

My own SLP-310 skipped a few seconds as I was writing this report. The cause turned out to be a bit of dust on the traverse guide shafts. **N.B.**

## Technics SLP-220

After going through the setting-up procedure with this machine acceptable performance was obtained though it needed a new laser unit to be perfect. I found that it was very sensitive to mechanical shock. As the customer had accepted the machine's condition and had agreed to pay for an hour's labour I resolved the problem by very slightly decreasing the tracking gain to compensate for the laser's performance. **N.B.**

# CD Player Casebook

*Reports from Mike Leach, Philip Blundell, AMIEIE, Mick Dutton and Nick Beer*

## Denon DCD1500 MK II

This very up-market Denon machine suffered from a laser problem. The focusing was intermittent, and occasionally the machine wouldn't read discs. So I replaced the laser assembly, which is a little tricky with these players. They have a linear motor, the laser assembly screwing on to the two motor coils on the left- and right-hand side. When changing a laser assembly you have to be careful in this respect: always unsolder the connections on the laser assembly's flexi PCB before loosening the screws. Yes, you're right, yours truly didn't do this and broke the very fine wires of the left-hand motor coil. These wires are far too thin to repair so a new coil had to be ordered. Well, at least I've owned up! The new coil and laser assembly restored normal operation. **M.L.**

## Sansui PC-V100

This Yamaha-based machine skipped and jumped right the way through the disc. The cause of the problem was the turntable motor which had a dead spot. This produced a glitch at each revolution of the disc, causing a slight error in the turntable speed. The error could be seen in the r.f. eye pattern, towards the right-band side of the waveform, where it appeared to shake from left to right at each revolution. It's possible to strip, clean and repair these motors, but this isn't advisable. The best course of action is to replace both the motor and the turntable.

The hole through the centre of the plastic turntable tends to become slightly enlarged when you remove the turntable from the motor. As a result the fitting is somewhat loose when it's placed back on the motor. That's why it's best to replace both items. Yamaha, and presumably Sansui, supply a jig for setting the correct turntable height. **M.L.**

## JVC XL-E300

This player would work for several minutes after which a click could be heard from the mechanism and it would revert to the stop mode. I knew that click: it's the sound that's produced by the laser unit when the focus is making hard work of it! Cleaning and setting up made no difference. Fitting an Optima 45 laser assembly restored normal operation. **M.L.**

## Pioneer Multiplay Machines

I agree with R.J. Wood of Pioneer (Letters, July) about changing lasers "on spec". I've done it myself when dealing with a really nasty fault and I'm sure that many other engineers have too. Here's a dodge that I've found to be invaluable on several occasions with Pioneer multiplay machines. The most recent case was with a PDZ-81M that wouldn't read discs. On inspection I could see that the disc spun very slowly and didn't reach the correct speed before the machine returned to the stop mode. On a previous occasion the laser had been at fault but quite often this symptom is due to a faulty turntable motor. How to tell which of these is the cause? Here's the dodge.

If the disc spins slowly, switch the machine off. Disconnect from the mains supply or you run the risk of touching the mains connections at the back of the machine. Disconnect both leads from the turntable motor. Next apply *no more* than 2·5V d.c. to the motor – I usually use a Philips KT4 backup battery. Let the motor spin for approximately ten seconds. Reconnect the motor and run up the machine. At this point you'll usually find that the player works normally. If so, change the turntable motor. If the player doesn't work normally you've probably got a fault elsewhere in the machine. But I've usually found that the turntable motor is the cause of this problem and that running the motor for a few seconds with an external supply can prove the point. **M.L.**

## Philips CD104

This machine wouldn't spin the disc for the TOC readout. The disc couldn't even be turned by hand! After stripping the turntable motor, cleaning and relubricating the shaft and bearings, the machine worked normally. For good measure I cleaned the laser lens and set up the laser current – recommended now that these machines are a few years old. I also resoldered the usual earth-through connections. After this the player was almost as good as new. **M.L.**

## Philips FCD762

There were unusual symptoms with this machine. It read the TOC all right and played discs, but it kept jumping tracks every few seconds, sometimes forwards and sometimes backwards. There was a lot of activity around the TDA5709 tracking chip when the fault occurred, but which was the cause and which the effect? When in play there was a burst of signal from pin 10 (DAC), which should operate only during skip or search. The TDA5709 was faulty. **P.B.**

## Pye CST428/35

This player had all the symptoms of a confused microcomputer chip. It tried to focus, the tray moved in and out, the turntable was rotating backwards and the display showed random characters. All this without a disc. Our first action was to check the supplies. We found that the 5V line was at 10V as regulator IC07 was short-circuit. Luckily no other damage had been done. **P.B.**

## Sony CPD35

I've had two cases recently of no sound output with these machines. There was an occasional burst of crackle on each channel and the disc rotated normally, with the correct time indication in the display. The cause in both cases was IC704. **M.D.**

## Sharp DX-150H

The complaint was simply failure to operate. When a disc was inserted the player didn't find the table of contents. We stripped the machine down and found that the laser wasn't on due to a no-laser-on signal from the

microcomputer chip. As there didn't seem to be an obvious reason for this we were about to order a replacement chip when we noticed that the laser assembly was positioned at approximately the centre of the disc: it hadn't moved to the inside as it should have done at switch on. On investigation we found that the slide motor had seized solid. After removing and freeing it the player worked. A replacement was fitted to prevent further problems. **M.D.**

## Pioneer PD-M500

This multiplayer required a new optical unit – the r.f. was low and mucky and couldn't be resolved by adjustment. A new PWY1009 type was fitted but we couldn't set it up and the r.f. level was extremely low at about 300mV. Laser power adjustment did little to improve it and the tangential adjustment been been optimised. The r.f. offset couldn't be reduced below 200mV. As work continued in the test mode the unit decided to stop focusing. The new optical unit was faulty, another replacement putting everything right. **N.B.**

## Pioneer PD-M6

This is one of the original multi-disc players. The complaint was that it didn't register that any discs were inserted and thus didn't play them. A focus problem naturally came to mind, but on test the unit performed faultlessly except for some skipping. Thoughts that the customer may have inserted the discs upside down (right way up, if you see what I mean) were discounted as he'd been using the player for about three years. A common cause of such intermittencies in all CD players is a break in the optical unit's flexi PCB. Sure enough when we flexed it the fault occurred. The skipping was due to an extremely worn traverse motor. We also replaced the belt, along with the optical unit. **N.B.**

# CD Player Casebook

*Reports from Mike Leach, Ian Bowden and Nick Beer*

## Technics SL-P110

A little experience can tell you when a laser unit is beginning to fail, as I thought it was in this machine. It would read the TOC quite quickly but when a track was selected the machine wouldn't play – it would shut down and go into the stop mode. The r.f. eye pattern was very low and noisy. So I began to suspect the laser unit – until I looked at it. The lens was filthy, covered in dust with a thick film of muck all over it. Cleaning the lens restored normal results – perfect in fact. Apart from cleaning and lubrication no other setting up was required. This brings me to another point.

We all know the state a VCR can get into when used in a dusty or dirty environment, and over the years we get to know the common faults that dust causes in various machines. CD players seem to be the same. I've found that Technics machines often need their lenses cleaning, and of course the mechanics associated with the movement of the laser assembly. Philips machines also often need a lens clean. On the other hand I've very rarely had to clean JVC or NAD lasers. Obviously the environment in which a machine is used plays an important part in determining its lifespan, but it seems that some makes suffer more than others from dust. How about some comments on this from other readers?

**M.L.**

## Technics SL-P202A

Skipping was the complaint with this machine, and we were surprised to find that the fault occurred straight away. With the top cover removed the reason could be seen. The whole sprung part of the mechanism was shaking laterally, with variable force, the result being that the radial arm jumped tracks. Investigation showed that the cause was a deep pit worn into the white plastic angled plate on which the ball bearing presses. This plate is clipped to the clamping arm. As the arm isn't part of the sprung mechanism, the bearing was presumably forcing the mechanism to move as it went into and out of the pit. We replaced the plastic plate and fitted an anti-sticking pad to the inner end of the radial arm slot as suggested by Technics. **I.B.**

## Pioneer PD4100

The reported fault was that this machine wouldn't play any discs. On a training course we'd heard about a fairly common problem that gives this symptom with these machines – it's also been reported in this magazine. So we loaded a disc. When the machine had read the TOC we selected play, expecting the machine not to. Much to our surprise it worked perfectly. We then left it on soak, but when we tried to restart the machine after it had played through the disc the fault appeared. The disc span up to what appeared to be the correct speed but there was no track display and no sound. A scope check on the r.f. waveform then showed that it was expanding and contracting. This reminded us of something else said on the course – "think PLL". We put the machine in the test mode and checked the VCO frequency, which was far too low. With the adjustment potentiometer at nearly fully clockwise the VCO would reach the correct 4.275MHz and the machine would then play. Just a quick squirt of freezer on IC2 (CX1082AS) which contains the VCO increased the frequency greatly. A new CX1082AS chip put matters right. **I.B.**

## Pioneer PDM500

This machine had been in a couple of weeks previously with the complaint that while it would load discs it would then eject one and go on to the next until all six had been ejected. It wouldn't read any of them. When we tested the unit it performed without fault. Flexing the laser unit's flexi-PCB didn't provoke the problem, neither did gentle heating and tapping of the laser unit itself. Since the fault failed to appear we left the machine on soak test. A few days later it was collected.

After a few days it returned with the same complaint and this time the fault did occur. The machine would load a disc, achieve FOK and the disc would spin up. But focus was then lost and you could hear the lens tap rather loudly against the disc which was then ejected. The machine ran all right when sequenced through in the test mode, which rather threw some of the theories being put forward in the workshop. A look at the error waveforms and the r.f. however convinced me that the laser unit was a fault, which proved to be the case. The disc motor was also worn but this was not, as is sometimes the case with these symptoms, the cause of the fault. **N.B.**

## Technics SL-P250

These machines use a mechanism with one guide shaft and one roller. In our experience it has proved to be very reliable. This particular machine was reported to be skipping, but when we tested it the drawer wouldn't close – if closed manually it would open. The machine was very dirty, as were the enclosed discs which were also damaged. This made it necessary to replace the roller, guide shaft and laser unit, which had been affected by the very fine dust. When we'd done all this we investigated the drawer problem. A clue was given by the fact that the laser would come on and the lens would try to focus when the drawer was open. Investigation showed that the drawer-in switch was permanently short-circuit due to a whisker in the relevant connector to the main PCB. **N.B.**

## Pioneer PDM500

This system control fault could have occurred with many types of equipment, not just a CD player. When reverse search (not skip) was selected it worked but several erroneous display symbols were illuminated. In this circuit the display and key-scan lines are commoned and a quick look at the circuit diagram suggested that if eject and disc-1 were selected a similar effect would occur. It did. The obvious cause was D209 on the relevant line. We found that it had a 17·5Ω leak both ways. This illustrates the importance of checking the symptoms and "commoned possibilities" carefully when dealing with syscon faults. One could easily have accused the system control microcomputer chip as it drives both the keyboard and the display **N.B.**

# CD Player Casebook

*Reports from Mike Leach and Philip Blundell, AMIEIE*

## Sony CDP-M20S

The problem with this machine was very distorted sound on both channels. On test I found that the distortion seemed to vary with the intensity of the music being played. As a first step the supplies were checked and found to be o.k. But it was getting late and I'd had a bad day – you know, phone ringing all the time, is this done, is that done, have you done Mrs Clatworth's handset and so on? So without further ado I ordered an LC3516AML-15 RAM chip as this device gives a certain amount of trouble (see *Television* March 1990, page 386, for example). It was fitted as soon as it arrived and cured the fault. Note that there can be different fault symptoms when this chip fails, i.e. no sound at all or very distorted sound. A faulty LC3516AML-15 normally affects both channels rather than one channel only. **M.L.**

## Marantz CD65 II

No turntable motor drive was traced to an open-circuit 10Ω resistor on the main panel. To get at it you have to remove the deck assembly and the main panel – a complete strip down in fact. I've had this type of resistor go before for no apparent reason. **M.L.**

## Rotel RCD820BX

This one caused me a bit of head scratching. It came in with the complaint "won't play disc" – a disc had been sent with it. I tried our test discs and the machine worked all right. I then tried other discs that don't work with certain players but again the machine was o.k. When the customer's disc was tried it went in, the TOC was read and 66 came up on the display. When play was pressed 34 came up on the display then the machine ground to a halt and just looked at me. Perhaps the disc was faulty? It played all right when tried in a Denon machine, which rather disappointed us! I should perhaps mention here that this Rotel player is very similar to the Philips CD160, the only real difference between the two being the power supply.

The customer's disc was all classical music. It was relatively long, with 31 tracks lasting in total for 66 minutes and 34 seconds. I inspected the disc only to find that there wasn't even a fingermark on it. There was a CD160 in the rack awaiting a new LCD display, so I decided to try using it to play the disc. Everything worked perfectly. Oh! With the disc back in the Rotel player 66 came up at TOC, 34 at play then stop.

I thought about this for a minute and tried to work out what was happening. Basically the TOC information wasn't being read correctly or was becoming jumbled so that the machine got confused. The player switched off because it was being told to play track 34 when the play key was pressed though there were only 31 tracks on the disc. The laser would scan the disc and as it couldn't find track 34 the machine would switch off.

A new CDM (laser plus servo) unit was tried but this made no difference. I then noticed one other difference between the Rotel machine and the CD160 – in the Rotel player the decoder microcomputer chip is an MAB8441-T078 while in the CD160 it's an MAB8441-T082. When these chips were swapped over the fault showed up in the CD160. I breathed a sigh of relief and made a note to order a new chip.

The Philips CD160 service manual actually lists the "T078" chip in the parts list. It would be interesting to know if Philips had encountered the problem and updated the chip to cope with more information. Incidentally the disc that caused the problem is called *Piano Works by Poulenc*, Decca 417-438-2 – I think I'll buy one and use it as a test disc! **M.L.**

## Toshiba XR-Z70

The customer's complaint was that this player wouldn't eject the disc. I removed it by turning the tray motor by hand. When I switched on the sled motor tried to drive the sled off the end of its travel – investigation showed that the limit switch was dirty. Cleaning the switch was all that was required. **P.B.**

## Philips CD582

The complaint with this machine was "whistles". The disc played and the time was displayed but we had silence from one channel and only a constant tone from the other channel. Use of the scope enabled us to trace the tone back to the DAC chip, but prior to this it was difficult to know whether the data was correct or not. We then found that there was sometimes no sound from either channel when the machine was tried. In this state you could see that the data from the decoder to the filter had changed. A new SAA7210 decoder chip restored correct operation. **P.B.**

## Philips CD150

This machine had been to another dealer who'd fitted a new RAFOC unit. It didn't read the TOC though the focusing and disc speed seemed to be o.k. I checked the radial arm for free movement and found that it seemed to be stiff at the start of its travel. What had happened was that the flexiprint had been stuck down with Sellotape which had lifted, fouling the arm. When I'd removed the tape and glue I repositioned the plastic clip so that the flexiprint was out of the way of the arm – what should have been done in the first place. **P.B.**

## Philips Module 07660

There was no play and no TOC reading. The disc rotated but there was no output from the laser. When I dismantled the player a paper clip that had been wedged between the PCB and the plastic frame fell out! Oh no! What damage had it done? Voltage checks on the laser supply transistor 6527 showed that it was open-circuit base-to-emitter. A replacement was fitted and the laser current was checked. Fortunately nothing else was required. **P.B.**

# CD Player Casebook

*Reports from Mike Leach, Philip Blundell, AMIEIE, S. DaCosta and Brian Storm*

## Toshiba SL3258 Midi System

No CD sound was the complaint with this Toshiba midi system. Just the odd thump and bang could be heard from the loudspeakers. A quick glance at the circuit diagram told me that a CXK5816M RAM chip is used in the CD decoder. As mentioned before, failure of this chip is a common complaint with various CD players. Access to the CD electronics in this model is difficult to say the least. The electronics for the whole system are on a single PCB. It appears that the only way to fault find on the CD section is to remove everything from the cabinet, including the mains transformer and CD mechanism, and spread it all out on the bench. This done I replaced the RAM chip (circuit reference Q707) and, as with all machines that are difficult to work on, this failed to provide a cure. I was convinced of being in the right area however. There's very little other than the DA converter chip Q801 or the decoder chip Q706 that could cause such a fault symptom. As it's the easier one to replace, I changed the DAC chip first. This didn't provide a cure either. Checks around the CXD1135Q decoder chip produced faint music when the data lines to and from the RAM chip were scoped and also when the output pins to the DAC chip were touched. It's not an easy chip to change by any means, but a replacement cured the fault. The Pyropen came in very handy here, but it took me as long to put the machine back together again as it did to replace the chip. **M.L.**

## Rotel RCD855

The fault symptom with this player was skipping and jumping on the first few tracks of a disc. A knocking noise could be heard from the CD mechanism when the fault occurred. Slight pressure applied to the disc clamp with the forefinger enabled the vibration of the knocking to be felt. When further pressure was applied the fault disappeared and the machine worked perfectly. A new clamp assembly restored normal operation. **M.L.**

## Philips CD160

Here's an unusual one! This machine read the table of contents all right and found the track, but it wouldn't play and the time display didn't appear. I suspected the M4804 decoder chip but it's no longer available, so I contacted the nice man at Philips. He said an SAA7210 could be used provided other components were changed, but suggested replacing the MAB8441 microcomputer chip first. He was right. Thanks R.N. **P.B.**

## Sony CDP-M35

The display said "no disc" when one was inserted. The disc didn't rotate and the lens didn't focus. We found that the connector between the laser assembly and the main PCB was only half pushed in. This has been the case with a number of players of different makes.

With another of these machines the tray opened and the sled motor moved to the outer position when power was applied. A new LA8550 sled/tray drive chip was required. **S.DaC.**

## Sony D100

This player was dead. A replacement Wickman fuse, F25X, was all that was required. **S.DaC.**

## Technics SLP500

This machine skipped and jumped from track 1 to track 6 when first taken from the box and tried. Beyond track 6 it worked all right. A new laser unit was required. **S.DaC.**

## Technics SLP550

We've had a few of these machines with complaints about intermittent sticking or skipping. The SLP550, along with its close relatives the SLP770 and SLP990, usually benefits from the following attention. First, clean the laser lens and the turntable. Then remove, clean and polish the two guide shafts. If there are any fine scratches on the shafts – this usually happens only with dusty units – replace them (part no. SUXD78-1). When they have been cleaned and reinstalled, lubricate them lightly with SZZOL32 grease. Finally, check the mechanical adjustments (first) then the electrical adjustments. **B.S.**

## Technics SLXP1 and SLXP2

We've had some of these portable CD players in with the 6·8Ω, 1W surface-mounted resistor R31 in varying states of distress. In one case the condition was so bad that a small

# CD Player Casebook

**Reports from Mike Leach and P.J. Roberts**

### JVC XLE34

This machine took us a while to sort out. It came in with the complaint of occasional skipping and jumping and not finding tracks properly. But it wouldn't show us these faults. It seemed to play all our discs all right despite a lengthy soak test. At a third attempt at giving it a soak test however we found that it wouldn't read some discs. Sometimes the turntable would spin but the machine didn't read the disc. As cleaning and setting up made no difference we came to the conclusion that the laser unit was faulty. A new Optima-5S was obtained from JVC and fitted. When set up the machine worked perfectly. **M.L.**

### Sony CDP-M35

It's all lasers this month! I wasn't too sure about this Sony player until after it had been returned to the customer and given a thorough soak test at his home. The complaint was of the usual skipping and jumping, but in the workshop the machine played our discs with no problems. As we know by now, faults like this can be a real problem. Setting up and cleaning made no difference in terms of the r.f. waveform. We wondered whether the laser had just been dirty and would now be o.k. It wasn't. After fitting a replacement and setting the machine up it worked perfectly. **M.L.**

### Grundig CD9000

The complaint was that the display didn't light up. Checks showed that the a.c. filament voltage and the supply to the driver chip were present, but the −4V that should have been present at pin 4 of this chip was missing. The voltage is derived from the −24·6V rail via transistor T2 and the 68kΩ resistor R205 which is connected between pins 4 and 5 of the chip. R205 had risen in value. A replacement resistor of the correct value restored the −4V and normal operation of the display. **P.J.R.**

# CD Player Casebook

*Reports from Mike Leach, P.J. Roberts and Nick Beer*

### Philips CD160

These machines occasionally suffer from poor or no loading drive. This particular machine would open the tray but would then refuse to close it. Usually the cause of the fault is the loading motor drive transistors, which often get very hot and have a tendency to burn up. They are mounted on the front panel and should be replaced with similar types. The circuit reference numbers are 6059, 6055 and 6056, all type BC328-40, and 6057/8, both type BC338-18. The Philips part numbers are 4822 130 41715 for the BC328-40, and 4822 130 40892 for the BC338-16. **M.L.**

### Sony CDP-M20S

This player is part of a midi system and is powered by a separate 15V a.c. supply from the amplifier unit. The fault symptom was interesting and, luckily, its cause was easy to find. No play was the complaint. When a disc was inserted the machine seemed to focus on it all right and the TOC was read, with indication in the display. Immediately after the total track and playing time appeared however a zero came up in the display: after that there was nothing apart from the zero. When I pressed play the machine tried to find track one but gave up after a few seconds, then the disc stopped spinning. Exactly the same symptoms were present when another disc was tried.

When I removed the bottom cover I noticed that two areas of the machine suffered badly from dry-joints. Most noticeable were the areas around the a.c. supply socket and the STA341M tracking drive chip IC6. A good solder-up in these two areas provided a cure, the machine working very well afterwards. I've looked at a couple of similar machines since that first one. Both showed signs of drying up in the same two areas. One to watch out for.

**M.L.**

### Philips FCD562

The report stated that this machine didn't work properly. When a disc was inserted, the machine would go into play. If stop was pressed after several minutes' the music would stop but the disc would continue to rotate. Furthermore open/close had no effect and the machine wouldn't open its tray. The player would work normally again for several minutes after interrupting the mains supply. The cause of the trouble was the MAB8441-T014 control/display chip on the front panel. Various component suppliers provide an MAB8441-T018 as a replacement: no modifications are required. **M.L.**

### Sony CDP-M35

The complaints were of skipping and taking a time to find tracks. Also the drawer would come back out after a disc had been loaded and there had been failure to read the TOC. The first item we replaced was the loading belt, which was worn. This belt operates the drawer drive mechanism and also the mechanism that lifts up the CDM to clamp the disc. The new belt cured the intermittent failure to read the TOC, but the unit still skipped and took a long time to find tracks. We tried a full alignment, but this didn't provide a cure. We eventually found that the tracking-coil driver transistors Q603 (2SC3666) and Q604 (2SA1426) and the focus coil driver transistors Q607 (2SC3666) and Q608 (2SA1426) were faulty. The 2SC3666 can be replaced with a BC639 while the 2SA1426 can be replaced with a BC640.

After replacing these transistors it's necessary to carry out both the focus bias (offset) and E-F balance adjustments. The machine should then be up to specification and should play the test disc. If it doesn't, the laser assembly is suspect. The drawer belt part number is 3-653-387-00. **P.J.R.**

### Pioneer PDM40

This six-disc multiplayer wouldn't read any of the discs – not even the TOC. On closer examination, guess what? Yes, the spindle motor was at fault. Normal operation was restored after fitting a new motor. The part number is PEA1028. Don't use a PYY1109, because the motor spindle is too short. Also make sure that you use a PD-M40 turntable height gauge, not the one for the PD-Z81M etc. **P.J.R.**

### Denon DCD660

This brand new player came from the shop with the complaint that it wouldn't read the TOC and hence wouldn't play. The laser focused and the disc rotated, but as tracking lock wasn't achieved the disc soon stopped again. The cause of the trouble was that connector CB101 hadn't been pushed fully home. **N.B.**

### Technics SLXP7

These early portable players are well built. This one was accused of cutting out at random whilst playing. We found that squeezing the lid down would produce the fault. The cause was the door/LD on switch. We also had to clean the copper hook on the door. One common fault with these players was also in evidence – intermittent failure to start to play due to a high-resistance traverse rest switch. Neither part is difficult to replace. **N.B.**

## MATTERS ARISING

**Correction:** The l.t. rectifier diode on the live side of the circuit was omitted in Fig. 1, page 276 last month. Its anode goes to the transformer winding and its cathode to the positive side of the reservoir electrolytic.

**February cover:** We should have mentioned that the free signal diodes were type 1N4148.

**Satellite TV receiver project (December/January issues):** Several readers have experienced difficulty in obtaining the sound demodulator chip IC7. The correct type number is XR215CN. It can be obtained in one-off quantity, cash with order, from Sabre Advanced Micro, Mead House, Suit 4, London Road, Bentley, Farnham, Surrey. Telephone 0420 22 004, fax 0420 22 008. Phone for latest price and delivery details before ordering.

# CD Player Casebook

*Reports from Mike Leach and P.J. Roberts, G1VUV*

## Rotel RCD865

This player uses the later type of Philips laser assembly, similar to that employed in the Philips CD371. The reported fault was very poor sound from cold and very bad background crackling. We found that the sound returned to normal, with no crackling, when the machine had been on for approximately five minutes. Once the sound had returned, no amount of provocation would make it go away again. So fault finding was limited to only a few minutes at a time. As this few minutes wasn't long enough I gave in and spoke to Rotel about the matter. An extremely helpful chap advised me to check the state of the printed circuit under the PDM board, where the connections from the main board are soldered on to the PDM board. I was surprised to find several pieces of very fine print all cracked around the plug connections, as described on the phone. After carefully repairing all the print and resoldering the PDM board back into place we soak tested the machine for several days. All was well. Thank you Rotel, you saved us a great deal of time. **M.L.**

## Sharp DX450EM

The complaint with this machine was no results. One of the power supply fuses, F202 (500mAT), had blown. When I replaced it and switched on the machine read the TOC all right but when play was pressed nothing happened. This was due to the fact that the sled motor had jammed, so the laser wasn't able to move towards track one. I gave the top bearing a very small drop of thin oil. This released the bearings and the laser was now able to move across the disc. Track one played o.k., but when I selected say track five or six the sled started to move and the fuse blew again. The motor had to be replaced. When I'd done this the machine still blew the fuse when the sled started to move, but this time it was because I'd used a 400mA instead of a 500mA fuse. The new motor and a correctly rated fuse cured the problem and the machine once again produced good results. **M.L.**

## Philips CD104

No sound was the problem with this machine. It read the TOC all right and would go into the play mode, but there was no output. Checks showed that the supply lines were all o.k., and the earth feed-through connections had all been resoldered on a previous occasion. When I applied a small amount of freezer to the SAA7000 interpolator chip IC6514 normal sound was restored. A new chip put matters right. **M.L.**

## Sony CDP-M35

This machine came in with the two circuit protectors PS901 and PS902 open-circuit. After replacing them and switching on they again blew. A look at the circuit diagram showed that these protectors are in the +12 and −13 supplies to the various motor drive circuits. Cold checks then showed that there was a short-circuit in the sled motor drive circuit. I removed the two transistors, Q605 (2SC3666) and Q606 (2SA1426), then replaced the circuit protectors (type N15) and switched on. As expected the machine powered up and read the TOC. Obviously it wouldn't play because there was no sled drive, but I'd proved the point. Fitting new transistors restored normal operation. After completing the electrical repair I checked the mechanics thoroughly in case an obstruction in the sled mechanism could have caused the motor to stall, damaging the transistors. As all was well here and the motor itself appeared to be o.k. the machine was returned to the customer. **M.L.**

## Pioneer XRP500

The ticket attached to this midi system said "no CD". It didn't read the TOC with any disc. In fact it was obvious when listening to the machine that the turntable motor was struggling to achieve the correct speed. I was surprised by this as it's a much later model than the Pioneer range that's now giving turntable motor problems, but after stripping the CD mechanism down I saw that the motor is of a similar type to that used in earlier machines. Fitting a new motor, part number PYY1109, once again produced good results. **M.L.**

## Rotel RCD865

Intermittent output from the left-hand channel was the complaint with this machine. It had apparently given trouble for some time. When the fault was present there was no sound whatsoever from the left-hand channel. The cause of the problem turned out to be poor connections to the audio leads on the right-hand side of the PDM board. The cure is to remove the audio plug from the board and hard wire it. I understand that this is becoming a common fault with these machines. **M.L.**

## Pioneer PD5010

This player would sometimes fail to read the TOC: when it finally did and started to play it would skip. As you will probably know by now, there's at present a high failure rate with spindle motors (PYY1109) in Pioneer players. This player uses a different type however and I didn't suspect it. What I did suspect at this stage was the little brown plastic bearing on the clamper holder (receptacle). On inspecting this I found that a large pit had worn away at the centre, applying friction to the disc clamper and thus preventing smooth rotation of the disc. With a new receptacle (part number VNL268), lubricated and fitted in the clamper holder, normal operation was restored – the machine played the test disc with no difficulty. **P.J.R.**

## Philips CD150

This player was included as part of a midi system (FCD565/35). The symptom was no sound from the left-hand channel. Scope checks showed that the signals in both channels were present at the output from the DACs, also at pin 2 of the LM833N chips 6308 and 6309. But there was no output at pins 1 and 7 of IC6308. I then noticed that R3362 (100Ω) had burnt up and, with the power off, a cold check showed that there was a short-circuit at pin 4 of IC6308. Another cold check was made after removing the chip. As the short-circuit was still present the chip was cleared of suspicion. On tracing back we found that C2382 (47μF) was short-circuit. **P.J.R.**

## Pioneer PDM700

The original fault symptoms – failure to read discs, not even the TOC, with the disc not reaching full speed (approximately 500 r.p.m.) – were indicative of a faulty spindle motor. But the customer had taken the top off to

# CD Player Casebook

*Reports from Mike Leach, Brian Storm and P.J. Roberts*

## Akai CDM300

This machine looked very Akai from the outside but when it was opened I saw a Philips laser assembly and chips. It didn't use a Philips PCB however: this item was obviously all Akai designed. Anyway, the complaint was that after a short while the sound would deteriorate, slowly becoming very distorted. The customer said that it sounded like white noise. On test the machine worked all right for at least an hour. I was able to instigate the fault by using the trusty hairdryer. It was brought on when a short burst of heat was directed at a TDA1541 DAC chip. Fitting a replacement produced good results even when the player was thoroughly warm. **M.L.**

## Dennon DCD960

Skipping and jumping was the reported fault with this fairly new machine. We found that it played all right for the first twenty minutes. When a fresh disc was inserted it read the TOC, played the first minute of the track then started to skip very badly. After that it wouldn't read any other discs. When a disc was inserted all that would happen would be that the disc rotated and the laser would chirp. It would carry on like this indefinitely. I dived in suspecting, too soon, a faulty laser – I tried one from a similar machine without looking to see what was really happening. The fault remained the same of course.

When the fault was present you could see, with the door open, that the laser didn't return to the centre of the disc to read the TOC. After much hassle I discovered that the cause of the trouble was the helical gear that drives the laser assembly. This gear receives its drive from beneath the chassis, protruding through the chassis to drive the laser unit. After removing the gear then cleaning and regreasing it the player worked perfectly. **M.L.**

## Technics SLP222A

The disc would spin then the machine would lapse into a sullen state, clunking and doing nothing else. Watching the eye waveform appear and disappear wasn't much help, so a new Philips laser assembly (part no. 4822 691 30209) was fitted. It was completely dead. The next one I fitted read the disc but failed to play past track two on any disc. The third replacement set up and played beautifully. Just as well as the spares storage drawer was now empty! **B.S.**

## Technics SLP222AK

Intermittent skipping was the complaint with this unit. Sure enough on test it played all right for a short time then developed a slight hiccup every few minutes. Unusually, the symptom was more in evidence at the start of the disc. In my experience a tendency to skip at the start of a disc is generally an indication of trouble with the turntable motor.

This model uses a Philips radial laser unit (type CDM4) which is quick and easy to change – the motor and the radial pickup are incorporated in one block. When a replacement had been fitted the fault was still present and we found that there was no interruption to the motor drive voltage when the hiccups occurred. So attention was turned to the clamp bearing. We had no further trouble after replacing the small plastic end bearing, part no. 4822 4669 2257. **B.S.**

## Akai CDM512

The customer brought in this player and explained that though he had bought it about a year ago he'd never tried to use it until now. Unfortunately it didn't work. On examining the unit we found that everything seemed to be o.k. physically but, as the customer said, it didn't function – it wouldn't even read the TOC. A look at the manual revealed that the player has a test mode. Good! There are some mistakes in the manual however, so I suggest that you follow the test-mode instructions below:

To engage the test mode, start with the player switched off. Short-circuit J304 (marked test), turn on the power, count to three then remove the short-circuit across J304. The display should now show "0 TEST". In this condition the laser and all the servos are off.

Press play/pause to engage test mode one. The display should show "1 TEST". The laser should be lit and all the servos off.

Press play/pause a second time to engage test mode two. The display should show "2 TEST". The laser should be lit, the focus servo should be on and the spindle and tracking motors off.

Press play/pause again for test mode 3. The display should show "3 TEST". The spindle servo should now be operative, with only the tracking servo off.

A fourth press on play/pause should bring up "4 TEST" on the display, with all the servos on and locked and sound available at the audio output sockets.

A further press on play/pause should reset to test mode zero.

I engaged the test mode and ran through the above sequence. This proved that the player could focus on the disc. But in mode three the disc ran away, so it seemed that there was something wrong with the spindle servo operation. I decided to check whether there was any r.f. output (eye pattern) from pin 4 of IC001. When the scope's probe was connected to this point only a very low-amplitude, noisy signal was displayed. From this I deduced that the preamplifier marked HF inside IC001 was faulty – since focus was found the pickup and the two input preamplifiers at pins 5 and 6 of IC00l were o.k. So a new CXA20109 chip was fitted (part no. EI-3961233). The focus, tracking offset and E-F balance adjustments were then carried out. After doing all this the player worked, playing the test disc with no difficulty. **P.J.R.**

# CD Player Casebook

*Reports from Mike Leach, P.J. Roberts and Nick Beer*

## Philips CD303

We've had a plague of dry-joint problems recently. An example was this CD303. It uses the early type of light-pen laser which has been very reliable over the years. The symptoms were very distorted sound on both channels while the display would flicker very badly and sometimes go out completely. The trouble seemed to arise only when the machine was warm. Its cause was dry-joints around the regulators in the power supply – in fact all the regulators looked as if they needed soldering. Also one of the smoothing electrolytics (1,500μF, 35V) looked distressed and in need of being changed. When this work had been completed the player worked perfectly during a couple of hours' soak test. **M.L.**

## Sanyo DCDJ1

This midi system produced similar results to the Philips machine. It would start to play all right, then the display would go out and the whole CD player section would shut down. The cause was dry-joints on regulator IC115 on the bottom board of the system. Other areas of the board also required attention, so this could be one to watch out for. **M.L.**

## Sharp DXR750E

The fault with this machine was failure to read any discs, not even the TOC. Focus was found and the disc rotated but the tracking servo wouldn't lock. When I dismantled the machine I found that the pick-up was half way along the sled rails and wouldn't return to the inner part of the disc. This was due to the sled motor having seized as the lubricant in the bearings had hardened with age. Although you can lubricate the motor's bearings with light oil I don't recommend doing this. It's better to replace the motor (part no. RMOTV0334AF00). After fitting a new motor and sled belt the machine operated normally, playing the test disc perfectly. **P.J.R.**

## Ferguson CD07/8

The player would accept a disc, read the TOC and commence to play any section of the track selected, but after about two-three minutes the tracking servo would go open, resulting in loss of sound. We also found that the r.f. signal (eye pattern) at the test point (BH01 Mk 1, BB05 Mk 2) became progressively noisy during the ten-fifteen seconds before the sound cut out. The cause was traced to a faulty sled motor. We removed it, connected it to a 1.5V cell and, with the spindle gripped between the thumb and forefinger, found that it would stop in one place, indicating that there was a dead spot on the commutator. A new motor (part no. 00X6644116) restored normal operation.

Note that there are two versions of this machine. They are easy to recognise: the Mk 1 has a latching on/off switch while the Mk 2 doesn't. The PCBs are different and so are the mechanics. But the sled motors are the same in both machines. **P.J.R.**

## Sansui SAP990

The fault with this portable radio/cassette/CD player was that the CD section would skip and sometimes fail to read the disc at all. I've found that with some KSS150 type pick-ups the plastic moulding is tight to the mechanism (opposite side of the pick-up with respect to the slide bar). To cure this, file a small amount of material from the lower part of this moulding and relubricate before reassembling.

Carrying out this modification freed the mechanism but the unit would still intermittently fail to read the disc. Studying the machine's operation I noticed that focusing was intermittent. The cause was traced to a break in the lead that supplies the focus coil. A replacement lead completed the service. **P.J.R.**

## Pioneer PDX303

The symptoms with this machine were a scraping noise whilst playing a disc and intermittent skipping. The cause was traced to the four rubber mountings at the base of the CD mechanism. They had perished, but in doing so some had become hard while the others had gone soft. The net result was that the CD mechanism sat at an angle, and in consequence the disc scraped on the drawer.

When you look at the rubbers you'll see that one of them is different. When replacing them the odd one out must be fitted at the rear right of the CD mechanism, looking from the front of the player. Part numbers are as follows: float rubber F, PEB320; float rubber R, PEB321 – this is the one that goes at the rear right.

With new rubber mountings fitted the player worked to specification and played the test disc without trouble. **P.J.R.**

## Toshiba SK3461

The CD player section of this all-in-one hi-fi ensemble had an exceptionally intermittent fault. It would work perfectly for weeks but would then cut out when running or fail to work correctly from cold, the symptoms being distorted then no sound and finally no display or disc rotation. The cause of the trouble was loss of master clock oscillation due to dry-joints at the 8.4672MHz crystal XTL801. Even though the crystal moved freely in its dry solder I couldn't instigate the fault in this way. Resoldering provided a cure. **N.B.**

# CD Player Casebook

*Reports from Mike Leach and P.J. Roberts*

## Denon DCD910

This player suffered from the all too common fault of skipping and jumping. In the past I've had one or two problems with the worm gear sticking in these machines, but in this case the laser assembly was the cause of the fault. It's the Sony KSS150A type, which was replaced by the KSS210A. The laser unit in these machines is nice and easy to change, not requiring a complete strip down. Just take off the bottom cover and move the plastic bar that holds the gear in place to one side: the laser unit will then come out from the top. Reverse this procedure when fitting the replacement. **M.L.**

## JVC XLE3

This machine was fitted with a new laser unit as it wouldn't read the TOC. The manual said it was fitted with an Optima 2 but the ticket inside the machine said Optima 3. Anyway we fitted an Optima 2 and all seemed to be o.k. Then the trouble started.

First the machine came back with the complaint of skipping and jumping. As we couldn't find anything wrong we set it up and it seemed to be o.k. Three weeks later it came back again because of no sound, but no one told me that this was the same machine that had had the new laser unit fitted and was still under guarantee. We found that the cause of this new fault was the YM3815 digital decoder chip, so the machine was sent back to the customer as an uneconomical repair. Suffice it to say that the machine reappeared along with its rather unhappy owner. Apologies were made and a new YM3815 chip was fitted.

Hopefully the customer is now happy, but the story does highlight one of the problems we face in this trade. If your garage fits a new clutch and three weeks later the battery goes flat you buy a new one and have done with it. It's not as straightforward in the consumer electronics field: how do you try to explain to a customer who has just spent a lot of money on an item such as a laser unit that the player now wants say another forty pounds being spent on it within the repair guarantee period? It's not an easy one. I think it's best just to put such things down to experience. **M.L.**

## Philips CD371

This player wouldn't spin the disc or read the TOC. On further investigation I found that in addition the laser didn't light. A quick check on the supply lines established that all was in order here. I didn't suspect the laser at this stage and decided to look around the a.p.c. circuit. If you look at the circuit diagram you'll see that the laser is supplied from the 9V rail via R3532, transistor 6527 and R3533. Time for the meter again. A check around this circuit showed that transistor 6527 had 9V at its collector, so R3532 was o.k. Its base was at 0V however, so either R3530 was open-circuit or C2546 was short-circuit. Cold checks with the power disconnected showed that C2546 was indeed short-circuit. With a new 10µF capacitor installed the player found focus, read the TOC and played the test disc without difficulty. **P.J.R.**

## Jamo DS50

This CD multiplayer/tuner/amplifier certainly gave me a run for my money. It all started with a simple CD player fault. The unit wouldn't read the TOC or play, nor would the disc spin up. On dismantling the unit I found that, due to hard grease on the sled worm gear, the pick-up was stuck half way along the slide rails. The worm gear was cleaned but the pick-up still refused to move. The trouble was that the sled motor driver transistors Q104 (2SB892S) and Q105 (2SD1207S) both had collector-emitter leakage and had destroyed their 2.2Ω feed resistors R147/8. They had probably been damaged by the jammed pick-up.

With new transistors and resistors installed the pick-up returned to its rest position, the lens moved and the laser lit. But focus wasn't found when a disc was loaded, so the disc wouldn't spin up. This time the cause of the trouble was the CXA1081M r.f. preamplifier chip. This was replaced and the focus offset adjustment was carried out. A disc was then loaded and play was selected. Focus was found and the disc spun up, but the tracking servo didn't lock.

At this point I noticed a couple of other burnt 2.2Ω resistors, R142/3. These are the feed resistors for the tracking driver transistors Q108 (2SB892S) and Q109 (2SD1207S) which were also leaky. The pick-up's tracking coil was checked and found to be o.k., so replacement transistors and resistors were installed. The E-F balance was adjusted and the focus offset and PLL adjustments were checked.

After all this I wondered whether anything else would be wrong. Taking my heart in my hand I loaded a disc and pressed play. Focus was found, the disc spun up, the tracking servo locked and sound came from the speakers. Also the test disc played all right. I reassembled the player and gave it a short soak test before returning to the customer. **P.J.R.**

# CD Player Casebook

*Reports from Mike Leach, P.J. Roberts and Philip Blundell, AMIEIE*

## Crown CDK2300

Should you come across one of these midi systems that's suffering from possible laser trouble it's worth carrying out a few initial checks. The cause could be a poor printed circuit or dry-joints on the main board. I've had cases recently where the cause of skipping or failure to read a disc has been due to dry-joints around the two regulator transistors. A good solder up and some print tidying cured the problem. **M.L.**

## Sharp WQCD15

Failure to read the TOC was the symptom with this player. The disc would spin backwards very fast and not shut down – we had to disconnect the power supply to remove the disc without damaging it. After stripping the player down (the usual pain – leads not long enough etc.) I found that the safety resistors R835 and R836 in the plus and minus 9V supplies to the focus and tracking driver transistors were open-circuit. I replaced them and carried out a good solder up in the power supply. The player then performed normally. When it was tried the following day however nothing happened – there was no display and no TOC reading. Checks in the power supply produced some rather abnormal results then, suddenly, the machine sprang to life and worked all right. The d.c.-d.c. converter in the power supply was suspected and after further checks replaced. There were no further problems after doing this. **M.L.**

## Pioneer PDM70

This player wouldn't read discs, not even the TOC. As you probably know the spindle motor is a common cause of this problem, but not with the type used in this machine. After checking the power supplies and finding everything in order I engaged the test mode and ran through the test sequence. When track forward was pressed disc one was loaded but focus wasn't found. After removing the pick-up I found that the objective lens was badly soiled – to the extent that I couldn't see any laser light when I pressed the track forward key, though the lens moved up and down (note that the pick-up must be held lens down).

I cleaned the lens and refitted the pickup. When track forward was pressed disc one loaded, focus was found, the tracking servo closed and sound was present at the phono sockets. But the machine wouldn't play tracks 8 and 15 of the test disc without skipping and jumping. A full mechanical and electronic alignment failed to cure the problem so the pick-up (PWY006) was replaced and alignment was carried out. The machine now played tracks 8 and 15 without difficulty. **P.J.R.**

## Pioneer CLD1080

A customer brought this CDV player into the shop, placed it on the counter and explained that he had broken off the modulator's output sockets. Thus a new modulator would be required. Whilst I was taking down the repair details I noticed that it was a US model, for NTSC video, and that the modulator was a v.h.f. type. As we didn't have the manual I gave Pioneer spares a ring, in particular to see if a modulator could be supplied. It could, but would take about a month because it had to come from the states. The customer needed his unit in three days' time, not a month! So I had to devise a way of setting up his equipment so that he could carry on using it while we waited for the spares to arrive.

Use of a Sharp VC681 VCR enabled this to be achieved. We fed the CDV player's video output (CVBS) into the VCR's video input. With the VCR switched to the aux input the NTSC signal was modulated on to a u.h.f. carrier. This was fed to the customer's TV sets. When all three sets had been retuned to u.h.f. (they are multistandard models) each one displayed a crisp (for NTSC) clear picture. Being satisfied with this I gave the customer a call. He took his equipment away and said he'd bring it back when the spares came in.

Subsequently the modulator arrived (well done, Pioneer!). It was fitted and the unit was given a short test before being returned to the customer. A few days later he came back and

complained that only two of his TV sets would work at one time. He wanted to use all three.

The customer brought in all his equipment and we set it up in the workshop. As the customer had said, only two sets would work at one time. The other one would tune up the band, find the v.h.f. signal then instead of memorising the frequency would carry on tuning. It worked all right at u.h.f., but apparently not on v.h.f. channel 4. I was about to give up for the day but thought that I would try one more thing – retune the output from the modulator and retune the TV sets. It worked. I reset the modulator's output to v.h.f. channel 3 and, once they had been retuned, all three TV receivers then worked perfectly. Could the problem have been caused by standing waves in the coax? After a short test during which it worked without difficulty the customer's equipment was sent back. **P.J.R.**

## Binatone 01/7270

The compact disc player in this midi hi-fi system was faulty. It would read the TOC but wouldn't play. When play was tried the radial arm skated across the track then ERR was displayed. As the player read the TOC it seemed unlikely that the CDM unit was faulty – the dealer had already tried fitting another one. Substitution proved that the MAB8441P-T107 microcontroller chip was the culprit. **P.B.**

# CD Player Casebook

*Reports from Mike Leach, Ronald Aranha, P.J. Roberts and Jim littler*

## Akai ACMM370L

The complaint with this midi system was that some discs would skip and jump while others wouldn't play at all. We stripped the left-hand side cabinet section from the machine to gain access to the CD section. Close inspection of the laser lens then told us what we wanted to know – the lens was filthy. Cleaning it gave us an excellent r.f. waveform, so we put the machine back together.

Unfortunately it came back several days later with the same complaint. This time the condition was worse and the laser had to be changed. When it arrived (part no. BO728643K) a great deal of hassle was required to fit it. Why is it that these days so many manufacturers put the bits that go wrong in such inaccessible positions inside the cabinet? **M.L.**

## Kenwood DP710

I've had a couple of these machines in recently, both suffering from intermittent TOC reading. The cause of the trouble was a faulty laser unit of course, but the unit is not easy to replace. When a new one is ordered Kenwood send a complete mechanism assembly including the laser, tray, motors etc. A modification has to be carried out: this involves removal of the main PCB assembly followed by many component changes depending on which model you are servicing. Good luck if you get one of them in! **M.L.**

## Sony CFD770S

This portable was dead when it came in. After replacing the fuse we found that the tape and radio sections worked normally but the CD section didn't. We noticed that the laser unit wasn't in the home position. Checks showed that the sled motor drive chip wasn't getting the relevant command from the CXP5078063Q system control chip, which is a surface-mounted device. When a new system control chip had been fitted the laser unit would return to its home position but the display said "no disc". We then found that there was no laser glow, so a new KSS210B laser unit had to be fitted. This finally put the machine to rights: fortunately for the customer it was still under guarantee. **R.A.**

## Sony D99 Discman

The complaint was that this machine didn't work properly. We hooked it to a 9V adaptor, inserted a disc and pressed play. The disc played normally but we noticed that the LCD illuminating lights flickered in a periodic manner. We didn't pay much attention to this and kept the unit on test. Occasionally if it was stopped and play was then selected the display would show "no disc". So we put the machine in the service mode and pressed the play button. Focus search was activated but there was no spindle rotation. A slight tap on the spindle table started the motor. The fault cleared when a new spindle motor (part no. A3133372A) was fitted – and the display panel lamps no longer flickered! **R.A.**

## Sony CDPH3600

This unit is supplied with Sony's FHE737 portable music system. The problem was that ejection didn't occur when the eject button was pressed. If the tray was ejected manually however and the tray close button was then pressed the tray would go inside and the machine would read the TOC. A check on the voltage at pin 24 of the UPD75116GF system control chip showed that it stayed at 5V regardless of the open/close situation. A new system control chip put matters right. **R.A.**

## Sony D350 Discman

There was no TOC reading. A scope connected to the FE point showed that after pressing the play button the search curve was not symmetrical around the "zero" axis. As a result the FOK signal wasn't produced. The SF89 laser unit had to be replaced. Normal operation was restored after carrying out the relevant adjustments. **R.A.**

## Yamaha CDX510

The cause of failure of the drawer to open was traced to a worn drawer belt. After fitting a new one we gave the unit a short test and as everything seemed to be all right the machine was returned to the customer. Two months later it came back with the same fault. When I examined the new belt I'd fitted I found that it had worn out. A call was made to Yahama to see what they had to say. We were told that the plastic type of motor pulley fitted does tend to wear the belt. They recommend fitting a new metal type, part no. VJ668800. We fitted one of these, plus a new belt (VE801800), and gave the machine another test. The change seems to have done the trick. **P.J.R.**

## Dual CD1030

This player would load a disc and read the TOC but wouldn't read any of the recordings – or if it did there would be bad skipping. The cause of this was traced to the worm gear on the sled motor spindle. What happens is that the gear slides along the spindle and jams the sled drive mechanism. Once the worm gear had been correctly positioned and fixed in place normal operation was restored.

Another fault I've had is a worn drawer belt. When I loaded a disc and pressed close or play the drawer closed but the disc didn't spin and the TOC wasn't read. On investigation I noticed that the drawer belt was slipping because it was slack. Drawer in/out sensing is done by monitoring the current drawn by the drawer motor. Thus when the belt slips the system control doesn't know whether the drawer is closed – the motor is still running but not drawing as much current as it would when stalled. With a new belt (part no. 282684) fitted the machine worked normally. **P.J.R.**

## Aiwa LX50

We had a linear tracking turntable fault on one of these machines. Failure of the 2SD150 Darlington regulator Q101 seems to have been the start of the trouble. A high voltage had been put on the 5V line with the result that the TLCS43 processor chip IC1 had died. No work could be done until IC1 and most of the power supply had been replaced. At this stage the arm moved right and the motor wouldn't stop. The position sensors and LED were found to be o.k. but the TC4069UBP inverter/amplifier chip IC2 had been damaged – its outputs at pins 10 and 6 sat at 3V no matter what you did

to the sensors. Replacing IC2 got the machine working, but the record size sensor had also been damaged. CP101 and a 2SC2001 transistor used as an amplifier had to be replaced – these items were not shown on our circuit diagram (issue 3, 1984).

Replacing all these parts plus a few belts restored the deck to full health. But all this mayhem had been caused by lack of over-voltage protection. Its omission may have kept the price competitive, but it made the repair long and costly. **J.L.**

# CD Player Casebook

*Reports from Mike Leach and Nick Beer*

## Pye CST428

The CD section of this midi equipment didn't work at all. When we removed the CD unit from the cabinet and inserted a disc it became plain that the turntable motor was being permanently braked. The laser assembly was at its outermost point, at the very outer part of the disc. Checks revealed that there was no –11V output from the power supply. The cause was traced to transistor T104 (BC338) which was leaky, a replacement restoring normal operation of the unit. **M.L.**

## Pioneer PD4300

After a period of time that varied the audio output would degenerate to noise – just like when a RAM fails. Giving the optical signal processor chip (r.f. amplifier) a dose of freezer cleared the problem. But the situation remained the same when the chip had been replaced. Oh dear! If you placed your fingers near the optical unit's flexible connector there was inordinate disturbance to the r.f. signal. It was the optical unit that was the cause of the trouble. **N.B.**

## Sony CDPM20S

This CD player is powered by a low a.c. supply. The problem was that the disc ran up at too high a speed, though it didn't run away. Thus the TOC wasn't read. The power supply is based around IC8 and produces split 8V outputs. There was no regulation however: the positive supply was too high and the negative supply too low. The cause of the trouble was a break in the print between pin 3 of IC8 and regulator transistor Q2, the noteworthy point being that if there's a fault in one half of a split supply both outputs will usually be affected, as in this case. **N.B.**

## Pioneer PDM435

This multiplayer was not happy: it was apparently dead but the spindle motor ran (makes a change!) and the disc and cartridge loading motors were running against their end stops. This all suggested loss of half of a split supply, which was indeed the case. The –5V supply was missing because circuit protector IC30 (ICP-N10) was open-circuit. It's quite common to get random failure of these ICP-N10s in Pioneer players generally. **N.B.**

## Ross RCD2000

This portable CD player had been dropped and would now read only the TOC. This is a classic sign of no traverse action, which was the case. Traverse drive comes from a brush motor via a couple of plastic gears to a rack on the laser unit. One of the plastic cogs was dislocated. All that was required was dismantling and retiming. **N.B.**

## Pioneer PDM550

This multiplayer was accused of playing one disc then refusing to play any more: in fact it would play some discs and not others. A check on the r.f. signal, using a test disc, showed that it was low at about 650mV. Lens cleaning improved this by only about 50mV, which is not enough. Increasing the laser power slightly brought up the r.f. signal, as you would expect, and the unit then worked admirably. But the customer opted for the sensible solution – a new laser unit. **N.B.**

## Sony CDPM29S

This player wouldn't read the TOC with some discs: with others it wouldn't play beyond the TOC. A dirty lens meant that the amplitude of the r.f. signal was very low, but the symptoms were compounded by the usual fault with these players – a weak loading belt, which causes intermittent poor clamping. Attention to both these points restored the unit to good health. **N.B.**

## Sony CDX5080

This in-car radio-CD player would spin the disc very weakly, stop then produce ER$ in the display. This indicates low output from the laser unit, which must be replaced. The focus and tracking were severly impaired. **N.B.**

## Pioneer PDX77M

This multiplayer lived in a restaurant. So it was no surprise when it came in because it wouldn't play discs and the spindle motor turned out to be faulty. A new PEA1233 motor cured the initial problem. The lens was visibly dirty, but before cleaning it we decided to check the laser unit and found that it wouldn't focus. Cleaning it got us running, but playability was poor at best and some discs couldn't be read at all. The r.f. signal was low at about 700mV (with a clean lens!). Increasing the laser power restored normal operation, but the correct course would have been to fit a new laser unit. The customer decided to have just the basic job done however. **N.B.**

# CD Player Casebook

*Reports from Mike Leach, Terry Lamoon, David Belmont, Andrew J. Finn and Nick Beer*

## Crown CD85R

This player wouldn't focus properly. When a disc was inserted the turntable would start to rotate and the laser would whistle loudly: it would then drop out, having not read the disc. A check showed that the eye pattern appeared briefly. It looked as if the turntable might be failing to reach the correct speed. Various dry-joints were visible on the main panel, but resoldering them made no difference. Now this player uses a KSS150 type laser, and as we had one in stock we decided to try it. A good start we thought. No, it wasn't! The laser still chirped and then dropped out.

We didn't have the circuit diagram for this particular model, only one for a similar machine that uses a similar set of chips. U101 was a likely candidate since it controls the r.f. amplifier and focusing circuits. It's a miniature version of the larger CXA1081 that's used in various Pioneer etc. models. We found one in a scrap machine and fitted it as a replacement. Lo and behold the fault condition had been cured, the player now functioning normally. **M.L.**

## Sanyo DCX802

The complaint with this midi machine was of a "drawer fault". Actually the CD section wouldn't work at all. Everything else in the machine worked perfectly, but even the CD unit's display wouldn't light. There was obviously a power supply fault, and the CD board would have to come out – unfortunately. . .

When the board had been removed dry-joints around the regulators were evident. A good solder up here produced a light in the CD display, and we thought that the player would now be all right. But the drawer wouldn't open. So out came the CD assembly. We found that the teeth had been stripped from both the loading cam and the slide gear. Presumably the customer had caused this damage while trying to load a CD, when dry-joints had been to blame all along. **M.L.**

## Sharp CWS370

When a disc was inserted and the play button was pushed there was a perfect display – but no sound at all. Scope checks brought me to IC3, which wasn't producing any output. A replacement restored normal operation. **T.L.**

## Sanyo DCX900

This multi-CD player was brought in by a field engineer. It wouldn't read the TOC. I took it apart but before doing anything else I cleaned the lens. Hey presto! the player now worked. I wonder why technicians don't try the obvious first before giving up the fight? **T.L.**

## Sony MHC2600

This new CD hi-fi system would start to skip when a disc had been playing for approximately fifteen minutes. The cause of the problem was the fact that the optical unit's PCB assembly caught on a capacitor on the main board. The cure was to reposition the PCB assembly slightly so that the sled movement was completely free. After that we could hear Ravel's Bolero without interruption! **D.B.**

## Matsui CD550

This machine read the TOC and played but the audio output was intermittent. We soon discovered that there was no input to the 18V regulator on the front edge of the PCB, because a previous repairer had pulled the orange lead from the mains transformer out of its plug. The orange lead is the shortest one from the transformer and is therefore subject to greater stress when the PCB is turned over. **A.J.F.**

## Pioneer PDZ72T

After rebuilding this twin-disc mechanism, because the customer had smashed a door into the unit's tray two, I found that a cyclic rumbling came from the mechanism when the loading motor turned clockwise. This meant that the machine was noisy when one drawer opened or the other one closed. The cause of the problem was the fact that a pulley, part no. PNW1487, was warped. It's the large one around which the other end of the belt fits. **N.B.**

## Technics SLPG520A

This pleasant looking CD player was dead. Checks showed that there was a problem with the 5V supply from the LM2940T5M regulator IC11, even when the unit was switched on from standby. The unregulated input was present, but the output remained at a sullen 1·2V or so. When the load was removed the output rose to 8·9V – not much of a regulator! A replacement produced the more acceptable result of 5V on load. **N.B.**

## Philips FCD463 (CD module 30001, tray kit A)

The CD section was dead. Easy enough, I thought: the 800mAT fuses were both open-circuit and the 5V regulator 6320 was short-circuit. Having sorted that lot out I was left with a unit which produced a readout but no audio. The supplies to the audio amplifiers, the decoder and the DAC were o.k., but there was no data – just noise on the link between pin 37 of the SAA7210 decoder chip and pin 3 of the TDA1541 DAC chip. The logical suspect was the RAM, which in fact had no 5V supply at pin 9 because the 4·7Ω fusible resistor 3338 had gone open-circuit. **N.B.**

# AUDIO FAULTS

Reports from
Adrian Spriddell
Chris Watton
Kevin Green, TMIIE
P.J. Roberts and
Nick Beer

## Technics SLP1200 CD player

Whenever I see one of these monsters I'm tempted to say "sorry, we don't mend cash registers". If you are faced with an intermittent shutdown type of fault, before you dive into the power supply and servo sections check for a dry-joint at the mains transformer header sockets CN2 and CN3. They are on the mains input PCB under the ASC mains insulation card. **A.S.**

## Tascam DA30 DAT recorder

There was a low balanced right-hand channel output. I had to replace C234 and C235 (both 100µF) in the balanced amplifier circuit. They had gone low in value – probably because both had been fried when an amplifier output had been plugged into the balanced XLR socket. It happens . . . **A.S.**

## Sony DTC750 DAT recorder

This machine damaged tapes. It was suffering from the Amstrad 4600 syndrome. If the tape is being rippled along the bottom edge, before replacing the pinch-lever assembly and exit guide first check that the play torque has not been set too high. **A.S.**

## Sony HST-DC01CDM

If the machine fails to record (the fault may be intermittent), check for signal around the CXA1198A chip IC603. If audio enters the chip but doesn't come out again, try the effect of connecting pin 13 to chassis via a 24kΩ resistor. The connection is usually made via two plated-through holes and a printed chunk of carbon that's deposited directly on to the PCB. Not surprisingly, it fails. **A.S.**

## Sony DTC1000ES DAT recorder

When tapes are damaged on eject you will find that the cause is almost certainly solidified grease in the mechanism, in particular on the half-load arm bearing – when this fault is present a cassette can be ejected with a loop of tape hanging out. A partial strip down and the usual VCR maintenance measures will suffice. **A.S.**

## Sharp CD-C570 Hi Fi

There was no CD unit operation and the drawer was stuck in. The cause was a short-circuit capacitor in the power supply, C823 (47µF, 25V). **C.W.**

## Panasonic SA-CH55

There was a simple fault with this nice hi-fi unit: the CD drawer wouldn't open. All other functions were OK. Unfortunately the cause wasn't so simple. The motor drive circuits were OK, and the mechanism worked perfectly. The cause of the fault was eventually traced to the main system control chip IC951 (MN18724RUF). It's a 100-pin surface-mounted device. An expensive repair! **C.W.**

## Samsung RCD750 portable audio

This machine was brought to us because of slow tape speed and very poor fast forward/rewind. The cause was traced to diode RD5, which had developed high forward resistance. **K.G.**

## Pioneer XR-P470C audio system

The number one cassette deck solenoid clicked away far too many times. In fact it clicked four times, which put the master cam in the wrong position for the tape to be ejected. The cause of the problem turned out to be IC1901, part no. PDC036C. **K.G.**

## Aiwa CXNV900K

This machine came in because of total failure to read CDs. The repair was easy: change the laser pickup and clean dust from the rest of the unit. But it came back because of intermittent skipping and failure to read discs. The cause was traced to the white sled drive gear, which had a few slightly damaged teeth. Normal operation was restored once a replacement gear, obtained from a scrap deck, had been fitted. **P.J.R.**

## Kenwood DMCJ7R MiniDisc unit

This unit played discs all right but wouldn't record, with "disc error" coming up. Using a laser power meter I quickly traced the cause to a low-emission laser unit – it didn't give sufficient output in the record mode. A new laser unit, part no. T25-0074-08, restored the record function. **P.J.R.**

## Sony MZ-R55 MiniDisc unit

This very small unit was brought to us because it wouldn't play or record discs. A few simple checks revealed that there was no output from the laser. A new laser unit, part no. X-494-925-61, restored normal operation. It's a very fiddly unit to work on, but nicely made. **P.J.R.**

## Sony MX-R3 MiniDisc unit

I've had a few of these units that will play pre-mastered discs or previously recorded material but, with their own new recordings, there is intermittent muting or a more severe fault, failure to recue after editing the TOC, with subsequent loss of all the audio on the disc. The problem has been cured by replacing the optical unit, part no. X-4946-054-1. These small personal units are nice to work on, though first impressions might suggest otherwise. **N.B.**

# AUDIO FAULTS

Reports from
Mike Leach
Paul Smith
Martyn Davis
Kevin Green, TMIIE
Ian Bowden and
Maurice Kerry

## Panasonic SA-HD52 midi system

If you get one of these machines that shows classic faulty laser symptoms, such as cutting out and stopping after just one or two tracks, always try replacing the regulator chips on the regulator board first. They get very hot and break down after a short while, giving the impression that there's a laser fault. **M.L.**

## Samsung MAX555

I've had several of these midi units with the same fault: the CD section would intermittently fail to recognise that a disc has been inserted. I noticed that in the fault condition the laser lens didn't move and was therefore not focusing on the disc. In every case removing the heatsink from IC9258, resoldering the IC's pins and the adjacent transistor Q1501, then replacing the heatsink with compound added cured the problem. **P.S.**

## Goodmans S2750

We had two of these systems in recently. The first one wouldn't play CDs. The laser was continually trying to focus, and at the same time the sled moved backwards and forwards. Meter checks showed that all the voltages on the CD PCB were low. They are derived from a separate winding on the mains transformer, via two in-line 2·2Ω resistors. Fortunately these were the cause of the problem: both had gone high in value.

The second system produced low, distorted sound. An oscilloscope used to trace the signal path showed that the inputs at pins 3 and 14 of the TC9153AP volume IC on the front panel were OK but the outputs at pins 4 and 11 were severly clipped. A new chip restored normal sound. **P.S.**

## Sanyo MCD-S735F

There was no audio output from this little hi-fi system. I suspected the LA4597 audio output chip IC108, as there was audio at its input pins 2 and 6 but no output at pins 10 and 12. A replacement made no difference however. The cause of the fault was R277 (22Ω), which was open-circuit. It was holding IC108 in audio mute. **M.D.**

## JVC MX-D401T

The customer complained that this equipment was dead. He was right. When I started to check I found that Q904 (2SB1375) had gone open-circuit, also resistors R902 and R904. There was very heavy ripple at C902 (2,200μF, 25V) which also needed to be replaced. By this time the unit was making a slow recovery, but was far from cured.

Further checks showed that R924 was open-circuit. Once this resistor had been replaced the unit came to life, but as yet with no sound. The final problem was caused by another open-circuit resistor, R958 in the amplifier circuit. Bingo! – and time for a large brandy. **K.G.**

## Technics SLP1200

The complaint with this CD player was "poor playability". These players are normally very good, not producing any audible dropouts with the Toshiba error disc.

I checked the RF level and servo adjustments and found that they were fine. I did however notice that when trying the PLL adjustment there wasn't a definite window where the blips in the audio were reduced or eliminated. This led me to suspect the PLL hybrid chip IC301. Correct operation was restored when a replacement had been fitted. I obtained it from a scrap SLP110. **I.B.**

## Aiwa CXN999 Mk II 4ZG-1 CD mechanism

When a CD was inserted there was no lens focus movement or disc rotation. Checks showed that the 7·5V supply was low at 3·8V. The cause was C301, an 0·1μF chip capacitor, which produced a leakage reading of 370Ω. A replacement restored CD operation. **M.K.**

## Technics SE-CA1080

There was intermittent loss of the audio output. I found that the symptom could be instigated by tapping the board. A scope check at pin 6 of IC501 in the fault condition showed that there was no AC here – pin 6 is the power detection input, and is an AC signal from one pole of relay RL701. This relay has two poles, which feed the bridge rectifier diodes D701-704 for the +B and –B supplies. One pole was faulty, going open-circuit intermittently. **M.K.**

## Aiwa NSXD858

The volume up/down and tray loading motors didn't operate. Volume can be remotely controlled, while the tray is opened and closed by a key on the front panel. The motors have four drive transistors each, for forward and reverse operation. Q202-209 are controlled by the TC4094B chip IC201, which is in turn controlled by data from the microcontroller chip IC1.

The supply to Q202-209 and IC201 should be 5V. A check showed that it was 12V! The supply comes from the main panel via the 2SD2005Q lo-sat transistor Q107, which was short-circuit. A replacement cured the fault, and IC201 seemed to be undamaged. **M.K.**

# CD Player Casebook

***Reports from Nick Beer and Mike Leach***

## Goodmans System 3500

The CD section didn't register discs because, we found, there was no laser light. The cause of the problem was tarnished connections on the plug-in looms at the laser assembly end. This player uses the Sony laser unit. **N.B.**

## JVC UXT1

We were told that the CD section of this midi system had operated intermittently for some time. It usually worked all right from cold, but would then stop while playing a disc. After that it wouldn't work for some time – it had to cool down first.

I inserted a disc and, when the fault condition started, carried out a few d.c. and scope checks. The focus drive waveform was present at the laser plug (pins 12 and 15 of CN501), but it seemed that the laser wouldn't light up. The laser supply should be present at pin 9 of CN501. When I connected the meter probe to this point I found that the supply was sometimes low and sometimes non-existent. This suggested the presence of a dry-joint or a print crack. A crack was found in the print around transistor Q501, which provides the laser supply. **M.L.**

## Pioneer PDM601

This CD player caused us trouble over a period of time. It appeared in the workshop three or four times with different reported faults but on each occasion we couldn't find anything wrong.

Eventually we found a blown circuit protector in the power supply. When this had been replaced the machine worked all right for a while then stopped and refused to read a disc until cold again. A d.c. check showed that there was no laser supply. The cause of this was the ribbon cable that connects the main panel to the laser assembly: one of the strands was open-circuit. I soldered a flying lead between the two points and the machine then worked all right. We left it on soak test but after a week or so it again stopped. This time the focus drive waveform had disappeared, again because of a break in the ribbon cable.

When a replacement cable had been ordered from Pioneer and fitted the intermittent faults all disappeared. The cable is not listed in the service manual: its part no. is PNP1343. **M.L.**

# CD Fault Finding

## Hitachi DA50

If you receive one of these units without the rest of the system, the CD player won't come out of standby unless +5V is applied to the centre pin of the single phono socket at the rear. We think it's marked 'control', but because of the scratched condition of this unit it was difficult to tell.

A replacement loading belt completed the repair. **G.T.**

## Dennon DCD700

This machine had an intermittent fault. The spindle would sometimes rotate at very high speed, with the result that the disc couldn't be read. It would sometimes do this with no disc inserted. The cause of the problem was traced to incorrect drive from the digital signal processing PCB that's soldered edgeways on to the main PCB, though the d.c. conditions in the spindle motor drive circuit were correct. This was another case of dry-joint trouble – there were a number on the edge-soldered PCB. **N.B.**

## Pioneer PDS301

This player wouldn't register discs – it wasn't focusing. The cause of the fault was a break in the flexible connector to the laser unit. It tends to break where it's folded at the laser end. **N.B.**

## Sony CDP35

The complaint with this machine was skipping. I initially thought that the laser output was low but found that the unit could be made to skip wildly if the PCB around the tracking/traverse drive circuitry was flexed. The cause of the problem was a collection of dry-joints along one side of the surface-mounted CX20108 servo chip IC601. **N.B.**

***Reports from Graham Thompson and Nick Beer***

# Chinese Junk

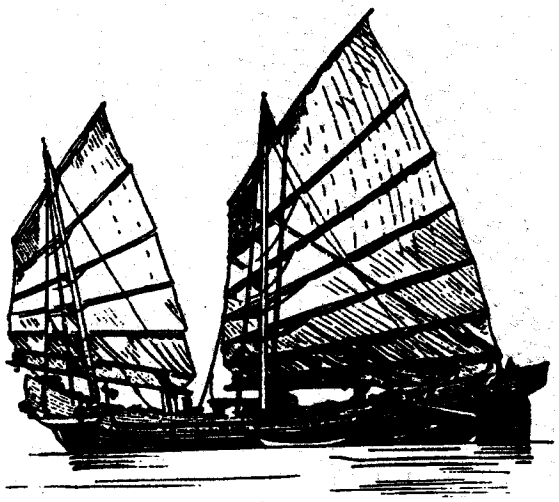
## *More Adventures in CD Land*

**Les Austin on his servicing experiences with dubious Chinese audio equipment**

If you want a gondola, try Italy. Portugal is the place to look for a man-of-war, and of course China for a junk. For me, the problem is that China sends too much junk to this country. When you consider the change over the years in what comes from Japan, and more recently from some other Far East manufacturing countries, we may well get better products from China before too long. So what wound me up this time?

### The Crown CDK2300

Do you recall the Crown CDK2300 midi system I told you about a year or so ago? The one with the faulty RAM chip in the CD player section? Initially,



*And there's more on the way...*

I sold it to a happy customer. After about three months he brought it back, complaining that the sound was rough. A dirty volume control was diagnosed, and a call was made to HRS for a replacement (part no. 9500702). After fitting this the customer returned to his state of happiness. But not for very long.

His next complaint was that the CD section had packed it in, stealing his favourite disc and becoming noisily unco-operative. So I took the record deck off and peered inside. At switch on the disc rotated at speed and the sled was at the outermost part of its track. This suggested that there was a fault in one side of the symmetrical power supply system.

I adopted the simple course of removing the CD PCB in order to get at everything more easily – and was amazed to find that the RAM chip I'd previously fitted was hanging on to the board with just about five hands, the others having let go. Apparently they'd burnt their fingers. I next found that the CXD1130Q servo chip was split across the middle. What was going on? When I made some voltage measurements I was in for a surprise.

The PCB carried +8V and –8V supply rail markings, which a check with the service manual confirmed. The readings I obtained were +18V and –18V respectively. Now since each of these supplies is obtained individually by full-wave rectification of the output from a transformer with a centre-tapped secondary winding, not much maths is needed to calculate that the winding should be rated at about 7-0-7V a.c. I was not pleased to find that it was 17-0-17V a.c. It seems that someone in China had not done his sums correctly when the player was designed.

The +8V and –8V rails are used to drive the motors, an M5290P regulator chip producing, via series regulator transistors, +5V and –5V supplies for the general-purpose chips. Needless to say the M5290P chip was short-circuit. Thus instead of +5V and –5V we had +18V and –18V, the poor little chips having 36V across them. This was obviously far too much: one had hung itself, one had been rent asunder, yet another had been killed and probably the rest all murdered.

Out of respect, I didn't investigate further. I put them all to rest quietly, the customer had his money refunded, and we tried to put it behind us. Repair seemed pointless: the cost of the chips would probably be far more than the unit's worth, with no great prospect of assured future reliability.

### Another One!

About a month later my eldest son asked me if I would look at a pal's midi system. Imagine my horror when he produced a Crown CDK2300! The problem was poor sound. I diagnosed a faulty volume control, and confirmed that the mains transformer was of the crazy design the inscrutable fellow in a far off land had specified. My initial response was to refuse to touch it, but I was persuaded to try to do something.

I was not prepared to repair it with that transformer still fitted. But, if I fitted a transformer from some other manufacturer's midi system, would I be on dodgy ground if anything went wrong? What to do? I knew that there was a new Crown importer. Perhaps they could help? It took many phone calls before I located the correct people. They were very helpful but had not been the importers for long and had yet to get their spares sorted out. A current model (CDK193R) seemed to correspond with the midi system in my workshop, and in due course the service manager rang to tell me that this had a transformer that provided the correct output voltages (thanks Wilf). They were eventually able to send me one. The original transformer, marked CDK23B, is still stocked by HRS. The one I bought from Independent Services Ltd of Ellesmere Port, for Model CDK193R, is part no. EP50-101-570068-4C. After fitting this transformer and a volume control from HRS a satisfactory repair was achieved.

### An Alba CD1010

An Alba CD1010, also made in China, was brought in a few days later. "I don't know what's the problem with

this one" said John, "but the drawer flies open, the sled moves to the outside of the disc and makes a noise like a machine gun, and the laser's lens leans over to one side as if it's drunk. I'll leave it with you and give you a call later." I suggested calling him, to put off the moment of truth.

It seemed obvious that this was going to be another power supply problem. So I connected my meter's black lead to a main PCB test point marked 0V, then checked the d.c. voltages at the power supply connector. Instead of +12V and –12V supplies there were excessive negative voltages. When I pulled the connector off I found that both voltages were still present! Strange, I thought. I decided to remove and examine the main PCB.

More problems. No chips hanging on in their death throws this time, but a series of lengths of burnt-off print. This was earth line print from the centre pin of the power supply connector. It follows a tortuous path around the board. I checked along it until I came to a diode where the damage ceased. I sat back and mused. We get these little safety resistors that go open-circuit for no apparent reason all over the place. But when there's a real need for one the inscrutable designer in China doesn't bother to fit it.

Time for a quick bodge with some jumper wires and a search for the obviously short-circuited cause of the trouble. I won't bore you with a tedious account of the search, just provide a list of the initial toll of damaged parts: D104 (7·5V zener diode), D114 (1N4148), IC110 (7805), IC112 (79L06), Q115 (2SA608), Q101 (2SC2458), Q107 (a DTC124 digital transistor), the LA6520 sled driver chip and R243 (22Ω). These items are all on the main panel. Q06 (2SD1384) and both 500mAT fuses on the power supply subpanel were also faulty.

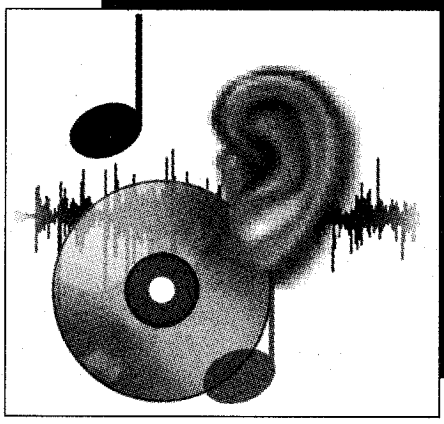
After replacing these items the voltage on the negative side of the supply was correct, but there was only about 2V on the positive side. Checks along the positive rail were obviously called for. I arrived at pin 23 (Vcc+) of the LA9200 chip and disconnected it from the board. This reinstated the full supply voltage. The next move was to replace this chip with a known good one from my junk box. I used the celebrated leg lifter (see earlier article), some Philips desoldering braid and the big Weller gun to carry out the repair.

Time to try the player again. No luck. The laser lit (continuously) but there was no sled motion or focus search, and the display remained unilluminated. Definitely give in time now, as there was no chance of the job making a profit. Ring John and suggest he tells his customer that I wish to file it in the bin, where much of this Chinese junk belongs. . .

## A Couple More

Shortly after the above episode a chap arrived in a BMW, clutching two CD players. The first was a Sony CDPM29, which required a new drawer drive belt and the cheaper KSS210 laser unit from CPC. The second was an Alba CD1010.

I opened the latter up and looked, fearfully, at the underside of the main PCB. To my surprise all was well. After replacing the two fuses on the power supply subpanel the machine worked satisfactorily. I noticed that the fuses, though both of the correct type, were clearly from different sources. So there'd been a previous failure. What had it been, and how long would my replacements last? I can report that the machine hasn't bounced yet, but to be fair I should add that it was collected only about two hours ago. . .



# CD/Mini Disc Player Casebook

**Reports from Philip Blundell, AMIEEIE, Nick Beer, Graham Thompson, Robert Marshall, Chris Watton and John Edwards**

## Philips CDC586

Focusing occurred when a disc was inserted but the disc didn't spin. Checks showed that one of the spindle motor drive transistors, Tr6511 (BC328), was open-circuit. To be on the safe side I replaced the pair – Tr6510/6511. **P.B.**

## Sony CDPM18

This unit was extraordinarily sensitive mechanically – it would skip if you went near it! The RF output from the laser was clean but well down. Cleaning the lens restored the amplitude to 1V peak-to-peak, just within specification. But the machine still skipped. Better results were obtained when a new laser unit was fitted. I used a pattern KSS210RP from CPC: it worked very well. **N.B.**

## Sony MZR2

We've had problems with a couple of these Mini Disc players recently. The first one was dead when removed from the box. All outputs from the DC-DC converter power supply were found to be OK. We then discovered that the micro-controller chip's reset was permanently active. The cause of this was traced to the reset tact switch S805, which had been made with its knob stuck under its escutcheon and was therefore short-circuit.

The problem with the second one was that it would play premastered discs, also discs that had been recorded by another machine, but when it was used to make and play back a recording it went through the motions but the playback consisted of just snippets of the recording, as if there was mistracking. If the same disc was tried in another player it registered as a blank disc. This was because the faulty machine was erasing the TOC. As with a floppy disc, re-recording consists of erasing the TOC, leaving the data to be over-written. We traced the cause of the problem to the magneto record head, which was in the wrong position because its support bracket was bent. Although this item is fixed to the chassis with a single screw, it's not available as a separate part: you have to replace the whole laser assembly (part no.A3300221A), which costs a fair bit. It transpired that the unit had been dropped.

I must say that these players are a delight to work on. **N.B**

## Goodmans S2750

We've had two of these in recently. The first was dead with no +10V supply. Q403 was found to be open-circuit: it had failed because the clip that should secure it to a heatsink was missing.

The second one was also dead, with no AC at the bridge rectifier on the CD PCB. Checking back, we found that there was no output from the mains transformer. The secondary winding is centre-tapped, with the outputs taken via a couple of safety resistors. These are in the leads from the transformer, behind heat-shrink sleeving. Suitable replacements can be obtained from Farnell Electronic Components, Leeds – part no. PR01 2R2. As they are safety components, the correct type must be used. **G.T.**

## Bush MS351CD

This player was totally dead. Even the drawer wouldn't open. The only sign of life was the LC display's back light, which was lit. We found that the 1N4148 diode D305 on the power supply/audio amplifier PCB was short-circuit. **G.T.**

## Bush MC101CD Hi-Fi

The CD section of this unit produced an output on only one channel. First a word of warning. Before you remove the miniature plugs from the CD PCB, glue the sockets to the board. Otherwise the socket can remain attached to the plug, leaving only the pins on the board. This happened to us with the supply connector – although the wires were red and black, the red one was the earth line! Resoldering in the output circuitry solved the one-channel problem. **R.M.**

## Samsung RCD1300 CD/cassette/radio

There was no CD operation with this portable equipment. The TOC wasn't being read, and when we opened the lid we found that the disc was rotating backwards. The laser lens somehow looked odd – shifted to one side. When the unit was dismantled, the thin plastic cover that encapsulates the focusing coils and the laser was found to be partly scrunched up. Fortunately we were able to reform the plastic and refit the cover. After some lubrication the unit worked remarkably well. **R.M.**

## Toshiba XR9318

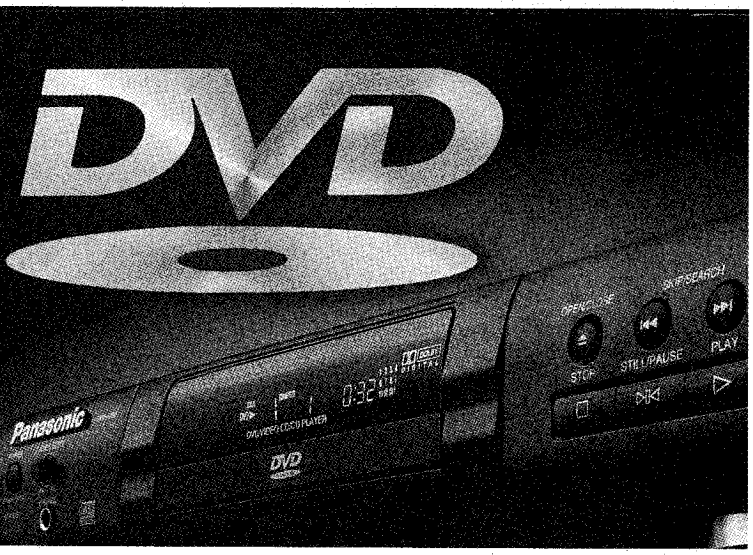
The disc motor ran out of control, the disc being just a blur. When we opened the drawer the disc clattered as it tried to go into orbit. The cause of the trouble was in the disc motor drive amplifier, where transistors Tr6511 and Tr6512 (BC337 and BC338) were both leaky and resistor R3570 (4·7Ω, safety type) was open-circuit. Replacing these items restored normal operation. **C.W.**

## Akura DX9

The sound was audible but masked by a high-frequency hiss, while the lower frequencies suffered from an effect similar to crossover distortion in a conventional power amplifier. The cause of all this was the LC7881 DA converter chip IC10. **J.E.**

## GoldStar CD621L

This machine remained lifeless. The display in the LCD panel read "00" with or without a disc inserted, because the disc-inserted leaf switch was bent and not being activated by the lid as this was opened and closed. We were able to cure the problem by carefully straightening and aligning the switch so that the lid made accurate contact with it. **J.E.** ■




# At The DVD Forum

**A recent international forum in Brussels set out to clarify the current DVD situation and press for agreement between the various parties involved. George Cole reports**

On September 16-17th the DVD Alliance, which consists of Time Warner and nine major consumer electronics companies including Philips, Sony, Toshiba, Hitachi, Thomson, Pioneer and Matsushita, hosted a forum in Brussels to discuss the current DVD format situation and latest developments. It also presented a chance to see prototype DVD players, drives and encoders in action.

The DVD system is almost ready to be launched on world markets, though the date when the first discs and players will be available is at present (mid September) still far from clear. There were numerous arguments and contradictions at the forum, with one company saying one thing and another saying something quite different.

## Specifications

First however a brief description of the DVD format – a more detailed specification will be provided in a later article, when certain details have been finalised.

DVD originally stood for Digital Video Disc. It then came to be known as the Digital Versatile Disc (since it can be used for purposes other than video storage). The official line now is that DVD simply means DVD!

The format is designed to take the compact disc into the 21st century. Although it is little more than a decade old, the CD – and in particular the computer version CD-ROM – is showing its age. When the CD-ROM was launched in 1985, many wondered how they would fill a disc that could hold over 600Mbytes of data, the equivalent of 500 high-density floppy discs. But with the advent of Video CD, multimedia CD-ROMs and complex video games, the CD is struggling to hold enough data. Indeed for this reason some games titles are spread over several CD-ROMs. As a result of all this there was a move to develop a high-density CD.

The DVD that has emerged is a hybrid of two rival high-density formats, the Multimedia CD (MMCD) developed by Sony and Philips and the Super Density (SD) disc developed by Toshiba in collaboration with Time Warner and others. The disc is of the same size and thickness as a conventional CD, i.e. 120cm in diameter and 1·2mm thick, the big difference being that the DVD consists of two 0·6mm discs bonded back-to-back. This gives the disc greater mechanical stability and a higher storage capacity. DVD discs are also more resistant to heat and humidity than conventional CDs.

With the DVD the minimum pit length is 0·4 microns, the track pitch being 0·74 microns. DVD uses lasers with a shorter wavelength than those used with ordinary CDs (635-650nm, compared with 780nm for CDs). It also uses Reed-Solomon error correction and an 8-16 modulation system. The reference speed is 4m/sec CLV (constant linear velocity).

## Versions

DVD has been designed as a single- and dual-layer (i.e. two layers on each side of the disc) system, and as a single- and double-sided format. With the first generation of players at least, users will have to turn over a double-sided disc, but we will doubtless at some stage see players that switch sides automatically. There are thus four basic disc versions, ranging from a single-sided disc that holds 4·7Gbytes of data to a double-sided, dual-layer disc able to hold 17Gbytes of data.

DVD makes use of the MPEG-1 and MPEG-2 digital video systems, the latter being able to provide broadcast-quality pictures for material such as blockbuster films. The video data rate can be varied between 1-10Mbits/sec, the average for audio and video data being 4·69Mbits/sec. For computer applications DVD's data rate approaches that of a x8 CD-ROM drive. The variable bit-rate system improves coding and storage efficiency. There are two alternative audio systems: Dolby Digital AC-3 coding is to be used in 525-line/NTSC territories while MPEG-2 audio is to be used in 625-line/PAL areas. These audio systems both offer 5·1 multi-channel sound, but are not compatible.

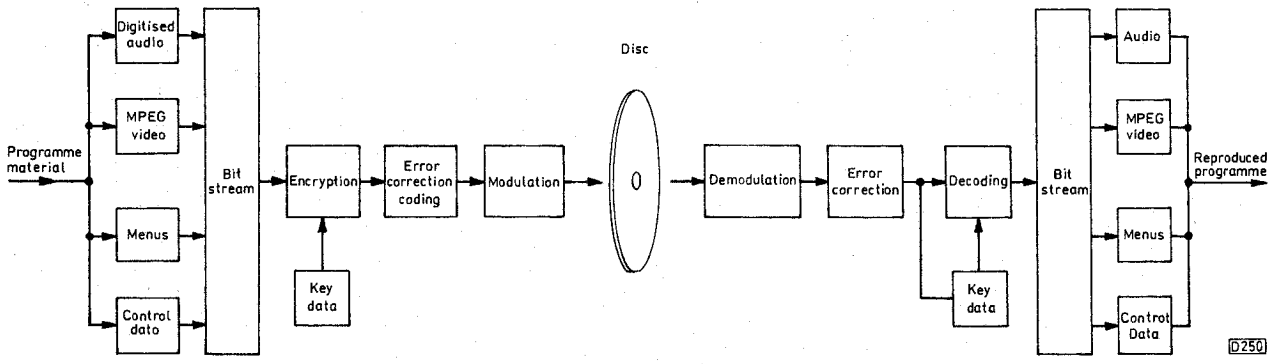
DVD is actually a family of discs, designed to store films, computer data, multimedia programs and games. The two basic formats are DVD Video (sometimes called DVD Movie) and DVD-ROM. The former has been developed as a means of recording and storing films and other video material. Up to 133 minutes of MPEG-2 video can be stored by a single-sided, single-layer disc. DVD Video can also store up to eight audio streams and 32 subtitled languages. There is provision in the specification for recordable and erasable-recordable discs.

## The Forum

Jan Oosterveld, president of Philips' key modules division, gave the opening speech. He immediately got to the heart of the problems that have led to the delay in

## STOP PRESS

***At the time of going to press Toshiba has announced that it plans to launch a range of DVD systems in Japan on November 1st.***




Television Nov. 1996. At the DVD Forum Fig.1 page 37 Reduce to 2/5ths scale linear (7" wide).

***Fig. 1: The DVD Video record and playback processes.***

launching the DVD system: the differing needs of the film and computer industries. As he pointed out, a computer software package has a shelf life of around six months while a film may have a life time of sixty years or more (think of Gone with the Wind!). This has led to problems in deciding what copy protection systems DVD should use. According to Jan Oosterveld, the problem is "close to being solved".

Film companies not only want to stop people making high-quality analogue or digital copies of DVD material, they also want to preserve a system that one film executive calls "Intelligent Sequential Distribution", i.e. releasing films around the world at staggered intervals. Typically, a top movie will be released in the USA months before its European launch. By the time it reaches Europe it will already be available in video form in the USA. Until recently, film companies relied on the differentiation between NTSC and PAL regions to preserve this system of distribution, but by digitising everything DVD eliminates this divide. As a result a system to stop consumers importing DVD discs from other regions has been developed. It's called Regional Coding, and divides the world into six areas as follows:

Region 1: The USA and Canada.
Region 2: Europe, Japan and South Africa.
Region 3: Asia.
Region 4: Australia, New Zealand, Mexico and South America.
Region 5: Africa.
Region 6: China.

The idea is that DVD players and many discs will be developed for specific regions. Most DVD film discs will be encoded with a flag to identify the region for which they are intended. DVD players will contain a chip set that recognises the appropriate flag and refuses to play a disc when there is a regional mismatch.

Regional Coding takes DVD well away from the original aim of "one world, one disc". Some of those at the forum felt that the system would hinder rather than help DVD Video. One argument is that a group likely to be amongst initial buyers would be home cinema/film enthusiasts who probably already have Laser Disc players. Many of these are dual PAL/NTSC models, enabling users to choose from the thousands of titles available in the USA and Japan. The contention is that DVD would severely restrict disc supply, and without an adequate supply of titles the format would be unlikely to get off the ground as a consumer product.

## Copy Protection

The other major stumbling block has been copy protection. Film studios point out that DVD will give users access to a high-quality digital master, so there should be protection against both analogue copying (on to VHS tapes) and digital copying (on to digital tape systems and, when they are introduced, DVD players that can also record). This has led to disagreements with the PC industry, because the film industry wants to see copy protection systems applied to multimedia computers and DVD-ROM drives. At the time of writing this the following systems were close to being accepted by all concerned, though the situation remains fluid and could change.

DVD Video discs will be protected in the following way, see Fig. 1. The original programme material is first digitally encoded, producing a bit stream that contains a mix audio, video, control and other data. This is then encrypted, using a 40-bit key system. The Disc Encryption System (DES) has been developed largely by Matsushita. Error correction coding and modulation are then applied, after which the encrypted data is recorded on the disc.

The DVD player reads the disc to see whether an anti-copy flag is present. It then uses a key to decode the data. To prevent copying, Macrovision's Colour Stripe system is used during the analogue output conversion. This disrupts the colour subcarrier: as a result, green stripes appear on the screen when copied material is played back.

The PC system is more complex. A DVD-ROM drive will also sense whether an anti-copy flag is present on the disc. If so, the drive will encrypt the key but not the programme data (which is already encrypted of course). There will be a second key in the MPEG playback card or in MPEG software to decode the encrypted key, then the data. Why such an involved procedure?

If the DVD-ROM drive simply decoded the data, it could be digitally copied on to a PC hard disc or tape system. The double-key encryption arrangement gives you only the second part of the key system when copying the data. If you tried to use a DVD-ROM drive or player to reproduce the copied data, it wouldn't recognise the key and would refuse to play.

So far this system has not been adopted officially. Incidentally not all DVD discs will be copy protected. The computer industry is unlikely to encrypt DVD-ROMs, while there may be material – such as old films that have already been broadcast many times – that is not considered to be worth encrypting. Free, cover-mounted DVD discs are also unlikely to be copy protected.

## Launch Intentions

Despite the setbacks over copy protection, several companies are confident that they will be able to launch DVD players or drives before Christmas, in some markets at any rate. Toshiba and Matsushita have stated that this is their intention. Pioneer and Hitachi are also hoping to be able to achieve a 1996 launch.

Others, such as Philips and Sony, are being more cautious and simply say that they will not go ahead with a launch until all the specifications have been agreed.

There are also plans for DVD-R (write once) discs that hold 3·9Gbytes of data and DVD-RAM (recordable-erasable) discs that can store 2·6Gbytes. Many expect these discs to appear within the next two-three years despite the objections of the film industry.

## Players

A certain amount of information on how the DVD players will operate was available. The first thing the player will do is to read the disc to see whether the regional code is correct and whether it is copy protected. If the regional code is incorrect, the player will simply refuse to work.

One speaker stressed the importance of software designers creating good screen displays that tell the user clearly what's happening. If, for example, a player simply said "cannot play this disc", the user might take the disc back to the shop. If the player said "disc is not designed for this player" the user would know where the problem lay.

The players will be operated by six main buttons on a remote control handset. These will enable the user to navigate around on-screen displays. The buttons include title (to display the title screen), up, down, left, right and enter. There will also be VCR-type buttons for fast forward, still frame, etc. The on-screen cursor will jump from point to point instead of floating around the screen. Anyone who has used a CDi joystick control will know how tricky it can be to move a cursor to the right spot.

The DVD disc menus are known as sub-pictures. They will be used for a variety of purposes, such as choosing the preferred menu language (English, Spanish, etc.), selecting closed captions or subtitles and so on.

The DVD player adapts cleverly to your language of choice. You could for example choose to have captions in say English and the disc's sound track in French. If part way through the disc you select Spanish captions for example, the end credits will include information about the companies that provided both sets of captions. In other words, the end credits will vary in accordance with the facilities you use while playing the disc.

## Options

Another session was hosted by Mike Fitzgerald, vice-president of MCA. He stressed how important it would be to prepare plans carefully before developing a DVD film title, and the need for the best source materials. DVD will offer disc developers many options, including 4:3 and 16:9 aspect ratio pictures, multiple language sound tracks, Surround sound, closed captions, subtitles, choice of camera angles, and extra material such as the director's views or an actor's biography. Although some film companies present (including MCA and Warner) pledged to make use of such options, others were not so sure. It's hard to see why film companies would want to invest in all the extra time and expense to produce multi-language discs. Differences such as censorship laws would make it hard to develop discs for multiple markets.

The general feeling was that DVD offers some fancy features, but that few of them will be used in practice. Mike Fitzgerald added that the average cost of developing a DVD title would be around £20,000, which seems very low when you consider the work that has to go into the creative process alone. He also suggested that some DVD titles may not need high-quality MPEG-2 video, offering hours of MPEG-1 video instead – one example given was of a DVD exercise video, whose users would not be too concerned about having the best picture quality as they went about their routines.

## Prospects

So will DVD be a success? Few doubt that it will sell well in the PC market, with sales of DVD drives probably fast replacing CD-ROM drives. In the consumer electronics market its prospects are less clear. DVD players will be expensive (around £500-£700), won't provide a record facility (to start with at any rate) and will not be able to play discs intended for other regions.

Although DVD will offer superior sound and picture quality, there is little evidence that the public is prepared to pay for this (S-VHS and Laser Disc have remained niche products). One delegate suggested that the DVD market would be more akin to the camcorder than the VCR or audio player markets. Until DVD machines can offer recording facilities, this is probably about right.

# CD Player casebook

Reports from
Nick Beer
Roger Burchett
Hugh Allison
Robert Marshall
Graham Thomson
John Edwards and
Steven Leatherbarrow

## Beogram CD5500

This player, part of the Beosystem 5500, wouldn't play discs. As soon as play was selected the radial arm moved to the outside edge of the disc. Checks around the radial error/tracking error amplifier showed that the supply voltages were incorrect. Pins 2 and 4, which should have been at 9·5V and –9·5V respectively, were actually at –0·65V and –5·6V. As so often, a fault in one half of the split supply was upsetting both halves. The 9·5V regulator transistor TR10 had never had its base connection soldered. Remarkably, the player had worked for several years without giving any trouble, going wrong only when its owner moved house. **N.B.**

## Pioneer PD-Z91

This player was dead. When we removed the main PCB we quickly saw the cause of the trouble: voltage regulator IC12 was badly dry-jointed. **N.B.**

## Pioneer XR-P250M

This system turned out to be faulty when we installed it. Discs were not read and were immediately ejected – there's no drawer as this is an edge loading model. We found that there was no laser output or focus bob. As is so often the case, the cause of the problem was a break in the flexiprint link (PNP1343) to the optical unit. There are connectors at both ends, making it easy to replace. It's folded under the traverse deck at 45°: many attempts had obviously been made during production to get the angle correct! **N.B.**

## Sony CDP101

This early model had been well and truly butchered. I had to replace both servo chips and repair quite a lot of print. I then found that the focus gain control had been turned right up. The cause of the trouble was a faulty inverter in IC105. Because of this the laser wasn't being turned on. **R.B.**

## Saisho CDX200

Failure of the open/close button is a fault I've had with a number of these players. They often come to us with a disc trapped inside. More often than not the drawer mechanism will function correctly when you short out the switch momentarily (a quarter-inch screwdriver is ideal for this). The cause of the problem is nearly always that the small PCB which carries the single switch is mislocated.

Note that in these machines the open/close button is hinged at the top, i.e. it isn't a true button, being attached to the front panel. What seems to happen is that the front panel gets knocked, pushing the little PCB out of its two locating lugs so that the push button at the front can no longer reach it. Push the PCB back home, then use a dab of glue to hold it in position. **H.A.**

## Matsui CDS1000

The sound was fine at first, but after playing one disc there would be a strong hum as the next disc was loading, with a background hum that became worse as the disc was played. The sound output chip is an NJM4060D, which is supposed to operate with ±10V supplies. They read ±15V however. The transformer was not the wrong one, but a replacement cured the problem – even though the supplies were still not within specification. The **Matsui CDM30** uses the same PCB, which is a Philips design. **R.M.**

## Sanyo DC-D12U

The display lit up, the CD section produced an error indication and there was no audio output. The N20 ICP41 was open-circuit – it's near socket CN705. I then found that safety resistor R4903 was open-circuit, while the audio output chip had a hole in it and had burnt the PCB. Repairing the burnt area of the PCB and replacing the failed components put matters right. **G.T.**

## Cheap CD Players

This is something of a problem area. Access is often limited, and servicing is at times virtually impossible. The only spares available seem to be complete mechanisms, inclusive of the laser unit, and replacement PCBs. This is not good when the unit is out of warranty, as the cost makes repair uneconomic.

The good news is that the laser unit is normally a KSS210, which is readily obtainable, while in many cases all that's required is to clean the laser unit and the sled and apply a spot of light grease to the latter.

The PCBs seem to come from China. It is worth keeping old ones if you are given a unit that has been written off. **G.T.**

## Goodmans SS5200

This is a component system with a tuner and a cassette player connected via a ribbon cable to a CD player and amplifier. The customer complained that nothing happened when he tried to activate the tuner preset scan function using the remote control unit. A check showed that the remote control unit was in order, the cause of the fault being traced to the ribbon cable socket on the tuner/cassette player – it was dry-jointed. **G.T.**

## Alba CD1010

This machine wouldn't play discs. All three plugs to the CD mechanism had dry-jointed sockets. In addition there was intermittently no display and no operation. The plugs to the front PCB were not pushed fully home. **G.T.**

## Bush MS352

The mains transformer was open-circuit, the cause being shorted protection capacitors across the bridge rectifier diodes. This is quite a common fault. **G.T.**

## Daewoo AMI310

The CD player section of this tuner/tape/CD system did strange things

intermittently: the drawer would sometimes refuse to open or close while on other occasions the machine would refuse to play a disc. The cause was a dry-jointed socket – CN704. **G.T.**

## Proline/Alba SYS150CD

The CD lid catch on this Proline midi system had failed. We were able to cross-reference and obtain a replacement from Alba – the part no. is 700016846000. **G.T.**

## Sharp WQ-CD220L

The main fuse F651 in this portable radio/tape/CD player unit had blown. After replacing it everything worked until the tape deck was put into play. The fuse then went again. On investigation I found that the leaf switch in the supply to the motor was bent and shorting to chassis. A new switch cured the problem. All right, not a CD fault – but the sort of thing you have to watch out for with such units. **G.T.**

## Aiwa CXN340X

This midi system holds three discs, using a turntable. The drawer would go in and out, but the mechanical timing was incorrect because of grease that had become like tar – the large amount of nicotine inside the unit was probably not unconnected with this. A clean, regrease and realignment cured this initial problem.

I next found that the spindle motor didn't rotate, then that the sled motor didn't move. The cause was an open-circuit N10 ICP – it's behind connector CN30 on the CD PCB. While I had the equipment apart I cleaned and lubricated the sled.

The disc would now spin and the sled moved, but the player skipped. I'd given the optical unit a clean while I had the machine apart to replace the ICP. So I checked the eye pattern, whose amplitude was low at 700mV. Not surprising in view of all the nicotine. A new optical unit cured this final problem. **G.T.**

## Hitachi DA7000

We fitted a new loading belt to get the drawer to open and close when told, then found that the inserted disc wouldn't spin. Cleaning the lens restored normal operation. **J.E.**

## Alba CX740

When a disc was inserted this top loader did nothing apart from flash two zeros in the display. After switching it off I examined the objective lens carefully with a magnifying glass. Its milky white colour meant that there was no chance of it focusing on the disc. A phone call to the customer revealed that after cleaning the tape heads with methylated spirit he had decided to clean the "laser thingy" as well. The estimate for a new optical unit was refused. Oh well! **J.E.**

## Pioneer PD103

Severe sound distortion was the complaint with this CD player. We've had the fault before with this and some Philips models. The symptom is often caused by a faulty AD converter. Sure enough IC401 (type PD2026B) was defective – a blast of freezer proved the point. **S.L.**

## Panasonic RX-DT401

Apart from the CD section everything in this radio/tape/CD player worked correctly. But after inserting a disc and closing the lid the LC display remained unimpressed and did nothing. A few seconds later it would say "no disc". I noticed that the lens was bobbing up and down frantically in an attempt to focus, but the disc wasn't spinning. In fact the spindle motor's turntable had been pushed down the spindle shaft and was jammed against the cabinet moulding.

I released the turntable by prizing it gently upwards. It was then able to spin freely. After a few experiments to get the turntable height correct the player was back to normal. **J.E.**

# CD Player Casebook

*Reports from Mike Leach, Ronald Aranha and Nick Beer*

## Hinari DK100

This large, flat music centre appeared on the bench with a no CD operation fault. When it was switched to the CD position the laser would smack hard against the end stop, after which nothing else happened. I was eventually able to gain access to the CD unit, which uses a Philips laser and chips – these machines are not easy to work on as they have to be upside down most of the time. As I didn't have a circuit diagram I though at first that the fault might be rather involved, but after a few quick checks in the power supply I soon found what the cause of the problem was: there was no input to the 5V regulator and thus no 5V supply to the CD player section. I traced back to the function switch which, in the CD position, feeds the 14V supply to the 5V regulator. This switch was faulty and couldn't be cleaned or repaired. Just a small amount of pressure on the switch would restore the 14V feed to the regulator, after which the CD player section worked normally. A complete new switchbank was required. **M.L.**

## Bush MS265CD

The CD section of this midi system didn't work at all. We found that the laser unit was stuck at the outside of its travel and wouldn't move towards the centre of the disc to read the TOC. I took the side off the machine and broddled around the power supply, looking for dry-joints etc. or even open-circuit fuses, but everything seemed to be in order in this department.

One thing I had noticed was that the disc didn't sit evenly in the door – this machine uses a door rather than a tray. It was difficult to locate the disc and shut the door. When I looked a little more closely I realised that the two plastic studs on which the disc sits were broken. One of these studs opens a leaf switch inside the machine when the door is closed, giving an indication to the microcontroller chip that a disc has been inserted. This was in fact the cause of the trouble. When I opened the switch manually the laser unit moved to the centre of the disc and read the TOC, the player working normally. A new door was required. **M.L.**

## Sony D350 Discman

This Discman really took us for a ride. It can be operated with a 9V adaptor, a 3·2V rechargeable battery or two 1·5V dry cells for which a separate case that can be attached to the Discman is provided. There were no problems whatsoever with the 3·2V battery or the dry-cell pack, but when the 9V adaptor was connected the display said "no disc". Strange!

Checks around the MC34063M step-down d.c.-d.c. converter IC401 showed that the voltage at pin 7 dropped when the player carried out focus search and spindle rotation. Now pin 7 is the excess current sensing input. When excess current is detected pin 8 switches off the regulator transistor Q401. Since the machine worked all right with batteries it was obvious that there was false excess current detection. Q403 is used to detect excess current. Its collector output is coupled to Q402 after a delay that's determined by the values of R407 (10kΩ) and C427 (1μF). The reason for introducing this delay may be to take into account the initial surge (focusing and spindle rotation). C427 aroused our suspicion – it's a chip capacitor. A suitable replacement was obtained from a defective panel in a CCD-TR55 camera. It was carefully extracted from the PCB and fitted in place of C427. The 9V adaptor was plugged in, a disc was loaded and the top cover was closed. The machine read the TOC within two seconds and when play was selected the machine worked normally. **R.A.**

## Sony FHE939

The CD section of this CDPH6600 music system had difficulty reading the TOC with some discs, especially those that were scratched. Also the scanning used to get stuck when some tracks were played and skipping was sometimes noticed. A check on the r.f. waveform showed that the eye pattern was at 1·2V peak-to-peak, which was quite normal. The scope was next connected to point TE and an EF balance check was carried out. While the waveform was symmetrical around the zero axis its amplitude was only 0·2V peak-to-peak instead of 2·5V p-p. A new KSS240A laser block solved the problem. With the KSS240A most of the adjustments, such as focus bias and EF balance, are carried out at the factory. So replacement is a simple task. **R.A.**

## Sony FHE636CD

This portable music system came in because of a CD problem. When a disc was placed in the tray and the open/close button was pressed the tray would go in, focus search would start and the disc would rotate for a few seconds. It would then stop. This suggested that the TOC was read, but the fluorescent display showed 00 tracks and 00 00 as the total playing time. When the play button was pressed the disc didn't rotate and the play symbol didn't appear in the display. In fact the machine responded to only the open/close button.

Attention was turned to the UPD78134GF system control chip IC305. As the voltages and waveforms at the various pins all seemed to be normal we fitted a new chip. The TOC was then read and the display showed the number of tracks and the playing time correctly. The play and other CD commands also worked. **R.A.**

## Sony FHB170CD

The display said "no disc" despite the fact that there was a disc in the tray. There was no focus search after loading, the objective lens just lying idle. A check showed that the search voltage was present across the focus coil, so we measured its resistance. It was open-circuit. Fortunately the machine was under guarantee, a new KSS240A laser block curing the problem. **R.A.**

## Sony CDPS39

According to the ticket the fluorescent display sometimes indicated "no disc". A disc was inserted and the drawer closed. The machine then read the TOC and played the music without any problems. When we carried out further

tests we found that skipping occurred on a few discs, especially towards the end of the track. A check on the eye pattern at the r.f. test point showed that its amplitude was only 0·7V peak-to-peak. So a new laser unit was installed and the relevant adjustments were carried out. This increased the eye pattern amplitude to 1·1V p-p. There was now no skipping but the machine was kept on test.

At first switch on next day the display said "no disc"! When the tray was ejected and closed again the machine read the TOC. We consulted the customer who claimed that the machine had been sent to the Service Centre three times for the same problem whilst under guarantee and that the symptom would reappear, especially after a long rest. Careful inspection showed that the FOK signal was generated in the fault condition and the spindle motor drive was present but the motor wouldn't spin. A slight jerk on the disc would put matters right. A new spindle motor eliminated the problem. **R.A.**

## Philips AZ8492 (RCD-1D Mechanism)

This radio/cassette/CD player would occasionally fail to play a disc. Sometimes it would read the TOC then do no more. On other occasions it wouldn't do anything. The laser came on and focus was achieved, but things went no further because the spindle motor was tight. Unfortunately it's not available as a separate unit, so a complete new RCD-1D mechanism had to be obtained. **N.B.**

# CD Player Notebook

*Reports from Mike Leach, P.J. Roberts and Chris Hawkins.*

## NordMende CP3500

This machine wouldn't work at all after a new laser had been fitted. There was no TOC reading and although the turntable rotated it didn't do so at the correct speed. Going through the setting up procedure made no difference, and all the supplies were o.k. A check on the r.f. eye pattern showed that it was very poor and distorted and lasted for only a few seconds before the machine shut down in the stop mode. The cause of the trouble was dry-joints on the main panel – lots of them! I could see that most of the transistors required attention, and after a good solder up I was able to set up the machine. All was then o.k. One to watch out for. **M.L.**

## Akai ACM370L

This was a bit of a silly one really, but it caused some difficulties before we got to the bottom of the problem. A new laser had been fitted to this midi system, which was working all right. After using it for about a week however the customer brought it back with the complaint that "the tray was sticking and there was a crunching noise". When we ran it in the workshop it performed perfectly and quietly. Now as with all CD midi systems this machine is not easy to strip down. But we did so in order to check whether there was anything amiss in the tray mechanism. There wasn't.

The customer insisted that the tray would stick and sent us some discs to prove the point. This they did: the tray stuck because the hole in one of the discs was too small. When the open/close button was pressed to eject the offending disc the clamp stuck, making the crunching sound complained about. I felt like charging him a second time for all the hassle he'd caused but I'm too nice for that. I just smiled politely and sent him on his way. **M.L.**

## Test Disc

In previous CD player fault notes I've mentioned a test disc. Readers may be interested in details of this helpful item. The one I use is manufactured by Panasonic, the part number being SZZP1054C. Tracks 1, 2, 16 and 17 are for reference purposes and don't have any defects. Tracks 3-8 have an information layer break that increases in width from 0·4mm (track 3) to 0·9mm (track 8). On the readout side of tracks 9-15 there's a black dot whose size increases from 0·3mm to 0·9mm. Tracks 1 and 2 have a 1kHz sinewave (L + R) at 0dB while tracks 3-17 have a 400Hz sinewave at –10dB. **P.J.R.**

## Saba DAD9772TM/Telefunken CD300

A problem we've had is that the disc eject system fails to lift and eject the disc after playing two or three discs. Before you examine the mechanism check for dry-joints around the two voltage regulators IP05 (7805) and IP10 (LM317). They are mounted close to the mains transformer. **C.H.**

# CD Player Casebook

***Reports from Mike Leach***

## Philips CD104

This machine wouldn't read discs. The laser chirped all right and the disc span but nothing else happened. It looked as though some soldering had been done on the servo and decoder boards, but I went over them all the same. Unfortunately on this occasion resoldering didn't cure the problem. All the waveforms (focus, etc.) seemed to be o.k., and all the supply lines were up and correct.

I turned the machine on its side to watch what happened when the laser tried to read the TOC. Well, basically nothing happened! The laser didn't move at all. Often when mains power is applied to these machines the laser assembly gets a kick and a slight jolt can be noticed before it comes to rest. This didn't happen. The cure was to remove the loading carriage assembly, take out the laser completely then clean and lubricate the moving parts with oil. Although no friction had been noticed when the laser was moved by hand this cured the problem – it seemed loose enough to do the job but it was obvious that a certain amount of wear had occurred over the years.

The machine performed perfectly when the laser supply had been set and the lens had been cleaned. **M.L.**

## Samsung RCD1200

This portable music system, or Ghetto Blaster as these things have come to be known, came in with a no CD operation fault. There was no laser beam, nor was there any focus coil movement when the lid-down switch was shorted. I thought that the lid-down switch was possibly broken, so we stripped the thing down to gain access to the CD mechanics. When the complete assembly had been removed it was clear that the sled assembly had jammed. The lid-down switch was working but with the sled jammed the laser unit couldn't return to its centre position to give the laser-on switch a kick to activate the beam and focus servos.

The problem was purely mechanical, though it was unclear why the mechanism had jammed in the first place. After stripping the mechanism down and lubricating the drive cogs all seemed to be well and the machine worked normally. The laser drive cogs are plastic, but there were no broken teeth and the motor itself was o.k. The cause of the problem could have been lack of lubrication from manufacture. **M.L.**

# CD Player Casebook

***Reports from Mike Leach, Nick Williams and Nick Beer***

## Yamaha YSTC11

This compact midi system came in because of no CD operation. When we ran the set in the workshop the CD player section seemed to work all right. Then after about an hour or so it stopped and wouldn't read another disc. Stripping the machine down didn't help us – it started to work again and wouldn't go off for another hour!

We noticed, by using the laser power meter, that in the fault condition no laser light was being emitted. The focus circuit seemed to be working, since the focus coil moved up and down in the normal way. A small spray of freezer on the microcontroller chip IC851 seemed to produce light from the laser and the player started to work again. Eventually it went off completely, and although laser light was present the disc didn't spin and the TOC couldn't be read. We changed IC851 but this made no difference. A quick word with Yamaha then threw some light on the subject – no pun intended!

If one of these machines suffers from a turntable motor problem, i.e. the disc rotates backwards or there's no rotation at all, or the machine stops while playing normally or won't read a disc even when it's rotating at the correct speed, the first item to check should be plug CNW1. The lead is usually brown in colour and is connected between the main panel and the laser assembly. The usual problem here is poor crimping of the leads. The plug and lead must be replaced, part no. MX601220.

Unfortunately this didn't cure our problem. We eventually decided to replace the laser assembly, and this did the trick. **M.L.**

## Philips CD150

If the spindle motor runs at maximum speed and there's no TOC reading check whether the LA7905 –5V regulator is short-circuit. **N.W.**

## Pioneer PDZ81M-PDZ84M

If one of these multiplayers searches all discs in the order 1-2-3-4-5-6, doesn't read the TOC and doesn't play, i.e. the fault mode is engaged, switch the unit off and put it in the test mode. Press TRK FWD-PLAY-PAUSE and use a frequency counter to check the VCO at test point PLCK. If the oscillator doesn't lock, or hunts up and down, the spindle motor is faulty. Part no. is PXM1001 – it's available from SEME. Note that a spindle height jig is mounted at the left-hand side of the laser assembly to help when fitting a new motor. Be careful with the flexi PCB – it's easy to break this – and place a paper clip over the two solder tags on it before removal to avoid damage to the laser. **N.W.**

## Technics CDX50

The remote control handset worked intermittently. When we opened the unit up we found that the base of the IR driver transistor Q1 had never been soldered. **N.B.**

# CD Player Casebook

*Reports from Mike Leach, P.J. Roberts, Nick Beer and Richard Newman*

## Crown CDK2300

No CD operation was the complaint with this midi system. The tray opened all right, but when a disc was inserted it would on occasions rotate extremely fast and at other times not at all. With the CD section being at the bottom of the cabinet it was hard to see exactly what was going on: the laser seemed to be trying to focus, but without success. It was quite likely that the laser unit was faulty, but having been caught out before I decided to make a few other checks first.

As with most CD decks that are mounted in little black boxes this machine isn't easy to work on. I was able to make some checks around the decoder section however and found that the d.c. conditions here were haywire. I came to the conclusion that either the main microcontroller chip or the decoder chip was faulty. The latter (IC3) is a CXD1130Q and as I had one in stock I decided to go ahead and replace it. While I was removing the chip it actually broke in half – I'd applied no pressure whatsoever to it and was using a standard soldering iron, not a hot-air gun. The replacement cured the ailing crown, and the two halves of the chip were left for the customer to see. **M.L.**

## Sanyo CP17

The drawer wouldn't open, but if a disc was loaded manually the player would read the TOC and play the disc. I decided that the fault must be in either the drawer motor or the associated drive circuit. A voltage check was made across the motor when open was selected. There was very little voltage, certainly not enough to operate the motor. So attention was turned to the LB1645N drawer motor driver chip IC691. The voltage at pin 8 was low at 2·4V instead of the specified 9V. Now pin 8 is fed from the 9V rail via R691 (10Ω): pin 7 is connected directly to this rail and was o.k. at 9V. Obviously R691 was open-circuit. A cold check with the power disconnected proved this to be the case. A replacement restored normal operation and the test disc played satisfactorily. **P.J.R.**

## Toshiba SM55

The customer said that the CD player section of this unit wouldn't play certain discs. He was most distressed that it wouldn't play his REM, Dire Straits etc. though it happily played his mother's Daniel O'Donnell. We agreed that it had a curious sense of taste! Anyway, we found that it sometimes failed to read the TOC or was tardy in doing so: at other times it simply cut out whilst playing. It seemed that there was a focus problem, and after many hours spent dismantling the unit I saw the simple reason why – the lens was dirty! **N.B.**

## Philips CD380

This machine would run for weeks then decide not to read the TOC. A new deck assembly had been fitted, but this made no difference. I eventually found that the machine could be made to function by pressing the main PCB in roughly the centre. When I removed the panel I saw that there are a large number of chip components on the reverse side. A bright light, a large bench magnifier and a lot of patience finally revealed a chip transistor that had been glued rather than soldered. It was T6520 which is connected to pin 23 of the SAA7210 decoder chip IC6522. Removing the transistor, cleaning the print and fitting a replacement provided a complete cure. **R.N.**

# CD Player

*Reports from Mike Leach, Nick Beer and Philip Blundell, AMIEIE*

## Crown CD80R

There were several faults listed on the job ticket. First, that the machine would only intermittently read the TOC. Then, that when it finally did read the disc the left and right channels would go off independently. And finally that the machine would sometimes switch off and go back to the stop mode. We didn't have the circuit diagram for this particular model but noticed that relay RL101 could be heard clicking during some of the fault conditions. The machine's performance improved when this relay was changed, but the TOC readout was still intermittent. The cause of this fault was traced to dry-joints around the h.f. amplifier and decoder sections. When these had been attended to the machine worked quite well. After inspecting the main panel I'd advise anyone undertaking the repair of one of these machines to have a good solder up around the regulators as well. **M.L.**

## Marantz CD54

The customer's complaint about this rather smart player was of intermittent no functions. I ran the machine for several minutes and found that it would eventually stop, after which none of the controls on the front panel had any effect on its operation. Several boards are mounted on the front panel. One of these has several beefy transistors on it. All were dry-jointed. They were QY05, QY06, QY07 and QY08. A good solder up restored normal operation. **M.L.**

## Akai ACM370L

A new laser assembly had been fitted to this midi system. It worked all right for several months and then started to play its old tricks again – reading discs intermittently and playing only some tracks. The customer reported that track four of some discs couldn't be played while with some other discs the machine wouldn't play beyond track two. It all depended on the length of the disc. The laser whistled constantly while the player tried to find a particular track. Basically there was a mechanical fault: the sled mechanism would travel only so far after which it came to a halt.

The cause of the fault was traced to a faulty rack that drives the laser assembly via a series of cogs from the loading/sled motor. It screws on to the laser assembly at two points and after some time can crack at the screw holes. As a result is becomes slightly warped and is unable to travel it's full distance when driven slowly, i.e. in the play mode. A replacement rack cured the fault.

I don't think that this item is listed as a spare part. The service manual shows it as item number 22 on the exploded view but I couldn't find a part number. Presumably a whole CD mechanism assembly has to be ordered. Check with Akai. My spare part came from a scrap machine in the workshop. **M.L.**

## Philips 70CD555

For CD problems such as failure to read the TOC etc., before dismantling the set to get at the CDM2 try pressing the CD decoder board in the centre, then try again. If you are lucky the CD player will now work. Remove the decoder board and check for dry-joints on the wire links soldered to the component side – the dry-joints will be on the print side. It's worth a try: removing the CDM2 is almost a morning's work! **P.B.**

## Toshiba Computer CD Unit

This unit, from a local college, had no make or model markings on it though their engineer assured me that it was of Toshiba manufacture. It was a CD player, with audio outputs, and a parallel interface for use with computers.

The unit was dead and the 2AT, 20mm input fuse on the board and the one in the fuseholder accessed from the back were both black. The cause was a short-circuit bridge rectifier, which was replaced, but a hole had been blown in the side of the inrush current suppressor that's in series with the live input to the bridge. This was found to be a 10Ω, 3A device that I was able to obtain from RS Components.

Interesting to see the far superior mechanical build quality of this unit in comparison with domestic ones – and the use of a switch-mode power supply. **N.B.**

# CD Player Casebook

*Reports from Nick Beer, Mike Leach and Savio Da Costa*

## Toshiba SL55

In the February casebook I mentioned an SM55 that refused to play some discs because the lens was dirty. It seems to be a problem with these machines – I've had others since. Despite the large metal cover over the mechanism the lens gets badly affected by dirt. **N.B.**

## JVC XLE300

With consumer electronic equipment becoming ever more complex we all too often overlook the obvious. This was just such a case, and I could have kicked myself for not realising sooner what was happening. The complaint was that the player sometimes wouldn't read a disc, though when it did the results were o.k. On test in the workshop it wouldn't read any discs at all. So we assumed that the laser assembly was faulty and fitted a replacement. As this seemed to cure the problem we set up the machine and left it on a test run. Just for good measure we tried a long-play disc as well. This too was o.k.

When the next disc was tried however the machine took an extremely long time to read the TOC – in fact it made several attempts before it played the disc. After taking out the new laser assembly and again checking the mechanics I eventually realised what was going on. When a disc that lasted say an hour or more had been played the laser unit returned only very slowly to the beginning to read the next disc, which rotated very slowly. This in fact was the key to the problem. Fitting a new sled motor provided a complete cure. **M.L.**

## Akai ACM370L

With most discs that were tried in it this midi system wouldn't play the first one or two tracks. The outer tracks played all right. As the machine always read the TOC we decided that the laser unit was o.k. After some soul-searching we resolved the problem: the PLL coil was marginally out of adjustment and wouldn't lock up at the beginning of the disc. Slight adjustment of the coil was all that was necessary. **M.L.**

## Sharp DX650

This American (110V) machine came on when a new mains transformer from RS Components had been fitted to adjust for the different mains supply voltage. But when a disc was inserted CD showed in the display. The sled motor had seized – a drop of oil on the bearings freed it. After that the machine worked well. **S.DaC.**

# cd player casebook

**Reports from**
**Nick Beer**
**Chris Watton**
**B. Ross**
**P.J. Roberts**
**Robert Marshall**
**and R.E. Kemsley**

### Sony CDPC50M

This five-disc carousel CD player was largely dead – there was no display and the drawer was sluggish, though the machine would eventually play discs. The cause of the problem was R604 (1·2kΩ) in the –25V regulator circuit (Q601/2). It had gone open-circuit. **N.B.**

### Murphy MS176CD

The CD section of this budget music system would not readily read the TOC. Cleaning the lens improved matters but it was still reluctant. A new pattern optical unit – it uses the Sony KSS210A/KSS150A – cured the fault. **N.B.**

### Sony CDP502ES

This CD player had come to sunny Devon from the Middle East and wouldn't register discs. I found that because of a stuck transit lever the traverse was jammed at its outermost extremity. Even when the lever was released it stopped the traverse. A clean cured the problem. **N.B.**

### Pioneer DEH66

This in-car CD player produced no sound output and its case got very hot: the audio output chip IC551 was short-circuit. When this item had been replaced the operating temperature was more reasonable but there was still no sound. The MA3091 surface-mounted zener diode D551 was missing – it appeared to have dropped off because of all the heat from the faulty IC. A new MA3091 restored the 8V supply, but again there was no sound. The bias supply BTB was found to be very low because Q953 (2SB1243) was open-circuit – it's in the separate, screened power supply. Presumably this was another result of the IC failure. **N.B.**

### Top-loading CD Players

If a twelve-track disc was played then a short, four-track disc was inserted the display still showed that twelve tracks were available – the disc could be played. If the short disc was inserted first, four tracks in the TOC would be read. Then, when the twelve-disc was inserted, only four tracks would be played. Everything worked normally if the mains supply was interrupted. Quite simple: the door switch was shorted. Afterwards I wondered whether the laser worked when the door was open? **C.W.**

### Saisho CDX101

I've had two of these personal CD players with the same fault, no operation with the mains power supply. The cause of the trouble is the player's power supply socket, which is mounted on the PCB directly without any mechanical support. When the power plug is inserted, the force results in the socket pivoting about its central lead, breaking the PCB track. Linking the break across will restore operation, but to prevent socket movement I add some hot-melt glue as a fillet between the body of the socket and the PCB.

Another machine would not play with either batteries or the power supply. There was no disc rotation or sled movement. The display was present and operated correctly – pressing skip forward or reverse altered the selected track number in the display. When I dismantled the unit I found that the power socket had already been repaired: but the wire link to the socket was dry-jointed. Remaking the joint restored normal operation. **B.R.**

### Hitachi MXW01

One of these units was brought in because it wouldn't read discs. The usual cause of this is dry-joints on the main PCB. Resoldering these restored CD operation, but there was digital noise (very loud) on the playback audio. A new DAC chip was tried without success. On further investigation I found that one leg of the RAM IC was dry-jointed. Putting this right cured the problem. **P.J.R.**

### Sony CDPC425

This unit was brought in because it wouldn't play CDs and a mechanical sound came from within. Once the top had been removed I saw that the disc tray moved back and forth without any disc clamping. The cause of the problem was a fractured ribbon cable that connects the disc tray optosensor to the main PCB. A new ribbon cable put matters right. **P.J.R.**

### Technics SLP202A

This CD player's drawer wouldn't open unless it was given a gentle push from behind. As there were no mechanical problems, attention was turned to the power supply. I found that the –7V supply was low because the protector ICP12 had gone high-resistance. Normal operation was restored when it had been replaced (type ICP-N15, 600mA). **P.J.R.**

### Sony CDPS37

This is a separate CD player for use with the TA717 amplifier. The one I had in displayed a zero for a moment then went dead. IC1 (M5294P) regulates the ±5V supplies, which were being shut down because a fault was detected.

The ±5V supplies continued to be present at pins 12 and 3 of IC1 when plug CNJ11 for the front display was disconnected. The cause of the fault was a small electrolytic capacitor, C333 (100µF, 10V), which decouples the 5V line and is mounted amongst the keyboard switches. The replacement doesn't have to be so small as it can be mounted on the other side of this double-sided PCB. **R.M.**

### Sharp DX461

This player loaded all right but wouldn't read the TOC. The loading

switch's plastic pusher was missing. As a result the switch made momentarily on loading, to stop the loading motor, but didn't stay closed. A new switch resolved the problem. **R.E.K.**

## Aiwa RDX01Y

This machine would play about half a track, stop for approximately two seconds then restart, sometimes returning to the start of the track. We noticed that the sled motor did not move. Voltage checks revealed that there was no sled output from the servo chip during play, except when the forward button was used. A look at the circuit diagram showed that a sled inhibit switch is present in the main microcontroller chip. When this was disconnected the unit worked all right. A new microcontroller chip restored normal working. Perhaps someone could tell us why this inhibit switch is incorporated? **R.E.K.**

## Technics SLPJ20

This machine wouldn't play discs. It would load a disc, and there was RF at the test point, but nothing else. Disc rotation couldn't be stopped with the stop button. Scope checks showed that the input to IC304 was OK but the EFM output was incorrect. When IC304 was replaced the machine worked correctly. **R.E.K.**

## Sony HCDD117

Disc play would stop intermittently. On test I noticed that the disc display flickered. When the function buttons were used to switch from tuner to CD the CD display sometimes flashed before locking on. The cause of the fault was traced to the 7V regulator IC400, on the main board. Its centre pin was dry-jointed. **R.E.K.**

## Sharp DX461

There was intermittent failure to read a disc. This was because the gear rack didn't go home fully. Correct operation was restored when the gear rack (part no. NGERR0035UFZZ) and the disc holder (part no. GCDV1871UFSB) were replaced. **R.E.K.**

## Sony CDPC325M

This machine would load but wouldn't read the TOC. Checks showed that the outputs from the power supply were correct. Most of the voltages on board BD were OK, but there were some variations around IC102. I initially took the readings with the negative probe connected to the zero line on the main board: when the probe was moved to IC102's zero pin all the voltages around this chip were found to be incorrect. The cause was an open-circuit in the ribbon cable between board BD and the main board. A new ribbon cable restored normal operation. I must watch out for multiple zero lines in future. **R.E.K.**

## Sony CDP710

At switch on there was sometimes no front panel control of disc operation despite the fact that the TOC was read and the RF from the disc was OK. There would also be no sound. A scope check on the data lines between the main board and the front panel showed that the data went missing. Freezing the Mecha Micon chip IC701 restored normal operation. When IC701 had been replaced everything was back to normal. **R.E.K.**

# CD Player

*Reports from Mike Leach, Nick Beer and Philip Blundell, AMIEIE*

## Philips CD150: Quickie Remedies

**Tray doesn't open/close:** Check and replace as necessary the tray motor drive transistors on the front panel. They are prone to failure. The correct types must be used.

**No sound:** Check the 12V supply to the audio amplifiers. You may well have to replace the MC78M12 regulator chip IC6316. If necessary check the SAA7030 filter chip by replacement.

**Distorted sound:** Check the –18V supply at pin 11 of the TDA1540 DAC chips. If the supply is high or low, replace the MC7918 regulator chip IC6315 and its associated 33µF smoothing capacitor C2414.

If the supply is o.k., check by replacement IC6311 (SAA7000) and/or IC6312 (SAA7030). The SAA7030 filter chip can also be responsible for distorted or no sound from one channel. Distortion in one channel is often caused by a leaky capacitor associated with the relevant TDA1540 DAC chip. Use a hairdryer/freezer to check the capacitors connected to pins 12, 13, 14, 18, 19, 20, 21, 23, 24 and 25.

**Disc spins too fast at TOC reading:** Carry out thorough resoldering around the regulators in the power supply circuit and clean the laser lens. If the fault persists it's likely that the laser unit is faulty.

**Intermittent problems:** If the machine starts to play then stops after a short while, or the tray opens of its own accord while the machine is playing, or the display appears to lock up, check all the plugs that link the front panel to the main board and the servo board. These plugs are often poorly crimped, the result being a multitude of weird, intermittent faults.

**Permanent or intermittent display segment problems:** These are usually caused by the display assembly itself rather than the front control chip. **M.L.**

## Sharp DX620H

This machine was brought in because there was no display and no other operation. The cause was simply that the mains transformer (part no. RTRNP1190AFZZ) was open-circuit. When a replacement had been fitted the machine appeared to be all right. We left it on soak test and found that after it had been playing for a short time, i.e. the length of a disc, it was very reluctant to play track one again. Track two could be selected but not track one.

As the laser unit used in this model is so expensive we decided to explore every other possibility before fitting a new one. Initially we thought that a mechanical fault in the sled mechanism could be the cause. But the fault was still present after servicing it. We then went through the setting up procedure and discovered that the PLL frequency was slightly adrift. The machine worked perfectly once the PLL had been set up. **M.L.**

## Technics SLP320

The problem with this player was intermittent failure to read or play a disc. We found that the lens was heavily coated with dirt. Cleaning it increased the r.f. by 300mV, but the cause of the trouble was dry-joints on the traverse drive transistor Q181. It's part of a complementary pair (Q181/2). **N.B.**

## Philips AK601

The fault note read "dead, but the display comes on when the open button is pressed". Sure enough there was no activity anywhere when I switched the unit on, but the display came on for an instant when the open button was pressed – nothing else happened. I took off the top, pulled out the drawer to remove the tray facia, removed the cabinet front then tried again. This time the player worked, but if the tray was in at switch on it still refused to work.

Everything became clear when I found that removing the tray motor belt cured the fault. At switch on the player pulses the tray motor to make sure that the drawer is shut. If the tray is in, the motor stalls and extra current is drawn from the power supply. A check on the rails confirmed that the 5V supply fell, as a result of which the microcontroller chip ceased to operate. The ripple at the input to the 5V regulator seemed to be excessive. A check on its frequency produced a reading of 50Hz. This from a bridge rectifier? Yes, one of the bridge rectifier diodes was open-circuit. I replaced all four to be on the safe side. **P.B.**

# CD Player Casebook

*Reports from Mike Leach and Nick Beer*

## Kenwood DPM6630

This machine was brought in with two discs stuck in the mechanism. One was in the six-disc magazine, the other one in the single-disc tray assembly. Nothing happened when the open/close button was pressed to open the tray or the eject button was pressed to open the magazine. Initially I thought that there might be a power supply fault, but checks in this department showed that everything was in order. Perhaps the LA6510 loading motor drive chip was faulty? As the same type of chip is used as the focus/tracking driver I interchanged the two. This made no difference. I removed the two discs by unwinding the mechanism by hand, after gaining access to the series of cogs at the bottom of the mechanism. When this had been done there was still no movement from the mechanism, so checks were made around the system microcontroller chip IC7. As a high of around 0·7V was obtained at pins 35 and 36 when eject or open/close was pressed I came to the conclusion that IC7 was probably faulty, but a replacement didn't alter the situation.

Having provision for a tray and a six-disc magazine, the mechanism used in this player is very complicated. Several leaf switches dotted around it tell the main microcontroller chip what the mechanism is doing. If the mechanism goes out of sync the microcontroller chip gets thoroughly confused. The result can be complete lock-out, which is what had happened. Part of the plastic chassis had broken. This affected the series of cogs driven by the loading motor. The only cure is a complete new plastic chassis, part no. A10-2994-11. If nothing on the main chassis is actually broken Kenwood advise fitting the counter-measure parts kit, part no. W05-0434-00. This should rectify any other problems that might occur should a disc get stuck. It won't however rectify problems such as the one we had. If the plastic is broken, the mechanism must be replaced. **M.L.**

## JVC RCX510

There was no CD sound from this portable music system. It read the TOC all right and went into the play mode, but nothing came from the speakers. The tape and radio functions were o.k.

I stripped the unit down to gain access to the CD board in order to carry out some voltage checks, plug checks, etc. When this had been done my first move was to give the CD board a gentle twist while in the play mode to see if any cracks in some of the finer print showed up. No luck: the fault remained the same. Then I spotted the cause of the problem. It was a fault I've not had before. Two or three of the data processor chip's pins had come away from the board and weren't making proper contact. Very careful soldering in this area restored normal operation, after which all was fine. **M.L.**

## Toshiba RT8089

This CD/radio/cassette unit would read the TOC but when it was asked to play it would spin up then rotate the disc backwards at high speed. There was evidently a focus fault, and we found that the focus servo couldn't be set up because of an offset error caused by the optical unit. After fitting and setting up a new unit the results were superb. A new cassette belt was also required on the PB deck: the old one had wrapped itself around the single motor's pulley, stressing both decks! **N.B.**

# CD Player Casebook

*Reports from Mike Leach and Ronald Aranha*

## Laser Problems

A spate of faulty lasers has given us some problems recently. The first machine was a Samsung RCD995 portable radio/CD/cassette player. When brought into operation it would read a disc, play it for about a minute then stop. After that it would no longer read discs. If you left the machine switched off for a few minutes then switched on again it would once more perform for a minute or so. A new laser assembly cured the problem, but considerable adjustment was required to set it up. This made me wonder whether the original assembly had been faulty from new.

The second machine was a Pioneer PDM601. When the first disc was inserted the laser unit seemed to move towards the outside before slowly returning to the centre: after this it would sometimes but not always read the disc. The first clue we had was the fact that the machine would read only some discs, not others. A new laser assembly restored correct operation.

The third machine was a Goodmans GCD601 which had a tendency to skip and jump with long-play discs. A disc that had a playing time of less than about forty five minutes seemed to be all right. Again a new laser was the answer. **M.L.**

## Sony CDPS39

The customer complained that this machine got hot and that after an hour's use the sound was distorted. We ran it on test and found that the heat it generated was, when compared with another machine, normal though it was quite warm. After forty five minutes or so the distortion set in. So we checked the eye pattern waveform at the r.f. test point. There was no clear eye pattern: it was distorted, as though clipping was taking place. We first checked the power supply, whose outputs were normal. Next a few bursts of freezer were applied to the r.f. amplifier chip, which is in the laser assembly. This restored normal sound. Hot air brought back the distortion. A new laser unit, type KSS240A, cured the fault completely. **R.A.**

## Sony CDPM43

The complaint with this machine was that the display said "no disc" though there was a disc in the tray. We found that focus search took place and there was laser glow, but the disc didn't spin. So attention was turned to the spindle-motor drive circuit. The drive comes from pins 26 and 27 of the BA6297 chip. There was a voltage across these pins when the focus o.k. signal was generated, but this voltage didn't appear across the spindle motor's terminals. The player has a double-sided PCB. As none of the tracks were open-circuit or cracked the cause of the fault had to be one of the plated-through holes. When pin 26 of the chip was wired directly to the motor's negative terminal the unit read the TOC and played normally. **R.A.**

## Telefunken CD300E

This machine was not able to read the TOC. We played a few discs but there was severe skipping. A check showed that the peak-to-peak amplitude of the eye pattern waveform was just 0·5V. After fitting a new laser unit, type KSS150A, and setting it up the machine played normally, the amplitude of the eye pattern waveform being 1·2V peak-to-peak. **R.A.**

## Sony Discman D90

There was no display, no focus search and abrupt shut down. We put the machine in the service mode but the display didn't change. The cause of the trouble was a dry-joint at the emitter of the 2SB1182 transistor Q417. Resoldering restored normal operation. It seems that the dry-joint could have been caused by the heat Q417 generates. **R.A.**

## Sony CDP17F

The customer complained about skipping. While checking the EF balance we found that the peak-to-peak amplitude of the waveform was just 0·5V. The manual said it should be 1-2V. Lens cleaning made no difference, so a new laser unit was fitted and set up. The machine then played perfectly. **R.A.**

## Sony Discman DT66

This player wouldn't read the TOC. We noticed that the spindle motor table, which holds the disc by means of three spring-loaded steel balls, was broken. Because of this there was too much wobble when a disc was loaded and rotated, hence no TOC reading. After fitting a new spindle motor, part no. A-3133-413-A, the machine worked normally. We've had this problem with a number of these players. **R.A.**

# CD Player Casebook

*Reports from Mike Leach and Joe Cieszynski*

## Aiwa DX-M77

The ticket said no results. When I switched the player on only the top right-hand corner of the fluorescent display lit up. No other functions worked. After getting a photocopy of the circuit from my friend Microwave Roy I checked the power supply system and found that the 5V ever supply was missing. The cause of this was a crack in the print around the 78L05 series regulator IC3 – there was in fact no 10V input at pin 1. When the print had been linked up the 5V supply was restored but the fault symptoms remained the same, with only part of the fluorescent display lit. I next moved over to the microcomputer chip IC51, where d.c. checks showed that there was no 5V supply at pin 15. This was again caused by cracked print. After a few blobs of solder the machine worked normally.

**M.L.**

## Saisho CDX200

I thought there'd be a Philips machine inside this one, but there wasn't. In fact it was something I'd never seen before. The machine played all right but there was no sound, due to a fault in the audio section. Fortunately I noticed a slightly discoloured 470Ω resistor on the audio/mains board – yes, that's right, audio and mains on the same subpanel! The 470Ω resistor, R923, was in the 9V feed to a BA4558 chip. Basically the cause of the trouble was no 9V supply at pin 8 of this chip. I decided to replace the resistor, the chip (IC901) and the 220μF capacitor C922. After doing this the machine produced good sound. Be sure to disconnect these machines from the mains supply before attempting to remove the nasty audio board – it can bite!

**M.L.**

## Matsui Midi 75CD

The play function was o.k., the fluorescent display did all that it should but there was no sound. When a disc was being played you could hear a faint hum through the speakers. I'd no circuit diagram so I dived in and trod carefully. It didn't take long to find that there was no 5V supply to the LC7880 DAC chip IC7007. It comes via a 100Ω resistor R038 which had a voltage at one side and nothing at the other. While I was making these checks the supply returned and the sound reappeared. There were no signs of dry-joints in the area so I replaced the resistor and, just in case something strange was going on, the chip. The machine then worked perfectly.

**M.L.**

## Dirty Lenses

In the November CD Player Casebook Mike Leach pointed out that some models are more susceptible than others to having a dirty objective lens and asked for comments. One factor that seems to be significant is the seal on the disc drawer when in the closed position. Many players have a loose-fitting drawer with large air gaps. This allows smoke, cooking fumes etc. to get inside with the result that the objective lens becomes fogged over. Think of the way in which the tube face of a TV set that operates in a smoky or dirty environment soon acquires a dark film over its surface. Consider the effect on laser output when such a film builds up on the objective lens.

A build up of dirt and grease on the sled mechanism also has a significant effect on CD player operation. For those more familiar with VCRs I should point out that in comparison the amount of grease needed to upset a CD player is quite small, because of the much finer mechanical operation. In addition a video mechanism's tape guides and heads are cleaned to some extent by the wiping action of the tape. There is of course no such cleaning action for the objective lens.

I also wonder whether the materials used in manufacture of the objective lens have a bearing on the build up of dirt. In most cases the lens is coated with a form of plastic. As we all know, some plastics are inclined to build up a static charge that attracts dust. This is a pure hypothesis on my part however and it would be very difficult to prove the point without the assistance of laser assembly manufacturers.

**J.C.**

# CD Player Casebook

*Reports from Mike Leach, Philip Blundell, AMIEIE and Joe Cieszynski*

## NordMende CP3000

This player wouldn't read the TOC – our customer complained that it made a strange noise. On removing the top cover we saw that the disc didn't spin. Basically, as the tray didn't load fully the microcomputer chip wouldn't tell the player to go.

With a fault like this the usual procedure is to replace the loading belt and clean the tray loaded/unloaded switch – you usually find it on the mechanism somewhere under the tray. Not on this one however. In fact there's no switch. The microcomputer chip simply relies on the loading motor coming to a stop when the tray is fully loaded. It then tells the laser to come on and the disc motor to spin. It's possible to initiate this procedure by hand. When we did this we found that due to a faulty loading belt the loading motor continued to spin with the tray in. When the motor was stopped with a finger the machine switched the laser on and read and TOC. After replacing the loading belt and the motor I got the necessary jolt as the tray fully loaded. The machine then worked perfectly. **M.L.**

## Philips CD373

The headphone output was o.k. but when the output was fed into an audio amplifier there was distorted sound. This was due to a burn up on the audio board. The culprits were R3126 (33Ω) and its associated smoothing capacitor C2106 (100μF). **M.L.**

## Pioneer PDM500

This multi-play machine suffered from the now all too common Pioneer problems. First, it wouldn't read the TOC because of a faulty turntable motor. When this item had been replaced and the machine had been reassembled I found that it was very slow at finding tracks. It would also occasionally jump across large sections of the disc.

I put the machine in the test mode to start going through the setting-up procedure. When these machines are in the test mode it's possible to move the laser assembly across the disc quickly by pressing the manual search forward and reverse buttons. The action was very slow with this machine however. This was because I hadn't cleaned and lubricated the worm gear when I'd fitted the new turntable motor. The problem has been mentioned before in these pages – Nick Beer wrote about difficulty with dirty worm gears in Technics machines. Always clean them: it could save you the price of a laser. **M.L.**

## Mission PCM4000

The problem with this machine was crossover distortion in the right-hand channel sound. The output from the DAC is too small to see easily with a scope but as the manufacturer has brought the DAC outputs out to links it's a simple matter to swap them over in order to check whether the analogue section is o.k. It was. A new TDA1541 DAC chip put matters right. **P.B.**

## Sanyo CP08

The complaint was of intermittent cutting out whilst playing. When I tried the player it seemed to be very sensitive to the slightest disturbance. Tapping the player would result in the servos going out of lock and the CPU would then initiate the stop mode. It seemed likely that there was a dry-joint somewhere. So I removed the main panel, using jump leads to maintain the earthing. The player now behaved impeccably. Suspecting that I'd disturbed something I resoldered any joint that looked dry.

After extensive board tapping and flexing I reassembled the player only to find that the fault was back again. This routine continued for some time until, by sheer good fortune, a jump lead fell off while I was flexing the board. The fault then showed up instantly. How could I have missed it? The main panel has a number of earth connections, one of which is made via the fixing screw at the rear, right-hand corner. Contact is made via a pad of solder which in this case had become tarnished. I should have been warned – I'd had a very similar tussle with a Toshiba colour TV set a few years ago. After remaking the solder pad I fitted a grip washer between the pad and the chassis to make sure that the fault didn't recur. **J.C.**

# CD Player Casebook

*Reports from Mike Leach and Nick Beer*

## Kenwood DP460

This machine wouldn't play. It would read the TOC on all discs but when play was selected the disc would spin and nothing else would happen. The disc appeared to rotate at a constant speed, and the r.f. waveform was stable and clean. I opened the tray and tried again, but the same symptom occurred each time.

The next step I took was to select track five to see whether the laser assembly would move to the correct section of the disc. It remained at the centre of the disc and didn't move at all. When I gave the sled motor a jolt however the laser assembly moved happily and track five was played as requested. Out came a scrap Lasertech CD100 machine which uses the same type of sled motor. When this was fitted in the Kenwood machine it worked normally again. **M.L.**

## Technics SLP420

This Technics machine wouldn't play, nor would it read the TOC. On occasions the disc would spin extremely fast, but this occurred with only some discs, not all of them. We cleaned the laser lens and serviced the mechanism but the fault persisted.

A check on the r.f. waveform at test point TJ301 provided a clue as to the possible cause of the fault. The waveform could be seen to be contracting and expanding slightly at the right-side whatever disc was inserted into the machine. This indicated that the turntable speed wasn't correct, probably due to a servo fault. Further scope checks led me to the EHDGA1234 data slicer and EFM chip IC304. Replacing this cured the fault and when the machine had been set up it performed superbly. **M.L.**

## Denon DCD700

The disc caught on the mechanism as the tray went in and out. This marked it. In addition the disc scraped as it span. The cause of these problems was the fact that the turntable had slipped down the spindle motor shaft. It relies on the friction of the plastic material, and as this was worn it wouldn't stay at the correct height.

New parts were ordered, including a new spindle motor as the bearings in the original one had become noisy and knocked. What we received was a modification kit containing a motor of new design and a metal turntable which has a hex-headed grub screw for fixing – a much more suitable arrangement. A circuit modification is also needed – add an 0·1$\mu$F capacitor in series with a 22$\Omega$ resistor between pin 1 of IC201 and chassis. This is in the circuit that controls the spindle motor drive transistors. **N.B.**

# CD Player Casebook

*Reports from Mike Leach, Ian Bowden, Nick Beer and P.J. Roberts, G1VUV*

## Sony CDP-M35

At switch on the tray would open very fast and the turntable would rotate extremely fast. There were no other functions and the open/close button would not close the tray. This situation is indicative of a fault in the power supply, so voltage checks were made. We soon found that PS902, an N15 circuit protector, was open-circuit. It's in the supply to the 79M05 voltage regulator. As the replacement immediately blew there was obviously a direct short-circuit. The voltage regulator checked out o.k. but the 1,000$\mu$F, 6·3V capacitor across it, C904, was shorted. Replacing this item cured the fault and after replacing the loading belt and cleaning the laser lens the machine performed perfectly. **M.L.**

## Akai CD-A30

This full-sized machine suffered from a fault reported in these pages before. The diodes in the power supply would fail after about half an hour, the result being that the disc span very fast and the sled assembly moved to the outside of the disc and stayed there until the machine had cooled down. Replacing the diodes cured the problem but we then found that there was occasional intermittent failure to read a disc.

One thing I always do when a machine won't read a disc is to check whether laser focus action is evident, i.e. does the laser move up and down? In this case it didn't but the focus drive waveform was present. This indicated that the fault was in the laser assembly itself. With this machine the plastic cap around the laser lens can be removed to gain access to it. A very light drop of thin oil on the lens pivot provided a cure in this instance. I must stress that only a very small drop was required — any more could have ruined the laser. **M.L.**

## Sony CDP-M35

The complaint with this machine was skipping. We found that it was worse at the beginning of a disc. Another point we noticed was the noise level — there was more than the normal servo noise. When the tracking gain was very slightly decreased from its initial position there was wild jumping. A slight increase cured the problem.

We removed the mechanism and tried spinning the spindle motor by hand. With the mechanism held vertically there was just brush and commutator noise. When the mechanism was held horizontally however there was a rattle from the motor and the vibrations from it could be felt through the mechanism plate. A new motor assembly was therefore ordered. The motor, disc table and mechanism plate are supplied assembled, so the laser unit, the guide rail, drive gears etc. have to be transferred. After doing this the machine behaved normally: when the tracking gain was reduced gradually the servo would just "cut-out" instead of introducing disc jumping. **I.B.**

## Pioneer PD4300

This machine wouldn't play discs at all, including TOC reading. In the test mode everything was o.k. until you tried to close the tracking servo — it wouldn't. The electrical adjustments were all o.k. and servo checks were inconclusive. For a very new machine the case was rather battered, so I decided to check the grating adjustment. The diffraction grating had indeed moved, but trying to reset it was most difficult — it wouldn't stay where it was put. A new laser unit presented no such problems.

During a soak test we found that in about one time in ten the drawer failed to open. This was because the disc stabiliser was stiff in its upward movement. It thus held the disc clamper arm down against the disc and tray, preventing it from moving. The disc stabiliser is pivoted across the tray. We found that the plastic housing for the arm was stressed at its right-hand pivot (opposite the clamper pivot side). It thus fouled the arm as it moved. Relocation is easy. **N.B.**

## Goodmans GCD530

Whilst working on one of these players recently I discovered one or two things that might be of interest to others. First, if you change the laser unit you must perform the focus and tracking offset adjustments (FO, VR3 and TO, VR5) before trying the player. Otherwise it will just sit there and do nothing. Note that you adjust the focus offset for 200mV positive with respect to the zero volts d.c. level. If you don't have a Goodmans laser unit in stock you will find that the Sony KSS150A will fit and works just as well, though you may have to reduce the focus gain setting a small amount.

It's also important to check the r.f. amplitude with a good disc. Adjust the laser power (VR4) for 1·8V peak-to-peak. **P.J.R.**

# CD Player Casebook

*Reports from Mike Leach and Philip Blundell, AMIEIE*

## Philips CD104

This player wouldn't read discs. When a disc was loaded it immediately span very fast and wouldn't stop. The laser whistled a bit and the error light on the front panel came on. I started by checking the earth-through connections on the servo and decoder panels, but for once they were all in order. My next checks were on the supplies, but again everything was o.k.

I then noticed that the turntable span fiercely with no disc inserted. This was a good indication that the fault lay somewhere in the turntable motor servo or its associated circuits. Voltage checks were made around the MC1458 chip IC6209 on the servo board: this chip, along with transistors 6233 and 6234, provide the turntable motor drive. Apart from the supplies most of the voltages were incorrect. When I moved back to the LM339 chip IC6205 I found that the voltages were again wrong. With a working machine pin 13 should be at 0V in the stop mode and at 4V when play is selected. It was high at 4·6V in the stop mode and fell to 2·1V when play was selected. As a result the turntable servo became unstable, causing the reported fault. A new LM339 chip cured the problem. The machine then performed quite well – all that was now needed was a quick laser lens clean and a soak test for possible intermittencies with regard to those earth-through connections. **M.L.**

## Goodmans GCD550 Multiplay

This player first came in about a year ago. The trouble seemed to be quite straightforward. When the disc magazine was inserted and the play button was pressed a very loud rattling noise could be heard as the disc tried to load. Fortunately the disc wasn't damaged, but it sounded as if the mechanism was suffering. I found that the magazine would load all right if pressure was applied to the top of the mechanism. After much stripping down, with modifications and grease everywhere, I gave up and used a complete mechanism from a scrap machine (cheat!). The customer was happy however and so was I. The machine worked correctly for many months then a few weeks ago came back again. The note on the job ticket suggested that the fault symptom was the same as before. Sure enough the player rattled fiercely while trying to load a disc.

My first thought was that the cause of the trouble was to do with the magazine itself, but the same thing happened with a different one. So that ruled the magazine out. When the disc loading motor, on the left-hand side, has been removed you can turn the feeding gear by hand. At the point where the disc is loaded into the mechanism the gear became very tight and started to slip against the feeding rack. I lifted the feeding gear from the chassis at this point, exposing the rack. The teeth on both were badly worn and it was this that caused failure of the disc to load and the rattling. The part numbers are as follows: feeding rack 21W8135, feeding gear 21W8141. **M.L.**

## Denon DCD800

This machine read the TOC all right and played the first few tracks normally. Occasionally however it would skip and jump at the outer edge of the disc. With many players this fault is often caused by a worn or faulty laser unit. Turntable motor problems or mechanical failure are other causes. Not this time though. As with all cases of tracking problems I went through the setting-up procedure. The PLL adjustment was slightly off: correcting this cured the tracking problem with all discs. This is a fault condition I've not come across before. **M.L.**

## Philips CD350

This machine wouldn't read the TOC. Focus was obtained and the h.f. signal was present, but the disc rotated much too fast. The motor control signal (MCES) should be present even in standby. In this case it was missing. Checks around the SAA7020 chip showed that the chassis pin (38) was at 5V. The earth return is via C2362's negative lead, which is soldered on both sides of the board. Not in this case however – there was a dry-joint on the underside. **P.B.**

# CD Player Casebook

*Reports from Mike Leach, Alfred Damp, Michael W. Bliss and P.J. Roberts*

## Kenwood DP710

This machine came in a few months ago because it wouldn't read the discs. Since the turntable spun too fast the diagnosis was a faulty laser unit. A new unit was ordered, but a complete deck assembly with a different type of laser unit – it appeared to be a Sony KSS150A – was supplied because the original type is no longer available. Fitting it cured the problem, and the machine was returned to the customer.

It came back recently, again because it wouldn't read the discs. This time the turntable wouldn't spin at all. A quick inspection once more led me to the laser. With no disc in the machine there was very little focus coil movement. As the focus drive waveforms were o.k. I suspected the new laser. But with the machine turned upside down and a disc in the tray the player worked normally! It seemed that the coil found it easier to focus on the disc in the upside-down position. The trouble is that it carried on working correctly when the machine was turned upright again. I've now got to convince Kenwood that the laser unit is faulty.

In cases like this it's sometimes possible to lubricate very slightly the pivot around which the focus coil moves up and down. But it's not possible with this type of laser as the coil has no pivot as such – it moves up and down by what appears to be thin rubber attached to the coil. Presumably in this case the rubber was too springy, thus slowing the focus coil action with the result that there was no focus.

**M.L.**

## JVC CAE21LBK

This JVC midi system had been a problem – a big problem. It came to me after two new laser units (type Optima 4), an 80-pin YM3805 signal processor chip and various other bits had been fitted elsewhere. The complaint was that it wouldn't read discs, which it certainly wouldn't. The disc rotated extremely fast while the sled assembly sped to the outer edge of the disc then returned. That was it. I pressed the open/close button and the disc almost flew out of the tray.

My first thoughts related to the signal path. Maybe there was no r.f. signal? I connected the scope to the r.f. test point and saw that the eye pattern started to appear then disappeared as the turntable sped faster. I assumed that the r.f. section was o.k., though I could have been wrong. The laser power was o.k., and the bit of r.f. waveform that was present was of the correct amplitude.

Servicing these players is no joke. As with most modern-day players/midis, the leads aren't long enough for the board to be taken out for servicing. All in all it was a bit of a struggle. Anyway, scope checks around the tracking servo (I knew that the machine was focusing all right) lead me in the right direction. Adjusting the tracking gain and offset controls made no difference at all to the tracking waveform. At the emitters of Q801/2 the tracking drive was low. Checks were then carried out around the YM3805 signal processor. Everything seemed to be in order apart from the voltage at pin 21, the TRHD signal. This pin should have been at 4·9V but was low at 1·5V.

The TRHD output from the YM3805 chip helps to generate the tracking error signal. It's fed to the base of Q803 in the tracking servo via a 10kΩ resistor. The voltage at the base of this transistor should have been −1·1V, but was 1·5V, thus upsetting the tracking servo. R827 (100kΩ) links Q803's base to the −12V rail. It was found to be open-circuit under load! When removed and checked it read 98kΩ, which seemed to be near enough, but when checked in situ it gave an open-circuit reading. Fitting a replacement restored normal operation. **M.L.**

## Hinari DK100

The symptoms with this player were the same as those with a DK200 reported by V.W. Cox in the September Casebook, i.e. at switch on the arm slammed against the outer stop. In this case R122 (1Ω) was open-circuit.

**M.W.B.**

## Sony CDP-M20

Only noise came from the audio outputs. Checks showed that the EFM was correct and that the signals arriving at the DA converter chip IC10 were apparently correct. So

IC10 was replaced. As this made no difference we had to assume that the data fed to IC10 was incorrect. Checks were then made around the digital signal processor and 16Kbit RAM chips. Replacing the RAM restored normal operation. **A.D.**

## Philips CD104/304

These machines use double-sided PCBs with holes that are copper plated to link the two sides. This through-hole plating can go open-circuit, causing all sorts of problems. The most common is that the machine won't read the TOC or play. I've found that the best thing to do is to push through a length of 22 SWG TCW whilst heating the solder that's visible on the ground plane side of the linking hole, then cut and solder both ends.

Other problems I've had with these players have been as follows: thickened lubricant on the disc clamp and turntable spindle; worn turntable height adjustment screw (carbon screw); dry-joints on the voltage regulators; a build-up of debris under the turntable motor's rotor; and dry-joints on the servo and decoder PCBs.

Other faults have been caused by power supply problems. Hum on sound (both channels) occurred when the −18V supply was high while sound distortion (both channels) occurred when this supply went low. The 12V supply going high resulted in skipping during the first part of any track. Thus a quick check on the power supply outputs can save you a lot of time that might otherwise be spent chasing wild geese.

On one occasion a fault was caused by very fine breaks in some of the PCB tracks leading to the microcomputer chip.

We've found that the laser units used in these models seldom fail. So if a player that refuses to work comes in, don't straight away condemn the laser unit.

These are very good quality, well-built players: it's well worth spending money on keeping them going. **P.J.R.**

# CD Player Casebook

*Reports from Mike Leach, Brian Storm and S. DaCosta*

## Philips CD450 Series

When loading or unloading a disc this machine would occasionally jump a tooth on the main cam. I've noticed that it's becoming a common problem with this series of machines. Philips first used the mechanism in Models CD150/160, and it was still being used until fairly recently. The most common cause of tooth jumping is the plastic bar on the main chassis: it holds the centre gear (item 119 in the exploded view in the manual) in position. A new mechanism is the obvious cure of course, but it's possible to apply a little heat to the plastic bar, using a soldering iron, to melt it back into position. This is best done when the centre gear is back in its correct position and realigned, otherwise there's a risk that the plastic bar will be snapped when the gear is replaced. I've found that this is an adequate cure.

After I'd done this with the CD450 it took on a mind of its own. It would occasionally open the drawer and not close it again, and would sometimes spin but not read the disc. The cause of the problem was again poor crimping of the leads on one of the plugs, this time the lead from the servo board to the front panel. As a replacement we used a lead from a scrap Philips VR6462 VCR. All is now well.

**M.L.**

## Technics SLP420 Series

On page 515 of the May issue I commented on a problem with the Technics SLP420. Briefly, the machine didn't read discs and the turntable span too fast. The cause of the fault was IC304, which is the data slicer and e.f.m. chip.

It would seem that this is becoming a common fault with this series of machines. I've had several in recently that had it. You will usually find that the disc spins much too fast for you to be able to see the r.f. eye pattern, but if you slow the disc down with your finger the eye pattern is usually viewable at the appropriate test point. In nine out of ten cases the chip is the cause of the fault: it's type EHDGA1234 and is available from SEME. If you suspect this chip, a check is to heat it slightly with the tip of a soldering iron: it should start to work all right for a few minutes and the machine should spring to life. **M.L.**

## Technics SLP8

This elderly three-beam pickup machine greeted me with a harsh mechanical clicking noise, failing miserably to read the TOC. As the pickup sled was sticking on its drive thread the pickup was not able to return to the centre of the disc to read the TOC. Out came the brass drive screw, nylon runner and drive belt: all were replaced, along with the Moritone grease on the guide shafts.

When I switched on again the sled returned to base and the disc rotated, but there was still no TOC reading. I clipped a scope probe to the r.f. test point and tried again. Nothing doing. When I adjusted the focus gain potentiometer a clean and ample eye pattern came up and the TOC appeared on the display, but when I pressed the play key there was again nothing, no eye waveform at all. The disc started to play when I increased the focus gain. I quickly reset the row of potentiometers on the side of the mechanism, but there was still no eye pattern at the correct focus gain setting. My next check was on the turntable height: it was way out! After adjusting this the machine performed immaculately. The owner later told me that someone had "adjusted" it for him as it had started to play up. It hadn't worked since. **B.S.**

## Sony CDP-M26

This machine gave a "no disc" indication – the laser unit failed to focus. The cause of the trouble was that the flex wire from the optical unit to the main panel was only half pushed in. Several models suffer from this sort of trouble.

In another of these machines the tray would move out but not in and the sled motor remained permanently on. The cause was the LA6065 control chip. **S.DaC.**

# CD Player Casebook

Reports from
Philip Blundell, AMIIEelec
Alan J. Roberts
Chris Watton
Michael Maurice
Roger Burchett and
P.J. Roberts

## Dusty Laser Lenses

Am I alone in finding that a lot of CD players that refuse to read discs have a layer of dust on the laser lens? A *gentle* clean with a camera lens brush or air puffer restores normal operation. Maybe CD player manufacturers should fit a lens cleaner in the same way that current VCRs incorporate head cleaners. **P.B.**

## Aiwa CX-NV70

A common fault with the three-CD changer mechanism is a broken ribbon cable to the CD drawer. The part number is 84-ZG1-614, Willow Vale order code 89004C. **P.B.**

## Philips AK701

This five-disc carousel machine came in with the tray assembly stuck in the out position. When I tested it, the whole machine seemed to be confused. Before you dismantle it you can call up the test mode, which is very useful. I got a no-go indication on the light-sensor test. This made sense, as the carousel didn't seem to know where it was and stopped at intermediate positions.

It's always a struggle to remove the tray from one of these machines. Once this had been done I examined the sensor panel under the carousel and could just make out a dry-joint on the position sensor. When this had been resoldered and the machine had been reassembled all was well. **A.J.R.**

## Sony CDPC311M

When this five-disc multiplayer was switched on the carousel turned continuously. I removed it and found that the flexible ribbon cable that carries the pulses from the opto-sensors to the main panel was frayed, which is not uncommon with this model.

I was able to repair the old cable by carefully removing the tray assembly and remaking it. After doing this and reassembling the machine it worked correctly. **A.J.R.**

## Philips AK701

Erratic operation was the complaint with this machine. When 'open' was pressed, the tray would sometimes come out half way, go back in then, if you were lucky, come out and stay out. Sometimes it would do a little shuffle back-and-forth, while at other times the machine would freeze and no buttons would operate.

There's a Philips modification for this. It consists of adding a 220µF, 10V capacitor to provide extra 5V supply decoupling. All you have to do is to remove the front control panel and add the capacitor between pins 4 and 5 of connector 1530, with the negative side of the capacitor to pin 5. Once this had been done the machine behaved itself perfectly. **A.J.R.**

## Mitsubishi DP703

"The disc plays then the sound goes off" the customer said. Sure enough it did: the disc started to play, then the audio went off, with the clock and remain indicator still working. Slight pressure on the PCB would occasionally bring either a crackle from the speakers or, on the odd occasion, a microsecond of sound. After a good solder up this no longer happened. I hadn't bridged any print, so what was amiss?

Further investigation revealed that C803 (1,000µF) was short-circuit, removing one of the supply voltages. While checking it with a component tester I discovered that it went short-circuit when the can was squeezed. **C.W.**

## Portable Players

When the CD door has to be pressed to open and close, the turntable can be pushed down the motor shaft until the disc is too far out of position with respect to the laser lens. An indication of this can be circular scratches on the data side of a disc. **C.W.**

## Aiwa NSX800

This stereo system had been imported from Hong Kong. Its input voltage was set at 220V and it was fitted with a Continental plug. The customer brought it to us because it wouldn't play CDs.

The cause of the problem was quickly traced to IC602 (STA341M). After fitting a replacement, a 13A plug, resetting the mains input to 240V and testing the unit I returned it to the customer.

A few months later I was asked to look at it again because, once again, it wouldn't play discs. This time there was no focus search. Checks around IC601 (LA6515) showed that the focus error voltage was present at pin 4 but there was no output at pin 2. Once a replacement IC had been fitted the player was OK. **M.M.**

## Aiwa CXZ720

The fault with the CD section of this music system was skipping and jumping at the beginning of a disc, particularly the first track – later tracks played perfectly. This ruled out the optical block, so attention was turned to the sled movement.

After removing the block's drive gear I found that the block didn't move smoothly along the metal rail. So I lubricated the metal runner and the block's bearings lightly with some Amberlube. After this the block traversed from beginning to end very smoothly. Once the drive gear had been replaced a test showed that all was now well. **M.M.**

## Sony CDPS207

This CD player arrived with its associated TA717 amplifier whose left-channel output was intermittent. The cause of this turned out to be dry-joints at the muting relay RY801. A stock fault?

When the CD player was brought out of standby it flashed zero on the display then shut down. I had a brief note on file to check the 5V line smoothing capacitor C333 (100µF, 10V) on the front control panel in this event. When I did so I found that it was very leaky. It had also leaked over the print, so some cleaning up was required.

Here's a quick check for this fault. Disconnect the panel at plug/socket CNJ11 and see if this restores the ±5V supplies at pins 12 and 3 of regulator IC1 (M5294P). If so, the hunt is over before it really begins!

My thanks to whoever originally provided the note on C333. **R.B.**

## Pioneer CLD2950 CDV Player

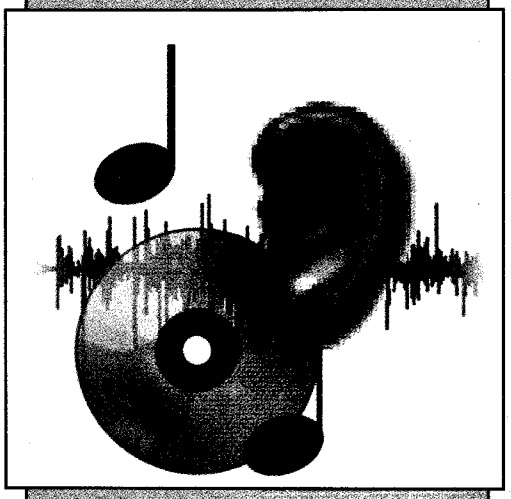
The complaint with this unit was that it wouldn't play any discs. I put the unit on the bench and found that once a disc was loaded (I used a CD – you'll see why in a minute) it would be clamped and the focus would be found but, instead of the TOC readout, the disc would spin in the right direction at a very high speed (I didn't dare try a 12in. disc), with a squealing sound from the spindle motor.

I decided to tackle the high-speed runaway fault first. The power supplies were present and correct, also the Vref (2·5V) voltage. A closer examination of the mechanism then revealed that the spindle motor FG opto-sensor was badly contaminated with dust. Once this had been cleaned off the unit read and played discs, but the squealing sound was still present – especially when the video track of a CDV single was being played. The cause was found to be the spindle motor, which had worn bearings. A replacement, part number VXA2208, cured this final problem. After a good test the unit was returned to the customer. **P.J.R.**

## Sony D240

We've had a number of these portable CD players in the workshop, all with the same complaint: that with both battery and external power supply operation the unit is "dead". On examination we've found that they won't do anything at all. Voltage checks have proved that the supplies are all present and correct – then suddenly the unit will start to work!

Investigation showed that the units would work only with the top assembly in a certain position. The problem is caused by the ribbon cable that connects the operation keys to the main PCB. It becomes intermittent, so a new one is required – the part number is 1-473-074-11. **P.J.R.**



# AUDIO FAULTS

Reports from
P.J. Roberts
Paul Smith and
Russell J. Fletcher

## Sony MDS-S38

This MiniDisc unit wouldn't accept a disc, with the display showing 'Eject', the mechanism fully ejected and a grinding noise that came from within. On inspection I found that the mechanics gear LA was loose because the shaft it's mounted on had broken away from the chassis, while gears LB and LC were damaged. As a result, the eject sense switch didn't operate and the syscon wasn't told to stop the loading motor.

Unfortunately the chassis is not available, but a satisfactory repair was achieved by gluing the shaft into place then retaining it with a small screw from below. With this done gears LA, LB and LC were replaced, restoring normal operation.

It's worth replacing switches S681, S685, S686 and S688 as they can cause further problems, and Sony recommends that all four rubber chassis insulators are replaced.

Part nos. are as follows: gear LA 4-979-897-01; gear LB 4-979-898-01; gear LC 4-979-899-01; switches S681/685 1-572-467-61; switches S686/688 1-762-621-21; insulator 4-987-327-01. **P.J.R.**

## Sony MZR55N

Even if it was not selected, record would sometimes be activated on inserting a disc in his MiniDisc unit. The unit would also behave as if the disc was blank, starting from track one even when information was already recorded on the disc. On examination I found that if the record switch was operated a few times the unit would behave. The cure was a replacement record switch (S503). Part no. is 1-771-331-51. **P.J.R.**

## JVC UX-T100TN

This unit was stuck in standby. As I didn't have a circuit diagram I started off by carrying out some routine voltage checks. I found that IC703, a 6V regulator, had a healthy input but no output. It's on the PCB under the CD player. A new 7806 restored normal operation. **P.S.**

## Akai CD-M480

The CD display intermittently showed garbled messages. When this happened no other functions were possible until the unit had been switched off and on to reset it. The cure was to resolder the pins of the CXD1139Q DSP on the top PCB. **P.S.**

## Some Quickies

**JVC DR-E55L:** The problem was no audio output. I found that R017 (10Ω safety) was open-circuit. It's near C060.

**Goodmans 2820:** There was no left-hand channel output. The cause was a broken land at C331 on the front panel.

**JVC CA-E33LBK:** No CD, display OK were the symptoms. R703 (10Ω) was open-circuit.

**Akai AM-A2:** There was no audio output, with the relay not clicking. R60 (3·3kΩ) near IC5 had gone high in value.

**JVC DR-E11LBK:** There was low volume at maximum setting. C357 (100µF, 10V) was short-circuit. **P.S.**

## Denon PMA350SE Amplifier

We have supplied and see a large number of these units, used in the commercial sector as distribution amplifiers. When the user insists on disconnecting all the speakers (via remote switching) and leaves the amplifier running at full tilt, the Zobel network eventually goes up in smoke. The components are on the small PCB that carries the output terminals. All that's normally required is a small amount of rebuild here. **R.J.F.**

## Philips CD710

There was a low-level right-channel audio output from this CD player, and one hell of a pulse on moving to the next track or any no-audio deck function (stop, pause, next, previous etc.). The cause was traced to a faulty muting transistor, Tr7361, in the final audio stages. You could obviously get the same fault with the left channel. **R.J.F.**

## Beringer Eurodesk

There was an audible buzz and intermittent crackling when phantom power was selected. On checking the voltage at the desk inputs with phantom power selected I got a reading of 73V DC instead of the correct 48V. The cure was to replace the 48V regulator IC in the separate power supply. It has an unusual part number but is an ordinary LM317T. **R.J.F.**

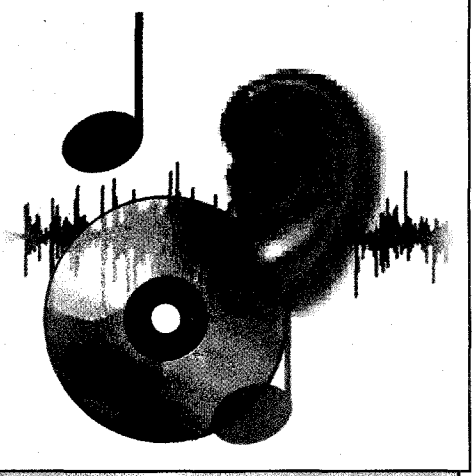
## Denon DRW580 Cassette deck

We've had complaints about noise from the mechanism during playback on several occasions with machines in very heavy use. The cause is a worn clutch assembly, part no. 9DF522030.

No output from one channel was caused by the HD14051BP Dolby chip IC303. **R.J.F.**

## Denon UCD250

This is the CD player in the D250 system. The fault was no audio output from one channel. I traced the cause to a faulty DAC chip – there is one for each channel in this machine. **R.J.F.**



# AUDIO FAULTS

**Reports from Paul Smith and Russell J. Fletcher**

## Panasonic SAHD52

The CD player would work normally for about an hour. It would then start to jump and skip tracks before it stopped altogether until it was left to cool down. I noticed that in the fault condition the spindle motor became very sluggish, so I fitted a new motor. Unfortunately this didn't alter the situation. Freezing Q131 and Q132 on the PCB at the right-hand side of the CD deck seemed to restore normal operation. The diagnosis was confirmed by fitting two new 2SD2037 transistors. **P.S.**

## Sony TA-F450D

The protection circuit was in operation, so the output relay wouldn't click in. It was doing its job well: the output line was at 45V DC, which would have destroyed the loudspeakers. Cold checks revealed that the following transistors were short-circuit: Q506 (2SD1585), Q508 (2SC2275A), Q509 (2SA985A), Q511 (2SA1215), Q513 (2SC2785) and Q514 (2SA1175). In addition R518 (100Ω), R520 (22Ω), R533 (1kΩ) and R536 (10Ω) were open-circuit. After replacing these ten components everything checked OK but the relay still wouldn't activate – until I refitted the screws to ground the heatsink! **P.S.**

## Studiomaster 1 6-8-16 Mixdown

What seemed to be a very peculiar fault with this unit turned out to be something quite straightforward. Though not admitted, it was most likely to have been caused by an unauthorised meddler. After much playing with signals and routings, I noticed that group outputs 6 and 7 seemed to be interactive and very distorted. The cause was a short on the group bus, actually a solder splash at one of the connector strips.

As the bus is connected to all 24 cards, the best way to find the source of the problem is to run the desk with the fault present and remove the bus connectors one by one until the fault clears. When it has cleared, check the connector/PCB tracks on the faulty card. **R.J.F.**

## Denon DMD1000

This MiniDisc recorder wouldn't accept a disc. The display said "MECH ERR 1M". This happens with some early-issue machines because the eject mechanism spring is a fraction too long and doesn't provide enough tension. You will find the spring at the left-hand side of the mechanism. Simply bend the lugs to which it is attached. Alternatively, replace the disc holder with the updated version – holder arm 04/9370216415 (the lug on this is repositioned slightly).

The same fault afflicts some **Sharp** machines. It's the same mechanism, and you get the same message in the display. **R.J.F.**

## Denon DCD825

There was poor playback with this CD player. The symptoms included skipping, not recognising certain discs etc. Premature failure of the laser unit was the cause. Use type KSS240. **R.J.F.**

## Soundlab CDJ500

The left-hand tray of this professional twin CD player wouldn't operate (open/close). It's a two-box system that consists of a twin-tray unit and a remote-mountable dual control unit. The two are connected via a pair of 25-way D cables. The cause of the fault was quickly traced to cracked joints at the control unit's left-side 25-way D socket. **R.J.F.**

## Denon DRM535/DRM555/ DRW580/DRW585

A fault you sometimes get with these cassette decks is intermittent stopping in any deck mode, accompanied by intermittent counter operation. The tape motion sensor is the most likely cause. You will find it on the small PCB attached to the cassette mechanism. Hayden Laboratories can supply the complete board as a replacement part. **R.J.F.**

## Denon DN2000F

This is a professional twin CD player. We've had two in for repair recently. The complaint with the first one was that the left tray intermittently failed to read the TOC. The cause was a faulty spindle motor.

Intermittent or no deck functions with one or both trays was the complaint with the other player. The ribbon cables that link the mechanism to the PCB were faulty. **R.J.F.**

## Beringer Eurodesk

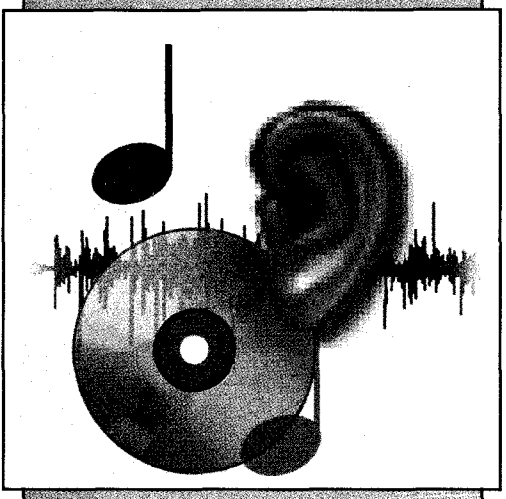
You sometimes get the following symptoms: excessive noise, rhythmic oscillation (loud clicking) or no response from individual inputs. The most likely cause is a faulty buffer/differential amplifier at the relevant balanced input. The amplifiers are on separate PCBs, with the relevant sockets, separated from the main boards and arranged in groups of twelve. There's a single-in-line dual op-amp, type NJM4580L, for each pair of inputs. **R.J.F.**

## Denon DCM260

This is a multiplay CD machine. The complaint "noisy when changing discs" is caused by a faulty turretto motor – the one that turns the five-disc tray.

The symptoms with one machine that came in recently were display lit, no functions and the disc tray continuously rotating. I found that ICP501 and ICP502 were open-circuit because servo transistors TR202 and TR203 had failed.

We've often had the report "tray jammed". What has happened is that the operator has opened the tray and noticed an empty space. He has then inserted another CD, not realising that the space belongs to the CD that's being played! The 'fault' is not limited to this make/model. **R.J.F.**



# AUDIO FAULTS

Reports from
Russell J. Fletcher
and
P.J. Roberts

## Kurzweil PC88 keyboard

This sort of equipment is an unusual but welcome visitor to our workshop. It usually means that the customer doesn't know where to turn for help next, so the problem is a going to be a good source of income! It's worth reporting on this particular fault, because it appears to be caused by a design error. The reported symptom was an annoying hum on the audio output. It was at a low level but nevertheless frustrating, particularly when operating with 1·5kW at front of house. It was also said that the fault had been present from new, which was very unusual with a piece of kit of such high build quality.

I first checked the power supply, replacing the 10,000µF, 16V main smoothing block and two suspicious-looking 1,000µF, 10V capacitors. I distrust the latter, and replace them on sight with the 16V variety – many a fault has been cured in this way without even lifting the meter! It then became apparent that there seemed to be a design fault. I spent some time tacking in extra capacitors here and there and trying some series inductance, all to no avail. Next, for some reason, I picked up the discarded 10,000µF capacitor and stuck it across the output from the bridge rectifier, which was drawing attention to itself, leaning over and fixed to the subchassis as a heatsink, bare-legged and available! The hum decreased by about a half. But when the capacitor was moved across to the board-mounted one, less than an inch away, there was no change to the hum problem.

Something to do with the PCB current path layout I decided. Diving into the bin, I found some 42-strand speaker cable (about 1·5mm$^2$ for those not familiar with it), cut off two short lengths and soldered them the shortest distance between the bridge rectifier and its reservoir capacitor. This provided a complete cure.

As the unit was now so quiet, I wondered whether the value of the reservoir capacitor might be a little excessive. **R.J.F.**

## Denon DCD425

We've had a couple of these CD players in recently. Loss of one audio channel was the complaint with the first of them. The cause was traced to a leaky mute transistor, Q301, in the final stages.

The other one suffered from intermittent skipping. An assembly person had forgotten to grease the sled! **R.J.F.**

## Studiomaster Horizon 12 powered mixing desk

The audio from one channel was low and distorted. It took a time to locate the cause, which was very basic. The problem was quickly proved to be on one of the power amplifier boards. The amplifiers are fairly complex, and after extensive tests and checking I decided to remove a few semiconductor devices to double-check them out of circuit. I started with the drivers, as I had eliminated the output transistors earlier by substitution. The very first solder pad I touched with the iron fell off the board! Obviously the print was cracked at this point. A decent board repair cured the fault. **R.J.F.**

## Denon DRM555 cassette deck

Here are a couple of problems we've had with these decks. First the eject mechanism not releasing. The mechanism concerned is on the left-hand side. It had slipped upwards because the assembly person forgot to apply the blob of glue. Release the single fixing screw, reposition and tighten. Finally apply some glue.

Secondly failure to eject some cassettes (door not opening without aid). Some cassettes are slightly oversized and stick against the silver, springy retainer inside the cassette tray, at the top. Push it up with your finger to release some of the tension. **R.J.F.**

## Revox PR99 tape deck

There was an odd fault with this open-reel tape deck: it would sometimes go into the record mode when either selecting play or coming out of pause. The operation modes are selected by a logic control board which is situated at left of centre from the rear. Mode control on this board is carried out by a special IC which is now very difficult to obtain. In view of this I looked at the board with a certain amount of distrust. Then I noticed that there are five metallic pale blue Philips electrolytic capacitors on the board. I don't like these, so I replaced them with some good-quality modern capacitors. That cured the fault. **R.J.F.**

## Denon DC1

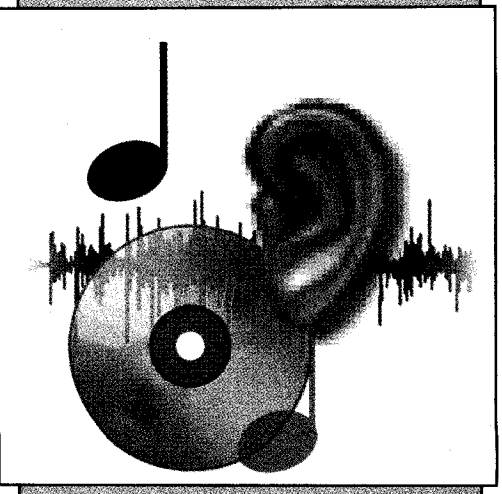
The complaint with this mini system was distortion during playback of CDs only. I don't really know why, but replacement of the laser unit cured the fault. It must be type KSS210B. **R.J.F.**

## Sony HCD-MD1EX

A whining sound was reported to come from within when MDs were being played. As I couldn't hear anything abnormal when the unit was checked I left it on soak test. Later I heard a very faint, high-pitched whining sound from within the unit during MD operation, even in pause. This gave me the clue I needed, as in this model the disc stops spinning when pause is selected. Thus all items in the MD mechanism were instantly eliminated. The cause of the noise was finally traced to the fluorescent display. A replacement cured the trouble. The display part number is 1-517-687-11. **P.J.R.**

## Sony MDS-JE510

A grinding noise came from within. It was caused by failure of the mech 'in' sense switch. As a result gears LA, LB and LC had been damaged. Once new gears have been fitted you have to replace switches S681, S685, S686, S688 and all four rubber deck insulators. Part numbers are: gear LA 4-979-897-01; gear LB 4-979-898-01; gear LC 4-979-899-01; S681 and S685 1-572-467-61; S686 and S688 1-762-621-21; insulator 4-987-327-01. **P.J.R.**



# AUDIO FAULTS

**Reports from Russell J. Fletcher Chris MacRae and W. Ferguson**

**We welcome fault reports from readers – payment for each report is made on publication. See page 106 for how and where to send reports.**

## Teac AX1030 amplifier

This amplifier was dead: there was no power anywhere other than the mains input circuitry and the primary winding of the mains transformer. This suggested a faulty transformer, which was in fact open-circuit.

The amplifier had been installed at a local pub and had been in constant daily use for over four years. Because of restrictions on expenditure and the fact that no money was to be spent on speakers "because the juke-box people had left the old ones in", L-pads had been installed in order to zone the system. Unfortunately in this situation the operators never seem to grasp the idea of reducing the amplifier's volume setting instead of the settings of the zone controls. Eventually the amplifier ends up running at full output with the zone controls down near zero!

If the zone controls don't give up and the amplifier is beefy enough not to lose its output transistors, as in this case, it's usually the mains transformer that suffers. **R.J.F.**

## Marantz PM45 amplifier

If the amplifier cuts out intermittently, check for dry-joints around the driver transistors. **R.J.F.**

## Revox B77 tape deck

This open-reel tape deck had a headphone monitoring fault: the left channel was missing and the right channel was very distorted. The headphone output is driven by two op-amps on the monitor PCB (bottom right viewed from the rear). One of these op-amps was of the incorrect type while the other was faulty. They should be type LM301. **R.J.F.**

## Harman Kardon AVR10/AVI100 AV amps

A buzzing from these AV amplifiers is usually caused by the mains transformer's loose metalwork. For a non-bouncing repair you will have to replace the transformer. It's a very common complaint. **R.J.F.**

## Technics SLP777 CD player

This unit was brought in because of a very straightforward problem: the output phono connectors were broken. I immediately saw a quick way of carrying out an effective repair and upgrade. This would avoid the need for a phone call to ask for the exact special replacement, which is probably no longer available anyway.

Strip down and remove the output socket assembly. Break away the original socket parts of this unit, and ream holes to take a nice pair of panel-mount, gold-plated phono sockets. When these are fitted, the grounding even picks up on the original metalwork. The whole assembly can then be refitted to the PCB, with the ground soldered as before and only the signal terminals to connect. When reassembly is complete, the modification really looks the part. **R.J.F.**

## Peavey LS systems

If you come across one of these systems with a 15in. Black Widow driver that grumbles, resonates or makes other disturbing sounds, before condemning it check the condition of the bond at the suspension. I've had several of these units in which the glue has let go at the back of the frame around the coil assembly. Check and, if necessary, reglue using a suitable contact adhesive.

If you do get one of these drivers with a damaged cone/coil assembly, Peavey can supply a new "basket assembly". The magnet is simply transferred. This also applies with the smaller Scorpion 12in. units. **R.J.F.**

## Revox B77 and PR99 tape decks

If the complaint with one of these open-reel tape decks is intermittent operation when selecting a transport function, strip out the row of operate buttons, dismantle the assembly and clean the switch contacts with an ink rubber or something similar. **R.J.F.**

## Sony HCD-H7/H1500

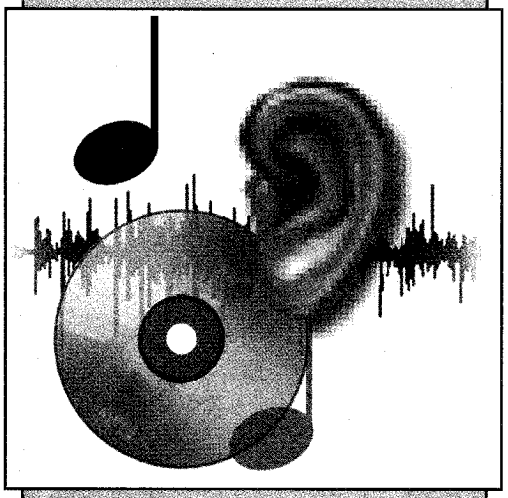
The display was erratic and at power up would freeze in one mode or another, though normal operation was sometimes possible. Scope checks revealed the cause of the problem, which was the 4·19MHz crystal X501 on the front display board. Its output was low. A new crystal restored normal operation. **C.MacR.**

## Aiwa LC-X50

This CD player was dead. A check on the door switch SW2 produced a beep from the meter, so I assumed that it was OK. I next found that there was no 8V supply from Q7 on the CD board. This switched voltage comes from pin 4 of IC252, but a replacement chip failed to restore it. When the contacts of SW2 were linked the player came back to life. The cause of the trouble was that its contacts were resistive: once the black film had been cleaned off everything was OK. **C.MacR.**

## Philips 70FC450

The trouble with this stereo cassette deck was no motor drive. A check showed that there was 12V at both tags of the motor all the time. I had no circuit diagram, but was able to find a faulty surface-mounted transistor in the motor supply circuit – it was leaky base-to-collector. The transistor is mounted on the panel behind the button unit, nearest the top. **W.F.**



# AUDIO FAULTS

**Reports from Russell J. Fletcher**

**We welcome fault reports from readers – payment for each fault is made shortly after publication. See page 246 for where and how to send reports.**

## Teac AX1030 amplifier

The reported fault was no audio output with the protection relay remaining open. Some quick resistance checks on the audio output transistors and voltage checks on the supply lines and mid-point indicated that the power amplifiers were OK. Attention was then turned to the protection circuit, where R367 (100kΩ) was found to be open-circuit.

## Studiomaster Powerhouse 8:2 powered mixing desk

Intermittent output to the headphone monitor socket is a common fault with these desks. The usual cause is the headphone volume control, which cracks across the PC mounting pins. I've also had no output to the headphone monitor socket on several occasions because the bottom three inches or so of the monitor PCB has cracked across. I've no idea why this happens.

## Revox B710 tape cassette deck

These superbly built recorders still hold a good price. A fault you sometimes get is that one capstan motor intermittently fails to run at power-up – the motor will work if you turn the capstan by hand. There are two capstan motors in the well-engineered mechanics, but unfortunately this start-up fault seems to develop with age. The manual says don't dismantle the motors, but you've nothing to loose against the cost of a replacement. Once you've got the motor out and in bits, use some very fine wet-and-dry paper (1200 grit) to lightly hone the shaft where it sits in the bearing. Finish the job with some polishing paper, then reassemble with a little machine oil. This should greatly improve matters.

You occasionally get a fault with the headphone monitoring. The LM301 op-amp chips in the headphone amplifier are the most likely cause – IC1 and IC2 on the mic/phones PCB.

## Technics SL1200/1210 professional turntable

You sometimes get the complaint "erratic pitch" with these machines. The control systems usually have nothing to do with this fault, the cause being a noisy 21V regulated supply. The action required is as follows: replace the two 2SD637 transistors Q2 and Q3 and the MA1051M (5·1V, 400mW) zener diode D2.

## Nakamichi BX2 cassette deck

The reported fault was intermittent winding and no take-up. It didn't take long to find the cause: there was a dry-joint at driver transistor Q602 on the main PCB.

## Studiomaster Vision 8 powered mixing deck

A very common complaint with this deck is intermittent low output and distortion. The cause is on the power amplifier PCB, which is mounted at the bottom of the case and will have to be removed. Take a look at the joints of the driver transistors, particularly the left channel (centre of the PCB): you will see that they are cracked. This is normally because the transistors have not been inserted far enough through the board. Desolder and move them down the heatsink against which they are mounted – they will slide under their clips. Resolder with a decent amount of leg and you've cured the fault for life.

## JBL MR series professional speakers

If the report with one of these units is "works but creaking sounds at high levels", check the HF diaphragm drives. They can be damaged when subjected to overloading. The problem is not always visible, so check by substitution if possible. Both units of a pair seldom seem to be damaged simultaneously. Diaphragms can be obtained as spare parts from the UK distributor, Arbiter. They are not cheap – about £90 retail – so don't let the customer think that the problem is something trivial! You can get the same problem with other models.

## Quad 303 Hi-Fi power amplifier

These units are now quite old though they can still provide good results. But to maintain performance as specified and correct operation they require servicing. The main problem is the output coupling capacitors and the smoothing capacitors in the power supply (all 2,000μF). If these capacitors develop leakage and fluid gets on to the driver PCBs below, a major blow-up will occur.

Replace all the capacitors at the slightest sign of problems, i.e. cracking of the rubber end casing, crystalline growths or seepage. In fact it's best to replace them even if they look OK: explain the problem to the owner and persuade him to have the unit brought up-to-date. Otherwise next time you see the amplifier it may be too late.

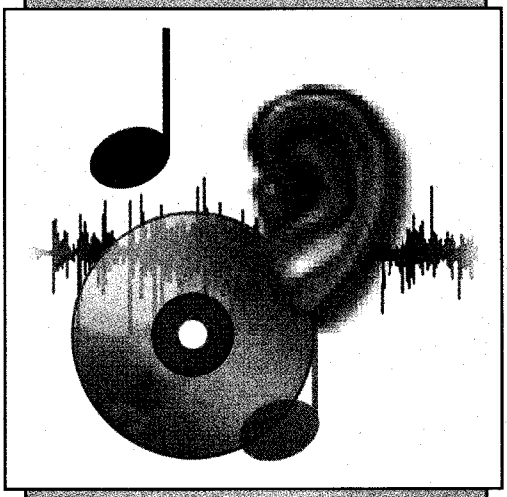
## Denon DRM700 cassette deck

The reported fault, which was unusual with this unit, was failure of one channel to record. The cause was traced to one side of the input level control being open-circuit.

## Studiomaster Vision 708 powered mixing deck

A complaint you sometimes get with this deck is intermittent loss of output to the speakers. The fault can drive you to distraction, but the cause is very simple: replace the 'insert' jack sockets at the rear of the unit. The break contacts become tarnished and thus resistive or open-circuit.

This trouble is very common with all amplifiers that have a send/return loop.



# AUDIO FAULTS

Reports from
Russell J. Fletcher
Nick Beer
I. Levy, LCGI and
Michael Maurice

We welcome fault reports from readers – payment for each fault is made shortly after publication. See page 298 for details of where and how to send reports.

## Telefunken M12 professional deck

We've had two of these two-track open-reel decks in recently. No record was the problem with one of them. No bias oscillation could be observed, and the power supply module seemed to be running hot. When the bias-oscillator board was removed from its slot the power supply worked normally. There was a short-circuit 4·7µF, 35V tantalum capacitor on the bias-oscillator board.

No spooling was the complaint with the other one. On this occasion a hunch proved to be correct. Normal operation was restored by stripping and cleaning the function switches. The low-/high-speed switch responded to the same treatment. **R.J.F.**

## Nakamichi 481 cassette deck

These high-quality decks seldom cause trouble. The problem with this one was that although it went through the motions it wouldn't record. Always check the obvious things first – the heads were dirty! Mind you playback seemed to be OK, and the contamination wasn't obvious. **R.J.F.**

## Alesis Quadraverb effects processor

One half of the front-panel dot-matrix display can become 'blacked' out. The fault is in the drive circuitry, which is all embedded in the display. It's therefore necessary to replace the complete module. The cost is about £48 inclusive from the agent. **R.J.F.**

## Audio Innovations Series 300 amplifier

The customer complained that there was distorted sound from one channel of this valve power amplifier. We've had the same complaint with other amplifiers from this manufacturer. The cause is the relevant output transformer. **R.J.F.**

## Nakamichi 580 cassette deck

These decks are now coming in more often because of an eject-mechanism fault. The eject button is coupled to the actuator via a cable. What happens is that a crack develops in the nylon moulding where the cable is coupled to the actuator mechanism. Unfortunately this moulding is part of the subchassis, which must be replaced as a whole. So it's an expensive repair. **R.J.F.**

## Sony MZR50 and other MD recorders

This note applies to portable MD recorders generally. Something that seems to afflict them is damage to the magnetic audio recording head, which is perhaps not surprising in view of the physical conditions. The usual symptom is that while the unit appears to record all right in terms of time etc. there's no playback audio, because the head was not over the heated part of the disc or not sufficiently close to the disc. In my experience the MRZ50 suffers most from this problem. **N.B.**

## Panasonic SCPM30MD

This is an all-in-one mini hi-fi system, including MD which was the faulty item. It would intermittently read the TOC but then not play. There was little difference to the symptom with either PM (premastered) or recordable discs. It's incredibly difficult to dismantle the unit to get to the MD section, which is at the bottom and is encased in a metal frame. It's also very difficult to run the equipment when dismantled. Little diagnosis was employed, more instinct. A replacement optical unit cured the problem. **N.B.**

## Sony MZR90

This 'fag-packet' personal MD recorder intermittently failed to record audio. Less often it would fail to read the TOC, though it always seemed to work with PM discs. These are classic faulty laser symptoms, and a replacement cured the trouble. Noteworthy perhaps because the unit was relatively new.

Despite its minuscule size, the unit is a joy to work on. I've worked on many Sony personal MD players and have found them all remarkably well designed (by contemporary standards) in terms of dismantling and servicing ease. **N.B.**

## Peavey UMA150T amplifier

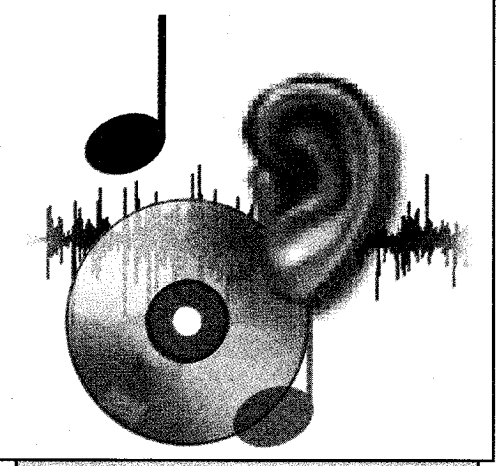
An output with buzzing, or no output, is usually caused by failure of the negative rail's reservoir capacitor (4,700µF, 55V) – it goes open-circuit. I've had ten of these amplifiers with the same fault during the past few months. **I.L.**

## JVC C-D5T

I was asked to repair this system which "wouldn't play CDs because of the building work". When I plugged it in both fuses blew. I soon found that Q552 was short-circuit. A replacement, along with D551, D554 and two fuses restored the system to life. Cleaning out the CD section's optical block completed the repair. **M.M.**

## Technics SU-X911

The display produced odd characters and there was no response from the selector switches. A new microcontroller chip, IC601, restored normal operation. **M.M.**



# AUDIO FAULTS

**Reports from Michael Maurice Russell J. Fletcher and Michael Curtis**

**We welcome fault reports from readers – payment for each fault is made shortly after publication. See page 362 for details of where and how to send reports.**

## Memorex CD5400

This player wouldn't read CDs let alone play them. The cause was the sled end switch, which was open-circuit. A new switch cured the problem. **M.M.**

## Revox B226 CD player

There were two faults with this machine, no display and no sound. The cause of the sound fault was loss of the –15V supply to the DA converter chip. The –15V regulator IC5 on the decoder board had failed. I also had to replace the BC337-25 standby switching transistor Q7. The display itself was the cause of the other fault. It's a backlit LCD type whose lighting power is supplied by a separate transformer, T1. This is driven by its own oscillator, which is part of IC12 (74HC00), and amplifier IC2 (L272). T1, IC12 and IC2 are on the microprocessor and control board.

Revox spares are available from the original parent company Studer. A couple of agents in this country will obtain them for you, but they are expensive. The display for the B226 CD player cost about £300 and I gather that the CD mechanism complete costs about £600. Apparently all Revox spares are available, including those for the B77 reel-to-reel tape recorder, its predecessor the A77, and earlier valve models (the D, E, F and G36 series tape recorders). I have it on good authority that a pinch roller for the valve machines will cost you about £80! A good example of these magnificent tape recorders, which are now nearly forty years old, can change hands at anything between £500-£1,000. You can still obtain new B77/PR99 tape recorders from Studer. Prices are between £2,500 and £3,500, plus VAT, depending on specification. They seem to be the only electronic products that actually go up in price! **M.M.**

## Technics SU-CH900

The sound cut out at low levels. The cause of the trouble was the fan motor. A replacement restored full output levels. **M.M.**

## Fostex B16/D8 multi-track tape decks

The most common complaint with these decks is that segments of the LED bar graphs don't light up. These VU indicators are complete modules, with a 'black blob' (embedded circuit) on the PCB to control the LEDs. The fault is always caused by the black blob, but the complete assembly has to be replaced. It costs about £50 from the UK agent. If more than one display is faulty, you've got an expensive fault on your hands. **R.J.F.**

## Omnitronic DD-2250 pro turntable

The report said "lights on at the target light and strobe, but no revolution". I very quickly found that there was no 24V output from a 7824 regulator. A replacement restored good working. **R.J.F.**

## HH MA150 pro mixer amp

Power but no sound output was the complaint. The output power amplifier was indeed working, but the preamplifier section wasn't. In this event check the +15V and –15V rails. Either a 15V zener diode or its load resistor will be open-circuit, occasionally both. Change the lot for a reliable repair. **R.J.F.**

## McGreggor GS500 pro mixer amp

The user was most frustrated: the amplifier would just cut out after some period of operation. The cause was very simple – the cooling fan had broken down.

Another unit was dead on arrival and blew fuses. The output stage was OK but the mains transformer had a short-circuit within the primary winding. In fact it's the second time I have had this fault, which is surprising as the transformer is a hefty toroidal type. On this occasion I decided to fit a 65-0-65, 650VA alternative rather than a replacement from the manufacturer. It seems to have been a success. **R.J.F.**

## Carlsboro Marlin pro mixer amp

The owner said that there was a "big explosion" from the rear, with fuse blowing. I found the remains of a broken spring from the reverberation unit welded across the mains input socket. Maybe it's useful to insulate the internal connections and wiring after all?! **R.J.F.**

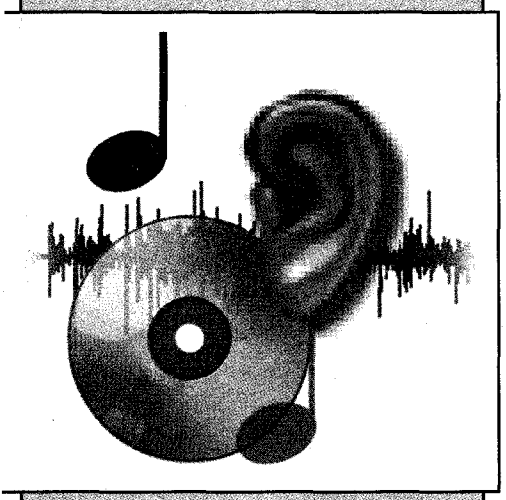
## Nakamichi 481/581 cassette deck

These machines are very reliable, but a fault you can get is failure to record because the bias oscillator has stopped. To restore oscillator operation, replace the two orange 4,700pF capacitors C316/7. In fact it's as well to replace them whenever one of these decks comes in for whatever problem. **R.J.F.**

## Cambridge Audio DACMagic 2

This solidly-built DAC sold well through a certain discount hi-fi chain. The problem with this one was no audio via the CD line input – the optical and DAT inputs were fine. As I didn't have a circuit diagram, I was relieved to find that the unit uses standard components.

Since audio was heard via the DAT and optical inputs, I assumed that the surface-mounted DAIO IC and the output circuitry were OK. So I concentrated on the input side and checked the UA9637ACP chip IC35. The CD signal entered at pin 6, but there was no output at pin 3. After fitting a replacement I tested the unit and confirmed the cure: when the CD input was selected the front panel status LEDs lit and there was excellent sound. **M.C.**



# AUDIO FAULTS

**Reports from**
**Mike Leach**
**Pete Roberts**
**Paul Sargent, LCGI and**
**Andre Nel**

**We welcome fault reports from readers – payment for each fault is made shortly after publication. See page 426 for details of where and how to send reports.**

## Sony HCD-H650M midi system

This model uses a standard KSS-240A laser assembly which, as we all know, is prone to failure. Recently I've had several cases where a new laser assembly failed to cure the skipping and jumping symptom – usually the machine wouldn't read discs at all. The problem can be caused by an intermittent laser ribbon cable. If a new cable fails to cure the fault, try replacing the three 47µF, 4V surface-mounted electrolytic capacitors C105/6/7 on the CD board. The smell when you desolder them will usually indicate whether they are the cause of the trouble. **M.L.**

## Arcam Alpha 6 CD player

A loud humming noise came from within the metal cabinet – the audio relay was vibrating very fast. If you get this symptom, try replacing C416 (470µF, 25V). It's mounted close to the mains input plug. The chances are that this capacitor will be the sole cause of the problem. **M.L.**

## Sony HCD-MD5

The MiniDisc unit wouldn't eject a disc. Once the machine had been stripped down it was easy to eject the disc by manually winding the belt on the MiniDisc assembly. The mechanism would then load another disc, but wouldn't eject it.

The cause of the trouble was the BA6287F loading drive chip IC431. It's an eight-leg surface-mounted device which is on the digital board. The Sony part no. is 8-759-040-83.

I've had one case where there was an irrepairable burn-up on the board when this IC had failed. So it's worth checking the condition of this area of the PCB whenever one of these machines comes in, whatever the fault. **M.L.**

## Roberts R700 transistor radio

This old-timer was an original from 1968, not the current replica. It's an unusual design, with completely separate tuners and IF strips for AM and FM reception, with only the audio stages common. Germanium transistors are used throughout. The faults were first no FM reception then loss of AM reception. The cause of the AM fault was traced to a shorted decoupling capacitor that removed the power to the Mullard mixer/oscillator/IF module.

The cause of the FM problem took rather longer to sort out. These sets use Mullard AF11x series diffused-alloy transistors, which are known to suffer from two failure modes: a collector-to-case short and a shorted base-emitter junction. Someone had been melting solder on top of the IF amplifier transistors – remember, these are germanium devices! As a result two of them had failed, also the mixer/oscillator transistor in the tuner head. Fortunately the tuner's special RF amplifier transistor had survived, as an AF115 won't work in that position.

After fitting three new transistors from my small stock of these vintage devices all that was necessary was to repair a print break that prevented the bass control working. **P.R.**

## Sony TA-VE150 integrated AV amplifier

Several of these amplifiers have come into the workshop. They all seem to suffer from similar problems. The usual reported symptom is one channel intermittent. It could be the rear or front speakers or even both. The customer may complain that one channel is permanently off, the other intermittent. I've found that the cause is nearly always dry-joints at the output ICs and regulators.

The main PCB comes out very easily. Check for dry-joints at IC751, IC701, IC651, IC601 and IC501. Also check plugs CNS800 and CNS801, and regulators IC801 and IC802.

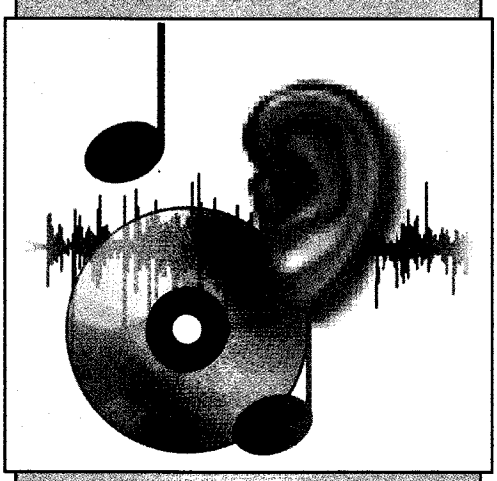
I've had to replace an output IC and a switching relay only once. **M.L.**

## Sony HCD-RX80

There was a background hum on one channel, and 'notchy' operation of the volume control, with this 3-CD, twin-cassette midi system. IC201, which is labelled "EQ/VOLUME", seemed a likely candidate. As It's a large flat-pack surface-mounted IC all other possibilities were checked before I ordered and fitted a replacement. I breathed a sigh of relief when it cured the problem. It's also expensive! **P.S.**

## Sanyo DC-F380KR

The complaint with this midi hi-fi unit was no record or playback via the right-hand tape deck. All other functions worked normally. I noticed that each deck had two solenoids, and that the left-hand solenoid on the faulty deck didn't seem to move at all. When I followed the wiring back I came to Q3132 (2SA952) on the front PCB – next to the fluorescent display unit. Although it measured good both in and out of circuit, a replacement restored normal record and playback operation. Strangely, the new and the old transistors both produced a gain reading of 372 when checked with my Peak component analyser. **A.N.**



# AUDIO FAULTS

**Reports from Geoff Darby Nick Beer and Nicholas Arnold, BDS**

## Sony ZS2000

The VFD didn't operate and the standby relay, which switches out a winding on the primary side of the mains transformer, didn't respond to the operate button. The pop-out CD holder would present itself and put itself away when the CD open/close button was pressed, but there was no other CD operation when a disc was inserted.

A search for a common cause for these seemingly unrelated problems led me to the 2SB1013 transistor Q307 on the main PCB. It provides power control and had a 100Ω short between its collector and emitter. A replacement restored normal operation. **G.D.**

## Pioneer XC-L7

These units have a rather elegant display and button unit for control. It sits on top and is connected to the main unit via a multiway cable with a plug at each end. With the similar-looking '77 series, this control/display unit is also the detachable remote handset.

This one's VFD was dead, and a faint smell of burning came from the main unit. Investigation revealed that the –30V supply to the VFD was missing. It's obtained from the –58V supply via the 2SB1238 regulator transistor Q23, which had failed badly – it was charred to the point of disintegration. The 33V zener diode D23 was also short-circuit. Replacing these two items restored the supply, but it immediately dropped to –4V when the display/control unit was plugged in. The cause of this and, presumably, the initial failure was the 39V zener diode D5708, which is connected directly across the supply within the display/control unit. Normal operation was obtained once this final faulty item had been replaced. **G.D.**

## Sony MDS-W1

This dual-deck MiniDisc recorder clattered when power was applied. It did little else and there was no response to the front-panel controls, including standby. I removed the case and reapplied power. It was then clear that the source of the noise was the sled drive motors on both decks. They were trying to drive the laser units home, though they were already there.

Closer examination revealed that the PCBs on the undersides of both decks were displaced and sitting at an angle. Once the decks had been removed it could be seen that with the PCBs in this position the laser-home switch operating tabs missed the switches. As a result the microcontroller chip thought that the motors still needed to be driven. Once the PCBs had been refitted correctly both decks reset and came to rest. The unit then worked correctly. **G.D.**

## Aiwa CX-ZR800K

Many different chassis are fitted in these three- and five-CD player systems. There are some major differences, for example some versions are fitted with a discrete output stage and others with an STK type. Otherwise the variations are mainly in board layout and the component reference numbers.

This particular model has a discrete output stage that uses FP1016 and FN1016 devices (CPC supply them as a kit, part no. AW87-A30-097-010). When this one was powered the display flashed on and off and the standby relay clicked. These are common symptoms, but there are several possible causes. The first thing to check is the output transistors mentioned above. A word of warning before you bring a meter or soldering iron anywhere near the PCB: ensure that the power supply reservoir capacitors are totally discharged, by applying a resistor across each of them in turn. If you don't, you may well regret it. I've known these capacitors to remain charged for a week or more.

In this case the output transistors were OK. The next things to check are the switching FETs. The unusual output stage is provided with low and high supplies. It normally operates with the low rails, at about + and –25V. When the power demand exceeds a certain point however the supplies are jacked up to about + and –50V. This is accomplished with the aid of the two 2SK2723 FETs Q219 and Q220 (CPC part no. AW87-A30-089-010). They tend to fail short-circuit: one had in this unit. A replacement restored normal operation. **G.D.**

## B&O Beogram CD5500

This aged CD player is part of the Beosystem 5500, though its styling makes it look like a current model. The complaint was that it started to play then the audio "faded away". In fact it reverted to standby because of loss of power. The cause was a fine selection of dry-joints at P10 on the main PCB. **N.B.**

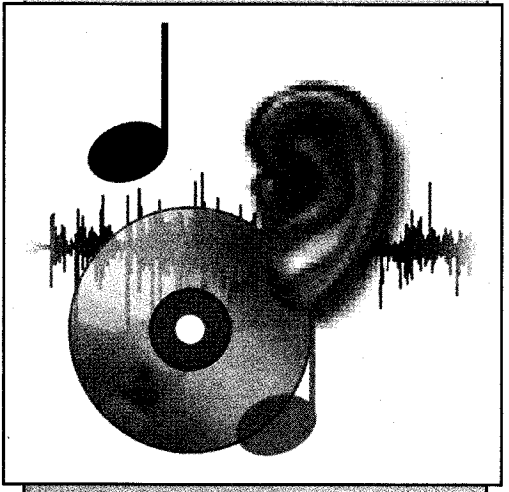
## Technics SH-E51 graphic equaliser

There was no operation because R754 (4·7Ω) in the power supply was open-circuit. There didn't seem to be any cause for its demise. **N.A.**

## Sony XR5451 car radio-cassette

There was extremely weak sound from one speaker and none from the other three. The audio output stages are based on two TA8215H ICs, IC501 and IC601. One is for the front speakers, the other for the rear ones: each contains two bridge output amplifier pairs. Both ICs had holes blown in the front of their plastic packages and, interestingly, although a substantial heatsink is used no heatsink compound at all seemed to have been applied during manufacture. Replacement chips, with a thin smear of compound of course, restored excellent results.

The output ICs and external connections are on a vertical daughter board that plugs into the main PCB. This makes servicing easy, but the connectors seem to become intermittent. Hard-wiring is the best course if you want to avoid a bounce. **N.A.** ■



# AUDIO FAULTS

**Reports from Nick Beer Geoff Darby and D.M. Thomas**

**We welcome fault reports from readers – payment for each fault is made shortly after publiation. See page 554 for details of where and how to send reports.**

## Uher 4200

With the advent of the MiniDisc there are not many of these once common reel-to-reel portable tape recorders still in regular use. But the freelance reporter who owned this one was adamant that its failure shouldn't mean the end of a long and happy association!

I settled down to deal with a variety of faults. Work included new belts and pinch roller, clean and lubricate the capstan bearings, etc., but the major problem was that with new recordings there was only very low and distorted audio while the record-level meters didn't deflect one iota. These symptoms were caused by the loss of the supply across R80 (5·6Ω), which had been getting very hot – this was not surprising as the 1,000µF, 6·3V axial reservoir capacitor C88 was short-circuit. Replacement of these items restored normal operation. **N.B.**

## Sony HCD-S300

There was no audio output from the amplifier section of this 5.1-channel DVD unit, though audio via the TV set was OK. The output protection relays weren't closing because one of the TA2020-020 output chips was faulty. In this case IC301 was the culprit – its two channels drive front and rear speakers. The fault-monitoring circuit in this unit requires all three output ICs to be present and working before it will release the output relays, so the same situation could be caused by failure of either of the other two output chips. It's more usual for removal of a faulty IC to restore operation with the remaining chip(s). **G.D.**

## Pioneer CT-L77 cassette deck

The cassette tray would open when asked, and take a tape in. But when play or any other function was selected the display would just show "no tape". After much time was wasted checking the operation of the cassette-in and associated switches I did what I should have done first: check the supply lines. There was no –6V supply because no –14V feed came from the XC-L77 tuner/amplifier unit: circuit protector IC5222 (1A) was open-circuit. Once this item had been replaced the deck detected a tape and everything was fine – until reverse play was selected, whereupon the mechanics groaned and froze, stalling the motor. Hence the blown protector, I assume.

The reason for the failure was that the flip-over record/play head was locked solid in the forward play position. When the head block was removed to find out why, I saw that the paint which seals the azimuth adjust screw was excessive and had dripped down on to the stop tab on the head, effectively supergluing it to the azimuth screw. Once this seal had been broken and the excess paint had been cleaned off, the head rotated fine. When the deck was reinstalled it performed faultlessly.

Why did the excess paint suddenly decide to glue these two parts together? It looked like factory original, and I know that this particular system had been working all right in the customer's house. I'm also puzzled as to why loss of the –6V supply should have upset the system control: as far as I can see it's used only by the op-amps in the signal path. **G.D.**

## JVC UX-T100

The job ticket attached to this hi-fi unit said "stuck in standby". Totally dead would have been a better description. The system control micro chip was inactive because its 5V supply was low at just 3V. The simple cure for this condition is to replace the 78L05 regulator IC703, which is situated on the LCD and System CPU board. Once the 5V supply had been restored the unit worked correctly. **G.D.**

## Sony HCD-CP11

This was a nasty little one for a Monday morning! The sled motor drive was poor, with the optical block returning home very slowly, and the focus search was weak, with the lens barely moving. These two symptoms led to investigation around IC102, which provides the sled, focus, tracking and spindle drives. Although the supply to this IC was correct at 7·8V, the voltages at most of the other pins were wrong.

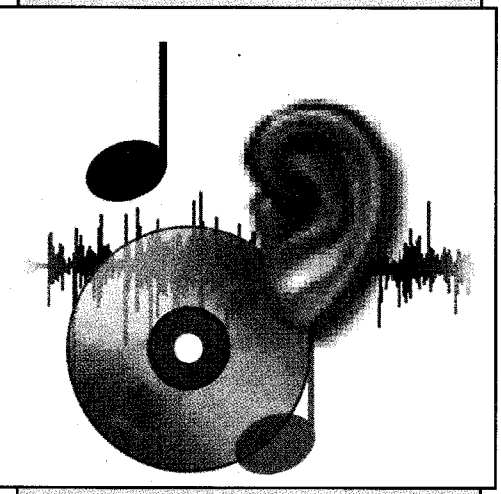
The cause of the problem was eventually traced to the surface-mounted 0·1µF capacitor C153, which was doing a good job at pretending to be a 1kΩ resistor! It decouples the input to the IC's internal reference voltage generator. A replacement restored normal operation. **G.D.**

## Technics SLHD501

This CD player would stop after five-ten minutes, with no functions at all. The cause was R443 (6·8Ω, 0·25W) which had gone high in value. **D.M.T.**

## Aiwa XRM11, XRM12 etc

You sometimes get the complaint that the front controls intermittently fail to work. The remedy is to replace the 0·01µF surface-mounted capacitors C338 and C339 on the front PCB. **D.M.T.** ■



# AUDIO FAULTS

**Reports from**
**Robin Beaumont**
**Geoff Darby**
**Dave Gough and**
**Russell J. Fletcher**

## Aiwa AM-HX30 MiniDisc player

This personal player appeared to recognise that a disc had been inserted. But a clicking noise came from the mechanism, as if the optical pickup was trying to drive itself past the limit stop.

Once a service manual had been obtained I was able to access the service mode, which allows step-by-step start-up of the playback process. The pickup would focus on the disc, but when the disc servo was enabled there was no disc rotation. Measurements on the tiny three-phase motor, from the connector on the PCB, showed that one coil was open-circuit. When I carried out further dismantling I found that the flexible cable wasn't properly soldered to the motor. Correcting this, followed by careful reassembly, completed a successful repair. **R.B.**

## JVC CA-MX1L

This two-part audio system had performed well for many years but had now developed intermittent sound from one or both channels. If the case was tapped anywhere, the fault would come and go. The cause of the trouble turned out to be the loudspeaker muting relays, which were intermittent and had to be replaced. Similar relays can be found in other JVC products. They can usually be recognised by their orange cases.

If the CD section of this model has any intermittent problems, resoldering the focus and tracking servo driver transistors will often provide a cure. The circuit reference numbers are Q701/2 and Q733/4. **R.B.**

## Sony MZR55 MiniDisc recorder

The initial problem with this personal recorder was intermittent sound from one channel. By the time it reached our workshop it wouldn't play discs. The dry-joints on the headphone socket were easily dealt with, but when an attempt was made to play a disc the machine was noisy. It seemed as if the rotating disc was fouling the mechanism or the disc caddy.

Close inspection of the turntable revealed that the plastic surface had deteriorated. As a result the disc hub didn't sit on the turntable correctly. A new spin motor was required. **R.B.**

## Kenwood RXD-NV500

This unit wouldn't play CDs. The cause was quite simple – a defective spindle motor. To get to the deck to change this item requires a fair amount of dismantling. When you do this, beware. The flexiprint is 60cm long and comes right up to the top of the unit. It's stretched quite tightly across the sharp edge of the PCB, and is held down just before its connector by a sticky pad. Just to make matters worse, it's paper thin and tears easily. Don't ask me how I know! **G.D.**

## JVC CA-MXJ75R

This one was brought in because there was no right output. Don't be fooled, as I was. Both channels were present at the inputs to IC401, the source-select chip, but only one signal emerged. The chip was OK however.

It transpired that this IC also contains the electronic balance-control stage, which can be adjusted only via the remote-control unit. The owner hadn't brought this along of course. Once it had been obtained, pressing the shift and bal-L buttons produced a balance display on the VFD, enabling the sound to be re-centred. This restored correct outputs. **G.D.**

## Denon DCD635 CD

This stand-alone hi-fi separate wouldn't display the TOC, though you could hear the spindle motor turning. On further investigation with the lid removed I found that the CD was turning very slowly. When the spindle motor was tested with the bench supply it seemed to be OK. Closer visual inspection of the laser assembly revealed the presence of a small 47µF, 4V surface-mounted capacitor. Anyone who has had experience of camcorder repairs knows how troublesome these capacitors can be. A replacement restored normal operation. **D.G.**

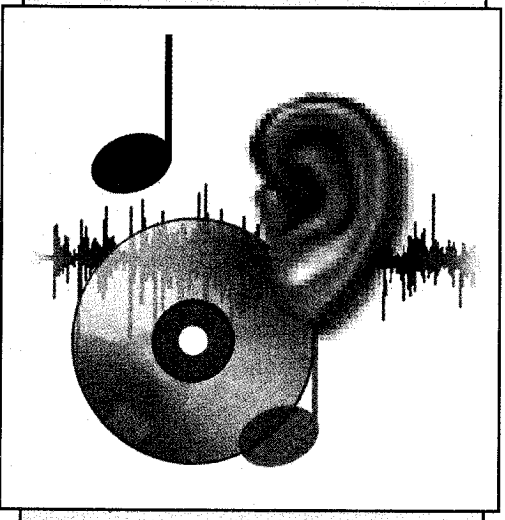
## Technics SL-PG48A CD player

We've had several of these units recently with the symptom "dead" or, strangely, "plays the first track only". The item to check is C11 (2,200µF, 16V) in the power supply. **R.J.F.**

## Kenwood KA4040 amplifier

If there's no output because the protection relay isn't energised, you will find that one or more of the output transistors is short-circuit. The fault will not be confined to the final stage however. As a matter of course, replace the µPC1298V driver IC and look for burnt safety resistors – R83/85 in the left channel, R84/86 in the right channel, all 10Ω. The transistors are difficult to come by, but we have used equivalents to good effect: a 2SD1047 can be used to replace the 2SD1717 and a 2SB817 to replace the 2SB162.

If you have right channel failure, don't miss the safety resistors which are tucked away out of view near the front control PCB. **R.J.F.**



# AUDIO FAULTS

**Reports from**
**Robin Beaumont**
**Geoff Darby**
**and Russell J. Fletcher**

**We welcome fault reports from readers – payment is made for each fault published. See page 746 for details of where and how to send reports.**

## Technics SLHD51E CD player

This player is part of a four-unit system, all linked together by ribbon cables. The customer's complaint was that after several hours the controls would lock up – neither the front-panel nor the remote-control buttons had any effect, but if the CD unit was unplugged the rest of the system worked normally. I tested the system for a week. As the fault didn't show up, the equipment was returned to the customer.

Shortly afterwards another identical system came in with the same symptoms, but this time permanent. I confirmed that disconnecting the CD player would solve the problem, also that the eject button on the player always worked, and that taking off the CD player's front control panel enabled the tuner and tape deck to work normally.

The CD player's front control panel uses a resistive-ladder arrangement. The switches short different resistors in the chain to chassis, the resistance change being detected by the control circuit. The control line should read open-circuit when no buttons are pressed, but my meter detected a resistance of a few kΩ. Further investigation ceased when the fault disappeared!

I inspected the panel for liquid or other contamination, but found nothing. This meant that either one of the switches or the 1,000pF capacitor must have an intermittent leak. As these items are inexpensive, I replaced all nine switches and the capacitor. This provided a permanent cure.

The CD eject button is the switch that shorts the control line to chassis, so it was always detected correctly. **R.B.**

## Sony TC-TX333 cassette deck

This was one of those increasingly rare faults that tests your ability to read a circuit diagram, understand it and reach a rapid and correct diagnosis. The front-panel keys FF, Rew, Rec, CD Sync and Eject did nothing, while all the other keys just turned the unit on and off. The first-mentioned set of keys are all connected to the microcontroller chip's key-0 line, while the others are connected to the key-1 line. The chip uses a clever technique to interpret the effect of so many keys linked via just two lines. Key-0 and key-1 are in fact inputs to DA converters in the chip. A network of resistors is connected around the key switches, and as a result different voltages appear on the key lines with different key presses. The chip compares these voltages with an internal look-up table to determine what's required.

In this case the key-0 line had only 0·5V on it with no keys pressed. As a result the chip thought that the on/off key had been used when any key connected to this line was pressed and, because it looked as if a key was permanently in use, the key-1 line was locked out, rendering all the keys connected to this line inactive.

A new microcontroller chip got the unit working normally. **G.D.**

## Sony CD turntables

Many Sony hi-fi models, for example those in the HCD-XBxx series, have a mainly metal CD turntable with a soft plastic coating on the disc-contact surface. Over a period of time this coating tends to pick up debris from discs. This can have two effects. First, if particles much larger than dust are picked up the disc may not sit flat, and thus wobble as it rotates. The result is poor 'playability' in general, with the symptoms generally worse on later tracks. Secondly, the grip between the turntable and the disc can be reduced significantly. You can hear the disc sort of skid to a halt after the TOC reading, rather than coming to the more normal controlled stop.

The cure is to clean the turntable with a cotton bud soaked in isopropyl alcohol. **G.D.**

## Musical Fidelity A1, A100, A120 and MA60

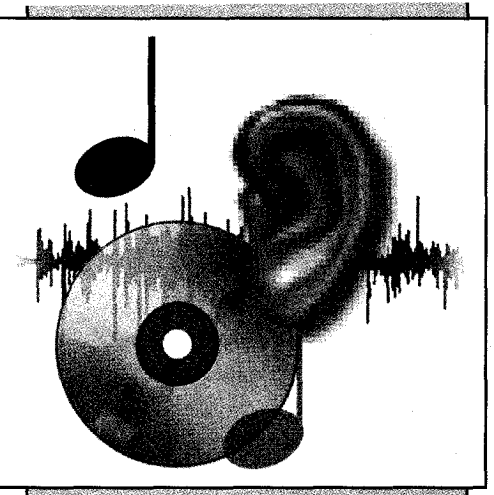
We've had several of these class A hi-fi amplifiers in for attention recently. They have either failed or have come in for general service – usually because the function switch is noisy – and seem to be on the point of failure. The unreliable function switch is a Lorlin type with silver-plated contacts. The other problems are associated with components that appear to be underrated. Look out for component and PCB discoloration. Replace faulty 400mW zener diodes with 1W devices. Faulty zener diode load and output stage bias resistors should also be suitably uprated. Some electrolytics fail because they are mounted close to hot-running components. Uprate any that have to be replaced. **R.J.F.**

## Trio KT5550 tuner

The owner of this tuner said there was no output from the left channel. With no service information and very little else to go by for this elderly unit I decided to replace the LA3350 stereo decoder IC. Lucky guess! **R.J.F.**

## Sony CDP-M20 and similar models

We get lots of these CD players in with the complaint that the tray opens immediately after the close instruction. The cause is no more complex than a faulty loading belt. **R.J.F.** ■



# AUDIO FAULTS

**Reports from**
**Roger Burchett**
**Geoff Darby**
**Robin Beaumont**
**and**
**Russell J. Fletcher**

**We welcome fault reports from readers – payment for each fault is made shortly after publiation. See page 42 for details of where and how to send reports.**

## Hyundai C320

This car radio/cassette unit suddenly failed, with no display or operation. It's a well-made piece of equipment that's reasonably easy to work on. The problem was caused by flux residues that bridged the tracks from the microcontroller chip to the display. This was easy to spot, as the board was otherwise very clean. Use of isopropyl alcohol to clean up cleared the fault.

I suspect that the owner or his garage mechanic disconnected the battery, after which the microcontroller chip failed to reset. **R.Bu.**

## JVC UX-V10/V30R

I've had two of these in recently, both with the same basic problem. With the first, which was the -V10 version, the cassette deck clattered back and forth and sometimes jammed, but never did as it was asked. The cause of this bizarre behaviour was the 'trigger arm', which is the link between the deck solenoid and the cam gear. It's item 35 in the exploded view, and was displaced from its clip.

To get at it you have to remove the deck and the PCB that's attached to it. Remove the forward flywheel, after removing the drive belt and the plastic flywheel retainer washer at the base of the capstan shaft. The trigger arm is then clearly visible, and can be clicked back into place. Reassembly is the reverse of the dismantling procedure.

The second one was a -V30R version. Its tape deck was dead because the 5·6Ω safety resistor R9101, which is located close to CN304 on the main PCB, had failed. Once it had been replaced I had the clattering deck symptom, the cause again being displacement of the trigger arm. **G.D.**

## Sony HCD-H1500

This unit appeared to be dead, but checks in the power supply showed that the basic outputs were present and correct. The cause of the trouble was that the 5V supply to the microcontroller chip was missing, because regulator Q791 was faulty. It's mounted on the main, not the power supply, PCB. Basic operation was restored once this item had been replaced but, curiously, there were no displays. The cause of this final problem was the 24V zener diode D910, which was short-circuit. It provides the reference for the –24V display supply regulator Q903, which is on the power supply PCB. **G.D.**

## Sony DEJ715

This personal CD player would play a disc when one was inserted, but none of the operate buttons at the top had any effect. In addition the LC display, which shares a PCB with the switches, had some missing segments. The control and display panel is connected to the main PCB by a flexible cable, which had two open-circuit leads. A complete new switch unit was required – fortunately the player was still under warranty. **R.B.**

## JVC RD MD5

This very impressive portable system comes equipped with a built-in sub-woofer arrangement that will fill a room with sound. Wisely, the manufacturer has designed it so that it cannot be run from internal batteries!

The MiniDisc section played discs without problems, except that new recordings suffered from intermittent skipping. After removing about a hundred screws to take out the MiniDisc unit, I was expecting to find a problem with the magnetic overwrite head. But nothing seemed to be wrong. Time for measurements. The unit was reassembled and the service manual consulted. I used the remote-control unit to get into the service mode, then used our Sony power meter to check the laser power. The meter is a modified MiniDisc caddy that you insert like a disc.

The laser power for recording on a MiniDisc is about ten times the read power, as the surface of the disc has to be heated to above the Curie point to enable the magnetic head to imprint a new recording. In this case the write power was 20 per cent low. Resetting to the correct value gave good results with both playback and recording.

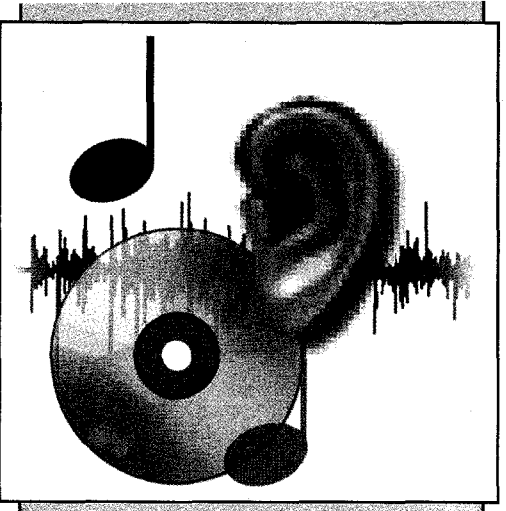
Next time I'll check the laser power before dismantling the set! **R.B.**

## Sony HCDRX90

There were problems with the CD section of this audio system. Discs would focus and spin, but refused to play. The tracking servo was working overtime, and the pickup was very noisy. After replacing the pickup and a number of components in the servo circuit I decided to consult Sony Technical, who said that the cause could be the flexible printed circuit which connects the pickup to board BD. Apparently it fails quite often. A replacement was immediately effective. **R.B.**

## Studiomaster Mixdown Gold deck

We have these studio recording decks in for investigation on several occasions, the complaint being no or intermittent output. Go straight to the insert jack sockets, without checking for anything else. Resistive switching contact here causes the fault. It's probably as well to replace the sockets whenever a unit comes in for service. **R.J.F.** ■



# AUDIO FAULTS

**Reports from Nick Beer Robin Beaumont and Russell J. Fletcher**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 170 for details of where and how to send reports.**

## Sony TCKE230

The problem with this brand-new cassette deck was intermittent failure to erase. A colleague had found that flexing the audio board (behind the mechanism) made the erase bias come and go, but he had been unable to find any dry-joints or PCB cracks.

I flexed the board while using a scope to monitor the FE bias. It didn't vary in level – but did disappear completely. The DC conditions remained perfect when the bias disappeared: it seemed that an AC fault was causing complete failure to oscillate, which suggested a defective capacitor. The culprit turned out to be C252, a 6,800pF surface-mounted component. It was cracked at its end cap, but the crack could be seen only when a microscope was used. **N.B.**

## Aiwa LCX155EZ

This mini system would work for a few minutes then go to standby. It could always be restarted, and would then work for a while longer. A clue was provided by the tuner section: it never remembered the last station tuned, and always cleared the memory of presets. This suggested a reset problem.

The service manual was downloaded from the Aiwa website and consulted. The reset transistor for the front panel microcontroller chip is Q201 (type DTC124XK), whose base is pulsed by C202, a 1µF surface-mounted ceramic capacitor. On test it proved to be slightly leaky. For good measure I also replaced the transistor, using the similar BCR141. **R.B.**

## Bang and Olufsen Beosound Century

This high-quality audio system could just be described as portable – there's a handle on top. It has nice B&O touches like the CD cover, which opens at the wave of a hand. The customer's complaint was "poor CD playback". As I could find nothing wrong I asked for a demonstration, which turned out to be opera – at full volume!

There was clearly a problem: severe mistracking produced unpleasant-sounding results. While I was trying to decide how to open the case a colleague from the local B&O dealer called in. He told me about the transit screws in the CD section. They had never been released when the equipment was installed. A simple adjustment restored full performance. Another problem solved without removing the case. **R.B.**

## Sony HCDED1

A common fault with this mini audio unit is failure of the filament lamp behind the LCD – it goes open-circuit. Replacement is not so simple, because the front panel has to be completely dismantled and the lamp teased out from behind the plastic film diffuser. Don't be tempted to remove the LCD from the panel, as its legs fit very tightly in the print and it's likely to be damaged. Remember to refit the connector to the cassette playback head, otherwise there will be no sound from the tape. The lamp's part number is 1-517-743-11. **R.B.**

## Sugden A21 and A48

Despite their excellent pedigree these hi-fi amplifiers (late models) often come in for service with the complaint "noisy during operation". The item that causes the trouble is the Lorlin function switch, which is a sealed type with silver-plated contacts. The contacts tarnish, and switch replacement is the only cure. It's a pig to get at!

A replacement, already mounted on the sub-PCB, is available from Sugden (Audio Synergy). Unfortunately it's the same type! The switch is also used in **Musical Fidelity** and **Audio Innovations** amplifiers, amongst others sold in the high-end section of the market. **R.J.F.**

## RCF DCA250

Total loss of output with no sign of any active-device failures is a complaint you sometimes get with this professional rack-mount amplifier. The cause is failure of the protection relay – the coil goes open-circuit. **R.J.F.**

## Hitachi HA12 amplifier

The complaint with this amplifier was "no output from one channel, other channel crackling". With this type of amplifier I go straight for the hybrid STK output module and ask questions later! The module was an STK463 in this case. A replacement cured both faults. **R.J.F.**

## Rega Planar turntables

If you get one of these excellent turntables with a report that says "running slow", check whether the ball bearing is still present in the centre bearing of the hub. If it's missing, drop in a 6mm cycle bearing. If lubrication is required, use a little light machine oil. **R.J.F.**

## NAD 402 tuner

The fault report said that there was intermittent operation, but when I powered the unit there was no response at all. Checks in the power supply revealed a regulator chip that wasn't working. A new 7812 restored normal operation. **R.J.F.** ■

# DVD

**Fault reports from Geoff Darby and and Nick Beer**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 170 for details of where and how to send reports.**

## Panasonic DVD-A160

This DVD player would run for hours and hours (and hours and hours and hours!) and then just die – no display, no functions and no standby light. The + and –11V standby supplies continued to be present however, but the others were inhibited by an active power-off signal from the system control at pin 14 of the PSU connector. If the player was left for just ten minutes with all power removed, it would come back on again and run for hours.

No amount of freezer would bring it back on quicker, and no amount of heat would make it fail quicker. This suggested that the cause of the fault was underneath the PCB. But once the PCB/deck/PSU had been removed from the case the player wouldn't go wrong at all! After a couple of days playing continuously it finally did fail, and was brought back to life by freezer applied under the PCB, confirming my suspicion.

The component at the centre of the assault from my can of freezer was IC5002, which is near the front. It's a three-legged device that looks like an oversized surface-mounted transistor. A touch on it with the tip of the soldering iron produced the fault immediately, while a single spot of freezer on it restored correct operation.

IC5002 is the reset generator for the 'operation microcontroller' IC6001. When it failed, IC6001 was put in a permanent reset condition. Replacing IC5002 cleared this troublesome fault. **G.D.**

## Sony DVP-S336

This DVD player would intermittently produce a 'C13' error message when a disc was inserted. Officially, this means 'dirty disc', but I think it's just a generic 'unable to read the disc' indication. There was no improvement when I used the electronic-screwdriver mode to set up the servos etc. automatically, while the data stored in the EEPROM was about right.

Eventually a replacement optical block and a re-run of the electronic-screwdriver set-up cleared the fault. In these players the optical block is actually a complete deck assembly, type KHM220AAA RP. **G.D.**

## JVC XV-M557GD

The only sign of life came from the standby LED, which was glowing rather dimly. When the power button was pressed all that happened was that the LED's glow became even dimmer. A few checks quickly revealed that the B5V supply was low at about 4V. It's derived from the M9V supply via the 78M05 regulator IC953. The M9V supply was also low, and a scope check showed that it was very noisy. All this was cured by replacing the supply's reservoir capacitor C979.

When I checked it with a capacitance meter the reading was 795µF, instead of the somewhat unusual marked value of 820µF. But a check on its ESR showed that this was way out at 15Ω. This confirms what has been said in the past about ESR being a better check than capacitance when the state of an electrolytic capacitor is being assessed. **G.D.**

## Panasonic DVD-A360

The customer complained that this fairly new DVD player wouldn't play certain discs: a copy of Komodo was supplied as an example. When the machine was checked it played all the test discs and various movie titles without any problems. Single- and multi-layer discs were tried. The player hadn't been modified, and the jitter rate fell within the specified 12 per cent for this model. Nonetheless the supplied multi-layer disc wouldn't play, though it did play when inserted in the ten or so other machines I tried. When the Komodo disc was inserted, the faulty machine simply kicked and the on-screen message "cannot play this type of disc, please insert another type" appeared.

My instinct was to replace the optical unit, but I decided to have a quick word with Panasonic technical support. I was told that IC3001 had been the cause of some odd faults. I had already read this at the web site, and felt that the symptoms didn't match the problem I had. So, at the risk of looking silly, I ordered a new optical unit and fitted it. This cured the fault. The interesting thing is that with the new optical unit the jitter rate had fallen to 8·5 per cent.

If I had had another identical machine with which to check the jitter rate and found that it was 8·5 per cent or thereabouts, rather than having to rely on the figure given in the manual, I would have been a lot more confident about ordering a replacement optical unit. I'll know next time! **N.B.** ■

# DVD

**Reports from Geoff Darby**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 234 for details of where and how to send reports.**

## Sony DVP-S335

The customer's complaint was that this DVD player wouldn't read discs. It was OK when I first tried it, but when it had been on for about an hour it wouldn't spin the discs I inserted. A new laser unit cured the problem – proved by a long soak test.

You have to fit a complete deck assembly which, in common with most Sony DVD players, is type KHM220AAA RP. It's easy to fit. Start by removing the whole deck/drawer assembly – there are four screws and the connectors. Next remove the disc clamp (two screws) and the drawer, by simply pulling it all the way out. There are no timing issues here. Remove the three deck retainer screws, release the ribbon connectors and lift the deck out.

The three rubber grommets can be used with the new deck. Fit the deck and connect its ribbons. Remove the laser shorting solder blob at the top rear of the optical block. Refit the drawer and disc clamp, and reinstall the whole assembly back in the main unit.

Finish off by running the test/auto-alignment programme as described in the service manual. **G.D.**

## Panasonic DVD-L50EC

There were two problems with this beautiful little personal DVD player, which has a colour LCD screen. First, the internal speakers didn't switch off when the headphones were plugged in. The cause was the headphone socket itself, as expected, but not in the way I'd assumed. The socket doesn't switch the audio directly in the normal way. Instead, a single switch element, which works when the headphone plug is inserted, connects a microcontroller line to chassis. An electronic mute system then operates, using transistors in the audio path. The pin on the headphone socket was broken. A new socket, glued to the PCB before soldering to add some mechanical strength, cured the problem.

Secondly, when the player had been running for a long time the picture blocked and broke up. I didn't see this in the workshop. But when I initiated the jitter test mode (use 'play' and 'pause' on the unit and '5' on the remote-control handset) a figure of 098 was obtained. This is 9·8 per cent, and is out-of-specification – the figure should be no higher than 095.

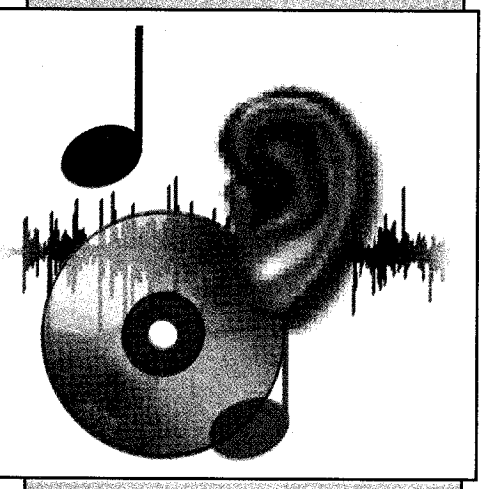
Although the laser's mechanical alignment can be adjusted to minimise the jitter figure, my experience with Panasonic players is that if the figure is wrong with the manufacturer's original settings the laser is probably faulty. This can usually be checked, with any model, by leaving the unit to run while displaying the jitter value. Note that the sequence of buttons to be pressed to get into the jitter mode varies from model to model. If the jitter value remains basically stable, increasing by only a few decimals with time and progress through the disc, adjustment should be tried and will almost certainly enable the figure to be reduced so that it's within specification. Adjustment involves careful rotation of hex socket screws to correct the disc turntable tilt with respect to the laser. Consult the service manual for details of how to carry out these adjustments.

If the jitter value steadily climbs however it's fair to conclude that the laser is faulty. In this case the figure rose above 12 per cent ("jit 120" indicated) with time. A replacement showed 083, indicating that it was within specification and didn't require adjustment. This value is typical of a correctly-operating Panasonic laser. During a long soak test the figure did not climb above 091, showing that all was now well. **G.D.**

## Sanyo DVD1500

There was no analogue sound output from this player, either from the phono sockets or the scart connector. Checks at pins 9 and 10 of the DAC chip IC673 showed that good-level, normal-looking audio was present. It arrived correctly at pins 3 and 5 of the following dual op-amp output buffer IC674, but didn't emerge at pins 1 and 7. DC checks then showed there was no supply at pin 8 of this IC.

The cause was circuit protector PR483, at the input to the 12V regulator in the power supply. It's one of those little yellow ones that look like a resistor and often go open-circuit for no apparent reason. A replacement restored the sound. As the 12V supply is the main rail, it's curious that everything apart from the sound seemed to work all right. **G.D** ■



# AUDIO FAULTS

**Reports from Geoff Darby D. Buckingham Robin Beaumont and Trevor Parker**

**We welcome fault reports from readers – payment for each fault is made shortly after publication. See page 170 for details of where and how to send reports.**

## Sony MZ-R70 Personal MD

"Screw missing and not recording properly" it said on the job ticket. The screw was missing from the door, which left it loose on the hinge/disc-holder assembly. This sort of thing can cause poor recording or playback, as the whole disc-holder assembly relies on being fixed firmly to the outer door – if not, the disc can lie at an angle. In this case however the poor recording was caused by the fact that the overwrite head was bent out of line. As Nick Beer commented a couple of months back, it's hard to understand how so many get to be damaged, as the head is lifted out of the way completely in all conditions other than record.

From the spares point of view, the overwrite head is part of the laser assembly. This makes replacement a very expensive out-of-guarantee repair. If the bend is not too bad you can sometimes straighten it, then realign the head over the lens by eye and trial. This machine responded to such treatment, with normal recording restored. If you are careful, it's also possible to fit an overwrite head from a scrap laser.

Typical symptoms with a bent overwrite head are normal playback of a disc with an earlier recording on it but stuttery or no playback of a more recent recording. Also, if you remove the disc and put it back in you may well get a "disc error" message – because, at the end of the recording session, the misaligned head corrupted the TOC. A disc that has been 'destroyed' in this way can often be recovered by putting it in another machine that's happy to give you menu options even though it cannot read the disc. You can then zero the disc by selecting 'erase all', which will write a new 'blank disc' TOC. **G.D.**

## Pioneer XR-P60C

The customer complained that this amplifier had blown a pair of speakers. She had gone next door for a while and came back to find that the volume was on full. When I checked the amplifier on the bench I found that, sure enough, the volume couldn't be turned up or down. In fact the longer the amplifier was left on, the higher the volume became.

The electronic volume control system is within the LC7535 chip IC406, but a replacement made no difference. I then decided to carry out some supply line checks. The lines involved are –14V and +14V, which are provided by regulator transistors Q502 and Q501. There was 30V at the collector of Q501 but only 0·5V at its base and emitter. After scraping away black hot-melt in the area I discovered that R501 was discoloured – it looked like 33kΩ but is actually 2·2kΩ. When checked it proved to be open-circuit. A replacement restored the supply at the emitter of Q501 and normal volume control operation.

I must say that Pioneer was very helpful in supplying information. **D.B.**

## Sony TCEX660

This cassette deck is part of a four-piece audio system. A dim or completely black fluorescent display is a common problem. The display's heater is fed with 50Hz AC via two 100µF electrolytic capacitors, C161 and C162, which can overheat and fail. If you are lucky, replacement capacitors will restore the display – use the best, low-impedance components you can find. In severe cases however the display's heater will have been overrun, making replacement of the display necessary.

Sony recommends use of a new capacitor type, part no. 1-131-938-21, when carrying out this repair. **R.B.**

## Pioneer CDJ-500S

The lid of this professional-DJ style CD player didn't always open when eject was pressed – i.e. the problem was intermittent. I eventually discovered that because one of the two metal arm/roller assemblies which hold the lid shut was slightly bent, the eject/lock slider assembly sometimes didn't slide to the correct position. While it held the lid shut, it didn't operate one of the tiny switches on the slider. Realignment fixed the problem. **T.P.**

## Grundig M10P

There was no CD or tape operation with this all-in-one hi-fi unit, though everything lit up normally. After checking all five fuses I eventually found an open-circuit N20-type circuit protector. A replacement restored life to the cassette and CD sections, but it was obvious that the CD mechanism was jammed, with the loading motor straining away.

I had to remove the CD mechanism, but this presented a problem because I couldn't open the tray to get the fascia off. I found that by removing the screw which secures the turntable I could remove this item then push the complete mechanism forwards, giving access to the two screws and plastic tabs that secure the fascia. When the tray was completely out, I could see a leaf switch that wasn't being operated properly. After a slight bend with the pliers and reassembly everything was fine. **T.P.** ■

# DVD

**Fault reports from Geoff Darby Martin S. Davis and Nick Beer**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 298 for details of where and how to send reports.**

## Toshiba SD110EB

There was no scart sound and no front-panel display. Otherwise the player did basically work. Checks on the power supply outputs showed that the –31V line at pin 8 of connector CN802 was low at about –24V, while the –9V line at pin 3 of CN801 was very low at –2V. The latter supply is derived from the former via 22V-worth of zener diodes, D836 and D837 in series, so –2V is what you would expect with –24V at the input.

When I followed the –31V line back I came to Q827, the supply switch transistor. It's fed by R834 (390Ω, 1W). At the other end of this resistor the voltage was correct at –40V. R834 was getting rather warm, but its value was correct. This suggested that the cause of the problem was an excessive load on the supply.

Resistance measurements across the –9V and –31V lines were inconclusive. There certainly weren't any readable shorts. When I disconnected the –9V line, the –31V supply rose to the correct level. I followed the –9V line across to the main PCB and came to IC912, a dual op-amp for scart audio buffering. This chip's negative supply comes via Q913. A dead short could be read at pin 4 of IC912, but Q913 had made it impossible to detect this at the power supply. The prime suspect was the chip itself, but when pin 4 was lifted the short was still present. The cause of the trouble was the only suspect left, C928 (100µF, 16V). A replacement capacitor restored full, normal operation. **G.D.**

## Pioneer NS-DV55

The customer's complaint about this DVD/hi-fi/home cinema system was that many controls didn't work following a power cut. When I tried it in the workshop it did indeed behave oddly. If 'vol up' on the remote-control handset was pressed all you got was a loud rushing noise in five volume steps. You couldn't play a disc using the remote-control handset, but discs would play when started with the front-panel button and the remote volume control was then OK. These are just a couple of examples. The controls produced results that varied from normal to bizarre, and you didn't always get the same wrong operation at different attempts.

There seemed to be a problem with the system control processing, so I got in touch with Pioneer Technical to see if a master reset sequence is available to get back to the factory settings. I was told that the problem is known with units manufactured before January 2001. A revised system control processor (IC11) was then introduced, type PD3410C.

The cure is to fit reset modification board part number GXX1198. When you order this be sure to ask for the fitting details, which are in Service Bulletin ref. PGB-186. I found that installation was straightforward. When the player had been reassembled and powered the new PCB forced a full system reset. After that everything worked normally. **G.D.**

## Philips DVD711

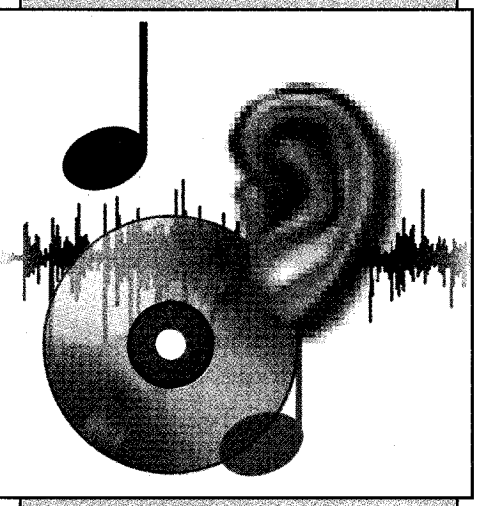
We've had several of these DVD players in with the 'dead set' symptoms – no operation, no front display and no audible ticking sound from the power supply. In each case the cause of the fault has been a short-circuit diode on the secondary side of the power supply, D6231. It's type BYW98, which is rated at 200V, 30A, and the Philips part no. is 4822 130 11584.

The protection circuitry is obviously very discreet in its operation! **M.S.D.**

## Panasonic DVDRV20

This quite new machine produced blocking/ mosaicing vision, not only with playback but also with the DVD-logo screen when no disc was inserted. Now Nick's no. 1 rule is that big chips don't fail, and that the bigger the chip and the more it does the less likely it is to be the cause of a fault. But I'm now going to have to change this rule, adding "unless Nick says it's faulty", because this particular fault was caused by IC3001 on the "Module CBA" under the mechanism. It's a surface-mounted device that measures 28mm square and has 208 legs.

I managed to obtain a suitable nozzle for our hot-air tool, but had some difficulty with desoldering because of the closeness of the end legs to the corners. The two correctly-sized nozzles our supplier sent had large gaps at the corners. **N.B.** ■



# AUDIO FAULTS

**Reports from**
**Chris Avis**
**Russell J. Fletcher**
**Geoff Darby**
**Ian Bowden and**
**Keith Wevill**

**We welcome fault reports from readers – payment for each fault is made shortly after publiation. See page 298 for details of where and how to send reports.**

## JVC UX-T100

The symptoms with this micro system were standby light on but no power up or display. I found that the output from the 6V regulator IC703 on the processor board was less than 4V. A replacement cured the fault: it's type KIA78S06P. I obtained it from Willow Vale under order code 87006KD. **C.A.**

## Citronic SM330 and SM450 mixers

These now elderly units suffer from various ailments, all of which are straightforward. Noisy faders are common, also open-circuit failure of faders, giving the symptom of one or both stereo channels not functioning with any of the inputs. One of the most common complaints is buzzes, crackles, frying-egg effects etc., either intermittent or permanent. The usual cause is elderly IC sockets into which the op-amps are plugged. The ICs themselves are very reliable, so the easiest cure is to solder them into the PCB directly. **R.J.F.**

## Fender guitar combo Model 85

We have had a number of these with the complaint of crackling during operation. The cause of the problem is either cracked or dry-jointed power resistors in the power section. **R.J.F.**

## Aiwa NSX-S77

Aiwa has marketed a number of three- and five-CD player units. This model employs yet another chassis. As so often, the symptoms were no display with the standby light on. When the on button was pressed, the display flashed up briefly and the standby relay clicked. These symptoms, as I've mentioned before, can have many causes.

Failure to come on will occur when the /hold line to the microcontroller chip is pulled down. This line comes from the fault-detector circuit, which consists of Q063-7 and D061-2. It monitors many things, such as the output stage DC offset, the presence of AC from the transformer board, and thermal conditions in the output stages. Thus a fault in almost any stage will give rise to the locked-off condition. Fault-finding usually consists of disconnecting the inputs to the fault-detector circuit until you find the one that's causing the shutdown. You can then check the faulty stage to find out why it's flagging a fault condition.

In this case the /hold line was released when the AC detect input was disconnected. The unit then powered up and worked normally – the AC was not actually missing. The cause of the problem was D062, a surface-mounted double-diode that produces the negative input for the fault detector from the AC (D061 produces the positive input). A replacement restored normal operation. **G.D.**

## Sony MZR50 MiniDisc recorder

I had two of these units with the same fault, failure to record. The causes were different, but the result was the same: the overwrite head wasn't being driven down into contact with the disc in the record/edit modes. In one unit there was an open-circuit length of print in the FPC connected to the stepper motor that drives the head lever. It appeared to have been cut through by contact with the sharp edge of the core of a small surface-mounted coil on the main PCB. Correct operation was restored once a new FPC had been fitted. With the second unit the cause of the fault was simply that the lever, which has a rectangular slot in it, on the mechanism driven by the stepper motor wasn't engaged with the finger on the slide lever in the lid assembly. The lid had to be removed so that the finger could be bent inwards slightly and re-engaged. **I.B.**

## Sony MZR50 MiniDisc recorder

The complaint with this recorder was that it had a disc stuck in it. When the unit was powered however the mechanism reset itself correctly and the disc could be ejected. After some use it failed again – when it had been in the record mode. I found that the overwrite head raise/lower mechanism hadn't raised the head fully, so the lid was locked. The cause was a dent in the lid. It was hitting the head lift/lower slider mounted in the lid. The problem was cured by removing the lid and pushing out the dent. **I.B.**

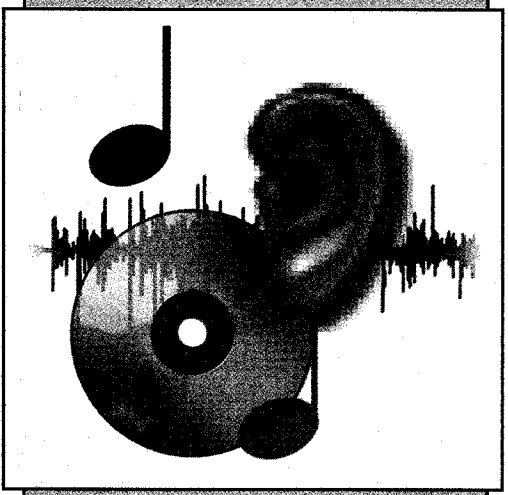
## Quad 405

There was no output from one channel, with the heatsink running very hot, because the output-protection circuit was in operation. The cause was R7 in the positive supply to IC1: it was open-circuit. As a result the output was shifted towards the negative supply.

The protection circuit is designed to protect the speakers, by detecting a DC offset in an amplifier's output and triggering a triac which shorts the output, preventing the speaker receiving up to 50V DC. **K.W.**

## Quad FM4 tuner

Inability to tune over the full range, with tuning drift, was caused by a dry-joint at L20, which provides a DC return for the tuning supply to the local oscillator. **K.W.** ■



# AUDIO FAULTS

**Reports from Keith Wevill Geoff Darby and Nick Beer**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 358 for details of where and how to send reports.**

## Quad 44 control unit

This control unit had a habit of sometimes switching to the default radio input. A temporary cure was achieved by replacing IC101 on the control board attached to the front panel, but the real cause was dry-joints at the through-board links on the main board. These are in the +7·5V and –7·5V supplies to the front panel. **K.W.**

## Aiwa CXNF9K

This unit's front-panel volume control was very erratic in operation. It's a common problem with Aiwa units that use a rotary encoder instead of a conventional potentiometer. The cause is grease, with which the manufacturer stuffs the control to give it a 'treacle' feel. Over the course of time this grease migrates on to the contacts, where it solidifies into a jelly, wreaking havoc with the electrical characteristics.

Once the control has been removed from the PCB it can easily be dismantled, by bending back four metal tabs. The contacts can then be cleaned, retensioned and treated with a thin film of contact lubricant. **G.D.**

## Technics SA-EH750 tuner/amplifier

When this unit was switched on 'F61' briefly showed in the display, after which there was nothing. This fault indication often means that the hybrid output IC has failed. In this case its failure had been violent, with one pin burnt right off. I removed the IC then powered the unit again to see if there were any other problems.

F61 again appeared. It's difficult trying to find the cause of a fault like this, with the protection circuit preventing power-up. As the obvious cause of the trouble had been removed, I decided to bypass the protection circuit temporarily. I did this by placing a short across Q971 to keep relay RL702 energised and the basic power supplies alive. This enabled me to check the conditions around the fault-sensing transistors Q601 and Q602, which look for a DC offset at the outputs from the hybrid IC. The voltages at the collectors of these two transistors were low, but not because of the conditions at their bases.

Two diodes, D657 and D658, are connected to the collectors of Q601 and Q602. Their cathodes are connected to the 14·8V and 7·5V supplies respectively. If either of these supplies is missing the relevant diode conducts, pulling down the collector supply with the same result – shutdown – as if a DC offset had been detected at the base of one of the transistors. The 14·7V supply was missing, because the 4·7Ω safety resistor R721 was open-circuit. A replacement resistor, followed by removal of the temporary short-circuit across Q971, proved that the unit was now able to power up without errors. A quick check on the power supply outputs showed that they were all present and correct. Finally, a replacement RSN311W64B-P output IC restored full operation.

The reason for going to all this trouble before replacing the IC is that it's *very* expensive. The last thing you want is to find that it goes up in smoke again. **G.D.**

## Sony CMT-CP11

The complaint was failure to read discs. A nice simple one for a change. A couple of the tracks in the laser flexiprint were open-circuit. This fault is not uncommon, and I keep some of these FPCs in stock (part no. 1-757-055-11). As expected, a replacement cured the fault. **G.D.**

## Sony HCD-C70

This integrated hi-fi unit had a problem with its CD section. There was no audio from either channel, just a gentle hiss. With all other sources the audio was fine. I decided to work backwards from the CD audio outputs and found that the audio amplifier IC205 had no discernible inputs at pins 6 and 2 (R and L respectively). Back one stage then to the PCM67U DA converter IC204, which had little by way of outputs at pins 7 and 4. The data inputs at pins 13 and 17 seemed to be OK, as did the clock signals at pins 14, 15 and 16. As all the supplies were correct, the obvious thing to do was to replace IC204, which involved surface-mount reworking. Once this had been done the CD section provided its audio outputs. **N.B.**

## B&O Beocenter 5000 (type 1802-4)

There was very low, sometimes no audio from the left-hand tape channel of this hi-fi centre. Signal injection tests showed that the playback worked most of the way back to the head. When I carried out scope checks from the head, using the right-hand channel as a guide, I found that there was no signal to speak of at the collector of TR100, in the second transistor stage after the head. The transistor was in fact biased hard off, with its base and emitter at 15V and its collector at –15V. I found that C102 (220µF, 16V), a reservoir electrolytic capacitor at the emitter of TR101, was open-circuit. A replacement put matters right.

These units may be old but they perform excellently and I find that many customers will happily spend up to £200 having the units overhauled. **N.B.** ■

# DVD

**Fault reports from Geoff Darby**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 358 for details of where and how to send reports.**

## Sony HCD-S300

The reported fault with this combined DVD player/5.1 channel power amplifier was "CD stuck in drawer". When it was first powered there was a soft clatter from the deck, in bursts. This would sometimes clear up and the unit would then work normally until left to get cold again.

I dismantled the deck from its carrier/drawer assembly and laid it on top of a sheet of card so that I could see what was going on. As I suspected the clatter came from the laser drive worm, which was slipping against the drive pawl because the laser was already firmly 'home'. A check with the manual showed that the laser-home sensor is optical. Scope checks then revealed that while there was a supply to the LED section of the sensor the output pin was low under all conditions.

This led me back to R004, a minuscule 22kΩ surface-mounted resistor on board TK, which is mounted beneath the deck. There was 3·3V at the adjacent through the board plated hole at one end but nothing at the other end. Inspection with a powerful magnifying glass then revealed that there was no solder at all at the 'high' end of this resistor. Once I had added some, using a tiny-tipped soldering iron, there was normal operation.

## Proline DVD1000

This DVD player's power supply was completely dead. The circuitry is fairly simple, based on a single TOP series chopper IC. None of the associated components appeared to be distressed but, before condemning the IC, I thought I would check a few other components. When I checked D7 on the secondary side of the circuit I found that it was short-circuit. A replacement restored life to the power supply but when I asked the drawer to open it came out a couple of centimetres then jammed. This had, presumably, been the reason for the rather unusual diode failure.

The cause of the jamming was that the U-section strengthening bar across the top of the deck had been fitted upside down – the arms of the 'U' were pointing down instead of up. As a result a plastic pin that stands up at the back of the tray caught on it. Clearance was restored once the bar had been fitted the correct way round, and the whole unit then worked normally. I wonder who had been inside the unit, and why?

## Sony HCD-S300

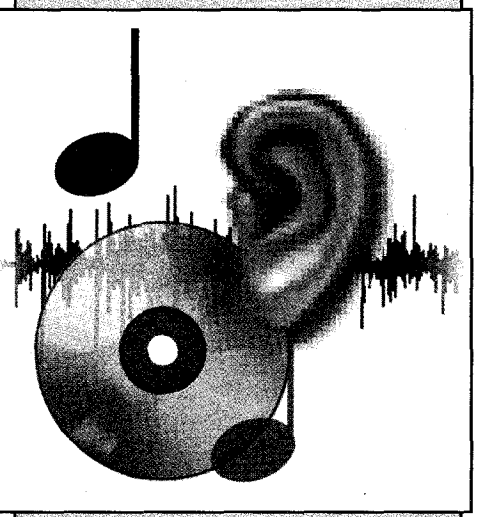
Two of these units came in during the same week, with similar fault symptoms but totally different causes. In both cases there was no audio output from any of the six channels, because the protection relays failed to pull in.

With the first unit the cause of this was a defective output chip, IC361, which drives the left front and rear speakers. It's not easy to determine which of the three digital output ICs is faulty. When they are operating normally there is a DC offset of about 7V with respect to chassis at both speaker socket pins with each of the six channels. When I checked the outputs with this unit, at the input sides of the relays as they were not closed, the two good chips had, misleadingly, 0V at their output pins while the faulty chip had 12V at one pin and 7V at the other.

These measurements can vary. Past experience has shown that the most reliable way of establishing which IC is faulty is to find the one that has different voltages from the other two at its output pins – even when the different voltages seem right!

The second unit with similar symptoms had the correct voltages to chassis at all the IC output pins, which indicated that the cause of the fault was not in the output stages. So I decided to check the protection circuit, which is on a sub-PCB that's plugged into the main one. To my dismay it bore no relationship to the circuit diagram or layout shown in the paper manual, nor the electronic Sony Assist one. To make things even more difficult, none of the fourteen connections to the protection PCB are labelled functionally on the circuit diagram.

I eventually found that the drive for the relay-driver transistor is at pin 3 of the board's connector, CN402. This pin should go high about six seconds after the unit is taken out of standby. As this happened, suspicion fell on the relay-driver transistor Q405. This tiny, surface-mounted transistor has to switch three 100Ω relay coils and doesn't look anything like man enough to do the job. Although it read OK with DC checks its gain was low. A replacement restored normal relay operation. ■



# AUDIO FAULTS

**Reports from**
**Michael Maurice**
**Dave Gough**
**Mark White**
**Ivan Levy, LCGI**
**Colin McCormick and**
**Geoff Darby**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 424 for details of where and how to send reports.**

## Aiwa MX-Z9300 Mk II

I've had two of these units with an identical fault: there were popping sounds, then the unit went dead. The solution is to remove the main PCB from the chassis, which is not easy, and resolder every joint that looks suspect. Pay special attention to all power transistors and ICs. You will find that all is well once this has been done. **M.M.**

## Sony LBT-XB20

These monster stack systems look to me like a cross between the dog robot K9 and Darth Vader's helmet, but they provide a regular source of work. The usual symptom is a 'no disc' display. The CD unit, a five-changer carousel affair, is at the base of the stack, and dust ingress to the laser assembly is a constant problem.

To reach the laser assembly is no mean feat. Remove the case/cover first. Then, after detaching all the cables/connections from the power panel, I remove the power supply complete with its supporting chassis. Be careful about this, because it's quite heavy and has sharp edges. Give the carousel and laser assembly a thorough clean – I remove the carousel. Once you have completed the cleaning you will find that the unit works normally. **D.G.**

## B&O Beomaster 3300 (type 2952)

The reported fault was very low sound, and I found that the volume control made no difference past number 10 on the indicator. With the aid of the service manual I located the IC for the volume control stage, IC6. Some quick checks at its pins showed that there was no voltage at pin 1 instead of 16V. The cause was C92 (100µF, 25V), which was short-circuit. There were normal sound levels once this item had been replaced and the unit had been reassembled. **M.W.**

## Peavey CS8005

This amplifier was brought in because channel 1 wasn't working. After extensive tests on the transistors in the output stage I found that the protection relay was in operation. No shorts or leakage in the output transistors or associated devices were detectable however. When I carried out voltage and resistance measurements in the protection circuit I found that the thermal resistor R207 was open-circuit. It's on the heatsink. A replacement cured the fault. **I.L.**

## Denon DCM270

I've had several of these CD players that cut out or stop playing after several tracks. The laser is usually OK, the cause of the problem being the ribbon cable that connects the laser to the main PCB. **I.L.**

## Sony PCM2500

The complaint with this professional DAT recorder was glitching with the green and red error lights coming on. I found that the amplitude of the RF waveform was pulsing up and down. Close inspection of the deck revealed dirt on the capstan shaft. The cure was to clean the shaft thoroughly. **I.L.**

## Technics SE-CA01

This is the amplifier section of the CA01 system, which has a metal-boxed amplifier section right next to the transformer – hardly audiophile stuff. The fault was reported as one channel being very quiet. I traced the cause to a dried up DC blocking capacitor, C205 (10µF, 16V), in a preamplifier stage. This seems like bad design: surely everyone knows that you don't pass audio signals through an electrolytic capacitor, because of the poorly-defined frequency-response characteristics? The owner told me that the unit had cost some £300, so this lack of attention to sound quality was unforgivable. But the system does have flashy displays and lots of buttons to press! **C.McC.**

## JVC XL-EX70

This is the CD section of the CA-EX70R system. It was completely dead, with no outputs from the power supply. The cause was R111, which is in one leg of the AC feed to the mains bridge rectifier. It was open-circuit. As cold checks failed to reveal any reason for its failure I simply fitted a replacement, which restored full, normal operation. A long soak test confirmed that there were no other problems. **G.D.**

## Sony MZ-E60

This personal MiniDisc player wouldn't read discs. A replacement laser unit, which is very easy to fit, was required. Removal of the door gives access to the top of the deck, which is secured to the body of the unit with two tabs that engage in slots at the right and one screw at the left. The deck can be lifted right out once the flexiprints have been released.

When the new laser unit had been fitted and the unit had been reassembled I ran the automatic set-up program. To do this you use two test discs in sequence. They are expensive, but if you want the auto set-up to proceed without problems there is really no alternative. The discs can be obtained from Sony, and can be used with other units in the MZ-xx range. **G.D.** ■

# AUDIO FAULTS

Reports from
Geoff Darby
and
Ivan Levy, LCGI

We welcome fault reports from readers – payment for each fault is made after publication. See page 552 for details of where and how to send reports.

## Sony HCD-MD5

If you get one of these units that won't accept a MiniDisc, the cause will almost certainly be the loading motor drive chip IC431, part no. 1-242-013-98. It fails at its control side, responding only to the unload command. You will also require modification kit A-4672-837-A, and technical bulletin no. AU02000 to tell you how to fit it. The kit is basically a small PCB with a regulator IC and a couple of support parts on it. This reduces and regulates the supply to IC431, presumably to reduce the possibility of a repeat failure. **G.D.**

## Technics SA-EH60 tuner/amplifier

When this unit was switched to any Dolby Surround mode by using the matching SH-EH600 sound processor unit the sound level from the main and centre channels became very low, also distorted. The simple but horrifically expensive cure was to replace the Dolby Pro-Logic processor chip IC801. **G.D.**

## Kenwood RXD-NV301

The CD player fitted to this equipment is of the three-disc carousel type. This particular one had a disc in the works: I don't know how this had occurred, as I can't see any reason why a disc should have jumped off the carousel and lodged itself at the side of the disc clamp. The point of this story however is that a considerable amount of dismantling has to be carried out to get to the CD player, including the disconnection of many plugs and two earthing wires, one either side at the front, which are secured under screws that hold the CD player chassis to the upper metalwork. They look just like the standard 'belt-and-braces' earthing bonds that you often find between areas of units to keep them hum-free. With this equipment however you get no audio, and a relay pulses, if you don't reconnect the one on the right before retesting prior to full assembly. If the speakers are connected, they produce a good bang with each pulse. **G.D.**

## Sony TC-EX66/660

If you get one of these with a weak or poor display, possibly with the heater wires glowing anywhere between just visible and a torch bulb, replace C161 and C162 (both 100µF, 100V) with the upgraded type, part no. 1-111-167-11. They are located at the rear left corner.

You will almost certainly find that the display itself, part no. 1-517-317-21, has been damaged and will need to be replaced. Experience has shown that it is advisable to replace C163 and C164 (both 470µF, 16V) at the same time. These are series-inverse connected, forming a crude bipolar electrolytic capacitor, and are also in the display's heater circuit. They go open-circuit/high-ESR, and can be the cause of a glowing heater and early failure of the display tube. **G.D.**

## Sony HCD-MD313

This was a curious fault. There was no VFD activity for a start, and there was a disc that wouldn't eject in the MiniDisc section. At power up the laser would hunt around but never seemed to get as far as reading the TOC. This couldn't be confirmed however because of the blank display. I decided that the first thing to concentrate on was the blank display, as the cause was likely to be straightforward and, once it had been fixed, I would be able to see what was going on with the MiniDisc section.

A few voltage checks revealed that the VFD's negative supply was missing at pin 12 of connector CN901 to the front panel. This supply is derived from the raw negative supply via regulator transistor Q530. There was voltage at the collector of this transistor but none at its emitter. Cold checks on the transistor and its associated components revealed that the 33V zener diode D534 was short-circuit and its 470Ω feed resistor R531 open-circuit.

Replacement of these two components restored the –VG supply and the display. But here's the curious bit. The MiniDisc now ejected and, when it was reinserted, the TOC was read and the disc was played. In fact the whole unit now worked correctly. The reason for this is strange, as the –VG supply is used only by the display circuitry and I can see no reason why its absence should have upset the MiniDisc operation. Any ideas? **G.D.**

## Pioneer F202L

This radio was brought in because there was no tuning. Tests showed that the LM7001 tuning PLL chip IC101 wasn't producing an output, though the voltages and signal conditions around it were correct. A replacement chip cured the problem. **I.L.**

## Otari MTR10 recorder

This professional half-inch tape reel-to-reel recorder came from a recording studio. The complaint was that the ready LED on the selector reproduce unit was oscillating on and off. Some checks showed that there were 100Hz spikes on the +5V rail. The cause was C4 and C5 in the power supply – they were open-circuit. **I.L.** ■

# AUDIO FAULTS

**Reports from Eugene Trundle Lee Archer and Geoff Darby**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 488 for details of where and how to send reports.**

## Sony HCD-H551

There was mains-frequency hum on both channels with all functions. It disappeared only at the zero setting of the volume control. Scope checks revealed that there was ripple on the –7·7V supply and very heavy ripple on the –13·5V supply. The culprit was C1002, which was weeping slightly and bulged at the top. **E.T.**

## Yamaha SPX90 FX unit

This unit had no LCD or seven-segment displays, the bar graph was permanently lit at 0dB, and there was no audio output. The cause of the problem was the 15DF2 rectifier diode D7, which went open-circuit under load. As a result here was then no –18V supply and the +18V and +5V supplies were low, as a reference is fed back from the –18V supply. As I didn't have a 15DF2 in stock I used a BY299 as the replacement. **L.A.**

## Sony MZ-R70

If it was left alone this personal MD unit would play discs perfectly. But if it was moved, picked up or tilted it would usually, though not always, just die with a blank display. How it was held when it was being moved seemed to be related to the problem.

The symptoms were much harder to instigate when the bottom case had been removed. PCB prodding and probing produced inconclusive results, but I eventually discovered that the problem didn't occur when the door was held to the main body. The cause of all this trouble was the bent-round 'foot' on the right-hand door hinge. It presses on the door open/close switch, and was not of quite the right profile. As a result it only just closed the switch when the door was closed. Any movement that flexed the case or PCB by even the smallest amount would open the switch momentarily. The unit then stopped and the display went blank. As soon as the unit was turned the right way up the switch remade and the disc restarted, as if it had just been inserted.

The cure was simply to bend the foot into the correct shape, so that it maintained firm but not excessive pressure on the switch at all times. **G.D.**

## JVC CA-EX70R system

I've had several of these three-disc CD changers now with the same problem and a common cause. Customer complaints may be "won't play some discs", "won't play some discs in some positions" or a "scraping noise when playing some discs".

If the customer hasn't provided a sample disc that offends in the way described, you may find that you have to go through several of your own before you find one that produces the problem. When the disc spins at the full rate you will see it wobbling to such an extent that its edge catches on the tray. It's so bad you would think that either the turntable or the motor shaft is bent. But put another disc in and it will be fine.

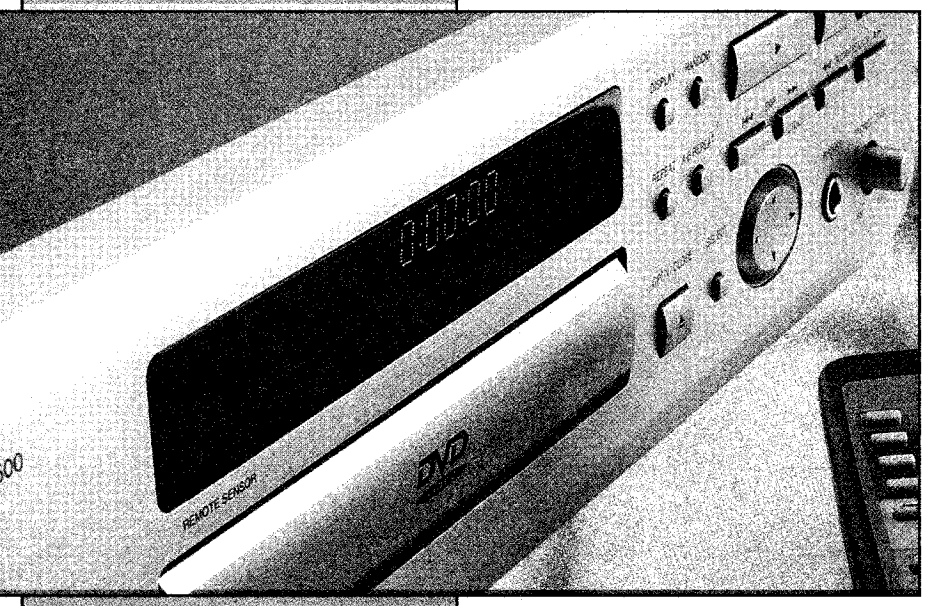
The cause of the problem is that the diameter of the centre boss of the turntable is at the upper limit of its moulding tolerance. This doesn't itself cause a problem. The difficulty arises when the centre-hole diameter of the disc is at the lower limit. You then get a slight 'stick' situation, and the magnetic pull of the disc clamp is not quite enough to force the disc down on to the turntable – hence the wobble.

The problem is easy to cure. First, remove the disc clamp. Load the top tray into the 'play' condition, then disconnect the power. Place a bad disc on the turntable and push it firmly down. Next use the tip of a scalpel to lift, gently, an edge of the disc. You will feel it 'pop' off the turntable as it unsticks. Hold the scalpel straight against the vertical face of the turntable's centre boss and, pressing firmly, rotate the turntable a few turns by hand. This will pare a very fine and uniform layer of plastic off the boss. **G.D.**

## Sony XR-C6220R

There was an interesting fault with this car radio-cassette unit. Its owner said that the volume control crackled at some points, the sound would go off completely, and the 'D-bass' function was intermittent. I was sceptical about this, as the volume control is electronic, controlled by a rotary encoder. But, sure enough, when the unit had been on for a while certain click points on the control produced a nasty interference, while with others the sound disappeared.

Further assessment revealed that the onset of the symptoms had nothing to do with the actual rotational position of the encoder. Instead, it was individual discrete steps in the volume-control characteristic that caused the trouble. As the fault didn't show up until the unit had been on for a while, judicious use of freezer seemed the best way of pursuing the diagnosis. There were immediate results when the surface-mounted TDA7462D chip IC401 on the main PCB, under the tape deck, was sprayed. In fact individual drops of freezer and heating with the tip of a soldering iron made the fault come and go. A replacement IC cured the fault. **G.D.**




# DVD

**Fault reports from Geoff Darby and and Jeff Herbert**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 488 for details of where and how to send reports.**

## Sony DVP-S725D

A disc was stuck inside this unit. The owner couldn't remove it because the display said "locked" when the open/close button was pressed. I couldn't find any reference to this condition in either the user or the service manual so, eventually, I called Sony Technical for advice.

I was given the following fix. With the machine in standby, enter '1410' then 'power' using the remote-control handset. The unit then unlocks. When I asked Sony how the unit might get locked in the first place, the answer was "by entering the same sequence quickly". The mind boggles at the chances of the customer doing this accidentally. **G.D.**

## Thomson DPL800VD

This gigantic DVD player/home theatre amplifier would play CDs but not DVDs, which is a typical symptom when the optical block is faulty. The deck is not as difficult to get at as it appears at first. Start by opening the tray and removing the fascia trim from its front edge. Remove all the screws from the front main fascia panel, at the top, bottom and sides, then pull it forwards. It doesn't need to come right off. Remove the metal bottom cover panel. From the top, disconnect CP208, CP202, CP402, CP404 and CP411. Back underneath, undo the two screws at the rear of the deck sub-chassis and the two at the front, farthest forward. The deck can then be withdrawn from underneath, after disconnecting the mains plug to the sub power supply.

The replacement optical block comes as a deck, ready mounted on the plastic carrier. When I fitted it however it didn't line up correctly with the disc clamp. The reason for this turned out to be that the hinge pins for the carrier were moulded in a slightly different place from those on the original. This pushed the deck back from its correct position. There was no alternative to putting the new deck in the old carrier, which didn't introduce any mechanical alignment problems. Fitting was then straightforward and, after reassembling the unit, it worked correctly. **G.D.**

## Sony HCD-S300

When the DVD mode or any DVD-related function was requested this unit just sat there for a while, with the "DAV-S300" identifier in the display if it had just been powered or "DVD" if you had gone from another mode, such as 'tuner', by using the function key. The display would then blank, followed by the error code "C81". This is another general error code that means nothing more specific than "I can't do anything".

A quick check on the motor 12V supply at pin 1 of CN902 showed that it was very low. The cause was D911, which was high-resistance, in the power supply. It's one of three diodes that are connected in series with the output from the motor-supply switch transistor Q907. Their function is presumably to drop a couple of volts to reduce the supply to 12V from the nominal 14V at the switch transistor's input. A replacement diode restored DVD operation. **G.D.**

## SMC DVD530

I'd never come across this brand before. According to the label on the back of the unit the manufacturer is based in the British Virgin Islands. It seemed a solidly-built unit however, and as the compliant was "no power" I opened it up for a look inside.

The deck consisted of a standard computer DVD drive, but with a smart, black escutcheon at the front of the tray. On the left inside there was a fairly conventional-looking chopper power supply. A quick check across the output from the mains bridge rectifier, which conveniently stood about an inch off the board with bare legs, produced a reading of 380V. There was no supply at the UC3842 chopper control chip however. The cause was quickly traced to the 120kΩ start-up resistor R35, which was open-circuit. A replacement got the unit working again. **G.D.**

## Toshiba SD110

No sound and no front display were the symptoms with this DVD player. The deck functions and playback picture were perfectly normal. A quick check on the power supply outputs revealed that the –9V line was low at –1·5V while the –31V supply was low at –24V. After much fruitless checking on the power supply PCB I eventually found that the culprit was C928 (100µF, 16V) on the main PCB. It was short-circuit. A replacement restored both the sound and the display.

I have also had C929 go short-circuit. The symptom in this event is no sound with the front display OK.

It's best to replace both of these capacitors as they seem to be developing into something of a stock fault. **J.H.**

# DVD

**Fault reports from**
**Geoff Darby**
**Matthew Biddlecombe**
**Robin Beaumont**
**Nick Beer**
**John Coombes**
**and**
**Gary Laidler**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 616 for details of where and how to send reports.**

## Pioneer DV717

This was an odd problem: the unit would play DVDs without fuss but, when asked to play a CD, would run it up, refuse to read it and then eject it. I've had this sort of problem on a number of occasions, but always the other way round, i.e. the unit reads CDs but not DVDs. A defective optical block has always been the cause of the problem. Although I was a little reluctant to suspect the laser in this instance, I eventually decided to give it a try. The replacement deck assembly, which comes mechanically prealigned, restored normal operation in all respects. **G.D.**

## Sony DVP-NS300

This started out as a nice simple fault. The job ticket said "when lead wriggled, the left speaker comes on; otherwise no sound from the speaker". When I tested the unit however it seemed that the owner was mistaken, as the output from both phono sockets was solid with my leads and test amplifier. A note was made on the job card to supply the owner with a new phono lead, as this was the most likely cause of the trouble he had been experiencing.

To be on the safe side however I thought that, while I had the unit apart on the bench, I had better check the soldering at the sockets. I removed board AV56 and examined the joints. All was well. But when everything was reassembled there was no sound from either channel!

I eventually discovered that PS402 (1A) in the ever-11V supply was open-circuit. It's a surface-mounted item, the size of a pinhead (really!), on board IF80. As there didn't seem to be any short-circuits present I temporarily hung a 1Ω safety resistor across it. This proved that all was now well, with normal sound present, and a replacement of the correct type completed the repair. The mystery is why PS402 had failed. **G.D.**

## REC 850

This DVD player would attempt to read a disc but, after several seconds, it would show "no disc" in the display. When I removed the top I could hear a high-pitched buzz that came from the power supply. On closer inspection C622 (2,200μF, 16V) appeared to have a slight bulge at its top. There was no sign of any electrolyte leakage when I removed it, but a check on its value revealed that this had fallen to 10μF. Replacement with a type rated at 105°C restored normal operation. **M.B.**

## Philips DVD750/004

This machine had gradually become very particular about which discs it would play, either not reading them at all or stopping after a while. A new loader assembly, which includes the laser unit and the spin and sled motors, restored normal operation.

Be careful when fitting this, as there are two laser diodes and thus two solder bridges to unsolder on the flexiprint . If you miss the inner one, which is difficult to see with the machine assembled, the unit will play only audio CD discs. **R.B.**

## Toshiba SD3109

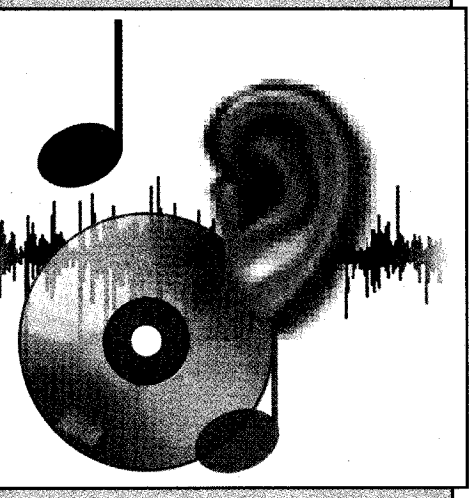
This player wouldn't read discs. When I removed the top cover I saw that the traverse didn't move the sled to the centre of the disc. In fact it didn't move the sled at all because the traverse gear, which consists of two interlocked and sprung gears, had fallen apart. Reclipping and reinstalling restored normal operation. **N.B.**

## Grundig GDV210

The complaint with this DVD player was no results. Checks on the primary side of the power supply showed that it appeared to be working correctly. There was no 12V output on the secondary side however. The cause was traced to D7 (SB1100) which was short-circuit. **J.C.**

## Medion MD7950A

The customer complained that there was no display and poor sound. As I had no circuit diagram the best place to start seemed to be the power supply. I soon found two 10Ω fusible resistors, R306/7, that were open-circuit. I couldn't find any reason for their failure, and replacement cured the faults. A long soak test proved that all was now well. **G.L.**



# AUDIO FAULTS

**Reports from Geoff Darby Eugene Trundle J.S. Ogilvie and Robin Beaumont**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 616 for details of where and how to send reports.**

## Aiwa 3/5-disc CD changers

If you get one of the many models in these ranges with the complaint "intermittent display", remove the CD changer unit to obtain clear access to the front panel PCB and check all four VFD heater pins for bad joints – the two at either end of the row of pins. You will usually find that two or more of the pins are dry-jointed. Note that the fault may not be apparent when the unit is first powered: it can develop after some minutes when the display and its pins have warmed up.

For no display with any of these models, check the –30V VFD supply. It can be conveniently measured to chassis at the heater pins, as the AC drive to these is superimposed on the –30V supply. When the display is missing you will find that one of the power supply electrolytic capacitors used to couple AC to the negative-voltage generator is open-circuit. Component reference numbers, values and locations vary from model to model. You will usually find a cluster of physically small electrolytic capacitors by several small diodes, generally at the top, left quadrant of the main PCB looking from the print side. The open-circuit one can easily be found using a scope or ESR meter. **G.D.**

## Sony ST-EX100 tuner

This unit had no display. My trusty ESR meter soon revealed that both of the VFD heater supply coupling capacitors, C161 and C162, were well out of specification. Replacements (100µF, 50V) restored normal operation. **G.D.**

## Aiwa CX-Z1290K

This unit was stuck in standby. When you get a problem like this with any make or model, not just Aiwa, it's worth checking that all the front-panel buttons move and produce a positive click from the switch behind. Ham-fisted operation, or broken button hinges, can cause the operating pin to jam under the switch button. As a result the switch is kept in the permanently-pressed condition. Because of the way in which the front-panel switches are multiplexed to the microcontroller chip's key ports, all the other switches will be prevented from working.

In this case the BGM switch was jammed. Releasing it and straightening its hinges enabled the on/off and all the other buttons to work normally. **G.D.**

## Daewoo AMI-517DP

This unit was to all intents and purposes dead, though the mains transformer was working. I soon found that the two 4·7Ω fusible resistors RF901 and RF902 in the AC feeds to the low-power bridge rectifier (D905-8) were open-circuit. The cause was not far away. The 4·7nF disc ceramic decoupling capacitor CC907 at the negative output side of the bridge was short-circuit. **G.D.**

## Sony RX100AV

The 16-way ribbon connector that links the OPU sled and the motor panel in the CD deck used in this and many other Sony music centres is a common cause of problems – for example no or intermittent disc play etc. Replace it: the part no. is 178-281-711. **E.T.**

## Panasonic SA-AK17

I've had a couple of these that were stuck in standby. Disconnect the mains transformer and check its primary winding. You will usually find that it's open-circuit. The part no. is RTP2W3B001 – it's available from SEME. **J.S.O.**

## Sony HCD-H5

If the problem with this music centre is no power, check Q735 on the main PCB. You will usually find that it's burnt. A 2SD1388 or a BC639 will cure the fault. **J.S.O.**

## Sharp DXR555

If this CD player fails to work, check the optical block drive motor. It's probably seized. A little WD40 on the shaft usually cures the problem. **J.S.O.**

## Pioneer PDM603

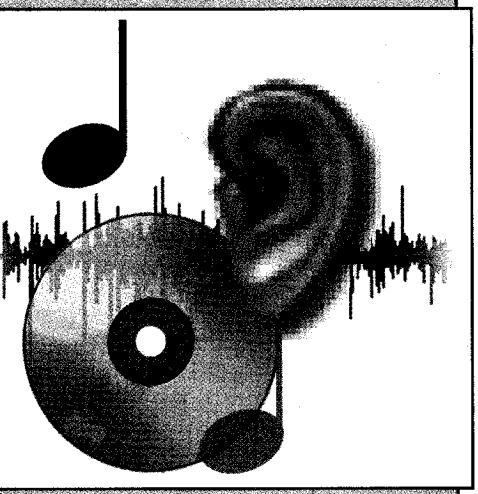
This multi-disc player was jammed with a fully-loaded magazine. When I removed the optical block assembly I found that the magnet on the spin disc had dropped out and was stuck where it shouldn't be. After applying a spot of Evostick and reassembling the unit everything worked fine. **J.S.O**

## NAD 304

I've had a couple of these integrated amplifiers in with the same problem: no sound because the loudspeaker relay hadn't pulled in. Checks showed that one power-amplifier channel had a DC offset of about 10V, though there was no excessive current drain and none of the transistors appeared to be faulty. Looking at the front end of the power amplifier section I found that R334 (47kΩ) was of the yellow-painted type that often causes problems in TV power supplies. It had gone high-resistance. To ensure reliability, I replaced the matching items in both channels, using power oxide resistors. **R.B.**

## Panasonic SAHD52

The CD section of this unit would stop playing after a while. Panasonic recommends upgrading the 9V regulator for the CD section – it suffers from overheating. Change zener diode D135 to a 9·1V type. I also replace Q131 and Q132, using TIP42A power transistors. This solves the problem. **R.B.**



# AUDIO FAULTS

**Reports from Robin Beaumont and Geoff Darby**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 680 for details of where and how to send reports.**

## Sony CDPXB930E

This upmarket CD player has an unusual mechanism – the optical pickup is fixed, the spindle motor moving sideways to track the disc. In addition the whole mechanism moves out on a tray so that the disc can be loaded.

The problem was that after about five-ten minutes the sound would start to skip, then playback would stop completely and the machine would refuse to work again until it had cooled down. I tried a replacement optical unit first, then used heat and freezer on the servo PCB, but it was an elusive fault.

Subsequent tests showed that the clock and data lines that feed the servo board became inactive when the fault occurred. When tracing the clock feed back I arrived at IC203 (7WU04F) on the main board. This IC is labelled "amp" on the circuit diagram but is in fact a clock-pulse multiplier: it takes 5·6MHz from the DA converter and triples this to 16·9MHz for the servo circuits. When I eventually discovered this surface-mounted chip on the back of the board it was dry-jointed all round. Resoldering cured the fault. **R.B.**

## Denon UPRC30

This mini system appeared to be running but there was no sound because the speakers were muted. The speaker relay is operated by a switch at the back of the headphone socket. This switch had failed, though the socket had never been used. As the customer never used headphones I wired out the switch – to avoid the delay involved when ordering a replacement. **R.B.**

## Pioneer PDCP520T

A fault you can get with this and some other Pioneer CD players is that the lens falls out of the optical pickup which, of course, then fails to read discs. I have tried to fix the lens back, on those occasions when I could find it in the bottom of the cabinet, but have never succeeded. A new laser pickup is always required. **R.B.**

## Sony HCD-H1600

The operation of this old-timer's CD drawer was very erratic. In addition when it didn't respond to use of the open/close button, or a power-off reset, the laser wouldn't home. At other times the unit would work all right for a while. The clue to the cause of the trouble was the fact that when the fault was present there was a clearly audible hum on the output.

C285 in the power supply, located on the audio board, was the cause of the problem. When I removed it from the PCB there were signs of leakage. A replacement cured the fault. **G.D.**

## Goodmans 1385

The only sign of life from this little hi-fi system was a red standby light. A quick scope check on the front-panel microcontroller chip's clock crystal showed that there was no activity. More out of forlorn hope than anything else – I don't normally take on low-end Goodmans micro systems – I grabbed the nearest crystal, which happened to be a 10·245MHz radio synthesiser type, and connected it across the in-circuit 7·2MHz crystal. I was shocked to find that the display then appeared, the on/off switch worked and basic functionality had been restored.

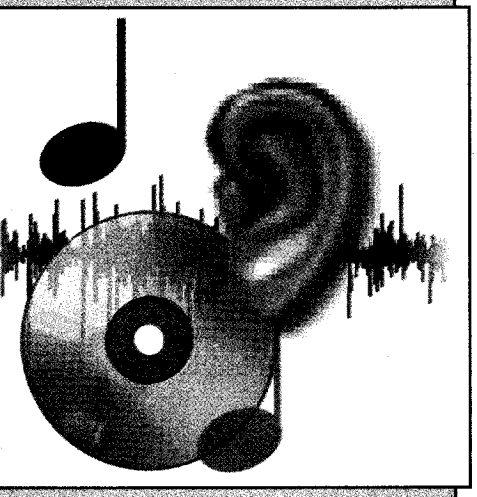
I couldn't leave the wrong crystal in circuit of course. But I didn't have a 7·2MHz crystal in stock and couldn't obtain one quickly. So I tried the old dodge that has worked on many occasions in the past with crystals that don't rattle and are thus not broken internally: I turned the crystal around so that its legs were in the opposite holes to the initial ones. The crystal then burst into oscillation and a long soak test, with many unpowers and repowers, proved that all was now well. **G.D.**

## Sony HCD-CP33

These units have a see-through LCD panel, mounted on the cassette door, for system-status reporting. As it's transparent the display is lit from the sides, using high-intensity amber LEDs. In the standard form there are two small bars, each containing two LEDs. They should be half lit in standby. When the unit is fully on they should be brightly lit.

It's quite common for them to become intermittent, giving various symptoms such as no standby illumination or only half of the display lit when fully on. Tapping will make the symptoms come and go, but don't waste your time looking for dry-joints. The cause is the LEDs themselves.

A lot of dismantling is required to get at them. The tape deck has to come out to gain access to two of the door screws. When all four screws have been removed the door can be dismantled, revealing the LCD panel and its LEDs. The PCB is also printed and silk-screened to take four LEDs instead of two LED bars. Interestingly, only the four-LED option appears in the manual. So I always replace both bars with four discrete diodes. The Sony part no. for these is 8-719-075-51. **G.D.** ■



# AUDIO FAULTS

**Reports from Geoff Darby J.S. Ogilvie and Martyn S. Davis**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 744 for details of where and how to send reports.**

## Sony HCD-MD373

This was one of those faults whose symptoms make you groan. When the unit was first taken out of standby or put back, the CD spindle motor would run backwards at high speed for about three seconds. If the laser unit was moved away from its 'home' position manually, it didn't attempt to return at power up.

The conditions at the sled and spindle motor outputs from the motor drive chip IC102 seemed to be about right, but application of a meter probe to the spindle motor channel input pin instigated the high-speed reverse-spin condition. This pin is connected via a single resistor to the servo and DSP chip IC101. A few quick voltage checks around IC101 showed that something was amiss: there was just over 2V at the 5V supply pin 59. This took me back to the 5V regulator IC911 on the main PCB. It's input was correct at 9·7V, but there was only 2·2V at its output. As it wasn't hot, which would have indicated that it was in the current-foldback condition because of an overload, I fitted a replacement. This restored the 5V supply and normal operation of the unit. **G.D.**

## Panasonic SA-AK18

The owner of this unit complained that the on/off switch didn't work properly and that it couldn't be turned off. When the unit was initially powered it lit up like a Christmas tree, with every light and function indicator, including the vacuum fluorescent display, performing a light show of which Pink Floyd would be proud. When the unit was switched to on, the indicators and the display settled down to what you would expect and it worked normally. When off was selected the display said "goodbye" then went dark, except for some Zs (sleep mode?) and unset clock dashes. This seemed to be OK, but fifteen seconds later a relay clicked and once again the light show appeared. The unit was clearly going into a demo mode, but getting it back out defeated me.

I tried every combination of buttons I could think of, including the obvious demo button, to no avail. Finally, in frustration, I called Panasonic Technical. I was told that you have to press and hold the demo button for at least five seconds. Can't think how I failed to figure that out for myself . . . But when this procedure was carried out the unit went off completely, and stayed off when the on/off button was operated. **G.D.**

## Technics SL-HD501

This is the CD part of a multi-unit mini system. If you get one that won't play discs, before doing anything else remove the disc clamp (two screws) and look to see if the laser unit is at the far end of its travel, i.e. at the outer edge of the disc. It's common for the laser unit to stick in this position, the sled drive motor not having the power to pull it back.

I don't know why the laser unit finishes up in this position – possibly the reason is failure to read a scratched or dirty disc. Once the deck has been taken out (four screws) it's a simple matter to remove the laser unit's PCB (three screws and four soldered joints to the motors), then the sled motor mounting plate (two screws). The mechanism can now be freed. Relubricate it, then wind the sled up and down its worm by hand a few times to ensure that there are no other mechanical problems. Reassemble in the reverse order. You should find that the deck now operates normally. **G.D.**

## Sony HCD-CP33

There was an odd set of symptoms but, for a change, the cause was straightforward. About two seconds after coming out of standby there would be an almighty bang from the right-channel speaker. After that the channel worked normally – until switch-off, when the bang was repeated.

The cause was dry-joints at the right-channel output chip. Two of its pins are called 'mute' and 'standby'. It was probably the mute pin that caused the trouble. It should hold the IC off until the supply rails are fully established. **G.D.**

## Aiwa NSX-V90

If the drawer in this or any other music centre fitted with the same CD mechanism won't stay shut, replace the five-way ribbon cable. It's available from CPC under part no. AW84-ZG1-614.

Also check the CD turntable belt, as this can sometimes cause problems. **J.S.O.**

## Hitachi DA6000

If this CD player blows fuses, check C706 (220µF, 16V) in the power supply. It tends to go short-circuit. **J.S.O.**

## Aiwa LCX108

This recently purchased mini hi-fi was brought back to us because it was completely dead. The mains transformer's secondary winding was open-circuit. It's item 38, part no. SA-CLD-642-010. There didn't seem to be any reason for the failure, and a replacement put matters right. Maybe this could become a stock fault? **M.S.D.** ■

# DVD

**Fault reports from Geoff Darby**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 744 for details of where and how to send reports.**

## Philips DVD701

This player was dead following a power cut. Meter checks revealed that the power supply was tripping. When cold checks were made on the secondary side of the power supply I found that D6240 was short-circuit. A replacement restored normal operation.

## Toshiba SD200B

The picture produced by this machine intermittently froze. A replacement laser unit, which comes as a ready-mounted and mechanically-aligned deck assembly, cured the problem.

There are no fitting problems with this model. You simply screw the new deck in as a replacement for the original one then connect it. The laser shorting points have to be opened of course before you test the player.

## Sony DVP-NS300

The complaint with this DVD player was that "it jumped around on all discs". I tried the player and found that when it had been running for a while it started freezing and 'blocking'. This is typical of laser trouble, but the DVP-NS300 uses a deck assembly (KHM-250AAA) which we don't usually have in stock. So I thought that, as a first move, I would run the internal diagnostics and auto set-up.

This procedure is normally carried out using the remote-control unit. It involves use of the numerical buttons to select various items from the service menus. I pressed Title, Clear and On/off in sequence to get into the main service diagnostic menu, but could get no farther as this machine's handset doesn't have numbered buttons, and no other buttons would enable me to get to option 1, auto set-up, then option 0 for "all" (disc types). I eventually used a handset for another Sony machine as this one did have numbered buttons.

After resetting the EEPROM data you carry out the first auto set-up with a standard, single-layer disc. Initial recognition and spin-up were OK. The focus servo was then switched on and appeared to lock. The adjustments continued to be OK until the sled motor was switched on. At this point the process consistently failed and set-up was automatically terminated, with disc ejection.

So a replacement deck assembly was ordered and fitted. When I ran the auto set-up to match the new deck to the electronics, the single-layer disc set-up, then audio CD and finally dual-layer DVD set-up progressed faultlessly. The final data stored in the EEPROM was within the correct ranges for a normally-functioning player.

A final soak test in the ordinary play mode proved that all was now well.

## Hitachi DV-P250E

If the problem with one of these units is no display, check the green protector F3 in the power supply. It's in the +5V feed to the VFD inverter. When you find that this protector is open-circuit, a repair kit, TP12121, has to be obtained. It comes with fitting instructions.

The modification involves replacing the two base bias resistors, uprating the transistors and changing the feed point for the bias supply. The latter change calls for a print cut and a link.

## Sanyo JCX AVD-B501

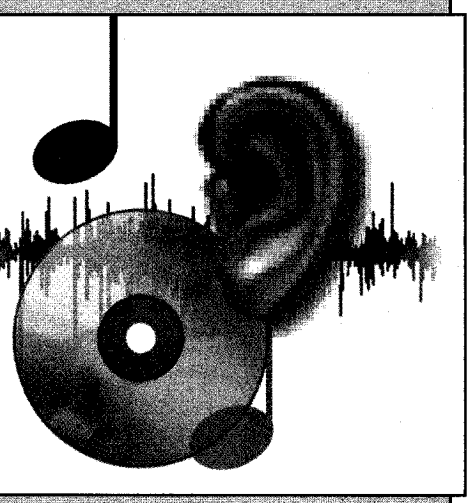
This is a home theatre system. If the tray refuses to open, plug in a monitor to see what the on-screen display tells you. If "locked" appears briefly when the open/closed button is pressed, press it again and hold it in for five seconds or so, until the word "unlocked" flashes up at the top left of the screen. The tray will then open and close normally.

The lock mode can be re-engaged by pressing and holding the open/close button from the tray open condition.

## Panasonic DVD-RV31

Shortly after it started to play a disc this unit just froze. I invoked the built-in jitter meter (operate the front-panel Pause and Stop buttons and the remote-control 5 button together) which produced a reading of 011, i.e. 11 per cent, while the unit played. In theory this is within tolerance but, as previously mentioned in this column, it's higher than one would expect from experience with a correctly-functioning laser.

A replacement optical block was ordered and fitted. When checked this one produced an immediate, and long-term stable, jitter factor of 078, i.e. 7·8 per cent. No further adjustment was required – this is a very good figure, unlikely to be bettered by mechanical tilt adjustment. ■



# AUDIO FAULTS

**Reports from James Grant J.S Ogilvie and Geoff Darby**

**We welcome fault reports from readers – payment for each fault is made after publiation. See page 40 for details of where and how to send reports.**

## JVC CAS30 Midi hi-fi

This fault had me stuck for a while. The job card said "doesn't read CDs". When I checked the system on the bench the disc spun for a few revolutions then stopped, and after that took off at high speed in reverse. A new laser unit cured the trouble. I then checked the electrical adjustments and found that everything was OK. But the system was back four weeks later with the same fault.

I phoned JVC Technical and was told that the laser unit must be faulty. So in went another one. The system came back three weeks later, and I was again told that the cause had to be the laser unit.

It seemed to be time to do some component checking, especially as my customer was getting rather annoyed. After a lot of checks I found that C671 (100$\mu$F, 10V) in Q671's base circuit was very slightly leaky. Q671 switches the laser on. After fitting a replacement capacitor and carrying out a long soak test I was confident enough to return the system to the customer. That was over six months ago, and there's been no further complaint. **J.G.**

## Kenwood XA3L

This cassette/CD/tuner unit would play a CD until track five or six, then revert to the beginning. On close inspection I found that the small gear which drives the optical block had split. When this happens the optical block stops at the point where it reaches the split. A replacement gear cured the trouble. But this is the third time I've had the fault, so it could be a common one. **J.S.O.**

## Philips FW12/22 Mini hi-fi

This unit powered up with a slight hum and no sound. The customer said wallop it on the right-hand side. This did indeed restore normal operation for a while. When I checked I found that Q7254 on the amplifier/power PCB was dry-jointed. Once it had been resoldered the unit worked all right. A nice quick, easy job for a change. **J.S.O.**

## Aiwa XRM25

This system was basically dead – there was no display and no activity. The main supply lines were present however. The circuitry used in this little unit is very similar to that in its big brothers and I have, on a number of occasions, mentioned the protection circuitry, which can be the cause of misleading fault symptoms.

When I disconnected the /hold line, at the conveniently marked link, the standby display appeared. Then, when on was requested, the unit obeyed. Some quick checks showed that the voltages on the supply lines were all correct, and that no DC offset was present at the speaker terminals. This suggested that the protection circuit was falsely detecting a 'problem'.

The unit worked normally when the speakers were connected, confirming my suspicion. So attention was turned to the various fault-detect paths. I soon found that the negative bias at the base of Q108 was missing. This transistor's job is to check that the main negative supply to the audio output stages is present. As they were working, it obviously was. So this left only the transistor itself, or the resistor that feeds a little of the supply-line voltage to its base. The latter item is R117, 39k$\Omega$, which judging by its size must be rated at about 10nW! It was open-circuit: a slightly more substantial replacement restored normal operation. **G.D.**

## Sanyo JCX-X5 tuner/amplifier (DC-X5C system)

The customer complained that the sound was distorted when a CD was being played. On test there was indeed a strange 'ethereal' quality about the sound: it seemed to be much more pronounced with CD playback than in the other modes. If the audio inputs from the CD unit were alternately shorted to chassis, just one channel seemed to remain when the left input was shorted but there was an odd, both-channel mono effect when the right input was shorted. Scope checks around the source-select IC were inconclusive, but it looked as if there was some sort of short between the channels within it. So I fitted a replacement. On test the results were the same as before.

A closer look at the circuit diagrams revealed an IC called "analogue surround". It's on another PCB, called preamp 2. This was something I'd not even considered, as the unit has no surround speaker connections or any obvious surround switches or indicators.

I then spotted a small front-panel button that was cryptically labelled 'pass'. When I pressed it, the display briefly flashed up "surround high". A second press produced "surround low", and yet another press "surround off". The audio was then OK.

Why do manufacturers think it necessary to incorporate nonsense like this? It obviously confuses owners, and it confused me. Aside from this it made the audio sound dreadful. So, in my opinion, it's not a valid feature for inclusion in an item that's supposed to be "high fidelity". **G.D.** ■

# DVD

**Fault reports from Eugene Trundle Carl Owen Dave Husband Graham Boor and Geoff Darby**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 40 for details of where and how to send reports.**

## Toshiba SD110 and SD210

Complete lack of analogue sound, at the scart and phono outputs, can be cured by discarding C928 and replacing C926, C927 and C929. These are all electrolytic capacitors, on the signals-processing board. My thanks to Toshiba Technical department for this one. **E.T.**

## Proline DVD1000

This player was dead, with no lights in the display. Two diodes on the secondary side of the power supply, D7 and D10, were short-circuit. Replacements restored full operation. **C.O.**

## Bush DVD1000

This neat little DVD player's standby light was illuminated, but there were no other signs of life. Not being a DVD expert, I was fortunate in finding a slightly bulged electrolytic, C213 (1,000µF), on the secondary side of the power supply. It appears to smooth the 12V output. A replacement restored normal operation, and I was then able to watch the customer's *Lord of the Rings*, which had been trapped inside. **D.H.**

## Sharp DV600H

The customer complained that this DVD player had died for no apparent reason. Once I'd removed the top case I saw a very black and shattered mains fuse. I then found that the mains bridge rectifier D9016 was short-circuit. A replacement bridge rectifier and fuse restored normal operation. I added a note to the invoice asking the customer to ensure that the player was not fed from a double adaptor or other poor mains source. **G.B.**

## Panasonic SCHT70

This new DVD home-cinema system was faulty straight from the box, with a severe buzz from the speakers, worse with on-screen graphics and in the pause mode. The cause of the fault was clearly a smoothing/regulation problem. A quick repair was required, as it was the last one in stock and the customer wanted this particular system. After printing out an ever-growing pile of circuit diagrams from the CD-ROM I narrowed the cause down to the DVD Reg PCB, where C702 was found to be loose on the board. One leg had never been soldered. **G.B.**

## Kenwood RXD-DV9

I'm not sure whether you would call this a hi-fi unit that plays DVDs or a DVD player that looks like a hi-fi! Either way, I had two of them in during the same week with the same problem: each would accept a DVD disc, spin it, attempt to read it then fail and eject the disc. Audio CDs played normally.

The clue to the cause of the problem was that the on-screen logo was in monochrome. This indicated that the unit wasn't in the standard PAL mode. In each case the cure was to reinitialise the system. This is done by pressing and holding the Enter button while applying mains power. The display will indicate that the unit is initialising, then return to normal.

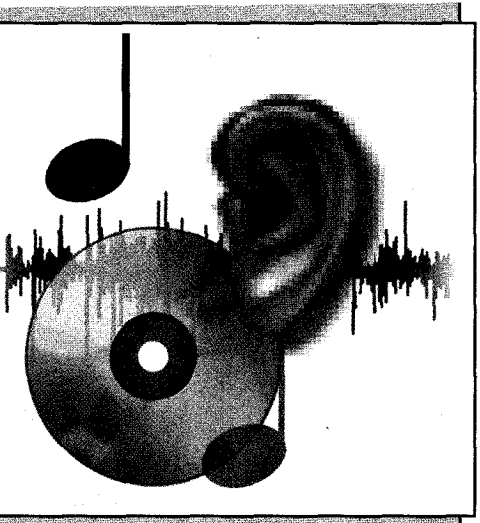
It is hard to know whether the software corruption just happened or whether, as I suspect, it's caused by owners using odd combinations of button pushes that they've read about in 'DVD Hacker's Weekly', in the fond hope that the machine is suddenly going to become a multi-region one . . . **G.D.**

## Toshiba SD110EB

There were two apparently unrelated faults with this machine. Most obvious was the absence of the front-panel display. The other fault was very low analogue sound output from both channels via the scart and phono outputs, though the machine produced perfectly good pictures. Long experience has shown me that in most cases of apparently multiple faults there's a common cause, though what it is may not be obvious initially.

I decided to approach this example from the low audio angle, as fault-finding would be easy with a scope. The scart and phono outputs come from a surface-mounted 4580 dual op-amp chip, IC912. Good left and right audio signals were present at input pins 2 and 6 respectively, but there were negligible outputs at pins 1 and 7. Voltage checks at the inverting and non-inverting input pins then revealed incorrect DC conditions – the inverting input pins were at 0V. A quick check to chassis showed that there was a short-circuit, which was caused by C928 (100µF, 16V). A replacement restored the audio and the display. It decouples the –9V supply.

The fault subsequently appeared on the Toshiba website, so it's presumably becoming a common failure. **G.D.** ■



# AUDIO FAULTS

**Reports from Geoff Darby and Robin Beaumont**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 108 for details of where and how to send reports.**

## Sony HCD-EP30

This unit wouldn't play CDs. When it attempted focus search, the intensity of the LCD backlighting went up and down. Checks on the CD 9V supply showed that this was a little low when the CD deck was doing nothing and substantially low when the backlighting dipped. So I checked at the CD 9V regulator Q308. Its input voltage was a little low, but when a scope check was carried out at the same point huge ripple was visible. This led me further back, to the power PCB, which remains in the rear of the cabinet when the unit is dismantled. I found that the reservoir capacitor for the regulator's input, C410 (2,200µF, 25V), was open-circuit. A replacement restored normal operation of the unit. **G.D.**

## Sony HCD-EP50

There was no tape action with this unit. Neither the motor nor the solenoid worked. The cause of the problem was quickly traced to Q37 on the main PCB. It's the switch transistor for the deck supply. Checks on it showed that the base-emitter junction had gone high-resistance. A replacement restored tape operation. **G.D.**

## Sony HTC-NX1

If you get one of these with the five-changer CD mechanism just sitting there doing nothing, though the display says the correct thing, e.g. "open 1", suspect a displaced disc in the works. This may not be apparent when you look into the top of the deck. Remove the disc clamp (four screws) and lift out the disc present. The chances are that there's another one underneath.

Any disc tray that's out can easily be fed back into its slot. It may however be necessary to rotate the loading motor on the right-hand side by hand – until the mechanism presents the empty slot in a position where the tray can be fed back in. When the unit is powered again the CD mechanism will reset. There should be no further problems.

I've had several of these units that were like this. It's hard to see how discs can get into the wrong place – unless they've been put there accidentally by the owner. **G.D.**

## Technics CH7 system

The original problem with this system was a faulty audio IC. But when a replacement had been fitted and the system was reconnected to the mains supply another problem showed up. Because the clock wasn't set, a flashing E came up in the display. It was not a steady flash, more of a stuttery blink really. It you attempted to switch on at this point, the main power relay in the amplifier unit clicked and the system all lit up, then immediately shut down again. Everything worked fine if the system was left for another two minutes – until the next time it was taken fully off power.

The main power switching takes place in the SU-CH7 amplifier unit. It's controlled from the ST-CH7L tuner unit, where the on/off button lives. The cause of the problem was eventually traced to C702 (1,000µF, 16V). This electrolytic is in the tuner's personal power supply, which provides the standby supplies for the system. At room temperature C702's ESR was 31Ω. A spot of freezer sent this rocketing to over 100Ω.

A replacement and a long soak test proved that the problem had been cured. **G.D.**

## Sony HCDCP33

This unit played CDs and MiniDiscs without problems, but new MiniDisc recordings tended to jump or stick. The cure was to use the service menu to reset the recording laser power.

Some of the set-up instructions in the service manual for this model are incorrect, because there's no AMS dial. Revised information can be found in the HCDMD33 manual.

Another of these units had a dark LCD display because the LEDs that illuminate it were intermittent. A Sony Technical Tip suggests a change of LED type and other modifications to make the display more reliable. **R.B.**

## JVC UXT100N

This audio system worked apart from its radio section: though the frequencies came up in the display, there was no reception. While checking around the LC72136N synthesiser chip I found that there were no clock pulses at the crystal. A new IC restored reception. **R.B.**

## Pioneer VSAE07, VSX908RDS

These two impressive AV receivers are very similar in design. Both had identical problems – slow to come out of standby, and wouldn't always recognise digital sources. After studying the circuit diagrams for some time I sought help from Pioneer Technical. The advice I was given was to replace the digital audio processing board. This worked, but it seems a rather drastic solution for equipment that's less than two years old. **R.B.**

## Panasonic SAFX1

This unusual audio system has a clam-shell style case with the power supply in an external box. Many functions had been lost because the flat cables between the upper and lower halves of the cabinet were partly open-circuit. Replacement was straightforward however, and there were no other faults. **R.B.** ■

# DVD

**Fault reports from Geoff Darby and C. Bowers**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 108 for details of where and how to send reports.**

## Panasonic SAHT80

This home-cinema system failed to play DVD discs about half the time. When it did play a DVD disc the jitter figure was unacceptably high at over 15 per cent. This figure is displayed when you press the front-panel Stop button plus the remote-control unit's 5 then Play button. The reading was JIT 155, which means 15·5 per cent.

Experience has shown that the cause of this is almost always a defective laser block rather than misalignment. When a replacement laser was fitted the unit played discs every time and produced a jitter figure of 8·2 per cent initially, rising to 8·8 per cent farther into the disc. I have found these to be typical values with a correctly working unit, though Panasonic literature suggests that 10-12 per cent is the figure to expect, and that problems won't occur until the figure rises to 15 per cent. **G.D.**

## Technics SLDV250

This DVD player is part of an otherwise conventional four-piece stacking hi-fi system. The complaint was no composite video output from the rear panel phono socket. When I checked I found that this was so, though S-video was present.

A look at the circuit diagram showed that S-video and composite video come from the same source, IC3301 on the decoder board. Y and C signals were entering this chip at pins 2 and 15, and emerged at pins 5 and 12. But there was no composite video output at pin 11. The IC itself seemed the most likely bet. A new one was ordered and fitted, providing a complete cure. **G.D.**

## Hitachi HTDK150E

The problem with this home-cinema unit was one of those you would probably never be able to suss out unless you had help from the manufacturer. When I received the unit it powered up but wouldn't come out of standby. There was only a red light at the on/off switch, and no display.

The cure was to replace the operating system EPROMs which, once the unit's cover has been removed, are clearly visible on the left, mounted in sockets. The part number for the ICs, which come as a pair marked HI and LO to correspond with the originals, is AFA0053C001. The official description is "IC EPROM 1-pair HI and LO".

When the replacements have been fitted the remote-control handset won't work and its coding will have to be changed. This is done by moving a diode and a wire link inside the handset. A note with the replacement EPROMs explains the procedure. There is however a version of the handset that doesn't have the link. In this case, lift pin 9 of the IC and separate it from pin 8, then link it to pin 12. **G.D.**

## Kenwood RXD-DV50

This is another of those three-player carousel hi-fi units that's actually a DVD player. It sometimes refused to open the tray. On other occasions it would open the tray and take in a disc then refuse to play it. Sometimes, when the unit was first powered, the laser would shoot to the far end of its track and the motor would stubbornly try to push it farther. At other times, when the unit was switched back to standby, the spindle motor would rotate at high speed backwards.

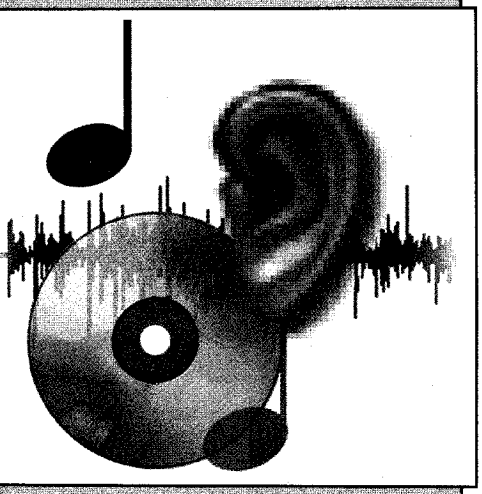
All this suggested a problem in the power supply. I found that some improvement could be obtained by pushing on the PCB hard: the unit would then sometimes work normally. It's a major operation to get the power supply out, but there seemed to be no alternative.

Having finally removed it, I examined it minutely under a powerful magnifier. But I couldn't see any obviously bad joints. I was convinced that there had to be one somewhere and, as the unit can't be run when dismantled, the only possible course of action was to carry out a blanket re-sweat of every joint on the board.

As it turned out, this didn't take too long. Better still, once the unit had been reassembled it worked correctly – and continued to do so during an extended soak test. **G.D.**

## Sony DAV-S300/HCD-S300

This unit had no display illumination. When I took the top cover off and looked at the power supply I saw that coil L930 and capacitor C933 were a burnt brown instead of the normal orange colour. Resistance and capacitance checks proved that there was a fault, and a quick call to Sony Technical confirmed that there can be a problem with L930 and C933. It's just a case of replacing them. The display was OK once I'd done this. **C.B.** ■



# AUDIO FAULTS

**Reports from**
**Geoff Darby**
**Graham Boor**
**S. Roberts**
**Roger Burchett and**
**David I. Scott**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 172 for details of where and how to send reports.**

## Sony CDP-CX235

This rather large unit is a sort of domestic version of a CD jukebox. It holds 200 discs vertically, in a circular carousel. The owner's complaints were that the door didn't open, that discs jammed, and that they fell out in the 'shuffle' mode.

When I inspected the action of the mechanics it was immediately apparent that something was amiss. The discs are picked from the carousel by a sort of mechanical finger-and-thumb that grabs the disc at its edge, then lifts it towards the vertically-mounted deck behind. The action is assisted by various guide and pusher bars, until the disc is clamped. The fingers and other bits of mechanism then withdraw out of the way. This is all operated by two levers and a cam – items 171, 172 and 214 in the exploded view in the manual.

On closer examination it was clear that item 155, lever B, wasn't correctly located. It was disengaged from its driving pin at one end, and the picking fingers at the other. I found it hard to see how the lever could have become like this on its own, as it was necessary to remove the retaining circlip and slide the lever off its pivot pin to refit it correctly.

Once this had been done the action was correct. But the mechanism still wouldn't pick a disc, because the fingers closed early, before reaching the edge of the disc. I couldn't see why this occurred, as the mechanism is driven by two levers that run on a very solid looking nylon cam. After much head-scratching I noticed that item 156, the plate on which the picking fingers are mounted, had a slight twist – and I mean slight! Because of the amplifying action of the lever system involved in opening the fingers, the slight distortion became a major mistiming of the finger action.

This final problem was corrected by using pliers to reverse the twist. The whole system then worked as smooth as silk. **G.D.**

## Kenwood RXD-M33MD

The problem with this unit was caused by an at best unthinking and, at worst, downright dumb bit of design engineering. If you had to position a control button that was going to be subjected to a lot of mechanical stress during its life, in this case the CD open/close button, would you put it at the very end of a thin finger of PCB material, barely any wider than the switch body itself, put the nearest support screw 10mm away, and connect one side of the switch to a print track barely thicker than a human hair and a solder pad just about big enough to take the switch's leg? Of course not! Neither would I.

The thin track had fractured where it joined the pad. A small piece of wire soldered across the track cured the trouble – and enabled the owner to remove his beloved Ministry of Sound disc. **G.D.**

## Technics STX990L tuner

The reported fault with this standalone tuner, part of a complete hi-fi system, was no stations being received. Once it was on the bench it was clear that there was no AM or FM reception. Some quick checks proved that the relevant oscillator and audio preamplifier circuits were working, but when I checked around IC201 no IF signal could be detected and most of the voltages appeared to be incorrect. The cause of the trouble was eventually traced to the IF transformer Z202. There was normal reception once a replacement had been fitted. **G.B.**

## Aiwa CX81MK

The customer complained that this audio system worked but he couldn't see the display. With all the lights in the workshop turned off you could just see the digits in the display module. When you get this fault the cure is to replace C107 and C108. **G.B.**

## Sony HCD-XB500

The job sheet with this system said that the only thing the customer could get the display to show was "To protect push power", with nothing else working. Normal operation was restored by replacing the audio output IC. As in all cases of failure in this part of the circuit, we leave a note asking the customer to check the speaker wiring at the house for any damage before reconnecting the unit. We were later told that the unit had failed while being at full volume for a considerable time so that the owner could hear it over the noise made by his lawnmower while he cut the lawn. The word Walkman springs to mind here! **G.B.**

## Marshall Valuestate Model 8008

If you get one of these stereo guitar amplifiers in for repair and find that fuses FS2 and FS3 (both 6·3AT) have blown, look no farther than TR1 (BDV65C) and TR14 (BDV64C). You will find that they are short-circuit. The driver transistor TR5 (TIP29C) usually survives, but should also be replaced to provide a reliable repair.

The usual cause of this blow up is when the two speaker outputs are accidentally connected together, which is surprisingly easy to do. The output jacks are next to

each other on the back panel. Most musicians are not interested in the electrical connections to their 'gear', only in playing their music, so it's not surprising that the problem arises quite often.

In most cases only one channel suffers damage. I am assured by Marshall that it is in order to replace only the faulty components in the damaged channel. The power transistors can be obtained from Marshall direct or from CPC. They are Darlington pairs. **S.R.**

## Sony D240 personal CD player

I don't know whether it's a common problem, but the screws that hold the spindle motor had worked loose. Unfortunately one had been lost. There's no reference to their size in the manual, nor do they have a reference number, so it was up to me to find one that fitted.

A model engineer friend found that 10BA seemed to match the remaining original screw, so in one went. As I doubt whether Sony would have used BA threads, I consulted a guide to cutting tools to see what the metric size would have been. This suggested 1·8mm coarse (thread pitch the same, 0·35mm; tapping drill 1·45mm for metric, 1·40mm for BA). **R.B.**

## Freeplay S360

I had not come across one of these interesting portable radio receivers before. Its AM/FM circuitry seems to be conventional, but the power supply is novel. The set isn't powered by dry batteries or by the mains supply. Instead it's powered by either a rechargeable battery, which is charged by an internal solar cell, or a clockwork-driven generator.

The complaint was that it didn't work. As it has a transparent case, I could see that the drive belt from the clockwork motor to the 'generator', which in practice is a small electric motor, had broken. But this didn't explain why the set wouldn't work from the rechargeable battery.

All became clear when I replaced the belt and wound the clockwork motor up. Although the 'generator' was turning, there was no voltage at its terminals. I then found that a small electrolytic capacitor across its terminals was short-circuit. The rechargeable battery and clockwork power supplies seem to be in parallel. Thus the short-circuit capacitor would drain the rechargeable battery, hence no operation.

I can't prove it, but I suspect that the short-circuited capacitor had the effect of 'braking' the generator, which may in turn have caused the demise of the drive belt.

This radio set's mode of operation was devised, developed and patented by Trevor Bayliss. It's intended for use in under-developed countries, where mains supplies and dry batteries may not be readily available. This particular set was made under licence in South Africa. As far as I'm aware, none of the main manufactures makes anything similar. **D.I.S.** ■

# DVD

**Fault reports from Geoff Darby**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 172 for details of where and how to send reports.**

## Sony DVP-NS300

This unit seemed to be dead: there was no red standby LED illumination, and no action when it was asked to wake up by pressing any of the buttons. Scope checks showed that the power supply was tripping. The output from the B+ rectifier D311 was struggling to get much above zero, though the various other outputs were at least trying.

After removing the power supply and setting to work on the B+ rail with an ohmmeter I soon realised that the low-resistance was not across the rail itself but at the other side of the 68Ω resistor R301, which is connected between D311's cathode and the anode of the LED in the regulation feedback optocoupler PC101. The optocoupler's LED was in fact short-circuit, which is unusual.

With the optocoupler removed there was still an odd reading at its pin positions. The LED's cathode is returned to chassis via an adjustable zener, IC301, which was also short-circuit. Once PC101, IC301 and, for good measure, D311 had been replaced the machine worked normally.

A quick run through the auto set-up program to compensate for wear/component ageing completed the repair. **G.D.**

## Sony HCD-S500

The complaint with this home-cinema DVD/amplifier was that its front-left channel output was intermittent. I found that the audio output from this channel could be made to drop to a thin reedy sound, then return with full bass, by pushing firmly on the 'Amp' PCB. The output ICs and sockets are mounted on this PCB.

A metal box goes from one side of this board to the other, behind the output ICs. It's secured by two of the three PCB-mounting screws. Once the three screws have been removed, the box can be lifted off. Then, after disconnecting the various plugs and ribbons, the PCB can be withdrawn from the chassis.

The box screens a line of hefty, ferrite-cored output chokes. The cause of the trouble turned out to be a whopping great dry-joint at the choke at the far end, L401. I remade the joint, also several others in the vicinity and the connections to the pins of all the other chokes. Once the PCB had been refitted there was good sound from all channels.

I've now had the problem on two more occasions. Each time L401 has been the one with the bad joint. **G.D.**

## Philips DVD711

There was no display and no action in general with this machine, though there was some basic power supply activity. A quick scope check showed that the power supply was quietly tripping. Rectifier D6240 on the secondary side proved to be the cause – it was short-circuit. A replacement restored normal operation. **G.D.**

## Sony HCD-S300

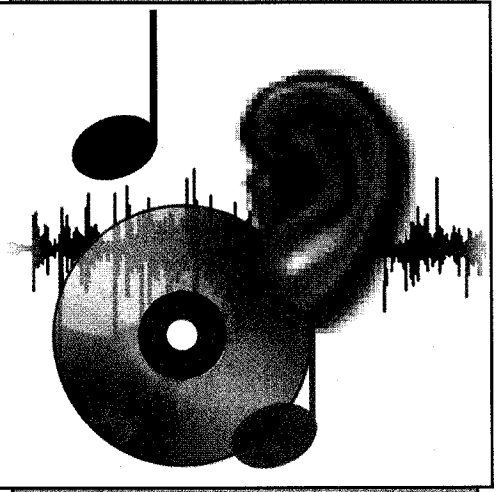
This home-cinema DVD/amplifier was brought into the workshop after a second field call because of the same complaint, "rear-right channel hissing". Our technician didn't hear the symptom during his first call, so he checked and reseated all the speaker cables.

Like him, I was sceptical. But when I quizzed him about his second visit he said he had, this time, heard the symptom. That was why he'd brought the unit and its two rear speakers back.

When I connected the equipment and switched it on it was fine. But the field technician is reliable, so I left the equipment running. After a while a hiss came from the rear-right speaker. Most of the time it was masked by the normal sound, but during quiet passages it was definitely there.

Once I'd removed the cover I found that a loud buzz came from the rear-right channel when the heatsink for IC301, the chip that provides the right-front and right-rear outputs, was touched. A meter check revealed a potential difference of several volts between the heatsink and chassis. To establish whether the cause was 'hard', or because of leakage from somewhere, I connected a 10kΩ resistor between the heatsink and chassis. The channel then ceased to work altogether! This suggested that there was some sort of connection between the heatsink and somewhere that shouldn't be connected to it.

An examination of the board showed that the heatsink was floating, so the only place I could see where things might be going wrong was via the metallic thermal-conduction pad set in the back of the IC. As I had the device in stock, I fitted a replacement. The new chip was not sensitive to having its heatsink touched, and a long soak test proved that the hiss problem had been resolved. **G.D.** ■



# AUDIO FAULTS

Reports from
Eugene Trundle
Nick Beer
Matthew Biddlecombe
Pete Roberts
and
Geoff Darby

We welcome fault reports from readers – payment for each fault is made after publication. See page 236 for details of where and how to send reports.

## Sony TA-VE150

When this mini surround amplifier was switched on its response, after a few seconds' silence, was to show "protect" in the display panel. There are five type 18752 audio power amplifiers, with 25 legs between them. Virtually all were dry-jointed. **E.T.**

## JVC XLE3

Some hi-fi customers consider that units are worth repair because they form part of a larger assembly. This 14-year old CD player was an example. The complaints were about intermittent jumping and skipping during play and erratic operation of the loading tray. I replaced the 'Optima' laser unit and the tray- and sled-drive belts. After that it was ready for another fourteen years! **E.T.**

## Sharp CD-BA1200H

Regardless of signal source the sound from both channels cut out after about five minutes. When I flexed the PCB the symptom came and went. Several pins of the big audio power-amplifier chip were dry-jointed. **E.T.**

## Denon DC30

This mini system with multi-disc CD changer had been to us a few months previously with the same fault symptoms: intermittent failure to select the correct disc – by over-shooting the requested position or going to the very top of the selector's travel range, beyond the top disc. On that occasion we had found the circuit diagram very small and unclear in the area that seemed to be the cause of the problem – the mechanism-detection switches, which are on a small PCB at the rear edge of the mechanism. Some time had been spent working out which switch does what (no reference numbers) and annotating the circuit diagram. We concluded that one of the switches was faulty and, after replacing the PCB, everything seemed to be OK.

But here we were a few months later with the identical symptoms. A lot of time was spent observing the operation of the mechanism and scoping the mecha-state signals at the microcontroller chip. As everything here seemed to be fine we spoke to Denon Technical at Haydon. They had not encountered the fault, but suggested misalignment. This had already been checked.

We eventually discovered that the reason why the mechanism didn't stop where it should was failure of the solenoid that holds an intermediate gear in the drive chain to disengage this gear at the right time. So drive continued to be applied to the elevator. A scope check across the solenoid showed that the voltage disappeared when it should, relative to the positional information from the mechanism switches, yet the solenoid remained in the energised position. The mechanism worked correctly when the solenoid's slug was flicked at the right time. The cause of the problem was that the solenoid had become magnetised. Demagnetising the solenoid and the surrounding area restored correct operation. **N.B.**

## Sony HCD-RX99

There was no CD drawer operation with this unit. As I didn't have a service manual I decided to take out the PCB that holds the drawer motor and IC to check for the presence of voltages. When I withdrew the board the motor fell into the inside of the unit! Judging from the appearance of the tags, it had never been properly soldered in the first place. Once I'd resoldered the motor to the PCB, refitted it and cleaned the lens everything worked perfectly. **M.B.**

## B&O Beolit 700

The complaint with this thirty-year old but stylish LW/MW/FM radio was no FM reception. I connected it to my bench power supply, set to 7·5V, and checked the current consumption. In the MW and LW positions this was normal, about 20mA, but when FM was selected it rose to 100mA. So maybe there was a short in the FM tuner, which is the only section not common with the AM circuitry.

There was no change when I disconnected the supply to the tuner, so the problem wasn't in there. The decoupling capacitors came out next, but there was still no change. The cause of the problem turned out to be a small, self-supporting choke, made of fine enamelled wire, that was touching an adjacent resistor. This fault was cured by pushing the choke to one side and securing it with a few drops of melted candle wax. After refitting the decoupling capacitors and reconnecting the supply to the tuner the consumption, on FM, was about 25mA with no signal – a bit more than one would expect. In addition, while FM was now live, there was very weak reception of Radio 2 at 104MHz on the dial instead of its actual frequency from Holme Moss, 88·9MHz.

Closer inspection showed that all the cores in the tuner had been twiddled. The one in the RF input coil was shattered. First step was to adjust the oscillator coil and the associated trimmer to restore correct coverage, which with this model is 88-104MHz. The IF output coils were then peaked for maximum signal, as laid down

in the service sheet. In fact all the FM IF transformers, with the exception of the discriminator, are peaked rather than being stagger-tuned. The RF coil had to be removed in order to extract the smashed core. After finding a suitable core and refitting the coil I was able to align the RF amplifier correctly.

Reception was now fair, but not quite as it should have been. When I replaced the BF115 RF amplifier transistor the FM band was solid with local and national stations, even with the aerial retracted. Fortunately the phantom core twiddler had left the IF cans alone! **P.R.**

## Sony HCD-ED1

I felt I'd not been told the whole story with this job. The customer's complaint was no sound, which is unusual with this equipment. Usually the only thing that happens is failure of the LCD backlamp, which is special and must be replaced with the correct type, Sony part no. 1-517-743-11.

Initial investigation into the no-sound problem revealed a hairline crack in the print run to the collector of the –7·5V regulator transistor Q510. Bridging this break restored the –7·5V supply, but the unit still didn't work. Further checks showed that there were no outputs from the +7V and +10V regulator transistors Q507 and Q509. In both cases the associated zener diode, D506 and D508 respectively, was short-circuit. Replacements restored the two supplies, and some life to the unit. Audio was now present all the way to the multipole back-panel connectors.

The speakers with this system are of the active type: each contains a full output stage and power supply, which is fed with low-voltage AC from the main unit via two of the back-panel connector pins. As there was still no audio output from either speaker, and the protection relays weren't closing, I was beginning to suspect the output ICs. I then spotted another rail, called B–, that comes across from the main unit and feeds the relays. It was missing. The cause was R524 (1Ω), which was open-circuit. It feeds Q512. A new resistor solved the problem. **G.D.**

## Philips FW670P

This was a nasty problem, and I admit that I didn't get to the bottom of it without some help from Philips Technical. Basically, the CD player was completely inoperative. The associated controls, such as open/close, were recognised however, as the unit could be brought out of standby by using them. But the microcontroller chip didn't go on to produce the CD stby signal, though I could see nothing wrong with any of its inputs.

The man at Philips first suggested that the cause was the microcontroller chip itself, but I'd already tried that. He next had me check whether the deck performed a slight shuffle – and it is slight – at power up. It didn't, and this was the root cause of the problem. This little shuffle enables the microcontroller chip to test the mode switches and check that the deck is at rest. If it doesn't happen, the chip does not simply produce an error indication in the display, it takes the CD unit off line.

Once the plastic and metal covers over the deck have been removed, the disc magazine at the rear of the deck can be lifted out. You have to 'spring' the sides to disengage the pins from the ramp slots in the up/down shift plates. It was then obvious that the cam-drive motor was stuck. I released it by winding the worm gear round, then relubricated the gears and cleaned the switches. This restored the power-up shuffle. The magazine and covers were then refitted, and a long soak test proved that everything was now OK. **G.D.** ■

# DVD

**Fault reports from C. Bowers and Geoff Darby**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 236 for details of where and how to send reports.**

## Sony DVP-S300

The problem with this DVD unit was a noticeable sound level difference with CD and tuner operation. I removed the top and carried out some voltage checks in the power supply and audio output sections. There seemed to be a fault with the audio system CPU, IC903. A quick call to Sony Technical confirmed this.

A software bug has been known to affect some of these units, with serial numbers up to 5820036. The action required is to replace IC903 with the new improved type M30622MA-1E5PF, part no. 8-759-688-94. This restores more equal sound levels. **C.B.**

## Sony DVP-S336

There was intermittent failure of CD, DVD or Video-CD playback with this unit, with the LCD message "no disc" or "C: 13:00" error. A quick look inside showed that F402 (0·8A) "conductor chip 2012" on the main board (side B) was open-circuit.

A modification is required when you get this fault. Remove F402/conductor chip 2012 and fit a "zero-ohm resistor" in its place. Erase the printing "F402 0·8A" from the board. Replace the 150kΩ resistors R416 and R418 with 82kΩ chip resistors, part no. 1-216-844-11. Then measure the resistance between pins 21 and 22 of the optical pickup's flexible cable connector. If the value is less than 6Ω, replace the optical unit. It's type KSS220AAA, part no. A-606-239-7A.

As the resistance value was low I fitted a replacement then carried out the servo adjustment. This restored normal operation. **C.B.**

## Philips LX3000D/22S

This home cinema unit wouldn't power up though the red standby LED went out. The reason for this was that the main power supply's on/off relay failed to operate when asked to do so by the control system.

There was a simple cause: the relay driver transistor Q981 was faulty with base-emitter leakage and its base-collector junction almost open-circuit. I checked the reverse-protection diode across the relay's coil in case this had been the cause of the transistor's failure, but it was OK. A new transistor restored normal operation. **G.D.**

## Sony HCD-S300 home cinema

Like a lot of engineers, I'm a terrible hoarder. I have a large box that keeps filling up with scrap items, like tape decks, which I am sure will be useful one day to provide the odd pulley I need in a hurry. But of coarse they never are useful. My latest box is used to save DVD lasers. Most of these come as decks, and I can't bring myself to throw away all those beautiful little motors and gears. I've given a number of them to a local model engineering club, where the motors and gears find a good home, turning gun turrets, raising ramps and so on.

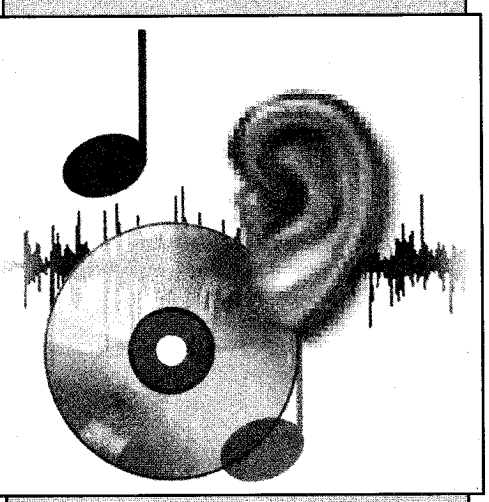
Anyway, the problem with this particular DVD system was that it refused to read discs. The sled sometimes appeared to be doing odd things, but at other times the basic operation seemed to be normal. I installed another KHM220AAA RP deck assembly, which worked all right. But I had this gut feeling that the problem with the first deck was not the optical block itself. So I put the old deck back in, then ran the auto set-up – hold in the front-panel stop and mute buttons together, rotate the volume encoder clockwise, then follow the on-screen instructions.

When, as instructed, I inserted a single-layer disc and pressed remote 'enter' to start the set-up, everything worked normally. The disc was identified, and the focus, spindle and tracking servos were spun up. This further led me to believe that the laser was OK. When the sled servo was enabled however the procedure immediately failed and set-up was terminated. The sled motor therefore seemed to be suspect. It's a tiny four-connection stepper, whose shaft is the actual sled drive worm.

A rummage in my scrap box produced a KHM240AAA deck that had been replaced because of a bad laser. The sled motor is the same, so I swapped it over. This made no difference at all to the fault. The only thing this left as suspect was the sled 'home' sensor, which is a tiny three-pin slotted opto. It was again easy to swap over the one from the scrap deck. This time, when the auto set-up was run, everything proceeded normally for single-layer, CD and dual-layer discs. A long soak test, with a variety of titles, proved that there were no further problems.

It had been a satisfying fault to sort out, something that's increasingly rare with modern equipment. And, better still, it had proved the worth of the scrap box!

Strangely, later that day I had an S300 with an open-circuit spindle motor. The donor deck was again successfully pressed into service. **G.D.** ■



# AUDIO FAULTS

**Reports from**
**Geoff Darby**
**C. Bowers**
**Eugene Trundle**
**and**
**Dave Gough**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 300 for details of where and how to send reports.**

## Sony MZ-N707

This personal MD recorder didn't produce any audio output, though it appeared to play discs all right. When I removed the bottom cover and pressed the PCB in the vicinity of headphone amplifier chip IC302, audio from one or both channels could be made to return. It depended on the angle at which I pressed.

I've had this problem before with other MZ-XXXX models. When I examined the PCB at IC302's location I could see that the IC's pins were covered with what can only be described as Araldite. I've found this substance there before: it's definitely not flux, as it is quite tough.

In order to sort the problem out you need two free hands and a powerful magnifier. I use an excellent headband type that's available from Farnell Components, order no. 724-5830. It comes in three different magnification powers – 724-5830 is the strongest. The first step is to get the epoxy-type material off the pins (you can't solder through it). I find that this is best done with a small scalpel. The one I use is a retractable type from X-Acto. It's like a click-click ballpoint pen and is available from good craft shops. Once the epoxy has been removed, I clean down with a toothbrush and alcohol.

When I inspected the pins closely several of them looked as if they had never taken solder in the flow process. It's exactly the same situation I've found on previous occasions. Once everything is clean and dry it's not too difficult to add some solder to the IC pins. But, be warned, you'll need a very fine iron. I use an Antex iron with a needle tip. In addition you need very fine-gauge solder and a very good eye (even with the benefit of the magnifier). For success, an extremely steady hand is also required. If you don't feel confident to carry out this type of work, it's probably best to leave it to someone who is. It is very easy to get into a mess and make things worse than they were before. Remember that this is a £200 unit.

Once the resoldering had been carried out and the board had been thoroughly defluxed and cleaned the audio was back, and solid! **G.D.**

## Sony STR-DE475

The customer's odd complaint about this AV amplifier was "plays very silently only"! We do get 'em in this trade, don't we? What he actually meant was no audio. I quickly established that this was not caused by trouble in the output stages. When the amplifier is set to the 5.1 mode there's little apart from IC201, an 80-pin flatpack IC, between the rear-panel input sockets and the input circuitry of the power amplifiers. IC201 is referred to as the analogue sound processor on the circuit diagram. After establishing that the muting transistors Q361-6 were not in operation I ordered a replacement IC. Once it had been fitted all functions operated normally and good sound was present from all channels. **G.D.**

## Pioneer XR-P470C with S-P470V speakers

There were two complaints about this equipment, one to do with playing CDs and the other about a crackling sound from the speakers. The CD problem was a minor one and was quickly resolved. Attention was then turned to the complaint about crackling.

Up to this point the unit had been run with the workshop test speakers and had shown no signs of audio trouble. Unusually, the customer had had the foresight to bring the speakers along, so these were next connected. The sound from both was fine at a 'normal' listening level, but when the volume setting was increased a little above this the output from one of the speakers suddenly started to sound very distorted, and the speaker protection relay in the hi-fi unit began to pulse with the bass. The offending speaker sounded fine once the volume setting was reduced.

I popped the decorative front off the speaker cabinet and felt the cone movement. It was smooth, with no feeling of drag at all. In desperation I checked the resistance of the coil, but this was exactly the same as that of the good speaker. I started the system playing again with the front off and turned the volume up until the problem appeared. At this point the cone was moving probably ±5mm on bass notes. I don't know why, but I decided to advance the volume setting further. The strange result was that the symptom improved then went away completely! After that the speaker worked correctly at all volume settings.

Now I've never known a speaker to get better spontaneously, and I was burning with curiosity as to what could have been causing this odd behaviour. So I removed the bass driver from the enclosure and, after a brief inspection, the cause of the problem became apparent.

The voice-coil wires are brought out on to the rear of the cone and then soldered and glued to super-flexible 'tails'. These isolate the moving cone from the stationary connection tags. The tails are made from many strands of very fine wire, woven together a bit like Litz wire. On this partic-

ular speaker the tails were very long, probably 5-6cm, and at high volume settings cone movement was very large. As a result metal fatigue had, over the years, occurred and a few strands had broken free. As these strands were so long, they could easily reach across the gap to the other tail.

So at high volume the vibration caused them to touch and bounce on the other tail, producing the initial distortion and crackle, followed by momentary opening of the protection relay. By turning the volume up high I had 'blasted' them far enough away to relieve the problem, but I'm sure that this would have been only a temporary 'cure'. Giving the offending strands a quick 'haircut' ensured a permanent cure. **G.D.**

## Sony SA-WMS7

There was no sound from this unit though the power light was green. When I took the back off and checked inside I found that the 800mAT fuse F1 had blown. There didn't seem to be any reason for this so, before fitting a replacement, I checked with Sony in case there had been an upgrade. I was told that to avoid a recurrence the fuse should be uprated to 1AT (part no. 1-532-078-00). **C.B.**

## Toshiba SJ3429

There was no power to the amplifier and tuner, though the tape deck appeared to be OK. So I took the top cover off and inspected the protection resistors. Meter checks showed that R905 and R913 had both gone high in value: instead of being in the low-ohms range they were in the high kilohms range. Replacements restored normal operation. **C.B.**

## Sony HCD-M70

There was sound skipping when CDs were played. Voltage checks at the optical pick-up and spindle motor showed that everything appeared to be within specification, so I consulted Sony Technical to see if any light could be shed on the problem. I was told that in a limited number of KSM mechanisms gear A is of incorrect diameter. This can cause various problems, e.g. sound skipping, no reading of discs or no switching to the next track. The units affected have numbers between 12522P and 28122P. The solution is simple: to ensure correct operation of the CD section, replaced gear A with the improved type, part no. 2-625-188-02. **C.B.**

## Schneider 2290 Midi

The problems with this somewhat ancient but solidly-built outfit were that it wouldn't play CDs and that the disc drawer sometimes failed to retract fully. I was alarmed to find that the lens of the optical unit was actually hitting the disc! The cause of the trouble was that the little turntable had moved down the shaft of the spindle motor. Once the correct height had been carefully established, the turntable was refixed with cyanoacrylate glue. This and a new tray-drive belt completed the repair. **E.T.**

## Sony TA818M

Intermittent sound dropout was the complaint with this unit. The cause was the protection relay RY801, which had dry-soldered joints and tarnished internal contacts. I guess it could have been cleaned and resoldered, but a new one seemed to be the better solution. **E.T.**

## Aiwa RX-N5K

This middle-aged tuner-amplifier worked all right apart from lack of its fluorescent display. Replacement of the electrolytic capacitors C107 (100µF, 25V) and C108 (47µF, 50V) brought the display back to life. **E.T.**

## Sony HCD-A190

The complaint with this unit, one of Sony's vast range of audio centres, was "no sound output". In fact the sound from both channels came up after a period of operation that varied from five seconds to forty minutes or more. The culprit was the big TA8221AH audio power amplifier chip IC1201, whose internal mute section had failed in some way. **E.T.**

## Sony HCD-RXD3

The problem with this unit was confined to the CD player section, whose sound would trip out every few seconds. I noticed that the sled 'jumped' at each break in the sound, and thought that I had cured the fault with a clean, polish and lubrication of the slide shaft. But the fault returned. It took a new laser unit to cure this fault completely. **E.T.**

## Marantz CP230

These professional portable cassette decks were much favoured by outside broadcast/recording people. They are still held in high esteem and, because of their build quality, provide good quality results and excellent service. But this one produced a very nasty screeching sound when it was operated. After stripping the deck down I removed the main motor and powered it via the bench power supply. This confirmed my suspicions: there was a loud squeal. Some careful lubrication, followed by an overnight soak test, proved that the motor and the unit were now in full working order. **D.G.**

## Sony TC158SD

This nice little professional portable cassette deck worked all right with a DC/battery supply but not with an AC supply. Cold checks inside revealed the culprit, Q512 (2SC1173), which was open-circuit. As I didn't have this type in stock I pressed a 2SD1138 into service. It worked fine. **D.G.**

## Musical Fidelity B1 integrated amplifier

I must confess that I like servicing good-quality hi-fi gear. This amplifier was no exception to the rule: good build and sound. It was in a bad way however. No audio output, only the dreaded hum! In fact after ten seconds or so you could fry an egg with the heat from the right-channel transistors. So the repair was as follows.

Replace all eight 2N3055 (same as BU208) output transistors. Use plenty of heatsink compound and take time and care over fitting. Double check your work – it always pays with unforgiving amplifiers to get it right first time. Next check all the 0·47Ω, 2W wirewound bias resistors. If in doubt, replace them all. A slight resistance change in these items can cause problems with this amplifier.

Finally, centre the four 100kΩ bias control potentiometers and power up. If all's well, set the bias for an optimum 15mV. Leave the amplifier to run quietly for a few hours, then recheck this. **D.G.**

## Sony RX77S

The complaint with this hi-fi stack was no display/functions. Checks on the PCB mounted close to the power transformer showed that R13/14, which are both 2·2Ω, were open-circuit. Replacements restored full operation. **D.G.** ■

# DVD

**Fault reports from Geoff Darby Matt Marrs and C. Bowers**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 300 for details of where and how to send reports.**

## Sharp DV740H

I'm not at my best first thing in the morning, especially at the beginning of the week. So I was feeling grumpy and in need of a quick repair to cheer me up. This was first item I picked up, and was a player I'd not come across before. The fault symptom was no analogue sound. Needless to say I didn't have a service manual.

There was nothing obviously amiss when I took a quick look inside after removing the cover so, with heavy heart, I took a closer look and did some general prodding around inside. Close to J1 I spotted a couple of blue diodes that looked suspiciously like zeners. This suspicion was reinforced by the fact that the pins of J1 were marked on the board as being supply rails. When I carried out voltage checks across these diodes, D5 and D6, there was a reading across D6 but nothing across D5. Cold checks revealed a short-circuit across D5 but, when one end was lifted, the diode was proved to be blameless. Cold checks across the nearby electrolytics proved that C58 (470µF, 16V) was the culprit.

There was voltage across D5 when a replacement capacitor had been fitted, and when the analogue sound was switched back on via the set-up menu there was good quality audio from all the relevant outputs. With spirits thus lifted, I moved on to the next one . . . **G.D.**

## Kenwood DVR7000

This curiously-designed home-cinema unit has two power supplies. The first is of the chopper type with a whole raft of outputs including the standby 5V supply. The second is a linear type with a large transformer. It seems to power the six output stages and is turned on by a relay that's driven from the system-control processor.

The unit was dead because the chopper power supply was inactive. I soon found that the 110kΩ start-up resistor R3 was open-circuit. It showed no signs of distress and, as the unit was only a couple of months old, I felt that the reason for its failure was more likely to be working-voltage distress than the more usual change of value because of ageing. In view of this I decided to replace it with two 56kΩ, high-voltage resistors connected in series, doubling the working-voltage rating while getting very close to the original, somewhat unusual, resistance value. Once the power supply had been refitted the unit worked normally. **G.D.**

## Pioneer DV454S

This beautifully-styled slimline DVD player was dead. The usual 380V or so was present across the mains bridge rectifier's reservoir capacitor however. The power supply doesn't use a chopper control chip and, as I didn't have the circuit diagram, I had to start following the print around. R71, which is connected to the 380V supply, feeds the cathode of D75. This is marked on the board silk-screening as a zener diode. Its anode is not returned directly to chassis however. Instead, it's connected to another zener diode, D71, via a tiny 3·3MΩ resistor, R74. The anode of this second zener diode is returned to chassis.

There was full HT at both ends of R71, at both ends of D75 and at one end of R74. There was no voltage at the other end, across D71. Cold checks proved that this zener diode was OK, which left only R74 as suspect. When it was removed from the board it proved to be open-circuit. A replacement, of slightly larger proportions, restored normal operation. **G.D.**

## Sharp DV740

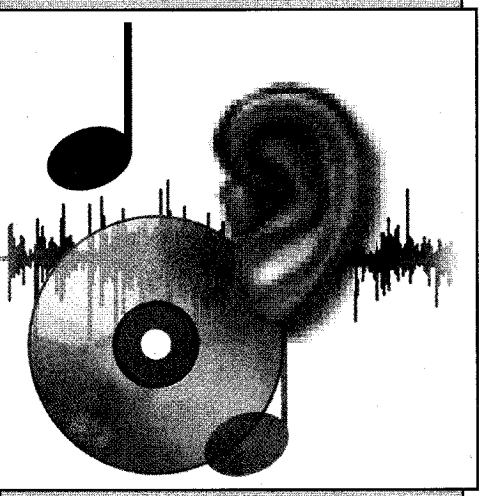
If there's no audio output check whether D5 or C58 on the main board is short-circuit. These items provide a –12V supply. **M.M.**

## Sony DAV-S400 or HCD-S400

When a disc was inserted it would be rotated but there were no control functions and no display. A quick inspection within the unit revealed the cause: the ribbon connector that connects the power-supply board to the main DVD PCB was improperly seated in the surface-mounted connector CN008. A push down on the connector ribbon restored normal operation. **C.B.**

## Sony HCD-S800

There was no operation in the DVD mode and the unit would intermittently display a "C-81" error code. The cause was traced to a defective surface-mounted transistor, Q002, on side B of the DVD board. A call to Sony Technical revealed that a small modification may be needed when this fault is experienced. **C.B.** ■



# AUDIO FAULTS


**Reports from**
**Geoff Darby**
**C. Bowers**
**Carl Owen**
**Ivan Levy, LCGI**
**Pete Roberts**
**and**
**Peter Graves**


**We welcome fault reports from readers – payment for each fault is made after publication. See page 364 for details of where and how to send reports.**

## Sanyo MD-MX30H

There was a disc stuck in this unit because the tray wouldn't open. When the unit was powered the disc rotated in reverse at a high speed. I've had similar faults previously with other makes and models, the cause often being a missing supply. So I started to look around for one.

I soon found that the 3·3V supply, which is called B+ and goes all over the CD board, was very low at just 1V. The only supply to the board is CD +7V, at pins 3 and 4 of CNP6. This also shoots off all over the board and, confusingly, is labelled both CD +7V and +B at various points. Up by IC2 a 5V supply is derived from it using a zener diode, ZD60. After this it again becomes, you guessed it, +B!

So where did the faulty 3·3V supply come from? I followed it round and round the board but was unable to find a regulator. The block diagram suggests that it comes from somewhere on the board by showing an arrowhead pointing into a bus that connects it to IC2, IC1 and IC3. On this diagram it has another new name, +B10!

Eventually a check with the service manual pages that show the internal arrangements in the ICs revealed the answer. In addition to being the focus, tracking, spindle, sled and loading motor driver IC3 contains a 3·3V regulator, with the output at pin 22. This is actually labelled 3·3V reg, but looks like an input rather than an output. A replacement for IC3 restored the 3·3V supply and normal operation of the unit. **G.D.**

## Sony HCD-H51M

This unit wouldn't play discs. I first suspected the KSS240A laser unit, but decided against this possibility as the unit seemed to make a lot of noise as it tried to focus. So I removed the deck and plugged it back in via its very long flexiprint connector. Now that it was outside the unit I could see what was going on.

The lens went up and down during focus search but the movement was very violent. There was none of the fluid grace one normally associates with this action. I'd seen this before with other Sony models and, as a result, went straight to the servo/signal processor board under the deck assembly. Once the spindle and sled motors have been unsoldered and one screw has been removed, this PCB can be dismounted and the laser disconnected from the top side. You will see some camcorder-type surface-mounted electrolytics here. How many there are, their values and their reference numbers varies – it depends on which board (there are several similar looking ones) is fitted in the unit you are working on.

In this unit there were three of them, all 47µF capacitors rated at 4V working. Even when there are more, with various values, you will usually find some 47µF ones, and these are the ones that usually fail. Close inspection of the PCB in this area will often reveal discoloration, and as soon as you come to unsolder the capacitors affected you will smell fuming electrolyte.

In this case replacement of the three capacitors – after a careful PCB clean and inspection of the nearby plated-through holes for electrolyte attack – restored normal focus search and disc reading. **G.D.**

## Panasonic SAPM01

The problem with this hi-fi unit was CD jumping. The unit was very sensitive – you only had to look at it and it would skip. I tried a new laser unit, but this made no difference. As the RF level etc. seemed to be OK, I called Panasonic Technical to ask whether there was a known problem. Now I've never known Panasonic Technical give me a bad steer, but I was frankly sceptical when the nice man at the other end of the phone told me to replace the disc clamp, using the revised type. This is part no. RKF0561-K2, which has "improved clearance".

I ordered one and fitted it, curing the problem completely. I can only assume that with the original clamp the clearance was so small that with the slightest deck shake the clamp momentarily caught the holder, causing a sudden brief reduction in disc rotational speed and thus a skip. **G.D.**

## Sony HCD-H1200

This unit had no main display and looked dead, though the red standby light was dimly lit. Once I started to carry out checks inside it didn't take me long to discover that the 2SD1388 transistor Q791 on the main board was short-circuit. I used a 2SD1616A-K, Sony part no. 8-729-111-29, as the replacement. Once this had been fitted and the reset button at the rear of the unit had been pressed the unit worked normally. **C.B.**

## Sony MZR700

The complaint was intermittent sound from one channel. A quick wiggle at the headphone socket while playing a MiniDisc showed that the fault was in the left-hand headphone channel. I removed the back of the plastic case to inspect the headphone socket, J302, expecting to find dry-joints. As there weren't any I used my eye-glass to take a close look around the main board, and found that the headphone amplifier

IC302 had become unseated from side B of the main board. Luckily for me it's directly below the headphone socket. A quick resolder, using a thin-tipped iron, solved the problem **C.B.**

## Sony MZR90

There was no sound at either side (left and right) of the audio jack in this MiniDisc player. The cause of the fault was found to be two defective muting transistors, Q101 and Q201. Normal sound was back once these two surface-mounted transistors had been replaced. **C.B.**

## Sony HCD-CP33

When this unit was switched on there was a loud bang from the left-hand speaker. I took a look inside, checking around the power amplifier ICs with a magnifying glass. This revealed dry-joints around the left-channel audio output chip, IC201. Resoldering it cured the bang. **C.B.**

## Sony HCD-RX70

There was a volume-control problem with this unit. When the rotary switch was turned the volume and the display increased and decreased unevenly. I removed the top casing and found the control, a rotary encoder switch marked S602, on a small PCB that's connected to the main display and control board. Visual inspection of the shaft of the switch showed that it had become bent in its casing, hence the uneven step count. A replacement switch, Sony part no. 1-473-392-11, cleared the fault. **C.B.**

## Sony ICF-SW100E

This small world-band radio produced a clock display but wouldn't turn on. A quick look inside revealed hair-line cracks in both the signal-wire PCB and the flexible key-wire PCB between the display panel and the main board. Before ordering the two flat wires I gave Sony Technical a call to ask whether there was anything I could do to prevent a recurrence. I was told to order the MCB Flexible Kit part no. X-337-234-01. It has a new type of front display cabinet, with the flat wires included. Once it had been fitted the power-up and no-sound problems had been resolved. **C.B.**

## Pioneer MIS21 amplifier

If the ICPs on the mains transformer have blown check whether any of the smoothing capacitors are short-circuit before condemning the output amplifier. The unit, part of a mini audio system, had spent some time with another service organisation before the owner decided to take it elsewhere. **C.O.**

## Pioneer PM603

This CD player's display dimmed after two seconds. I found that IC31 (N10) was open-circuit, but a replacement failed to restore normal operation. Although the display had now returned the machine didn't read discs. A check on the RF eye pattern showed that this was OK, but the sled motor wasn't moving. As its voltages were correct a replacement was fitted. This cured the fault. **I.L.**

## Tascam MD801R

This MiniDisc recorder's display would fade and disappear intermittently. The drive signals and heater voltages were correct in the fault condition but the –30V supply had disappeared. I traced the source of the supply to the oscillator block U503. When I removed the sealed block from the PCB I found numerous dry-joints. Resoldering these provided a complete cure. **I.L.**

## Kenwood 1080

The fault with this amplifier was no front LED illumination when an input was selected. Initial voltage checks failed to reveal anything amiss, but rapidly switching the amplifier off and on produced a temporary cure. It seemed that the microcontroller chip IC303 wasn't being reset properly. Then, after ten minutes, the display locked up. When I checked IC303's supply and reset voltages I found the supply voltage very high at 11·5V (should be 5V) and the reset voltage at 6V. Tracing back to source I came to Q106, whose base circuit should include a 5·6V zener diode, ZD101. It had never been fitted! Making this deficiency good provided a complete cure. I can only assume that the problem had been present from new. **I.L.**

## Numark radio-mic system

This radio-mic system was reported to be dead. I suspected a simple supply fault and found a broken connection between the input power socket and the bridge rectifier. Resoldering this and the output mic jack socket restored correct operation. **I.L.**

## Macgregor BG100

This MOSFET amplifier was brought in because it didn't produce any music or mic outputs. Checks revealed that the 18V supply was high at 40V. The cause of this was the relevant 18V zener diode, which was open-circuit. The two output MOSFETs (BUZ900 and BUZ902) were also open-circuit. Replacing these items restored normal operation. **I.L.**

## Sony STR-DE135

This multiple-input amplifier was dead. A simple fault: the mains transformer was open-circuit. **I.L.**

## Nytech C252 amplifier

This UK-made integrated amplifier, dating from the early Eighties, was dead with a suspect mains transformer. The owner, a university lecturer, had given it to one of their technicians to look at: he had pronounced the custom-made toroidal transformer dead. I found that the 3·15A anti-surge glass fuse had failed in a big way. A replacement immediately went to meet its maker. Trying a replacement fuse isn't as foolhardy as it might seem, since toroidal transformers are notorious for the heavy magnetising current they draw at switch on.

Closer examination however revealed that the dead fuse was in the main 40V secondary circuit, feeding a bridge rectifier that consists of four beefy 6A diodes. No, the cause of the trouble wasn't a short-circuit diode but something I've never come across before in a hi-fi amplifier, a dead-short reservoir capacitor. There are two of them, both 3,300µF, 63V 85°C types, wired in parallel. To be on the safe side I decided to replace them both. As they have to deal with only 100Hz ripple and are not subject to great heat, I felt that there was no need to upgrade to 105°C capacitors. I fitted long-life 85°C units rated at 63V. The shorted capacitor looked to be completely innocent, with no signs of leakage or bulging, but measured zero ohms when checked.

To complete the repair I replaced the broken 4mm banana speaker sockets and changed the glass 1A anti-surge mains fuse to a ceramic HRC type. **P.R.**

## Philips AZ1101

This CD/cassette/radio wouldn't produce audio from the radio or cassette sections. The CD player worked normally. I found that R615, at the left-hand edge of the PCB, was burnt to a crisp while the associated 8·2V zener diode was dead short. But when I replaced these two items there was no audio at all! The 1·6AT fuse in the power supply had blown at switch on. This time the TA8227 audio output chip had failed. A new IC and another 8·2V zener diode restored normal operation. **P.G.** ■

# DVD

**Fault reports from Geoff Darby and Ivan Levy, LCGI**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 364 for details of where and how to send reports.**

## Panasonic SA-HT80

When a normal region 2 disc was inserted this home-cinema unit responded with a 'no play' message on the front panel and a 'can't play this type of disc' message on the monitor screen. A check on the player's region code software (press 'tune mode/stop' on the front panel and '6' on the remote-control unit) indicated that it thought it was, correctly, a region 2 machine. There was no internal evidence that any attempt had been made to 'chip' the player for multi-region operation.

I decided to try my trusty Toshiba demo disc in it. This is a region 0 disc and usually manages to bypass any regional blocks imposed by the player. While it was playing I checked the jitter (press 'tune mode/stop' and '5' with the remote-control unit), just in case. This was fine at five per cent, indicating a good laser. I now felt confident that there was a software error and that re-initialising the unit ('tune mode/stop' and '10' with the remote-control unit) would cure it.

But when, after doing this, a region 2 disc was inserted the unit still behaved in the same way. Just for sport I then inserted a genuine American region 1 disc. As expected the unit refused to play this and produced the same error messages. I then re-inserted the region 2 disc – which now played! The region 0 disc would also play, and the region 1 disc continued to produce the error messages.

Many power on/offs and trials with different types of disc proved that the unit was now functioning correctly. I guess that this is another problem that can be blamed on the Hints and Tips page of DVD Hacker's Weekly!

While on the subject of disc and player regionalisation, the other day I came across a new-generation disc that won't play in a multi-region machine. My daughter has a portable DVD player, with LCD widescreen, that she bought in the US for about half what she would have had to pay for it here. Rather than having it chipped, and risking that it might not play, she buys region 1 discs from a very good internet company. These are genuine American region 1 imports, which tend to be cheaper than their region 2 counterparts and usually contain more features.

The main machine in our home is a Toshiba one that was bought chipped and normally plays all discs without any problems. It refuses to play the latest disc my daughter bought however, producing on the screen a message something like 'this disc is intended to be played in un-modified region 1 players only', along with a world map of the regions. The disc plays all right on her genuine region 1 portable of course.

It makes me wonder why they are bothering with this. It's clear that films and DVD releases are becoming much closer in time between regions, presumably in a move towards eliminating an archaic leftover from the practices of the cinema industry. This makes sense and could go some way to reducing internet pirating across regional boundaries. **G.D.**

## Panasonic NV-VHD1B-S

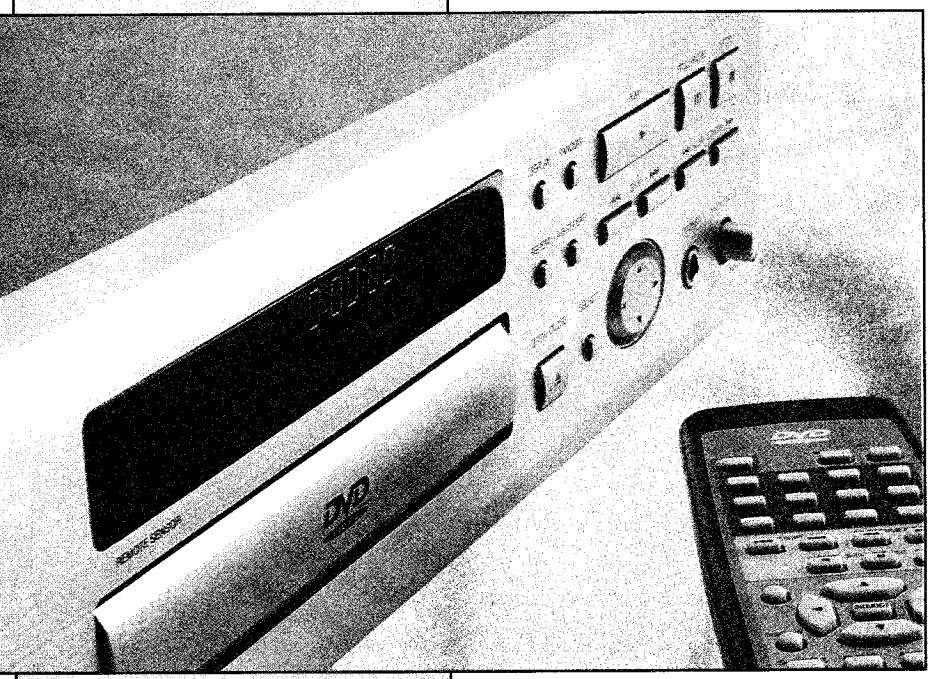
The problem with this combination DVD/VCR machine was no action from the DVD section other than to bring up the error code F498 in the display. This indicates a flash ROM problem. The first move should be to try resoldering the pins of the device, which is IC37001. You'll find it on the underside of the main DVD PCB, which is screwed down to the chassis underneath the DVD deck. If resoldering doesn't cure the problem, the IC will have to be replaced. In this case however a reflow at all the pins restored full, normal operation. **G.D.**

## JVC XV-S302SL

The owner of this unit complained about 'distorted sound'. For a change the fix was quite simple. The '3D Phonic Theatre' mode had been selected! This is one of those 'Dalek' modes that I tend to get annoyed about. While it may give a pseudo-realistic big-theatre sound with some content, with most discs it just sounds metallic. Switching all sound enhancement back to 'off' restored normal hi-fi sound. **G.D.**

## Grundig GDP51UO

This DVD player came in with a dead power supply. On investigation I found that the primary side wasn't starting up properly because the IL0380R chopper control chip IC101 was faulty. A replacement cured that, but I then found that the off-disc pictures and on-screen menus shimmered horizontally. Voltage checks showed that the 12V supply was low at 11V. Once this had been reset there was no more shimmering. **I.L.** ■



# DVD

**Fault reports from Geoff Darby and Philip Salkeld**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 428 for details of where and how to send reports.**

## Sony HCD-S400

There were two complaints with this unit, which is part of the DAV-S200 home-cinema system. First was intermittent sound from a couple of the six channels. I went straight for the output chokes and, as usual, found that a couple of them were badly dry-jointed. A blanket resolder here cured this problem. The second fault was described by the owner as "dim display". In fact when the unit was powered the display flickered between full on and nothing at all and then, after a few seconds, settled at either full, nothing or dim.

The negative and heater AC supplies for the VFD are generated on a little sub-board which is screwed to the front panel, underneath the disc tray. I can't understand why, when someone has gone to the trouble of designing a model-specific switch-mode power supply, from which any supplies needed could be derived using only a couple of components, it should be necessary to design another separate inverter, using about twenty components, to run the VFD. When I removed this sub-board I was able to inspect the joints on it carefully. There were no obvious signs of poor soldering, but a blanket reflow of all the connections provided a complete cure. **G.D.**

## H + B DVD4155S

This unit was to all intents and purposes dead, but checks in the power supply revealed low output voltages. On making a closer visual examination I noticed two slightly tired-looking electrolytic capacitors on the secondary side of the circuit. For some reason the electrolytics have E designations on the silk screening instead of the usual C.

The two electrolytics concerned, E6 and E8, both have a value of 1,000µF, one being rated at 10V and the other at 16V. According to the ESR meter the worse-looking electrolytic had the better performance. For good measure I replaced them both. This restored full outputs from the power supply and brought the unit back to life. **G.D.**

## Sony HCD-S880

This player is part of the DAV-S880 home-cinema system. The fault symptom was that it went into the protection mode shortly after switch-on. When there are six output stages to choose from, it's always difficult to know which one might be the cause of the trouble. The system microcontroller chip monitors the lot, shutting the unit down when it detects a fault in any one of them.

In this design the six separate power amplifier ICs have fully-floating differential outputs. These outputs are monitored by pairs of transistors, Q101 to Q112, which are connected to digital transistor Q114 via OR diodes. Q114 drives another digital transistor, Q113. The output from this device is connected to pins 8 and 18 ('Diag A' and 'Diag B' respectively) of each output IC. The line is connected to the 5V supply via R300, and leaves the AMP PCB to head for the DVD PCB. When it leaves the AMP board the signal is called 'Diag'. After arriving at pin 13 of CN004 on the DVD board it becomes 'OCP'. Its final destination is pin 44 of the system microcontroller chip IC901.

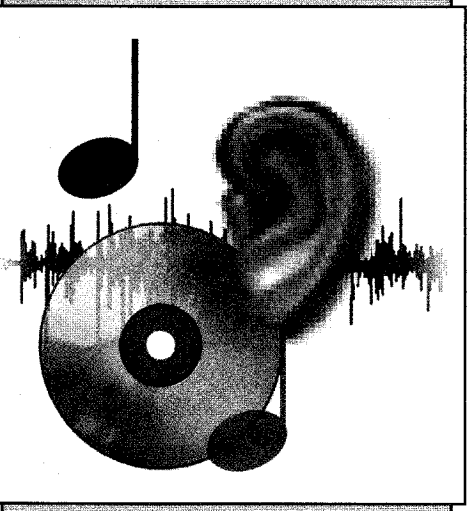
According to the circuit diagram pin 44 of IC901 should be at 4·9V, which confirmed my interpretation of the circuit's operation. So I disconnected the collector of Q113 on the AMP board to override the protection system temporarily – making sure that no speakers were connected to the unit of course. As expected, the microcontroller chip's fault-sense pin and the Diag pins at the output ICs all rose to 4·9V. This enabled the system to power up and stay on.

Checks at the output pins of the audio ICs showed that they were all at approximately half-rail voltage, i.e. about 8V, except for pin 19 (Out B) of IC307. The voltage here was zero. A cold check at this pin revealed a dead short to chassis. When I disconnected the pin the short was still present. This left D324, zener diode D344 and C458 (1µF) as possible suspects: they are all connected between pin 19 of IC307 and chassis. The culprit turned out to be D324. Normal operation was restored once this surface-mounted diode had been replaced, along with reconnection of Q113's collector and pin 19 of IC307. **G.D.**

## Toshiba SD210EB

I needed help with this one. My thanks to Toshiba Technical for providing it. The symptom was very low sound output, the cause being C929 (100µF, 6V) which was short-circuit. It's on the MPEG board, next to the phono sockets.

This fault can also occur with Models SD110EB, SD110EE, SD110EL, SD210EE and SD210EL. **P.S.** ■



# AUDIO FAULTS

**Reports from**
**Chris Bowers**
**Geoff Darby**
**Eugene Trundle**
**and**
**Roger Burchett**

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## Sony HCD-H4900

When this unit was powered up and the CD eject button was pressed it would only open the drawer and not close it. The cause of the problem was traced to failure of the loading-motor driver chip IC203, which resulted in excessive power consumption. A quick IC replacement cured the fault. **C.B.**

## Sony HCD-MD373

There was no audio from the AM/FM tuner in this unit. When it was in the tuner mode there was only a slight clicking sound as the volume control was turned. Voltage checks at the tuner block connector (CN105) on the main board showed that the 12V and 5V supplies were present and correct. An oscilloscope check at the tuner output pin at CN105 then showed that there was no output. A replacement tuner block, circuit reference 57, part no. 1-693-473-41, restored normal operation. **C.B.**

## Sony HCD-CP33

The display had no backlight. When I carried out meter checks at the LCD display board I found that the two LED strips were open-circuit. According to Sony Technical they can become open-circuit because of thermal expansion of the epoxy. They need to be replaced with four single LEDs, D601-4. At the same time you have to change the value of the two surface-mounted resistors R372 and R373 on the main board from 82Ω to 120Ω. Once this had been done the display was fine. **C.B.**

## Sony CDP-CX235

This is a 200-disc carousel CD player. The complaint was no mechanical operation after being moved by the customer. A close look inside the unit revealed the cause of the trouble: several discs had been knocked out of the carousel holder with the result that the CD mechanism has locked up. Removal of the jammed discs restored normal operation. **C.B.**

## Sony TC-TX313CEK

This unit would switch itself off after a short while. Checks on the low-voltage board, using a voltmeter and a can of freezer, revealed that IC06 appeared to be faulty (overheating). I was told by Sony Technical that the replacement should be type NJM78M05FA, part no. 8-759-701-56. The new regulator stopped the switching off. **C.B.**

## Sony HCD-G1

This unit's display didn't light up and the radio just made a loud buzzing sound. I found that the protection resistor R389 had gone high in value – the reading was in the kilohms instead of low-ohms range. A replacement restored the display and stopped the loud buzz from the radio. **C.B.**

## Sony MZ-R35

The door of this personal MiniDisc unit wouldn't open, though the release button felt normal in operation. According to the fault card the unit had been dropped. There were no signs of external damage however. What had gone wrong was apparent once the bottom cover had been removed and the door catch had been released.

The door-catch mechanism consists of two plates. The outer one engages with the 'open' button on the case while the inner one has the actual door catch attached to it. Clearly the two plates have to be linked for the button to move the catch. This link is provided by a metal tab that's attached to a plate on the over-write head motor drive. The idea is to prevent the door being opened whilst recording, as this would prevent the TOC being rewritten to reflect the recording that had taken place and would also leave the over-write head down, in a vulnerable position.

The metal tab had become bent and had disengaged from its hole in the chassis, through which it passes to link the two plates. The problem was easily corrected by winding the mechanism manually until the tab withdrew, then bending it back straight so that it would pass back through its hole. A full function test, including a recording, proved that there were no other problems. **G.D.**

## Kenwood RXD-3L

The customer had said that this unit wouldn't play CDs. There were two discs in it, and they certainly wouldn't play, but this was because the unit didn't come out of standby properly. The unit would come out of standby when the power button was pressed, but relays then clicked and the display went back to being a line of flashing horizontal bars.

The manual doesn't mention this condition. I suspected that some sort of protection mode was in operation, so I phoned Kenwood Technical for confirmation. The chap I spoke to said he didn't know about such a condition, but felt that I was probably right and that the most likely cause was defective output transistors. Hmmm.

I decided to tackle the problem from a different angle. The easiest way to get at the main PCB is to turn the unit upside down and remove the bottom tray, complete with the mains transformer. The mains lead can be released from its clamp to facilitate this, while the transformer's output cables are long enough for it to be placed to one side. The output transistors and the entire underside of the main PCB

are then accessible.

Checks on the output transistors showed that they were OK, and both output stage supply voltages were present and about equal during the brief period before the unit shut down. The mid-point voltage in both channels was fully negative however, so this was the cause of the shutdown.

It's very difficult to trace the cause of a fault like this – unless you can force the unit to remain on so that voltage checks can be carried out. When I looked at the print layout in the manual I spotted a link marked 'protect'. This led off towards the front panel, where the microcontroller chip lives. The unit remained on when this link was disconnected, and within about thirty seconds there was a smell of something getting hot. This turned out to be the –12V regulator transistor Q27 and its feed resistor R271. Cold checks around this transistor showed that there was a short to chassis at its emitter. The most likely culprit appeared to be C142 (220µF, 35V), which was indeed the cause. A replacement restored normal operation, so the protect line link could be refitted. **G.D.**

## Sony HCD-BX3

I sometimes think that manufacturers go out of their way to make life difficult for owners and, indeed, service engineers. This unit had been in twice before with the complaint "not reading discs". On neither occasion had I been able to fault it. As the unit was back yet again with the same reported problem, I decided that I had to get to the bottom of it.

Step one was to quiz the customer. This revealed that 'not reading discs' was a rather imprecise description of the problem. The true situation was that the unit would play only disc one of the three-disc carousel. Now I had, on the previous occasions, checked that the unit played discs in all three carousel positions but had done this using the 'direct-play' buttons.

What was actually happening was that at the end of play of disc one the unit didn't automatically move on to play disc two. The cause was found to be the play mode to which the unit had been set. The owner had inadvertently changed this to 'continue one disc'. For the unit to play all three discs in sequence automatically, the play mode has to be set to 'continue all discs'. Other settings for this feature are 'shuffle all discs', 'shuffle one disc' and 'program'. The setting is selected by repeated pressing of the play-mode button. **G.D.**

## Sony STR-DE475

The complaint with this tuner/amplifier was "all power being directed to the right-hand speaker". The problem was to do with the electronic volume control: while the left channel's output increased smoothly from zero, the right channel's output never reached zero and, when the setting of the volume control was advanced, this output increased in steps that sounded like four times that from the left channel.

Now I'm a great believer in 'Beer's Maxim' – the one propounded by Nick Beer, that "the likelihood of an IC being faulty falls in direct proportion to the number of pins it has". In this unit however all volume control action takes place in the audio processor chip IC201, which is an 80-pin flatpack device. There seemed little else that could be the cause of the fault, and a replacement cured the trouble. The exception that proves the rule! **G.D.**

## Sony HCD-XB200

The antics of some customers never cease to amaze me. The reported fault with this unit was "customer put compost in CD drawer"!! In addition, it was being claimed as an internal warranty on a laser replacement that had been carried out three months before. I wonder how such a customer would get on if he bumped his car then took it to the garage and asked for it to be repaired free of charge because the engine had been serviced three months ago?

When I got down to the job not only was the CD carousel full of compost, there was also a great chunk of magnet in the works – it looked as if it had come from a large loudspeaker. The complete carousel drive had to be dismantled, and the compost painstakingly removed from the gear teeth and slide tracks with a toothbrush and cotton buds. The laser sled drive had to be treated similarly. Eventually, when everything had been cleaned and regreased, the unit was reassembled – and worked correctly. **G.D.**

## Technics SA-CH550

This power amplifier, part of a 'separates' group, didn't produce a sound, though the internal cooling fan would rotate at high volume-control settings. All the voltages around the SVI3101D output amplifier chip IC501 were correct, it had L/R inputs, and the protection circuit wasn't in operation. The IC itself was the cause of the fault. Panasonic was able to provide a replacement at the best price. **E.T.**

## Aiwa DX990

This CD player belonged to the RX990K ensemble. The trouble was with its disc-loading tray, which sometimes failed to emerge or retract on demand. A replacement tray-drive belt seemed to solve the problem, but the job bounced. The pulley was cracked, and as a result the motor shaft sometimes slipped under load. **E.T.**

## Sony STR-DB830

The local Sony dealer had taken on this surround-sound amplifier but had failed to solve the problem. Occasionally when the unit was put in standby one or more of the source-indicator LEDs remained on and the mains relay wouldn't drop out. The unit would have to be disconnected from the mains supply then reconnected before it would work normally. There was no pattern to the fault. On some days the amplifier would go into and out of standby every time, but on another day it would play up on every third or fourth attempt to go to standby. Very occasionally, just to add spice, the amplifier would 'lock up' after working normally for some time. Then nothing could be changed. The source would stay on CD for example (though the display would change), and the speakers couldn't be turned off.

Microcontroller trouble I hear you say. Well, almost. There are four regulators on the top, 'digital' board. This board has print tracks on both sides, with plated-through holes. The 5V regulators IC1201 and IC1205 looked distinctly dry-jointed, but the culprit was IC1204 (BA05T) which was virtually short-circuit input-to-output, putting nearly 8V on the supply to the front control board. **R.B.**

## Sony HCD-EX1

The complaint with this CD player/tuner/amplifier was that it would work for about twenty minutes after which the sound would be lost, though all functions remained OK. When I tried it the sound had disappeared permanently. I checked the LM1876FT power amplifier chip IC801 first. This was working, but the headphone amplifier IC501 didn't seem to be working though the socket was OK and the relay could be heard switching the power amplifier on and off.

Checks on the supplies to the main board showed that the –7·5V supply was missing. It's used by the headphone amplifier and the audio preamplifier chip IC111. When I stripped the unit down I found a bent-over pin in the socket on the power board, the one that connects it to the regulator board.

When I reassembled the unit there was a flashing clock display and nothing else – not even remote control of the clock setting. I had fitted the ribbon cable from the front panel to the main board the way is appeared to lay, which was wrong. Fortunately no harm had been done. **R.B.**■

# DVD

**Fault reports from**
**Geoff Darby**
**Mark Hiles**
**Mike Leach**
**and Chris Bowers**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 489 for details of where and how to send reports.**

## Sony HCD-S300

This unit is part of home-cinema system DAV-S300. It belongs to my wife's business partner's daughter, so it was a 'must-fix' job (don't you just love them?!). Her husband brought it over, complete with a speaker, so that I could hear the dreadful noise he swore it made when it had been on for a while.

I set it up to run on the bench. Initially, it seemed to be OK. Then the picture started bouncing around the screen, sometimes dropping out completely. Pops and thumps on the sound accompanied this. Finally there was a fearful howl, with a badly broken up picture. Scope checks at this time showed that the analogue –10V supply was generally low, with massive disturbance on it. The regulator IC903 was getting hot.

I initially suspected the regulator itself, or one of the adjacent decoupling capacitors. But the cause of the trouble was nowhere near the power supply physically. It was a further, surface-mounted decoupling capacitor, C555 (47$\mu$F, 16V), which is at the rear, right edge of the DVD board. On closer inspection I saw that there was quite a bulge in the top of its can. A replacement restored normal sound and vision stability – and won me brownie points all round! **G.D.**

## Sony HCD-S300

The customer's complaint about this integrated DVD player/six-channel amplifier was "when you switch it on it squeals". And boy, didn't it just! In addition it popped, banged and made other noises that defy description. Then, after about thirty seconds, something started to smell very hot and distressed. I burnt my finger establishing that this was IC903. It's labelled '5V reg' in the service manual but is actually the –10V regulator. There was a dead short across its output. When plug CN902, which goes to the MPEG board, was disconnected the short disappeared. So it was on the MPEG not the power supply/power amplifier board.

The first place the –10V supply goes to on the MPEG board is a three-legged filter, FL012. It then goes off to feed eleven operational amplifiers and IC507, which is labelled 'audio level adjust'. There are also various decoupling capacitors across the supply. Now despite all the problems that surface-mounted electrolytics cause, I've not found them prone to going short-circuit. But as it was going to be a lot easier to check them than to start lifting the supply pins of the twelve surface-mounted ICs, I decided to concentrate on them first. The third one I checked, C529 (47$\mu$F, 16V) proved to be short-circuit. A replacement restored normal operation. **G.D.**

## Sanyo JCX-TS750

The complaint with this home cinema unit was "not coming out in colour". When I'd obtained the remote-control handset, which had been left behind with the dealer who sent the unit to me, I found a button at the bottom left marked 'picture mode'. One of the modes is 'black and white' (I wonder why?). When it had been reset to normal, colour was present on all the outputs. **G.D.**

## Sony HCD-S800

If one of these DVD/tuner/amplifiers is dead with the fuse OK, replace the RK46LF diode D909 on the power supply board. It goes short-circuit. The part no. is 8-719-059-21. **M.H.**

## Dansai DVD1010

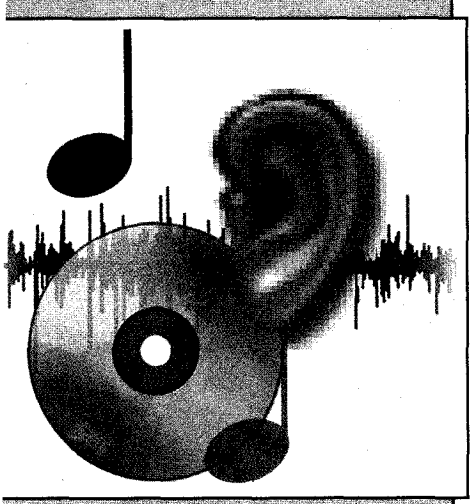
The power supply was extremely noisy and there were no functions or illuminated LEDs on the front display. A visual check on the power supply revealed that there were three bulging 1,000$\mu$F capacitors. Once the three of them had been replaced the machine worked well. **M.L.**

## Sony HCD-S880

There was no disc-loading operation with this unit. A look inside the DVD player revealed the cause – no rotation of the rubber loading rollers. I've had this fault before, with an **HCD-S550**. The solution is to replace pulley RTR (item 501) and pulley RTL (item 505) with improved parts, which can be distinguished by the black mark on top. Part numbers are X-4954-711-3 for pulley RTR and X-4954-712-3 for pulley RTL. Once the new pulleys had been fitted the loading mechanism worked normally. This was followed by a quick set-up and check on the DVD player. **C.B.**

## Sony HCD-S800

There was an intermittent volume drop from the front left-hand column speaker with the **DAV-S800** DVD player. The cause was a dry-joint at L401 on side B of the amplifier PCB. The cure was a quick resolder. **C.B.** ■



# AUDIO FAULTS

**Reports from Geoff Darby Chris Bowers J.S Ogilvie and John Woodgate**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 489 for details of where and how to send reports.**

## Sony STR-H100

This old-timer had an interesting though simple problem. It failed to supply power to the accompanying CD and cassette units. This power is in the form of low-voltage AC, which is carried by the ribbon-type bus cable that interconnects the units. It's switched from standby by relay RY901. When the system-power button was pressed there was a healthy click from this relay, but its contacts didn't pass anything.

All became clear when I observed the back of the PCB while pressing the power button. A small spark could be seen at one of the relay pins. On closer inspection I saw that there was a cracked joint at one of the relay's coil pins. What was happening was this. When the relay was driven it initially energised, giving the deceptive click. Once the relay had drawn enough current to pull-in however the cracked joint went bad. It became so high-resistance that the relay immediately dropped back out, but too quickly to be heard.

The repair consisted of cleaning up the pin and the pad, then applying fresh solder. After that the whole system came to life. **G.D.**

## Sanyo DC-F280U

This unit arrived from the dealer with no screws in its case. He had accepted it from his customer in this state, albeit reluctantly, but told me that the problem was straightforward – it wouldn't play CDs. The owner had apparently removed the cover to see if he could clean the laser. When he couldn't find it he had gone no farther with his attempt at a kitchen-table repair.

These machines almost never need a new laser, a simple clean and general deck service being all that's required to restore reliable playing. A few plates and bits have to be removed from the deck to gain access to the laser. As expected, the lens was very dusty. A clean and lubrication job got the CD player section going again.

The job ticket also said "check all functions". I began with the tuner, which was OK. Then I went on to tape deck A, which is bi-directional, play only. This was also OK. When the test tape was put in the uni-directional, play/record deck B however the machine produced sound for about half a second then fell silent.

How very odd I thought, then tried again. The result was the same. Several attempts later the reason for the short burst of music followed by silence dawned on me. The half second of sound represented the time taken for a given point on the tape to travel between the erase and the record/playback heads. My beloved test tape, which has the record tab removed, was being erased while the deck was in the play mode! A quick rewind, after which I put the tape back in the play-only A deck, confirmed my worst fears.

A look at the circuit diagram, followed by a few measurements, brought me to Q3302. This transistor is a driver for Q3301, which switches the supply for the bias oscillator. Q3302 was leaky. As a result Q3301 was permanently on, enabling the bias/erase oscillator. A replacement transistor corrected this situation. Unfortunately Sugar, Sugar, by the Archies, now has permanent holes in it. **G.D.**

## Sony TA-S7AV

This brand-new amplifier, which is part of a four-piece stacking system, had no right-channel surround-sound output. The simple (for a change!) cause was that a pin in CN113 had been bent when the plug had been inserted. Repair consisted of carefully straightening the pin followed by plug reinsertion. **G.D.**

## Sony MHC-EX7 system

This music system consists of four units, an ST-EX10 tuner, a CDP-EX10 CD player, a TC-EX10 cassette deck and a TA-EX7 amplifier. When everything was connected together and powered there was a set of flashing zeros in the tuner display, indicating an unset clock, and light from the standby LED on the amplifier. When the on/off switch was operated the standby LED went out, the source select LED for 'tuner' came on and, after five seconds, there was a healthy click from the speaker protection relay. This was the sum total of the activity. The cassette deck and CD player remained dead, while the only life from the tuner was its flashing zeros. The clock could be set to the correct time however.

My immediate suspicion was that something was blocking the system interconnect (AU) bus. This was quickly confirmed by scope checks at the AU in and AU out pins, 27 and 30, of IC101 on the amplifier's front panel PCB. I disconnected the other three units from the amplifier, then checked again for activity on the AU out line when the source select switch was rotated. There was now a data burst at each selection. When I tried reconnecting units in turn, the bus hung up when either the tuner or the CD player was connected. With just

the cassette deck connected, there were data bursts on the AU out line at the appropriate times. If source select was set to say tuner then play was pressed on the deck, the amplifier correctly switched over to 'tape 1', proving that the cassette deck could send data correctly and that the amplifier could receive it correctly.

I turned my attention to the tuner. A look at the circuit diagram showed that the bus data arrives at pin 36 of IC201, the system microcontroller chip, via D281. This point is also connected to chassis via Q281, which is labelled 'switch' on the circuit diagram. It's an npn transistor, and was short-circuit. When a replacement had been fitted the tuner could be connected to the bus without causing any problems. The tuner then came out of standby when the system was powered, and could be tuned and worked correctly.

This brought me finally to the CD player. I looked at the circuit diagram to see if there was a similar arrangement to the one in the tuner. In this case the bus signal is routed via D601 and R631 to the BS in pin, 47, of the system microcontroller chip IC601. D602 is connected between the bus line and chassis. This diode was short-circuit. Pin 42 of IC601, BS out, is connected to the bus via Q601, which is labelled 'buffer'. It was leaky base-to-emitter and open-circuit base-to-collector. A new transistor and diode enabled the CD player to be reconnected, completing the repair. **G.D.**

## Sony HCD-ED1/CMT-ED1

This unit wouldn't read discs. I inspected the optical pickup and spindle motor carefully and found that there was a fault in the spindle motor, or M101 (base outsert), part no. X-4950-343-1. A hairline crack had developed in the black plastic disc plate. As a result it had moved down the motor's shaft and the laser couldn't focus. Replacement of the spindle motor, a quick job, restored normal operation. **C.B.**

## Sony HCD-CP100

There was an intermittent display fault with this unit. One fully-lit seven-segment display number would show after twenty minutes. I took a quick look inside, equipped with a meter, a heat gun and a can of freezer, and found that the cause of the trouble was the main microcontroller chip IC802. A replacement restored correct LCD operation. The chip is glued as well as being soldered. **C.B.**

## Sony TA-VE100

The problem with this unit was that it would switch off intermittently. Inspection inside revealed the cause: dry-joints at connector CN505 on the small power switchboard on the front panel. There was no further trouble once the pins had been resoldered. **C.B.**

## Sony MZ-R55

This MiniDisc recorder would start to record when the charge button was pressed. I checked around the record switch S805 with a resistance meter and found that it was faulty. The solution was to replace it with the new improved type, part no. 1-771-331-51, whose terminals are gold-coloured.

For future service reference it's a good idea to mark the new switch with a black dot in the centre, to distinguish it from the former type. **C.B.**

## Sony MZ-R91

This MiniDisc recorder would show the word 'protected' on the LCD screen, no recording or editing being possible. A close inspection inside, around the protect detection switch, with a MiniDisc inside the unit led me to suspect that the switch wasn't being pressed in correctly. A phone call to Sony technical provided the solution: replace the 'battery case assy' with the new improved type, part no. X-4952-043-5. Normal operation was restored once this had been done. **C.B.**

## Yamaha CRX-M5

The fault card that accompanied this CD/tuner/amplifier said "keeps skipping tracks". When I removed the CD deck to check the optical block I found that the drive shaft was a bit sloppy. On closer inspection I saw that a small piece had broken off the clear plastic cover which retains the drive motor and holds the shaft assembly. As a result the drive shaft moved back and forth.

I found a light-tension spring, approximately 5mm in diameter and 10mm long, to fit over the gear on the shaft, then refitted the cover and checked the tension on the shaft. This cured the problem. I suspect that it might become a common fault with these decks. **J.S.O.**

## Sony HCD-H650M

The fault was a chattering noise on loading a CD and 'no disc' coming up. Before you decide to try a new optical block, remove the PCB from the base of the unit and check the three surface-mounted capacitors C105/6/7 (47$\mu$F, 4V). If they have leaked, clean the PCB and check for any corrosion. Replacement of these three capacitors usually clears the problem. **J.S.O.**

## Sharp CD-BA1700H

If 'protected' shows in the display, disconnect the STK402-040N output IC then switch on again. If the display is now OK and everything works, replace the IC. It's also advisable to check the speakers for any damage. **J.S.O.**

## Goodmans S4475

If this music centre has no display illumination, check C113 (220$\mu$F, 25V) and C114 (470$\mu$F, 16V). They usually look a bit cooked. Also check ZD102 (12V), R112 (1k$\Omega$) and Q105 (2SD882Y) and replace as necessary. **J.S.O.**

## Pioneer PD8700

This also applies to any PDM series CD players. If they skip through CDs 1-6 the fault is usually that the lens on the optical block has fallen off. If the customer hasn't opened the unit up first you will usually find the lens, which can be refitted with a couple of spots of glue (not superglue, as this will turn the lens white). I've done this with a number of these music centres and players over the years and never had one back – touch wood! **J.S.O.**

## Sony MDS-JE520

This MiniDisc recorder kept failing with a disc locked inside and an error message that varied. It was usually E13 or E14. Sometimes the slider timing had jumped out of lock, and sometimes the shutter-opening spring had been displaced as a result of over-enthusiastic disc insertion – the machine gets hard use from a local disc jockey.

I found that the 'spring (shutter) leaf', item 225 on page 82 of the manual, can be carefully soldered into place where the small hole in it fits over the partially-sheared boss on the 'holder assembly', item 223. But even so the unit is unlikely to be reliable.

The 'timing diagram' on page 28 of the manual is almost incomprehensible. When you replace the slider and holder assembly, the spigot on the big white cam-gear should be as far forward as it will go (the gear doesn't rotate all the way round), the slider should be as far forward as it will go, and the holder should be as far back inside the slider as it will go. **J.W.** ■


# DVD

**Fault reports from Geoff Darby Chris Bowers and Dave Husband**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 553 for details of where and how to send reports.**

## Sony HCD-S550

This home-cinema unit had been in a few weeks previously with a defective laser. It was now back with a disc stuck inside and no action at all from the deck. The cause of this new problem was a bad joint at Q002, the motor-supply switching transistor. It's difficult to get at, being located on the underside of the DVD board.

I'm not too impressed with this range of home-cinema units (the S880 is much the same). They are very tight inside and, because of the short cables to the front panel, which is an integral part of the top cover, difficult to work on with the top cover removed. The build quality doesn't seem as good as that of previous models. I've had faults in just about every area – the audio amplifiers, power supply, DVD board, laser and even the front panel, where there's an inverter for the VFD supply. The deck's loading mechanism is fussy and over-complicated. It's virtually impossible to align by trying to follow the instructions and diagrams in the service manual – I've made my own drawings from a correctly working deck. **G.D.**

## JVC XV-THA5R

The complaint with this home-cinema unit was that it overheated and cut out while playing a disc. So I removed the cover screws for quick access when it went wrong, then set it to run. After a while it got quite hot to touch, but it was still playing an hour later. In fact it was not until half way through the second play of the disc that the fault appeared. The unit then stopped playing, opened its tray, and refused to respond to any controls other than the on/off button. If it was switched off and on again it would play for a few more minutes before doing the same thing.

When I removed the lid I was hit in the face by a wave of heat from the regulators' heatsinks. It was clear that the fan wasn't running and, when I felt its movement, I found that it was very stiff. I removed it from the unit and studied its construction. The end of the motor shaft could be seen behind the manufacturer's circular label, with a plastic split washer that held it all together. Once this had been removed the motor came apart easily and I was able to clean the shaft and resoak the phosphor-bronze Oilite bearing sleeve with fine machine oil. When it was reassembled, the fan ran smoothly and quietly at full speed. I let it run on the bench for a while then refitted it in the unit, which ran continuously for a number of hours on soak test. The interior and case were considerably cooler than they had been previously.

I've been told that some thermal issues relating to this model are described at JVC's website, but haven't been able to find this information to date. If anyone knows the exact URL, perhaps they could let me know through the magazine. **G.D.**

## Sony HCD-S500

When this unit was in standby a hum came from the speakers. The cause was a defective capacitor on side B of the power board. A small modification is required to cure this fault. Replace the chip capacitor soldered between pins 4 and 5 of IC901 with an 0·22$\mu$F, 50V film capacitor, part no. 1-136-169-00. It's important to ensure that C912 on the primary side of the power supply is discharged before carrying out this modification. Once it has been done there should be no further humming in standby. **C.B.**

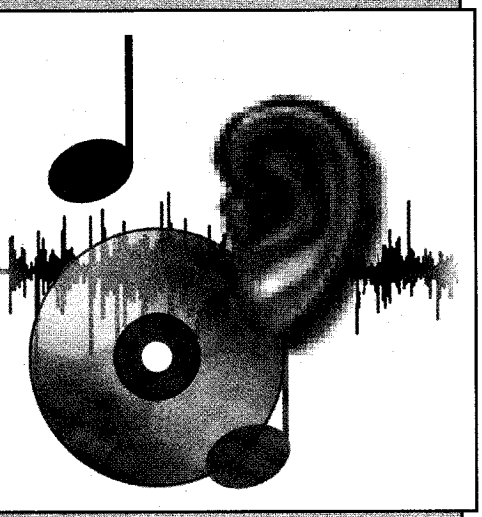
## Sony HCD-S800

This unit had an RDS display problem: when the information changed, parts of the previous display remained visible. Checks inside with an oscilloscope and meter confirmed that the cause was the $\mu$PD703033A YGF-M27 microcontroller chip IC901. A word with Sony technical revealed that a modification, using the 'S500 IC Kit (V113) Assy', part no. X-4954-876-1, would be required to restore normal operation of the DVD player's RDS radio display mode. **C.B.**

## Bush DVD2013

This fairly new DVD player was confused, spinning a disc and stopping every couple of seconds. Voltage checks showed that the outputs from the power supply were pulsing high and low, but the capacitors on the secondary side were all found to be OK. The voltage across the mains bridge rectifier's reservoir capacitor also varied by several volts. A replacement made no difference however.

The player uses a TOP202Y chopper chip, with pin 3 fed from the 300V supply via the transformer's primary winding, with a 200V 1N5388 zener diode in parallel. This diode was running a bit warm but checked OK. Nevertheless a replacement cured the fault **D.H.** ■



# AUDIO FAULTS

**Reports from**
**Eugene Trundle**
**Chris Bowers**
**Geoff Darby**
**Mike Leach**
**J.S Ogilvie**
**R. Vickers**
**Dave Gough**
**and John Coombes**

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## NAD Model 304

Owners of 'exotic' audio units seem to be happy to have them repaired even when, as in this case, they are nine or more years old. There was no sound from this heavy stereo amplifier because the relay-based output-stage protection came into operation. I found that the right-hand channel power stage was unbalanced because R334 (47kΩ) was open-circuit. To be on the safe side I also replaced the equivalent resistor in the left-hand channel, R333. **E.T.**

## Sony CDP-M35

I've had a couple of cases of erratic mechanical or electrical behaviour with these CD players because of hairline cracks in the soldered connections to Q1 and Q2. These are ±4·8V regulator transistors in the power supply section. **E.T.**

## Sony SA-WM525

This unit would switch to standby, even with a low input signal present and the power-save switch in the off position. When I carried out some checks in the auto power-save stage I found the cause of the problem: diode D702 was short-circuit. Its part no. is 8-719-991-33. Normal operation of this active subwoofer was restored once a replacement had been fitted. **C.B.**

## Sony HCD-H901AV

There was no sound from the centre or surround channels. Checks on the surround amplifier board revealed that C1320 (220μF, 10V) was faulty. The part no. is 1-126-923-11. A replacement restored the centre and surround outputs. **C.B.**

## Sony HCD-ED1 or CMT-ED1

There was no sound from the speakers or the headphone socket. I carried out some checks on the volume/power board and discovered that the fusible resistor R514 (6·8Ω, 0·25W, 5%) had gone high in value. In fact it produced a reading of 34·81kΩ. The part no. is 1-212-853-00. Once I'd fitted a replacement and resoldered a doubtful joint at Q510 there was normal sound. **C.B.**

## Sony MZR50

There was no disc playback with this MiniDisc unit. I carried out some meter checks on the main board and soon came across the cause, a poor contact at the optical pickup connector CN501. A replacement restored disc playback. The part no. is 1-573-931-11. **C.B.**

## Sony STR-DB1080

About five minutes after this unit was switched on a buzzing sound (instability) came from the speakers. Checks on the power regulator ICs on the main board, using a heat gun and a can of freezer, revealed that IC802 was the cause. A replacement cured the fault, which was most apparent in the DVD/LD mode. The part no. is 8-759-245-87. **C.B.**

## Pioneer NS-11TQ

There was a complaint about CD drawer operation with this hi-fi unit. At first everything seemed to be OK – the drawer opened and closed correctly, the message 'TOC read' came up in the display when a disc was inserted, and the player seemed to read it. After the number of tracks and the disc playing time came up in the display however a new message, 'CD close', was continuously displayed. When play was pressed the disc played normally and all functions worked correctly, but the message never changed until the open/close button was pressed. The display then showed 'CD open', as you would expect.

These symptoms were odd. With most units if the system microcontroller chip thinks that the drawer hasn't closed there will be a 'CD close' or similar message and all other functions will be suspended. The unit won't even attempt to read the TOC.

With any other unit these symptoms would lead me to suspect the tray position sense switch. I thought it would be a good place to start with this unit as well. The switch is at the left-hand side of the deck, and appeared to be of quite robust design. Nevertheless I gave it a good squirt of Electrolube and worked it back and forth vigorously. After reassembly the problem had been cleared: the unit produced a normal track and time display after the initial 'TOC read' message. **G.D.**

## Sony MZ-N1

The fault report with this personal MiniDisc unit said "showing error code". When the lid was closed the words 'NV error' appeared in the display irrespective of whether or not there was a disc in the unit. If a disc was inserted it seemed to play all right.

The message appeared to refer to non-volatile storage in the EEPROM chip, where all sorts of parameters and adjustments for the unit are stored. By using the built-in diagnostics, I was able to establish that the temperature-compensation data seemed to be missing. It was a simple enough job to go to this

item via the manual adjustment menu and reset the data – the instructions are in the service manual.

I returned to the unit several times to check that the entered value was still stored correctly, and then ran the full auto-adjustment routines for both CD- and MO-type discs. In both cases these procedures were completed correctly, verifying that the unit was now OK.

When the unit was reset from the diagnostic mode, by momentarily interrupting the power supply, and the lid was opened and closed, the correct message ('no disc') came up. To complete the repair, all play and record functions were tested. **G.D.**

## Kenwood RXD-F4L

The two complaints with this unit were that it wouldn't play CDs and wouldn't record tapes. The first problem was straightforward: the deck needed a good general clean and service. CDs then played reliably.

The second fault showed up when I tried to make a recording. There are two ways to start a recording, by using either the 'one touch record' button or the 'rec/arm' button. Neither worked. After a quick look at the circuit diagram I found that the other buttons which are connected to the microcontroller switch-matrix lines that serve the rec/arm button worked correctly. This ruled out microcontroller pin failure, though there could still have been a problem with the IC's internal look-up table. There could also have been physical switch trouble, but this seemed unlikely as two functions were affected.

More on a hunch than anything else, I decided to carry out a system initialisation – you do this by holding the 'enter' button while applying mains power. All record functions worked perfectly once this had been done.

I've had odd problems like this before with various Kenwood models and have been able to cure them by resetting the software. It's often the 'enter' key that starts initialisation, but it can be one of the others. If you don't have the manual, it's worth trying all the keys. Some models, though not all, tell you in the display that initialisation has either been started or completed. This one doesn't. **G.D.**

## JVC CA-D5T

This midi system would load a CD but there was no sled or laser operation. I moved the laser to its outermost position and tried again, hoping that it would return to the centre of the disc by itself, but alas it didn't. It looked to me as if a supply had failed somewhere, and this suspicion proved to be correct. There should be a 'CD 5·9V' supply at pins 3 and 4 of plug CN613. This supply was missing. I got out the circuit diagram and traced the source back to an N15 circuit protector, CP901. When I found this item in the machine it was open-circuit. Normal operation was restored once a replacement had been fitted but, to be on the safe side, I gave some of the regulators and transistors a good solder up. **M.L.**

## Sony HCD-EX1

Presumably others have had to strip one of these machines down. Over the years I've read many comments in these pages about products being difficult to service. These players are certainly in the premier league when it comes to construction complexity – and that's being very polite!

This machine was stuck in standby with only a sort of purple/blue light at the front illuminated. There is a Sony technical bulletin about what to do when there's a complete power-supply failure, but this wasn't the situation here. After finally getting the thing apart I turned my attention to the regulator board and found a 78 series 5V regulator, IC932, that was so dry-jointed it had almost fallen out of the board. I resoldered it and some other poor joints in the vicinity, then realised that trying to run the thing when stripped down was going to be very cumbersome and dangerous. After some thirty-forty minutes it was all back together again and, to my relief, worked. If it hadn't, I think my boss would now be using it as a piece of headwear! **M.L.**

## Amstrad MC2900

This is a micro hi-fi unit. If the CD spins flat out, or there is no go, check the ribbon cable that's connected to the optical block. It is quite common for this to break at the end. A replacement usually cures the fault. **J.S.O.**

## Goodmans System 2850

If there's no CD operation with one of these music centres, check C101/2 (2,200$\mu$F, 16V) on the CD power supply PCB. You will probably find that they are open-circuit. Replacement cures the fault. **J.S.O.**

## Philips AZ1005/05

As an engineer of some years' standing, I find that it always comes as a bit of a surprise when a piece of my own equipment fails less than two years after purchase, as it did in this case. The CD player section of this CD/radio/cassette-recorder failed to operate. Initial tests showed that the source-selector switch (CD/radio/tape/power off) didn't operate as smoothly as it had done previously. When I stripped the slide switch down to investigate I found that it had two burnt contacts. This made the switch unrepairable.

I didn't have any luck when I contacted Philips direct for a replacement. An email to Willow Vale Electronics Ltd. brought a quick reply however, with a price and part no. (16105SD) for the function switch. The problem was cured once I'd fitted the switch. **R.V.**

## Panasonic SA-PM30MD

The complaint with this classy-looking midi system was no sound. As always with this fault, one expects the worst. So, after the lengthy dismantling procedure, checks began in the audio output section. A point worth noting was the customer's comment that the headphone output still worked. Once inside, with a circuit diagram to hand, I found out why. The AN7135 driver chip for the headphones, IC403, was OK. But the AN7194K speaker output chip IC404 had blown, as had its protector FP601. I ordered the replacement chip direct from Panasonic, as the usual sources were rather expensive for this IC. Once it had been fitted all was OK. **D.G.**

## NAD 613 cassette deck

The owner of this up-market standalone cassette deck said that it would operate correctly only in the fast-forward and rewind modes. When play was selected it seemed to run fast. Checks showed that there was reel drive but no capstan drive. A check on the capstan motor proved the point. Once a new motor had been fitted this nice deck's functions all worked. **D.G.**

## Kenwood RXD-F4L

The customer said that this hi-fi system worked apart from the CD player. Checks showed that the KSS213B laser assembly was faulty. I also replaced the connecting ribbon. Everything was then OK. **D.G.**

## Aiwa CX-ZM2600UK

Failure of the CD turntable to rotate can be caused by a broken flexi lead, but not on this occasion. When I checked at pin 1 of the flexi socket there was no voltage, though the power supply was providing the correct output. Circuit protector PR112 (1A) was open-circuit. **J.C.** ■

# DVD

**Fault reports from Geoff Darby**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 617 for details of where and how to send reports.**

## Sony DVD-NS300

Don't confuse this with the DAV-S300! The unit wouldn't read discs of any type. It tried to spin them, with much servo squealing, but never made it. If it was given help it would get the disc to rotate, but not at anything like the correct speed.

As the KHM250AAA deck is very easy to replace I fitted a new one. After that the unit worked correctly. But I suspected the spindle motor rather than the laser, even though it felt OK.

When I examined the turntable position I saw that the top of the motor's shaft is level with a lip in the turntable moulding. It was therefore an easy matter to remove the motor from an almost-new KHM220 deck, which had been consigned to the junk box because of a defective laser, and fit it in the unit's original deck. Resetting the turntable height was straightforward, accomplished by gently pushing it down the shaft until the shaft top was again level with the lip.

When the deck was refitted, the unit spun all discs and read them without difficulty. This saved the customer the high cost of a replacement deck, and once again proved the worth of a junk box.

The repair was completed by running the internal auto-setup program to compensate for wear and any minute differences in turntable position.

## Sanyo JCX-TS750 Home theatre

This multichannel DVD/amplifier's sound would come and go with an alarming bang. It also produced a sort of hum, like a swarm of angry bees, from time to time. The owner described these symptoms as "feedback through all speakers".

Fortunately the fault could be instigated by applying pressure to the power supply regulator board, which is located at the rear left. Once this board had been removed, multiple dry-joints were seen at the pins of the three regulators at the heatsink edge of the board. Reworking these with fresh solder cured the fault.

## Panasonic SA-HT70

I've had two of these DVD players within a week. This was odd, as I'd never seen one before – though I've encountered a number of the brother HT80s.

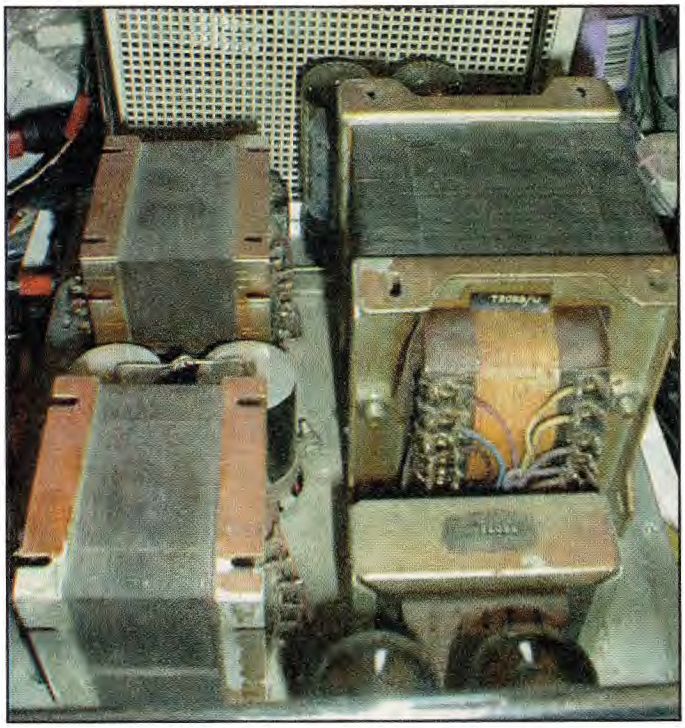
The first one wouldn't read DVDs, though it was fine with CDs. It required a replacement optical block. This is different from the type, which I normally have in stock, used in the HT80. The replacement was fitted as soon as it arrived. This restored DVD playing, and a check on the jitter figure (front panel 'stop' and remote-control '5') produced a reading of 7·5 per cent, indicating that no further adjustment was required.

The second player had difficulty closing its drawer all the way. It stuck at the very last moment, and would go home fully only with a good push. This resulted in a loud click each time. The mechanism is the same basic five-changer fitted in many Panasonic/Technics hi-fi models. It's easy to recognise, as it holds the discs in free space at the back, each separated from the one above and below by a plastic ring.

Timing problems with these decks are usually limited to the tray itself, and are easy to correct. Panasonic provides a spare drive gear, moulded into the top of the deck's plastic, to assist with mechanism checking. Cut it out and fit it on the end of a small-gauge hex driver (the jewellers' type is ideal). If you then look under the deck you will see the edge of the main drive gear and, by the side of it, a small hole. This is to locate the tip of the hex driver. The spare gear will then mesh with the main drive gear, enabling this to be turned to put the mechanism through its paces manually.

Rotate the gear until the tray starts to open. Pull it all the way out until it butts up to the plastic clips at either side. Push the clips outwards to enable the tray to be withdrawn fully. All that should now be necessary is to refit the tray correctly. To do this, push the white rolling rack on the underside of the tray all the way to the rear, as far as it will go. Hold it in this position and slide the tray back on to its guides, until the rack meets its drive gear on the main chassis. The next is the important bit: hold the white rack very firmly in the all-the-way-back position and continue to push the tray home, until it clicks past the clips.

Use your recently-made winding tool to check that the tray can be wound in and out smoothly, that the mechanism goes up and down, and that the disc carrier is able to slide off the tray. If any of these functions doesn't work correctly, remove the tray and try again. If the rack moves off the fully-back position by the tiniest amount as you push the tray home, the timing will be off when the tray is refitted fully.



**Much vintage equipment, particularly in the hi-fi field, is of very high build quality. It can therefore continue to provide good service for years, with only the occasional need for repair. But many modern technicians are probably not too sure how to go about it when valves are involved. Pete Roberts tackles a Radford STA25 valve hi-fi amplifier**

*Photo 1: Top view of the Radford STA25 hi-fi amplifier, with the screening cover removed.*

# EL34s and all that

This job should bring a tear to many eyes. None of your cheap, flimsy surface-mounted nastiness here. Oh no! A proper piece of kit, built on a heavy metal chassis, with big parts and enough volts to fry the unwary. The fault report that came with this Radford STA25 stereo amplifier said "one channel bad".

## Basic circuit arrangements

The power amplifier has a matching preamplifier, which was the usual practice in those days. The power stereo amplifier has, in each channel, an EF86 low-noise voltage amplifier valve, an ECF82 phase splitter, and a pair of EL34 output valves connected in an ultra-linear configuration. What this means is that the screen grids are fed from taps on the primary winding of the output transformer, a sort of compromise between triode and pentode operation. And no, ECF82 is not a misprint: Radford designs used an unusual triode-pentode balanced phase-splitter, so don't insert an ECC83 in its place!

The valves are arranged at each side of a large screening cover that encloses the mains and output transformers, the reservoir capacitors and the smoothing choke, see Photo 1. The power amplifier is connected to the preamplifier via an umbilical cable with international octal plugs at each end. This carries the HT and heater supplies, also the mains live connection to and from the on/off switch. So you need the preamplifier and cable in order to switch the thing on. The audio cables are separate, and use RCA plugs.

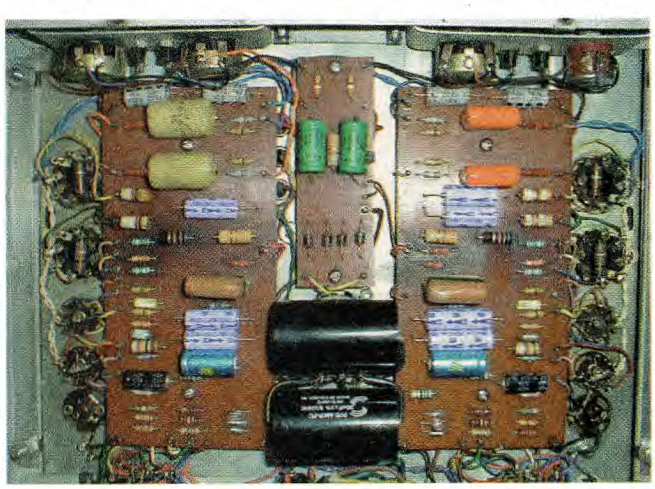


*Photo 2: Layout under the chassis. There are three PCBs, one each for the right and left channels and a small one (centre) for the silicon HT rectifiers and the bias supply components.*

## Testing

After risking a hernia lifting the amplifier on to my bench I plugged it in, stood well back, and switched on. It wasn't long before one EL34 started to glow cherry red. Yes, I know they are meant to – but only the bit in the middle! This valve's anode was glowing hot enough to make toast. Not a good state of affairs. Furthermore the strong smell of a carbon-composition resistor gently roasting, accompanied by a wisp of smoke, indicated that all was not well underneath the chassis. It took me back to my teenage years!

When the amplifier is upside down on the bench and the baseplate has been removed you see the fascinating arrangement shown in Photo 2. Most of the circuitry is mounted on two heavy PCBs, one for each channel. The small upper centre PCB carries the HT rectifier diodes and the bias supply. The upper right-hand section shown in the photo was the bad bit – the photograph was taken after the fault had been cleared.

The usual cause of a hot and bothered output valve is a leaky control-grid cou-

pling capacitor. So I checked the voltage at each of the EL34 control grids. In this version of the STA25 a –35V fixed bias is obtained from a winding on the mains transformer, via a half-wave rectifier. The checks showed that the correct voltage was present at three of the valves, while the distressed one had several hundred volts at its control grid when cold, dropping to 17V when hot.

I realised what was happening only after a certain amount of head-scratching. I hadn't noticed, with the digital meter I was using, that the minus sign was missing: the grid was being driven hard positive. Had I been using a more appropriate instrument for the job – my old-fashioned analogue meter – I would have noticed straight away that there was a positive voltage at the control grid. The 0·47$\mu$F, 400V grid coupling capacitor was dead short. It's one of those big, fawn fellows on the left-hand side PCB. These old Philips polyester capacitors are usually extremely reliable, so what had led to this one's failure?

## Fault analysis

Previous repairwork had been carried out – a nice job, with many new parts tidily mounted. The circuit diagram shows 400V coupling capacitors, and the repairer had fitted 400V replacements. And here was the rub. Most Radford amplifiers have a valve HT rectifier and use cathode bias for the output valves. The one that sat in front of me had silicon HT rectifiers and used fixed bias that's fed to the control grids. Because of the silicon rectifiers, the HT comes up straight away at switch on. It peaks at about 500V with no load, before the valves warm up. Initially the phase-splitter valve is cold, so there's no current via and voltage drop across its anode load resistors. Thus the 400V coupling capacitors initially have about 500V at one side and –35V at the other. This state of affairs lasts for the better part of a minute, until the EL34 valves have heated up and the HT supply is properly loaded. No wonder one of the 400V coupling capacitors had failed. I thought it advisable to replace all four with 630V polyester capacitors – the type shown at the top right (red blobs) in Photo 2. This cured the overheating and restored correct operation.

The distressed EL34's screen-grid feed resistor had been the source of the smoke. In the interests of reliability, as well as making the job look nice, I replaced all four screen-grid feed resistors using a 1k$\Omega$, 3W flameproof metal-film type.

I was surprised that the overrun EL34 had survived all this abuse. Once its grid-coupling capacitor had been replaced the grid bias was rock-steady at –35V, so there was no grid-current flow, and the audio quality was excellent. The EL34 is a really tough bottle. I've seen examples, from high-power guitar amplifiers, where the bias supply has failed and the glass envelope has melted, yet the user has managed to finish the gig.

## Bias adjustment

This particular model has a facility for setting the bias for the output valves, see Photo 3. All you have to do is to connect an accurate meter (a DVM is best for this job) between a test point and chassis, then adjust the accompanying potentiometer for a reading of exactly 2V. This procedure has to be carried out for all four valves, with the amplifier fully warmed up. The grid-bias reservoir capacitors, dated 1966, were obviously the originals, so I replaced them with new long-life ones – good for another forty years perhaps!

There was a limited edition version of the STA25, made with a special finish and circuit: I suspect that this particular amplifier may have been one of them, which would explain the circuit differences.

## HT surge

There's a moral to this tale. When servicing valve gear with solid-state rectifiers, be aware that the HT supply could be up to 40 per cent higher than normal until the valves have heated up. The capacitors must be rated accordingly. This amplifier's HT settled at about 370V once the valves had warmed up.

Back in the 'golden' days you would find electrolytics marked something like "275V DC wkg, 350V DC surge". They were designed to withstand substantial over voltage for a short time. You would find them in TV sets that were fitted with a selenium HT rectifier rather than the ubiquitous PY33.

The smoothing capacitors in this amplifier had been replaced with the largest polyester-film capacitors I've ever seen, 20$\mu$F at 630V! See Photo 4.

## Precautions

Finally, while old-hands are aware of the hazards associated with valve gear younger readers may not be. As well as the usual risk presented by the 230V mains supply, the HT line in hi-fi and guitar amplifiers can be at 1kV or even higher. Where a bi-phase valve rectifier is employed, the mains transformer's centre-tapped secondary winding will be running at not far off twice the rectified HT voltage, with enough current to kill you. A few tens of microfarads charged to several hundred volts pack one hell of a punch, and smoothing capacitors can hold a lethal charge for hours. Always ensure that they are fully discharged before you touch any part of the circuit.


***Photo 3: The grid bias adjustment test points/potentiometers.***

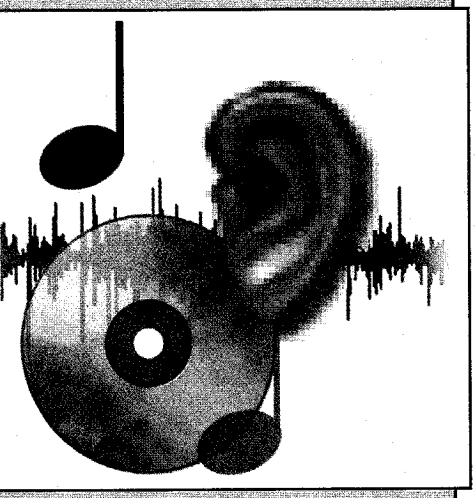

***Photo 4: The replacement polyester-film HT smoothing electrolytics.***

High-voltage electrolytics are grenades waiting to go off. So never hang over the cans in powered equipment. I know of a couple of cases where large electrolytics have blown out their bungs and taken off like rockets – through both ceiling and roof!

Never trust the mains switch – always isolate it from the mains supply before carrying out repairs. When working on preamplifier and power amplifier separates, make sure that umbilical cables are correctly connected before applying mains power.

Test probes should be rated for use with high-energy circuits, and preferably fused. When carrying out 'hot' measurements, keep one hand in your pocket.

And never run a valve amplifier without a load, otherwise the high back-EMFs that will be developed across the output transformer's primary winding could cause serious damage to the transformer and flashovers in the output valves. ■



# AUDIO FAULTS

**Reports from**
**Eugene Trundle**
**Martyn S. Davis**
**Geoff Darby**
**Chris Bowers**
**Michael Smallwood**
**and J.S Ogilvie**

**We welcome fault reports from readers – payment for each fault is made after publiation. See page 617 for details of where and how to send reports.**

## Sony HCD-H51

The symptoms suggested a faulty or worn laser unit: there was a 'no disc' caption in the display because of failure to read the TOC. But the laser proved to be OK, even though it was ten years old. The cause of the fault was traced to three 47$\mu$F, 4V surface-mounted electrolytic capacitors, C105/6/7, on board BD. **E.T.**

## LG ADR620

The complaint with this twin-deck CD player/recorder was that a very unpleasant "popping" noise could be heard during playback of its own recordings. The owner is a musician who produces and copies his own work, and the fault had shown up only recently.

A call to LG technical revealed a late production modification to cure a "crackling or hiss audio noise". The cure is to fit a modified ribbon cable between the two decks and replace chip resistor R237 on the playback PCB with a 330Ω resistor. There doesn't appear to be a part number for this kit, but LG technical kindly sent out the parts f.o.c. **M.S.D.**

## Aiwa ZR770

This four-year old hi-fi unit's right-hand tape deck refused to function. Aiwa has used a variety of cassette mechanisms, and I didn't feel that I had much hope of being able to get spares for this one, especially as Aiwa has been taken over by Sony. This particular mechanism has a solenoid arrangement, which was clattering up and down. In the past I have replaced these solenoids, but on this occasion a replacement drive belt from a scrap deck got the mechanism working. **M.S.D.**

## Sony DEJ835

The complaint with this personal CD unit was "not playing discs properly". When I tried, it didn't play them at all. Lots of odd-sounding motor whirring came from the unit, but little else happened. With the lid open I could see that the optical block was halfway down its track, rather than 'home' at the centre. An experimental prod with a cotton bud moved it farther down the track, with little of the expected mechanical resistance.

Once I had dismantled the unit and removed the deck I could see that the tab of metal, which is fixed to the pickup and serves to provide a spring-loaded interface between the pickup and its drive worm, was badly twisted out of shape, presumably because someone had pushed the optical block down its track violently. It was a simple matter to remove the tab (one screw), straighten it with tweezers, and refit it. A long soak test then proved that the unit worked correctly, with no signs of sled sticking. The bent piece of metal is referred to as "rack", and is item 110 in the exploded view in the manual. **G.D.**

## Kenwood RXD551

This unit wouldn't come out of standby. It was a classic example of a general problem I've mentioned before with other models. With a fault like this, where none of the front-panel buttons, including standby, appears to do anything, go round every push-button to make sure that they all move and click before you start to look for microcontroller problems. Chances are you will find that one of the buttons is stuck.

When some ham-fisted users ram the buttons in, the operating pin at the rear can be pushed down the side of the electrical switch beneath. This will keep it pressed and lock out the other controls.

In this case the problem lay with the dubbing button. I didn't have to dismantle the front panel to free it: all that was needed was to slide a scalpel blade into the gap between the button and the front panel and twist it gently until the button popped back out and reseated itself on top of the switch. The unit could then be brought out of standby, with all functions working normally. **G.D.**

## Pioneer XC-L11 CD/tuner

I am indebted to the nice man at Pioneer technical for help with this one. It's part of an L11 system which, in addition, consists of an M-L11 amplifier, a CT-L11 cassette unit, and a display unit that sits on top and is connected to the CD unit via a multiway cable.

The symptoms were as follows. When the two sets of mains power to the system were applied it came on briefly, with all the blue LEDs lighting and relays clicking, then went off, leaving just the standby LED flashing. From this point on there was no response from the system. During the brief on period the display could just be seen to say, dimly, "goodbye".

Behind the rear-panel socket into which the display unit plugs there's a small PCB with a metal shielding can around it. It's a DC-DC converter that produces –37V for the VFD. There are a number of electrolytic capacitors on this board. A complete cure was achieved when, as advised, I replaced C5612 and C5611 on this PCB. Well done Pioneer technical, and thank you for making my life a little easier! **G.D.**

## Sony TA-VE150

The customer's complaint with this AV amplifier was "some channels not working". The usual problem with this and similar models in the same range is bad joints at the output ICs. But with that fault the unit usually goes into the protection mode,

with no outputs at all rather than just some channels being absent.

As a first check I set the unit to the 'Dolby 5.1 input' mode. All five main channels worked fine, which proved that the output stages were OK. If any other input mode that involved signal processing was selected however only the front channels seemed to work. It was apparently this that troubled the owner when he tried to use his TV set with the system.

I find it increasingly difficult to get my head round all the sound modes one has to cope with nowadays – AC3, Nicam, Dolby Pro-Logic, Dolby 5.1, analogue input, digital coaxial input, digital optical input and so on. When I referred to the user manual I gave up trying to work out what the amplifier was supposed to make of the two-channel output from a TV set and instead concentrated on the confusingly-named ''DVD 2CH' mode/input. Although this consists of two electrical channels physically, it carries the full six Dolby-encoded audio channels. This mode produced no rear and centre outputs from the DVD player that was on soak test on the bench. As a further check, I tried the 'simulate' mode with a straight stereo source fed to the 'video' input socket. Again there were no rear-channel outputs – 'centre' is not relevant in this mode.

All this led me to the conclusion that there was a decoding problem, which pointed to IC300, a 64-pin flatpack IC on the underside of the PCB. This IC is labelled 'Dolby Pro-Logic Decoder' on the circuit diagram. There's little other than this chip between the input sockets and the power amplifiers, so I ordered a replacement and fitted it. The new IC restored audio from all channels, as appropriate, in all modes. **G.D.**

## Panasonic SA-AK28

The only response from this unit was the error message F61 in the display. It means that the protection circuit is in operation. The usual cause is DC offset at one or more of the output channels, because of a failed hybrid output IC, but it's hard to prove the point without first disabling the protect circuit.

The easiest way to do this is to unsolder pin 6 of connector CN302 and isolate it from the surrounding print. This pin carries the 'DC detect' signal: it's the link between the error-detection circuit, which consists of Q311, Q352, Q307, D306 and D307, on the main PCB and the microcontroller chip IC600 on the 'panel' PCB. Disconnection of this pin enables the voltage at IC600's error-detect pin to rise, thus making a normal system power up possible. You should of course ensure that no speakers are connected to the system at this time, in case there's a DC offset problem present.

In this case checks, once the unit had been forced to power up, showed that the problem was not caused by an output stage offset. So attention was turned to the other things monitored by the protection circuit. Foremost among these are the main supply rails, which are monitored by the two double-diodes D306 and D307. D306 checks the 10V and LED 9V supplies, while D307 checks the 15V and 7·5V supplies.

D307's inputs were both missing. This led me back to IC501 on the power PCB. It's a 19-pin regulator that's on the same heatsink as the output hybrid IC. Internally it's just a bunch of power transistors, regulation control taking place externally. The two missing supplies come from pins 11 and 12. The 15V output at pin 12 is connected to chassis via a 16V zener diode, presumably to protect the circuits it supplies in the event of a voltage rise. This zener diode was short-circuit. As the 7·5V supply is derived from the 15V output, it follows that with the zener diode short-circuit this supply will also be missing. A replacement zener diode failed to restore the outputs however, although there was the correct input at pin 14 of the IC.

The circuit diagram shows IC501's internal arrangements clearly. The electrodes of the various transistors are all connected to pins, so it's possible to check these devices with a meter. Several had failed. A replacement IC (type STK470-020A) restored the 15V and 7·5V supplies, but not the 15V input to D307. This was because the 2·2Ω surface-mounted resistor R312 on the main PCB was open-circuit. Once this item had been replaced the fault detector went back to sleep and I was able to reconnect pin 6 of CN302.

The whole unit now powered up normally and worked, except that the CD changer was jammed. Retiming this, and replacing a missing disc spacer (there should be five of them) with one from a scrap unit, restored full operation. I subsequently found that the CD changer jam had been the original problem, and that the owner had had a go on the kitchen table . . .**G.D.**

## Sony HCD-N355

Manual volume control was not possible though it worked fine using the remote-control unit. Close inspection of the front panel board inside the unit revealed the cause, which was the rotary-encoder switch S579. A replacement, part no. 1-473-392-11, restored manual volume control. **C.B.**

## Sony MZR-700PC

There was no sound output from the left-hand side of this MiniDisc player's audio jack. The cause of the problem was quickly traced to the headphone amplifier chip IC302, which had become unseated from the main board at one side. All I had to do to restore normal sound was to resolder this surface-mounted IC, using a fine-tipped iron. **C.B.**

## Sony HCD-H901AV

This unit had no fluorescent display. The cause was on the main board, where the fusible resistor R814 (0·33Ω, 0·25W, 5%) had gone open-circuit. A replacement, part no. 1-219-122-91, restored the display. **C.B.**

## Sharp MD-SR60E(GL)

This MiniDisc recorder sometimes failed to read the TOC. It wasn't tracking and didn't move reliably from track to track. The cause of the trouble was the plastic helical pinion gear on the laser assembly drive shaft. It had split and was slipping. Gluing it didn't work, because the split could not be closed and the gears would not mesh after going over the gap.

CPC put in a special order for the part, using the pictures I emailed from the Falkland Islands – the part no. is SHNGERH0597AFZZ.

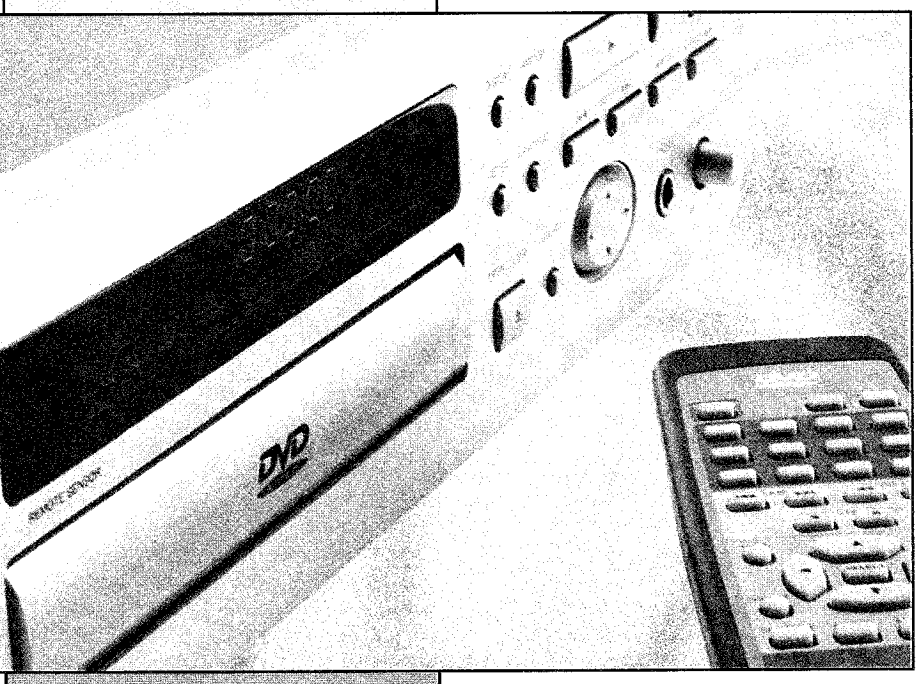
I softened the new gear a bit by heating it in boiling water before pressing it on to the shaft, then put the recorder back together. **M.S.**

## Sony HST-V302

Intermittent loss of sound from one or both channels in this music centre is usually caused by dry-joints at the STK4132II output chip IC401. **J.S.O.**

## Welltech car radio/CD player

The customer had, as so often, reversed the supply polarity when fitting this unit. When you get this problem, check the in-line fusebox/choke unit where you will find the protection diode short-circuit. The 1,000$\mu$F, 16V capacitor next to it should also be checked as it usually pops. Also check R440, R533 and R715 in the unit: they are all 1Ω and usually go open-circuit. You may find that the reverse-polarity supply has knocked out IC801 (TDA7377). I had to replace all these items on this occasion. Hopefully if the customer fits it correctly this time I won't see it again. **J.S.O.**



# DVD

**Fault reports from Geoff Darby J.S. Ogilvie and Chris Bowers**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 681 for details of where and how to send reports.**

## Sony DVP-NC600

This carousel-type five-player arrived on the bench with a note that said "ejecting the tray and not playing discs". When it was powered and the open/close button was operated, the tray came out but the carousel continued to rotate. When the button was pressed again, the tray closed but the mechanism never got as far as lifting the deck up under the disc. At this point the mechanics were clearly in some distress, so I switched off before damage was done to the motors or their drivers.

The changer unit is secured to the chassis by quite a lot of screws. Some, located at the front of the assembly, are not visible from the top. So I tipped the unit on its side to see where they came through the base pan. There was a rattle, and a large spring fell out! When I turned the unit back upright it rattled again, but no amount of tipping and shaking would make anything else fall out.

To get the changer unit out, the tray/carousel has to come off. I removed the unit's front panel, then the four retaining clamps – two at each side. After disconnecting its ribbon cable the assembly could be lifted off. This enabled me to get to the other screws and remove the changer.

There were still no visible signs of where the second rattle came from. I eventually pinned it down to the vicinity of the main cam gear, which I removed. Beneath it there was a sheared-off post. It's part of the main plastic mechanism chassis, and appears to be a 'stopper' to prevent the cam gear going the full 360° round as, on the underside of the gear, there's a 'wall' that would hit the post if allowed.

It was a simple matter to drill a small hole through the plastic chassis and refit the post, with a screw through from the underside and some polystyrene cement to assist with rigidity. There's also a mode switch under the cam gear, similar to a VCR one. So I cleaned it while I could get at it. The spring that had fallen out was item 161, which biases lock lever 160. It was easily refitted.

The cam gear and loading gear were then refitted and aligned as shown in the service manual. The changer unit was fitted back on the main chassis, then the tray was refitted. Once everything had been reconnected the mechanism worked faultlessly.

The job was completed by running the internal auto set-up program to ensure best performance while playing DVDs. **G.D.**

## Sony DVD-SL20

You need an easy one every now and again to maintain your sanity! This was the easy one for the current week. The tray refused to open, though there were motor noises.

At the end of tray loading a lever should be pushed across by the groove in the underside of the tray, with which the lever is engaged, moving it to one side. This lever pushes the deck up and down and locks the tray in. The lever didn't move for the simple reason that its pin was not located in the groove.

The tray doesn't disengage from the deck all that easily, so it's difficult to see how the lever could have become displaced. Nevertheless removing the tray and refitting it, taking care to guide the pin into the groove, provided a complete cure. **G.D.**

## Philips DVD711

If one of these is dead, check R3132 which will probably be open-circuit. The value may be 0·27Ω or 1Ω – I've come across both. Then check D6241 (BYW98-200) for being short-circuit. Replace both components and the player should be up and running again. **J.S.O.**

## Toshiba SD22VB DVD player/VCR

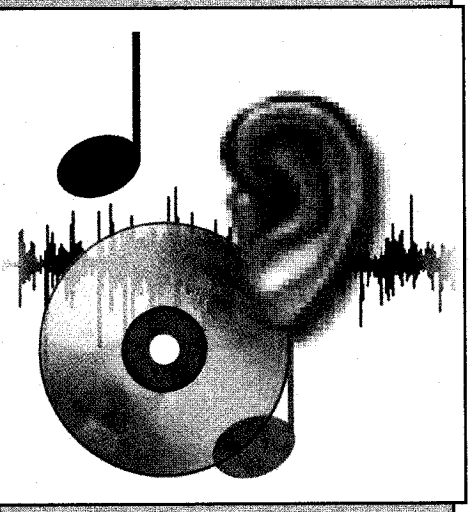
This is not really a DVD fault. A problem we've had with several of these machines is tape chewing. Check the reel-drive assembly, which tends to pop off its mounting post. To prevent a recurrence, bend the pillar to the rear of the assembly slightly forwards (it's the pillar that releases the reel brakes in the cassette). **J.S.O.**

## Sony HCD-S800

There was no power in this unit. Checks on the power supply board showed that D909 and IC901 (STK-F6676) were both short-circuit. Replacements restored normal operation. The part numbers are 8-719-079-46 and 8-749-017-79 respectively. **C.B.**

## Sony DVP-NS300

There was no display with this unit. Voltage checks on board IF80 revealed that the fluorescent indicator tube ND401, part no. 1-517-971-11, was defective. I've had this fault before. **C.B.** ■



# AUDIO FAULTS

**Reports from**
**George Cooper**
**Chris Bowers**
**Geoff Darby**
**John Young**
**J.S Ogilvie**
**Dave Gough**
**C.M. Crook**
**and**
**David I. Scott**

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## Sony TA-VE215

The complaint with this home-cinema surround-sound unit was no output from the front speakers – the condition had been intermittent for some weeks. Access in this small, compact unit is very difficult. When I did gain access to the underside of the main board I found dry-joints on the relays. There are three of them in this unit, and all three were suffering from poor joints in varying degrees. The output ICs, which I had thought might be the source of the trouble, all had well-soldered joints. A long soak test after reworking the joints proved that all was now OK. **G.C.**

## Sony HTC-NX1

This five-disc interchanger unit wouldn't read discs and defaulted back to disc one. The advice from Sony Technical was that a new, improved optical base assembly (item 253) would be required. Its part no. is A-3328-818-A. Replacement was simple and restored correct operation. **C.B.**

## JVC AX50

There was no volume control and a locked LED volume display with this amplifier. Inspection inside revealed the cause: grease on the motorised volume control S405 had gone hard. Cleaning this and R05a/b restored normal operation of the volume control mechanism, and the LED display worked again. **C.B.**

## Sony MZ-N707

The sound from the right-hand channel audio jack of this MiniDisc Walkman player, type R, was intermittent. The cause was found to be the surface-mounted headphone amplifier chip IC302, which had become unseated from the main board at one side. All that was needed to restore normal operation was resoldering with a fine-tip iron. **C.B.**

## Sony HTC-NX1

This five-disc interchanger unit wouldn't load discs. A quick look inside revealed that the mode belt, part no. 4-211-237-01, had become stretched and was covered with grease. Normal operation was restored by replacing this belt and the three other belts in the mechanism, i.e. the two loading belts (part no. 4-211-236-01) and the communication belt (part no. 4-211-235-01). **C.B.**

## Sony HCD-EP707

There was little activity from the CD changer in this new hi-fi system, and within a short time from switch on there was a pungent smell of burning. This came from Q802, the B+ switch transistor that's on the regulator board at the very bottom of the unit. When I removed it I found that it was very leaky all round.

Everything was fine with the unit in this dismantled state and a replacement transistor installed. Note however that the mechanism-protect switch, which is at the bottom of the unit and is included to ensure that the hi-fi can work only when standing upright, has to be unplugged to allow operation with the unit on its side.

But when I refitted the regulator board to the base pan and the latter to the front and back panels the original symptoms returned. I switched off quickly, before another transistor was destroyed, and referred to the circuit diagram.

Q802 switches approximately 14V, which leaves the regulator board at pin 1 of CN801 and goes to the power amplifier PCB, where it is stabilised at 9V by U700 before returning to the regulator board at pin 3 of CN801. No short could be measured at the output of Q802, but there was a dead short at the output of U700. I removed the plug from CN801 and disconnected the rest of the boards in the system. This proved that the short was on the regulator board.

Once again however when the base pan was dismantled the short disappeared. I resorted to the use of a strong magnifying glass and found two wire links, J838 and J843, just to the side of CN801. They are in parallel, and connect pin 3 of CN801 to a track that's connected to a cableform which goes up to one of the other boards in the unit. A track at chassis potential passes under these two links. The problem was that when these links had been inserted and cropped during manufacture the ends had been folded over prior to the soldering. The end of J838 had been left so close to the chassis track that, when everything was screwed together, the regulator board flexed enough to cause the short. The cure was simply to stand the end of the link up again and resolder it. **G.D.**

## Sony HTC-NX1

This is the CD/tape section of the two-piece MHC-NX1 system. The owner complained that five discs were stuck inside. This was confirmed when I removed the case, and the CD changer was clearly in some distress when the system was powered.

After a little dismantling – removal of the disc clamp etc. – it was clear that a couple of pieces of the mechanism were displaced from their correct positions. A judicious twist here and a push there clicked them back into place, and it then seemed that everything was moving correctly. When the deck was loosely reassembled and the system was powered

everything was fine – until a disc tray was loaded. When the deck subsequently went on to unload the tray it jammed on the slider/shutter (item 221 in the exploded view). This should move up and down when the slider/selection lever (item 223) moves.

The purpose of item 221 is to 'block' the other four trays in their rest positions to prevent them from moving and fouling the tray that's being loaded or unloaded. It wasn't going down far enough to allow the unloading tray to return to its rest position. The reason for this became obvious when I looked into the mechanism a little more deeply and found that a spring, item 222 (spring/shutter tension), was stuck to the grease on item 224 (gear, chucking). The changer worked flawlessly once this spring had been refitted in its correct place. Fortunately the exploded view shows this clearly, as it is by no means obvious. Note that the spring is different at each end – the end with the long hook is attached to item 223. **G.D.**

## Yamaha CT7000

This high-end FM-only tuner produced a deep bass rumbling in both channels after operating for about half an hour. A major dismantling effort was required to remove a number of very pretty chrome-plated shielding cans. The cause of the trouble was then traced to two blue 1µF tantalum-bead audio coupling capacitors (the curse of the blue tants strikes again!). They were reverse biased because someone in the factory had fitted them back-to-front. Silence was restored when I fitted replacements – I used the polycarbonate type. **J.Y.**

## Philips C104

Intermittent audio was caused by lack of lubrication at the bottom bearing. A small amount of grease fixed the fault. **J.Y.**

## Revox A700

As soon as power was applied to this reel-to-reel tape recorder the supply spool started to rotate in full rewind, with the brakes squealing. The cause of the problem was traced to the TCA561 chip IC3 in the supply-reel servo system on the transport-control PCB. Fortunately the customer had a spare IC – and a service manual. Replacement of the IC followed by adjustment of the servo cured the fault. **J.Y.**

## Pioneer TX9100

This elderly AM/FM tuner suffered from intermittent low gain, which showed up as a sudden 30dB drop using a signal-strength meter. The cause was traced to a faulty feedthrough capacitor in the RF stage. It provides the feed to the second gate of the dual-gate RF amplifier FET.

Extraction and replacement of the capacitor was interesting – I had to use my largest soldering iron – but restored stable gain. **J.Y.**

## Marconi 345

The Pen A4 output pentode in this vintage radio (dating from about 1937) glowed a most interesting mauve while gently sparking between the grids. Replacing this valve and a number of somewhat leaky waxed-paper coupling and decoupling capacitors brought the set back to life, ready for another sixty years' service. How much of the current electronic junk will be working is sixty years' time?! **J.Y.**

## Aiwa CX-Z1800K

This fault can be experienced with the above music centre and most Aiwa cassette decks fitted to various models. The symptom is flat-out playback as if high-speed dubbing is activated, in either direction. It's more than likely that the small spigot at the bottom of the pinch-roller assembly has broken, so that the pinch rollers don't come into operation. Replacements are available from CPC and SEME.

If one of these machines just clicks on tape at switch on, replace all the drive belts. **J.S.O.**

## Aiwa NSX5909

The complaint with this hi-fi stack system was no display. It's becoming a common fault with these systems. On stripping the unit down you will find horrendous dry-joints at the pins of the large LCD panel. A good resolder will bring the panel back to life. **D.G.**

## Sherwood RX1010

This receiver powered up but produced no audio output, only the dreaded hum, while R2183 (0·2Ω, 2W) was smoking. Cold checks showed that the transistors in the left and right output stages were faulty – there are two 2SB688 and two 2SD718 transistors. Once replacements had been fitted I had a fully-working receiver. **D.G.**

## Nakamichi CR3

Who said cassette audio is dead? Not while these beauties are still around. I must confess that I love quality hi-fi gear of this sort. It's a pleasure to work on, and customers are always pleased to get a cherished item repaired.

This deck would power up with a display, but would do little else. A common fault with this machine is the LB1649 dual bi-directional motor driver IC. It's a Sanyo device that can drive two motors of various types from a 6-24V supply. But a replacement made no difference. The cause of the fault was elusive, but turned out to be the small motor that's mounted on the top right-hand side of the cassette mechanism. It provides cassette loading/lifting etc. and was breaking down under load. It thus failed to operate the leaf switches above in time, via a cam unit, with the result that there was no electromechanical operation.

I fitted a much more robust replacement, taken from a scrap Sony VCR carriage, and after some adaptation had a fully functioning deck. **D.G.**

## Aiwa CSD-SR540K

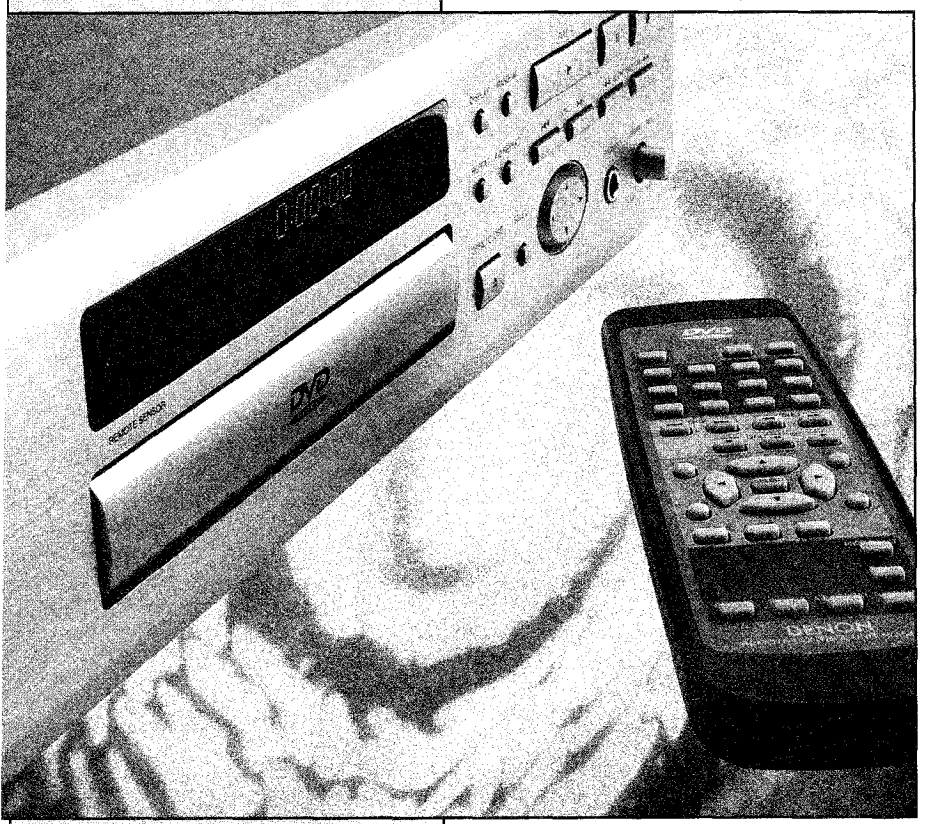
There was a fast tape playing and tape chewing problem with tape deck 1 of this CD/stereo radio/cassette model. The other systems were all OK. I found that the cassette-door damper spring was out of alignment with its chassis groove. Also the cassette tape resting metal spring plate was somehow pushed back under the cassette casing. All was well once these items had been set up as in tape deck 2. A good soak test proved that everything was now OK. **C.M.C.**

## Arcam Alpha 8R

The owner of this amplifier had been very pleased with it since he bought the unit some three years ago but now found it impossible to adjust the volume control without loud crackling from the right-hand speaker. I told him, without seeing the amplifier, that the most likely cause was dirt in the volume control and that I would try to clean it with contact cleaner, though replacement would probably be necessary in the long term.

The fault turned out to be exactly as I expected, but I was somewhat apprehensive when I saw the volume control. It appeared to be in three sections, all linked together. Fortunately it wasn't necessary to apply contact cleaner, as the cause of the trouble turned out to be cracked soldered joints between the control and the PCB. Access isn't easy however – a considerable amount of dismantling is required to expose the joints.

While the board was out of the case I took the opportunity to check for and rectify other suspect joints. It took some time to carry out the repairs and reassemble the unit, but the outcome was perfect operation – and a happy customer. **D.I.S.** ■



# DVD

**Fault reports from Geoff Darby Chris Bowers and J.S. Ogilvie**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 745 for details of where and how to send reports.**

## Samsung DVD-S224

The symptoms produced by a defective laser can be many and varied. A fairly common one is failure to play one type of disc, usually either CD or DVD. It's often not appreciated that there are usually two laser diodes in the optical block, and of course either can fail.

As a general rule if one type of disc plays and the other doesn't the optical block is the first suspect. There can be other causes however, including servo trouble, because different servo processing systems may be used for playing different disc types, and spindle motor trouble, because the rotational speed for playing a DVD is much higher than for playing a CD. I've also known corrupt software to cause problems between media types.

This particular unit would play CDs but wouldn't spin a DVD up to full speed and play it. This could have meant a suspect spindle motor. But in this machine the motor is an electronically-commutated direct-drive type rather than a conventional DC type with brushgear, and these are in general reliable in this application.

So I fitted a replacement laser from stock. This restored normal playing of all types of disc. **G.D.**

## Sony HCD-S300

This home-cinema unit produced crackles, pops and hisses in varying degrees from all channels, more predominantly from the surround channels. There didn't appear to be any disturbance at the inputs to the power amplifier ICs, nor on their supply rails. So, reluctantly, I replaced them all.

This cured the problem, but these TA2020-020 digital amplifier ICs are not cheap. At over £30 each it was a very expensive repair. I wonder whether all three were from a faulty batch? **G.D.**

## Panasonic DVD-LA65

This nice little personal DVD player, with widescreen LC display, wouldn't read discs. From the top, it didn't look as if the laser was fully home. So the unit was dismantled and the deck was removed. This whole operation is very simple, involving simply removal of all the obvious-looking screws in the bottom, separating the case top half from the bottom, unplugging the deck, and lifting it off the locating spigots – it's not screwed in.

When the deck was out I found that the laser worm drive felt stiff. The laser and drive were easily removed from the deck, by undoing the two screws that secure the sled-motor cover plate. Once the laser and its worm drive were out, the worm was indeed found to be stiff in the laser. I screwed it out carefully, cleaned its grooves, relubricated the bearing and interface pawl surfaces, then screwed the worm back in. After that it rotated freely and smoothly.

The laser and drive were then refitted to the deck and the whole unit was reassembled. When tested, it played discs faultlessly and performed chapter jumps quickly, quietly and correctly as requested. **G.D.**

## Sony DVP-NS305

There was no audio from the scart connector at the rear of this unit. A quick call to Sony technical provided a possible cause, bad or poor contacts at connector CN203 on board AV61. Resoldering the contacts restored correct operation. **C.B.**

## Sony HCD-S800

There was no DVD operation. Checks at connector CN008 on the DVD board showed that the 12V supply was missing. The cause was traced to a faulty 10$\mu$H inductor, L904, on the power board. The part no. is 1-414-398-11. **C.B.**

## Sony DVP-NS300

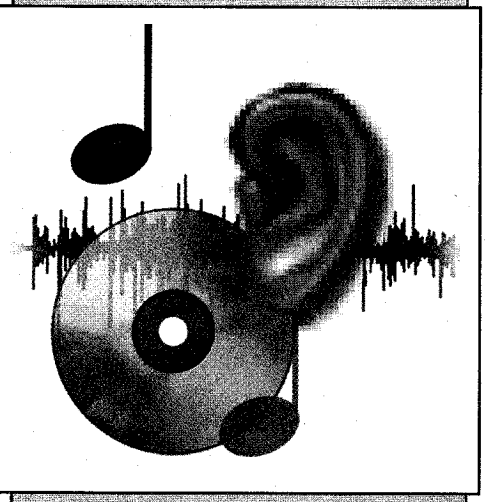
This unit had no power. I soon found the cause when I checked the supply lines on board IF80 with a meter. The 1A chip link PS401, part no. 1-576-509-21, was open-circuit. A replacement restored power. **C.B.**

## Oritron DVD600

I'd never heard of this one before. It came in dead. On checking I found that the main reservoir capacitor C802 (33$\mu$F, 400V) had leaked and as a result U801 (TOP223P) had failed. I couldn't find this device listed anywhere. It looks like an 8-pin IC, but six pins are shorted together. So I obtained a TOP233Y with a slight modification, fitted it and found that the player came back to life. I let it run for a day to make sure. **J.S.O.**

## Pioneer DV515

If there's no drawer operation, check whether circuit protector P103 (800mA) is open-circuit. **J.S.O.** ■



# AUDIO FAULTS


**Reports from**
**Eugene Trundle**
**Roger Burchett**
**Geoff Darby**
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## Sony LBT-D359

The complaint was very intermittent sound-track 'jumping', usually backwards and generally near the beginning of a disc's playback. It happened only when the moon was blue and Manchester United were playing at home to Wimbourne Wanderers. The cure was to replace the sled-drive motor and the optical unit's ribbon cable – I think! **E.T.**

## Technics RS-TR373/374 tape decks

I had for repair a later version of the TR373, which is similar to the TR374 and quite different from the earlier TR373 covered in the main service manual. For the later version you need supplement AD9512273SO. My thanks to SEME for sorting that out for me.

The fault itself was quite simple. There was no audio output and no bar-graph movement. The deck functions were OK. There are two 0·25W fusible resistors on the mechanism control board, which is mounted on the back of deck 2. They are in series with the ±7·7V supplies (marked +B1 and –B). R406 (27Ω) is in the +B1 feed and R407 (18Ω) in the –B feed. Both were burnt and open-circuit. Amongst other things these lines supply the AN7356SC-E2 playback/record amplifier chip IC2 and the AN7357FB-V Dolby chip IC401.

It was easy enough to measure the current flowing via each supply. I found that the –B line was supplying excessive current, and a near short-circuit could be measured to chassis. But where was the short? Close examination under a strong light with an even stronger magnifying glass led me to link J66 which, when cut, isolated both ICs. Glory be, the fault was at the input side! The culprit was the 470$\mu$F, 10V decoupling capacitor C424. Presumably C423 (same value) in the +B1 supply could cause the same fault.

This was a simple fault theoretically, but dismantling the unit was not so simple (a Mole grip was required to move one screw holding the board). The print is spidery. Who designed the print on the IC side of R407 without an adequate land? Shame on you! **R.B.**

## Goodmans System M500

I normally associate Goodmans with the lower end of the market where, often, the cost of a repair can exceed the value of the unit, resulting in just lost time and no profit. So I lifted this one, which was labelled 'dead', osn to the bench with some trepidation. The first shock was that it was surprisingly heavy. The second shock, once it had been opened up, was the superior build quality. It was well put together, and looked as if it was going to be very difficult to work on.

The only voltage I could see marked on the main PCB, at the right-hand side of the unit, was 5·6V. It was right next to a three-legged device that I guessed might be a 5V regulator, as its centre pin was returned to chassis via a forward conducting diode. It was impossible to see the device itself readily, being on the other side of the board. If it was a 7805, its input voltage was very low. There were however good 20V levels across the nearby smoothing capacitors. Following the print back from the regulator's input pin I came to another three-pin device, below, to the right and at 90° to the first one. Its middle leg went straight to chassis and its input pin went straight to a smoothing capacitor with 20V across it. This suggested that the second device was also a regulator and might well be faulty: the PCB beneath it was cold, indicating that the device was not in an overload shutdown condition.

I unsoldered its legs, pushed it in and then shook it out from the unit. It turned out to be one of the smaller D-line regulators, probably rated at 100mA or so. It was a 12V type, which made sense. Rather than try to fit a replacement into the board in the original position, I installed a 1A plastic flat-pack type on the back of the board, where it would probably run cooler anyway. This restored full normal operation, and a long soak test proved that there were no other problems.

In this case I can't provide component reference numbers, as the devices were so far down on the board that I simply couldn't see these and there was no printing on the track side. **G.D.**

## Sony HCD-RG30

There was a tape problem with this unit. The B deck (record/playback) produced very low, muffled and brassy left-channel playback. The right channel was OK, and both channels were OK with the A deck. When I tested the unit I found that the 'Groove' feature, a sort of dynamic bass enhancement, was switched on. When this was set to off there was no discernible sound from the left channel.

I found these symptoms confusing. The problem had a sort of 'heads' feel about it, so I set about swapping the left head's output to the right-channel amplifier, to check out the head. I did this by removing the solder from the four connector pins on the main boards, then patch-wiring the pair from the left head to the print going to the right amplifier. The result was nothing at all from the left head, even with the Groove feature applied.

At this point I decided to measure the resistance of the heads. The reading for the right-channel head was a couple of hundred ohms, but the left-channel head

read short-circuit. So there was clearly a head problem of some sort. I next stripped the front panel away from the unit to gain access to the tape decks, then removed these to take a good look at the head assembly on the bad deck. This deck uses a bi-directional 'flip-over' head, with the connections made via a flexiprint which is terminated at a small PCB that's screwed to the bottom edge of the deck. A connector on this PCB is used for the screened cable that plugs into the main PCB. I found a small whisker of solder here, across the pins for the left head. Once this whisker had been removed there was normal audio from the left head.

What I am uncertain about is how, with the left head short-circuit, it had been possible to get anything from this channel? I assume that the low, distorted sound was signal from the right channel being fed to the left channel by the Groove-effect system. This would account for why there was nothing at all, even with the effect turned on, when I connected the shorted left head's output to the right-channel amplifier. **G.D.**

## Sony HCD-RXD5

There were control problems with the CD changer in this unit. Intermittently the tray would eject on its own and the carousel would revolve endlessly. I was able to establish that there were no carousel-position detect pulses at pin 6 of CN392 on the main PCB when this happened. Checks on the supplies to the CD changer via this connector showed that the motor 7V supply was present at pin 1 but the 5V supply for the disc and carousel detectors, at pin 5, was missing.

The 5V supply comes from switch transistor Q905 on the main board. This transistor is driven by Q904, whose base input comes from pin 2 (power) of the microcontroller chip IC501. Inspection of this IC's pins under a powerful magnifier revealed that the amount of solder on them was meagre at best. A reflow of all the pins, with a little fresh solder added, restored the drive to Q904 and correct operation of the CD unit. **G.D.**

## JVC VS-DT2000R

"Loud buzzing on left channel" was the complaint with this elegant unit. I found that the level of the buzz was not affected by the setting of the volume control except when it was at zero. The noise then stopped. Audio reproduction from the channel affected was fine. The buzz was very 'raspy', quite unlike anything I had heard before.

Scope checks at the outputs from IC101, which is a dual op-amp buffer between the volume control/function select IC and the output IC, showed that a very odd waveform was present at pin 7, the left output. A couple of capacitors near this IC were getting in the way of the scope probe. When they were moved the symptoms changed dramatically. Although an odd output waveform was still present, it was no longer large enough to be heard.

A little farther away there are a couple of electrolytics and some diodes. These are involved in generating the negative supply for the VFD. A scope check in this circuitry showed that the supply was not only ragged but was also 'hooting' at high frequency, in bursts. This was the waveform I had been seeing at IC101. The actual hoot was at too high a frequency to be heard but the burst rate was low enough: this was the raspy buzz that came from the left-channel speaker.

The cause of the fault was that C3802 (100$\mu$F, 63V) was unsoldered at its negative end. This is the last reservoir/smoothing capacitor at the end of the voltage multiplier that produces the VFD supply. Application of fresh solder to the joint restored a nice, clean supply and normal audio output. **G.D.**

## JVC CA-MXJ75R

If the problem with this music centre is no or intermittent no sound, remove the amplifier and heatsink assembly and check IC781/782 (both type TDA7295) for dry-joints. Also check IC701 (STK411-210E). Resoldering all pins is usually an effective cure. **J.S.O.**

## Aiwa CSD-MD5K

If the problem with this MD/CD/radio/cassette player is loss of tuner reception, remove the separate tuner PCB and check for bad joints, some of which may well be in the tuner itself. The repair is difficult but can be done with care. **J.S.O.**

## Sony TA-FE230

This amplifier unit appeared to be totally dead. I carried out some cold checks with the multimeter and found that the main power transformer T1 was open-circuit on the primary side. The part no. is 1-433-6211-1. All was well once a replacement had been fitted. **C.B.**

## Sony CDP-H3750

When a KSS-240A optical unit is used a whistling noise may be heard from the mechanical CD assembly with some discs. The cause is vibration of the disc, the optical lens and the BU base, resulting in resonance. This vibration can be reduced by adding a fixed weight, part no. 7-685-134-19, which is screwed on to the PCB, and optical block weight part no. 4-962-979-02. **C.B.**

## Sony ZS-D50

There was a cassette stuck in this portable unit's tape deck. A quick check inside revealed that the capstan belt had slipped off the motor pulley. We've had this before. There is now an improved belt, part no. 3-229-349-01, also a guide belt assembly, part no. X-3380-302-1. You are also advised to replace the collar, item 152, and gold screw, item 151. **C.B.**

## Sony CDP-H3750

There was no operation when the AB button, or power off, was pushed. A quick look inside revealed that connector CN213 hadn't been pushed in or correctly inserted. Normal operation was restored once this had been done. **C.B.**

## Sony MZ-R900

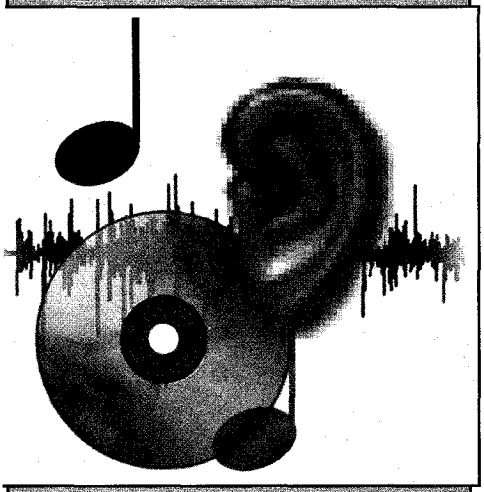
This MiniDisc player opened and closed poorly. A look inside revealed that the chassis had become bent and deformed. Normal open-close operation was restored once a replacement chassis assembly, reference 52, part no. X33793205, had been obtained and fitted. **C.B.**

## Trio KR-4070-L

This tuner/amplifier had given flawless results for over twenty years. The problem now was that stereo FM broadcasts were sometimes reproduced in mono form. The FM beacon LED had also become very sluggish in operation, occasionally lighting first time on reception of a stereo broadcast but more often coming on only after careful retuning. In addition stereo decoding seemed to be more difficult to achieve with stronger signals.

Fortunately I had the service manual. Stereo multiplex decoding is carried out within an IC, which might have been difficult to obtain. But the 'borderline' symptoms seemed to me to be typical of a decoder whose oscillator is running slightly off frequency. An external preset resistor, VRg1, is provided for frequency adjustment, and a procedure for accurate setting up is given in the manual. I decided however to note the original position of the wiper and try slight adjustment. My first attempt stopped the stereo decoder working altogether, suggesting that I had moved the preset in the wrong direction. This proved to be so. When I turned VGg1 to a position just the other side of the original one there was correct and reliable reception of stereo broadcasts.

Clearly an element of drift had occurred over the years. It would have been nice to have been able to measure this drift, but I was pleased to have been able to correct the fault. **D.I.S.** ■



# AUDIO FAULTS

**Reports from Geoff Darby Charles Coultas and Chris Bowers**

**We welcome fault reports from readers – payment for each fault is made after publication. See page 40 for details of where and how to send reports.**

## Yamaha CRXM5

If one of these comes in and you suspect the laser unit, be very careful how you quote for the job. I would suggest that you allow a good two hours for labour if the laser unit is type KSS580.

There are two reasons for this. First the laser unit is not very easy to get at. You will spend twenty minutes or so getting to the point where the changer is out and you can see the deck itself. Secondly and much more importantly, you have to change the laser unit to type KSS710A. Although this is physically similar to the KSS580 in general mechanical terms, its connections and electrical characteristics are entirely different. So it comes with a kit of parts and two large sheets of modification instructions and diagrams.

The modifications involve removal of links from the PCB, removal of a number of surface-mounted resistors, replacement of others with resistors of different value, print cuts, and the addition of standard carbon resistors and a lot of wires across the back of the board. All this is after you've actually removed the main board of course.

In all fairness the instructions are fairly comprehensive, though a little misleading in places. For success you must follow the numbered instructions completely blindly. Do not attempt to figure out what you are doing by referring to the modified circuit diagram, as this will mislead you. All the resistors you are told to remove in the first couple of steps are still in the circuit diagram, but are shown with new values, in red. This is not correct. They should just be removed, and left removed, as the instructions say.

When it comes to the print cuts and adding the wires and external resistors, refer to the print layout supplied for help with interpreting instructions like "short the No 10 pin of PN801 to the No 9 pin cut above (the +side of C823)". You'll need good eyes or a magnifier to see the modifications clearly on the print layout. But they are there, and are correct. The procedure is not helped by instructions like "remove chip resistor R830 (silkscreened as R832)". Yes, R830 and R832 are marked incorrectly on the board but are shown correctly in the circuit diagram! One of them has to be removed and the value of the other has to be changed, so make sure you get them the right way round. Also one of the carbon resistors that has to be fitted has a value of 100Ω. The resistor supplied has this value, but its packet is incorrectly marked 100kΩ.

Finally there is a problem with the flexiprint connection tail from the replacement laser unit. It's upside down in comparison with the original, so it has to be twisted over before it can be inserted into the connector that joins it to the long white flexiprint which goes up to the main board. Be careful to do this close to the connector. Otherwise, even though the tail comes round a piece of plastic that should isolate the moving part from the fixed part, the twist can migrate up to the transition point and make the laser run stiff on its tracks.

Once I'd carried out these modifications a further twenty minutes were required to reassemble everything. I was then rewarded with a fully working unit. I dread to think what I would have done had it not worked. You certainly wouldn't want to put the original laser unit back, and such a situation would probably leave you seriously concerned as to whether your original diagnosis had been incorrect or you had made an error in fitting the modification kit. **G.D.**

## Sony STR-DB940

This gigantic AV amplifier arrived on the bench with a note to say that it "makes a buzz from the sub". I soon discovered that the output to the sub had quite a high level of treble on it intermittently instead of being pure sub (bass). This odd behaviour could be instigated by slight movement of the flexiprint between the main PCB and the 'vol' sub-PCB.

No amount of cleaning of the connectors or foil tails at the flexiprint's ends would correct the problem. I was loath to believe that the cable itself was faulty, as it was quite thick and had never been stressed with tight bends near its ends. Eventually however I decided to order a replacement. When this had been fitted the problem was no longer present. **G.D.**

## Sony HCD-MD313

This CD/MD player/radio/amplifier was brought in because 'no disc' was displayed when a CD was inserted. Without thinking too much about it, I suspected the optical block and ordered a replacement. But when it was fitted the fault was still there. I then noticed, as I should have done before, that the CD wasn't rotating. So maybe the optics had been OK after all.

Investigation into why the motor was not rotating led nowhere. The motor worked all right when it was tested with a 1·5V battery, and the sled and focus seemed to be working normally. I replaced the motor/focus/sled drive IC, but this made no difference.

Much delving around with the scope didn't help, but I then found that focus search was missing. I sat back and thought about the problem. Perhaps the disc doesn't spin until some positive result is obtained from the focus search. When I scoped the output from the focus-coil drive IC it was cycling up and down but the lens wasn't. A little further investigation showed that the flexible, flat cable to the optical unit was damaged. I also realised that I had forgotten to remove the solder short that protects the laser when the optical unit is in transit! I probably damaged the flat cable with all the messing about I subjected the drive to.

A new flat cable and removal of the solder short put matters right. **C.C.**

## Sony MZ-R90

There was no recording with this MiniDisc unit. A look inside revealed the cause: the overwrite head didn't come down because of a defect with the HC gear, reference 113. A new gear, part no. 4-222-215-01, restored normal operation. **C.B.**

## Sony ICF-SW7500

This small LCD radio produced an IC-type cracking noise after five-six minutes with FM operation only. A look inside, on the B side of the main board, revealed that the small surface-mounted electrolytic capacitor C69 (220μF, 4V) had started to leak on to the board. A quick board clean up and replacement of the capacitor, part no. 1-126-246-11, restored normal FM sound. **C.B.**

## Sony MZ-R900

This silver MiniDisc player had a broken LCD module. I've had this problem several times. You have to fit a replacement module, part no. 1-804-171-11. Units with serial numbers CED325801-326000 are prone to this fault. **C.B.** ■


**Here's a useful sideline, looking after the amplifiers used by local musicians. Geoff Darby has been involved in this work for some time and explains the type of problems you can get and how to tackle them. Also how to get such work**

# Repairing PA amplifiers

For some years now I have looked after PA amplifiers for several local bands. In general they are well-built units that are usually quite easy to repair. They don't suffer from output stage failure nearly as often as you might expect and, even when you do get defective output transistors or FETs, it's unusual for a multiple-device cascade failure or burn up to occur.

The most common problems are physical damage to sockets and adjustment potentiometers, and bad joints. An area where dry-joints are particularly prone to occur is in the circuitry used to produce the low-voltage positive and negative rails for the preamplifier stages. Such supplies are often very simply derived and regulated – by 'zenering-down' from the high-voltage supplies for the output stages. You will typically find 5W wirewound resistors and 2-3W zener diodes used for the purpose. These devices run very hot of course. Also look out for associated decoupling capacitors.

The equipment is usually expensive to buy and replace and you generally find that the owner expects to pay a fair price for any repairs required. These are often 'urgent', for a gig that's to be played in a couple of days' time. As temporary equipment hire is expensive, the owner may well be prepared to pay a premium for a fast turnaround. In my experience engineers who are prepared to look at this sort of equipment are thin on the ground and, once you've got a customer, he'll stick with you for life – provided you look after him/her. Be prepared to get your phone number passed around: you are likely to get calls that start "you don't know me but . . ."

If there's a band playing in your local pub when you go in, it's well worth handing your card to the members, particularly the person at the mixing desk, if they have one. This is usually the person who's responsible for looking after the equipment. If you have a local shop that sells musical instruments and/or amplification equipment it's worth making yourself known there. Even if they have someone on call, they will probably be interested in you for holiday, emergency or illness cover.

Here are a couple of faults I have had recently, to give you an indication of the type of problems you are likely to face and how to go about getting to the bottom of them.

## An Ampeg combo

The first item was an Ampeg combo (that's a speaker cabinet with built-in amplifier), Model B15T. It's slightly unusual in that when the unit is being transported the amplifier lives upside down in the top of the cabinet. To use it, you undo clips at each side, lift off the entire wooden top of the cabinet, turn it the other way up and replace it on top of the cabinet. The amplifier is of chassis-type construction, fixed to the wooden cabinet top. The cabinet's internal speaker plugs into a socket at the rear of the chassis.

The owner's complaint was that it had suddenly gone very quiet halfway through only the second song of the evening. Oh dear!! Scope checks showed that there was a good level of undistorted audio at the master volume control, which is at the end of the preamplifier chain, but a very low level where the signal left the preamplifier board as drive for the output stage. There are two 1·5kΩ resistors in series between these two points, with a FET connected between their junction and ground. This device, an n-channel junction FET type J122, proved to be short-circuit drain-to-source. None of the components on the preamplifier board have reference numbers. The FET is located between the master volume control and line output level potentiometers. I'm not sure about its function – the block diagram silk-screened on the amplifier's top cover would suggest that it's part of a muting arrangement – but a replacement cured the fault.

While on the subject of block diagrams, it's worth mentioning that these amplifiers often have quite an elaborate one on the case top. They are there to impress of course, by looking very technical, but once you learn to ignore all the 'technical terms' on it the diagram can be a very useful guide to the general arrangement of the equipment and how it's supposed to work.

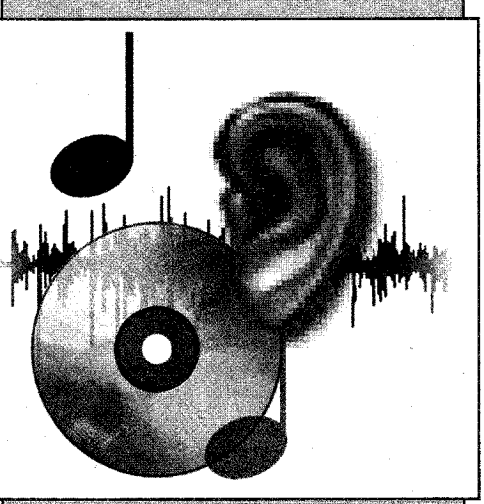
## A mixing and effects desk

The second item, which came in a day later, was a Studiomaster Model Power House 8-2. It's a superior-quality 8-channel mixing and effects desk with built-in 250W RMS stereo power amplifiers. The complaint was that input channel 5 had originally failed and now they had all failed. It turned out that the second problem was a red herring – the owner had set a mixdown routeing switch wrongly, with the result that the mixer desk was effectively no longer directly connected to the power amplifiers. Once this had been corrected, the unit was back to its original complaint, a dead channel 5.

The eight input channels each have their own separate preamplifier board. They are all identical, so it's easy to compare waveforms and voltages. The preamplifier and tone amplifier in each channel are based on TL072 low-noise bi-FET operational amplifiers. In a good channel there was a large signal present at pin 7 (output b) of IC2 and the average voltage was zero. At the same pin of the corresponding chip in the bad channel there was no signal and a slight negative voltage. A replacement IC put the channel right.

## In conclusion

I hope this shows you that such equipment contains nothing to worry about. Problems can usually be solved by employing straightforward fault-finding techniques, of which we should all be capable. The advantage is that you can get much-needed additional business that tends to be long-term. And, because of the nice build quality, you get a lot more job satisfaction than with the average piece of domestic equipment. We could all do with more of that! ■



# AUDIO FAULTS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**Geoff Darby**
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## Sony HCD-LX9AV

This monster one-piece hi-fi unit, with DJ Mix, Guitar, Mic and goodness knows what else by way of inputs and modes, had a fault that was designed to separate the men from the boys. There was no audio from the front (main) channels, though the surround sound channels were OK.

To start with, the audio/power PCB is impossible to work on. You can't measure the voltages at the STK device without risk of electrocution from the exposed mains terminals on the power transformer. You can't remove the PCB on its leads, as at one edge it has two connectors that mate directly with a pair of matching connectors on the large, vertical main PCB. Extender leads are not available.

As an initial guess, I decided to go for the STK device itself. This brought another problem to light. According to the service manuals, both the paper one and the Sony Assist one, the LX9 version of the hi-fi should be fitted with an STK442-020, and only the LX10 version should be fitted with an STK412-040. Yet my LX9 was fitted with the latter type! A call to Sony didn't help much. It was their feeling that if the IC appeared to be the original one it probably was, and I shouldn't be too concerned. So I ordered an STK412-040.

When it arrived I removed the board. First take out the entire rear panel (about 100 screws), then the screws that secure the board, the heatsink and the side main PCB. A number of connectors and ribbon cables also have to be released. After that I replaced the IC, then reassembled the unit – sufficiently to enable it to be tested. The fault was still present of course. To be honest, I hadn't expected the unit to work, but you have to hope.

About the only way that I could see of being able to check voltages was to remove the surround-sound amplifier sub-PCB, which sits at the top of the heatsink, above the STK. Once it was out I was just about able, in conjunction with the removed back panel, to get in with scope and meter probes. The first thing I found wrong was that the +VL and +ZD supplies, at pins 2 and 3, were both at the same voltage. According to the circuit diagram they should be at 60·9V and 24·2V respectively. This is impossible however, as there is a 15V zener diode connected between the pins. There's a similar arrangement on the negative side, but the voltages here are helpfully marked –24·3V and '*'! By following the +VL supply around the board I was able to find that it's actually the B+ rail, which should be at 31·5V. This seemed to correspond with what was present at the pin, so I expected the +ZD pin to be at 15V less. Checking at the negative side, I found that there was –30V and –15V at the two corresponding pins.

A cold check at pins 2 and 3 revealed a dead short between them, so the board came out again. The most likely bet was the zener diode, D852. When I unsoldered this item it fell in half. In went a replacement, back went the board, on went the power – and still nothing.

Further voltage checks along the STK's pins showed that the –60V supply (–VCC) at pin 12 was missing. It comes from the standby switching transistor Q834 via a 100Ω safety resistor, R857. There was nothing at this resistor or the collector of Q834, but plenty at its emitter. Q834 was cut off because its base and emitter were at exactly the same voltage. Q843's drive comes, via D805, from the junction of two series-connected resistors in Q803's collector circuit. Cold checks here showed that D805 was OK but that one of the two resistors, R821, was open-circuit. It's a minuscule 33kΩ type. A replacement, followed once again by a unit rebuild, restored normal operation.

Was the original STK device faulty? Had it led to the demise of the zener diode? I didn't put it back to find out! It's now in the junk box labelled 'possibly OK'. I will have to wait until I have something easier to work on before I try it out elsewhere. **G.D.**

## Denon UDM30

The complaints with this hi-fi unit were that it wouldn't play CDs and that there was a 'smoky' smell from inside. Both were true. In fact the smell was so metallic and pungent I suspected that the owner's cat had been there before me. There were no obvious signs of PCB or chassis corrosion however, nor of anything burnt or starting to burn when power was applied. So I turned my attention to why the CD section wasn't working.

When I examined the laser I found that the inside of the lens was completely 'smoked'. So presumably either the laser diode or the pickup chip inside the optical block had virtually caught fire, coating the inside of the lens with residue and producing the pungent smell. It was a good job that the unit was under warranty as the cost of the replacement laser, which comes as a deck assembly, is horrendous. It did cure the problems however. **G.D.**

## JVC UXP7R

The owner's complaint with this elegant little unit was as follows: "went bang, has power but no sound, CD drawer not

opening". On test I found that there was indeed no sound and no response from the CD drawer, but the disc that was trapped inside did spin up and did 'play' when asked. There was also no LCD backlighting, and the standby LED went from red to nothing instead of turning green.

These symptoms suggested power-supply problems, so I decided that the best approach would be to tackle the failure of the drawer to open. I soon found that the supply to the loading-motor driver IC was missing at pins 11 and 12 of CN652. It's called SW10 at this point, though elsewhere it's called SW9V. It took me a little time to trace the source back to IC910, using the circuit diagram. This IC is referred to as a 'multiregulator'. It's on the main PCB, at the back, bolted to the same heatsink as the audio output IC. You can't really see its pins until you remove the plastic cover attached to the rear panel.

Once this had been done, gaining access, it was immediately apparent that almost every pin was either completely dry-jointed or showed signs that it was about to part company with the PCB. A clean up and application of fresh solder restored the supply to the CD section and the other functions. **G.D.**

## Sony MZ-N707

This personal MiniDisc unit wouldn't play discs. Apart from the initial sled-motor activity there was no feeling of vibration or disc movement, even though the display indicated that the disc was being spun up. With the door open and the disc removed I was able to insert the tip of a cotton bud to check the turntable rotation. It was able to turn quite freely, but was ever so slightly stiff in comparison with normal operation.

These motors are tiny, and have just enough 'oomph' to turn themselves and the disc. Any slight stiffness in the bearings is enough to prevent them being able to spin up a disc. The diagnosis was confirmed by fitting a new motor, which restored normal operation. **G.D.**

## Sharp MD-MX10H

The right channel audio was low with all functions. A simple cause for a change. Coupling capacitor CS08 (1$\mu$F, 50V) was open-circuit. A replacement restored correct audio. **G.D.**

## JVC XVS302SL

The front panel display showed only a few random dots that varied depending on what the unit was doing at the time. When the main PCB was removed the cause was immediately visible. Of the 41 connections to the display panel only three showed no signs of distress. The other 38 were all dry-jointed at best and cracked right round at worst. Application of a little liquid flux and fresh solder restored a solid and correct display once the unit had been reassembled. **G.D.**

## Sony CDP-CE375

This five-disc CD changer unit seemed to be totally dead. Cold checks inside with a multimeter soon revealed the cause of the trouble: the main power transformer T601 was open-circuit on the primary side. A replacement transformer, part no. 1-435-343-11 restored normal operation. **C.B.**

## Sony TC-K611S

This single-tape stereo cassette deck made a clicking noise when the power was turned on. A look inside, around the tape deck mechanism, revealed the cause: a loose shaft on the R-FWD flywheel assembly, part no. X-3356-642-1. The tape-deck motor and flywheel continue to run when they are not in use. A replacement restored normal click-free operation. **C.B.**

## Sony TA-VE170

This AV amplifier went into the protection mode less than a minute after being switched on. The fan came to a screeching halt at the same time. The cause of the trouble was the 12V DC fan motor on the main board. A replacement fan, part no. 1-763-561-22, restored normal fan operation and unlocked the protection mode. **C.B.**

## Sony CDP-X229ES

This CD unit produced the no-disc message when a disc had been loaded. A look inside revealed the cause of the trouble: there was a kink in the middle of the flexiprint lead, part no. 1-575-001-11, that connects the KSS240A laser unit to board BD. A replacement flexiprint lead restored correct operation. **C.B.**

## Sony STR-DB940

This unit would go into the protection mode at high volume levels. Voltage and capacitance checks on the main board revealed the cause, which was C590 (4·7$\mu$F, 6·3V). A replacement capacitor restored normal operation. **C.B.**

## Panasonic SAHD52

A new laser was fitted, after which this unit test played through several discs faultlessly and was returned to its owner. Two days later it came back, with the complaint that it kept stopping while playing a disc. When I inserted my vintage rock'n'roll test disc it refused to return this – a real emergency!

Tests revealed that the output from the 8V supply regulator was very low. This crazy circuit sits on the bottom left-hand side of the CD PCB and is readily accessible. It consists mainly of two parallel-connected 2SD2037 transistors which are mounted straight on the board with no heatsinks. The heat generated by this suicidal arrangement had resulted in a charred board and failure of one of the transistors in the pair. I cleaned up and repaired the board then fitted two new 2SD2037 transistors, complete with homemade clip-on heatsinks. A long test proved that all was now well – but those heatsinks were working hard! **C.A.**

## Technics RSB755

This is an old cassette deck but a very high-quality one with a direct-drive capstan and 'beltless' operation. It came to me with two problems. The fluorescent display was intermittent because of dry-jointed heater pins on the display panel. And there was no tape-reel drive because the reel-motor pinion was loose on its shaft. This is item 130 in the exploded view of the deck. **E.T.**

## Panasonic SAHE200

The fault with this AV amplifier was no sound with the error code F70 displayed. This indicates communication failure between the main microcontroller chip and other components. The cause of the fault was no +5V supply on the digital PCB because F5 (1·25A) was open-circuit. It's on the transformer sub-PCB. **D.K.**

## Panasonic SAGX550

If the loudspeaker and headphone outputs from this amplifier cut out when the volume level is increased above 8 on the scale, check for noise on the supply to the cooling fan. The usual cause of such noise is that the contacts between the fan and the main PCB are dirty or tarnished. Alternatively the legs of the contacts may be dry-jointed to the PCB. If these points are OK, check the protection transistor Q604 (2SC3311) by replacement. **J.C.**

## Technics A900

When this amplifier was warm its output was low and distorted. The cause was found to be dry-joints at the pins of Q752 (2SB941) and Q751 (2SD1265). **J.C.** ■

# DVD

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## Ferguson DVD400FE

The only sign of life from this budget DVD player was a glowing standby LED. Scope checks showed that the power supply was running, but there were large pulses at the cathode of D807, which runs hot. The associated reservoir capacitor C807 (1,000$\mu$F, 10V) sits right alongside. It's blue sleeve looked decidedly tired and discoloured, and an ESR check showed that it was away with the fairies.

I decided to fit a replacement rated at 16V and, in an effort to reduce its running temperature and thus improve long-term reliability, left its leadouts slightly longer than normal so that it could be bent over away from the diode. When the power supply was refitted and the unit was powered it worked normally. **G.D.**

## Technics SL-DV280

This unit is part of a four-piece DVD/hi-fi system. According to the job card the fault was "won't read discs after cleaning". I have warned against the use of DIY cleaning discs in the past. This was another reason why. I assume that one of those cleaning discs that have brush hairs sticking out of it had been used. These hairs cause problems. Hair had obviously got caught in the tiny piece of plastic that surrounds the immediate area of the lens. Because of the high torque and rotational speed of the DVD spindle motor, the little cover had been torn off and become jammed between the lens and the main laser cover.

Once the little cover had been removed the lens was free to move again and the unit was able to read discs normally. I was not able to refit the displaced piece, as its mounting clips had been badly distorted. But it certainly doesn't affect the basic operation of the optical block. About the only possible purpose I can see for it is to provide a little more dust protection for the internal optics than that provided by the basic laser cover. **G.D.**

## Sony SLV-D900G

This combined DVD player/VCR failed to read discs after a few seconds. Voltage and scope checks revealed that the cause of the fault was the optical block, which didn't focus properly. A replacement, part no. 1-796-620-11, and auto-adjustment set-up via the service menu restored normal DVD operation. **C.B.**

## Sony HCD-S800

This unit would power off after a few seconds when it tried to read a disc. The cause was suggested by Sony technical: the 29MHz crystal oscillator X102 on the DVD board can cease to operate because of a fault with the optical block. A new KHM-240AAA optical block, part no. 8-820-144-06, restored normal operation. **C.B.**

## Sony DVP-NS305

This unit failed to power up. Some checks showed that the cause was the switching chip IC101. An improved type, part no. 9-885-030-35, should be fitted unless the board part nos. are 1-468-648-12 or 1-468-651-13, which in this case they weren't. The new chip restored normal operation. **C.B.**

## Sony DVP-S735D

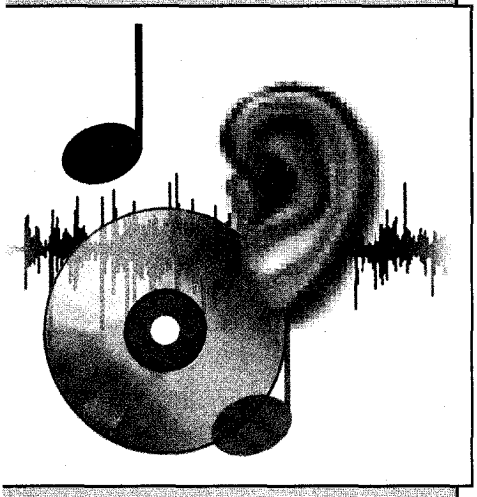
Digitised square blocks appeared in the DVD picture and also the various menu screens. Checks on board MB-86 showed that the cause was the 16MB SDRAM chip IC504. A replacement, part no. 8-759-463-47, restored normal pictures and displays. **C.B.**

## Sony DVP-S535D

This unit produced no video through the RGB (only), Y/C or composite video outputs. All the mechanical functions worked correctly. Checks inside, on board MB86, revealed that the 3V regulator IC503 was faulty. A replacement, part no. 8-759-486-55, restored the video output. **C.B.**

## Sony DVP-S9000ES

Sometimes this DVD unit's tray would not be loaded completely. Investigation inside revealed that the cause was the loading assembly (item 104) and the tray assembly (item 101). There are improved replacements for these two assemblies, part nos. A-6062-471-F and X-3950-950-6. Once they had been obtained and fitted there was normal tray loading. If the number printed on the MD cover contains the letter F or later, the new loading assembly is already fitted. **C.B.** ■



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## Sony TC-V10 cassette deck and TA-V10 amplifier

This cassette deck is part of the V10 stacking system and was therefore considered to be worth repairing despite its advanced age. The symptoms were that playback sound was fine momentarily then faded to nothing, with the VU display indicating full output continuously. It transpired that the bias/erase oscillator was running continuously, wiping the tape as it was played – except for the inch or so between the heads at the start of playback.

I had no manual, but eventually found that Q307 (type 603 3YG) in the oscillator's switching circuitry was faulty. A general-purpose npn transistor restored normal operation before too many of my tapes had been destroyed. You also get this type of fault with certain VCRs.

The partnering TA-V10 amplifier came in for repair shortly afterwards, the complaint being intermittently distorted sound in either channel, usually at low volume levels. It sounded like a sticking voice coil, but the speakers were blameless. My suspicions about the obsolescent STK-series hybrid output chip were also unfounded, the cause of the trouble being dirty contacts on the speaker protection relay. I cleaned the contacts with very fine wet-and-dry paper soaked in Servisol. **N.A.**

## Sony HCD-CP505

When this unit was powered it came on briefly then the standby relay dropped back out and it became completely dead – apart from the red standby light. The unit took no notice of its on/standby button. At no time, even during the brief period when the standby relay was on, was there anything other than a completely blank display.

I turned my attention first to the power supply board, where every joint appeared to be bad. This was because of the use of the new lead-free solder. I remain unconvinced about the ability of this material to make long-term chemically-stable joints – or indeed about the detrimental effects of 'real' solder. After all, not long since we all drank water delivered to our houses in lead pipes.

Anyway the clue to the cause of the problem was the lack of any display. The system controller chip is not mounted on the front control PCB, as you might expect. Instead it's on a PCB called the 'digital board', which is located under the MiniDisc unit. Once it had been exposed by removing the MiniDisc chassis, it was easy to check the IC's 16MHz clock resonator X402 with a scope probe. There was no waveform here until pressure was applied with the probe. When the clock signal was restored, four dashes appeared in the display.

After removing the board I inspected the resonator's three joints. They all looked grey and dry – but so did every other joint on the board. Undeterred, I unsoldered and removed the resonator, turned it round to face the opposite way on the board – this sometimes helps with crystals and resonators that are reluctant to resonate – then resoldered it with conventional solder.

Once the unit had been reassembled it performed faultlessly, and continued to do so throughout many power ups and downs over an extended soak-test period. **G.D.**

## Sharp CD-DP2500H

This was a straightforward job – apart from the need to download the service manual from the internet then wrestle with the Adobe Acrobat program to get it to print the pages required in the size required. Initially the unit wouldn't read discs. The cause was nothing more than a faulty HPC-1LX laser unit. So why did I need a service manual?

Well, after replacing the laser unit there was no audio output with any function. Wet-finger tests quickly established that there was a fault in the low-level circuitry on the side PCB rather than the output circuitry on the main PCB. Healthy hum could be induced on all channels back to the audio processor chip IC401.

By referring to the circuit diagram I quickly established that the supply voltage was missing at pin 23 of this IC. The B+ supply should be present here. It's produced on the main PCB as 'analogue 10V' by a monolithic regulator, IC802. All three pins of this chip were dry-jointed, and several other devices nearby had poor joints at their pins. A blanket reflow in the area, with new solder as required, put matters right. **G.D.**

## Sony ZS-D50

If you have the misfortune to find one of these design nightmares, or indeed one of its close relatives in the ZS series, on your bench with tales of CD woe written on the job ticket, be sure that your quote is high enough to cover the extra time it is surely going to take you.

The models concerned are easy to recognise. The CD unit is vertical in the normal, closed condition, and hides behind a very 'cassette-looking' door. When you press 'open' the door rolls up into the unit and the CD deck slides out, down a curving track, until it is presented horizontally to take a disc. At this point the optical block looks as though it's easy to get at. But don't be fooled – it's not!

To start with the back of the unit is secured by no fewer than 18 screws. Once you've removed these and got inside you'll find a homogenous 'lump'. This is the CD mechanism, and a PCB with the audio heatsink is attached to it. The 'lump' can be removed from the front panel by undoing a further four screws, plus another one that secures the headphone socket. After doing this you will have to disconnect many ribbons and harnesses, all of which are too tight to allow movement without disconnection. Take note of exactly how these cables are dressed, as they pass through slots in the unit's internal walls. If they are not positioned correctly when you reassemble the unit, the back won't fit to the front properly.

Once you've obtained proper access to the front of the CD unit, you will be tempted to dismantle it to get the deck out from the slide-in/out mechanism. My advice, unless you are a masochist, is don't! There are gears and tracks and shafts involved, the timing of which is critical to the tooth if you ever want to see that deck slide back home again. The alternative technique that I've developed might be regarded by some as a bodge but, if you've ever had a go at one, you'll understand.

If you remove the two black screws at the front underside of the CD tray, the top and bottom halves can be separated by a couple of centimetres by gently bending the plastic – it's quite pliable, doesn't break if you don't go mad with it, and goes back exactly as it started off. With a suitably-sized gap opened up in this way, you can insert a pair of long-nosed pliers and pull out the laser flexiprint from its connector at the rear of the compartment. The deck can then be eased off the pins over which its suspension rubbers sit, and swung out of the gap. The motor leads remain connected, but are long enough to allow this. You can then easily replace the laser and refit the deck. Getting the laser's flexiprint back into its connector is a bit fiddly but, believe me, not half as fiddly as putting all those gears back and reassembling the whole unit, only to find that the deck sticks at the last moment . .

Reassembly is a straight reversal of the dismantling procedure outlined above but, as mentioned earlier, take note of the cable dressing – and check all functions before replacing those 18 back screws. **G.D.**

## Pioneer SX-D5000

This large digital receiver dating from about 1980 seemed to be dead, but the heatsink was at gas mark 6. Resoldering the +18V and –18V regulators on the power supply board brought it back to life, and resetting the quiescent current at 60mA instead of 200mA stopped the overheating. This was a transition model from the analogue ones of the Seventies to the all-digital ones of the Eighties. **P.R.**

## Yamaha TC800GL

This classic cassette deck's belt had turned into a gooey mess. It dates from 1978, but belts are still available from Yamaha dealers. Clean away all residue from the old belt, remove the PCB and, with a bit of fiddling, the new one can be dropped in. **P.R.**

## Pioneer SA-9500

This power amplifier dates from 1975. There was no output because one channel was holding the speaker relay off. The output, driver and voltage-amplifier transistors all had to be replaced, also the positive regulated supply transistor on the power-supply board. Fitting decent heatsinks to the power-supply transistors will ensure that they work for another thirty years. **P.R.**

## Technics RS-B305

No sound was the fault with this unit. It was cured by resoldering the large IC at the front, right-hand side of the main PCB. **P.R.**

## Roxan Xerxes T/T

This unit uses two LM1875 audio output power amplifiers to supply the motor's two windings, with the waveforms 90° out-of-phase. The ICs had failed, with signs of heat stress, because they had not been fitted on the heatsink properly. The two regulators on the same heatsink can fail for the same reason. **P.R.**

## Aiwa CX-ZM2600K

If either of the deck-drive belts in this audio centre slips, the system-control section will shut down the motor drive until the unit is powered down and then switched on again. This can be very misleading during fault diagnosis, as it may lead you to suspect non-existent faults in the motor or the driver, syscon or power-supply sections. **E.T.**

## Sony TA-SP55

There was no sound from the main speakers and only one output from the stereo headphone jack. Voltage checks revealed that the cause of the fault was the LM4766T power amplifier chip IC211, which is on the heatsink in the middle of the unit. A replacement, part no. 8-759-681-35, restored normal output from both main speakers and correct outputs from the headphone socket. **C.B.**

## Sony HCD-H551

There was no display and no sound from the tuner. Ohmmeter checks on the main board revealed that R1601 and R1604 (both 1Ω, 5%, 0·25W) were open-circuit. All was well once replacements had been fitted. **C.B.**

## Sony STR-DB1080

About five minutes after this unit was switched on a buzzing sound (instability) came from the speakers. I checked around the power regulator ICs on the main board with a voltmeter, a heat gun and a can of freezer. This proved that IC802 was faulty. Replacement of this IC, part no. 8-759-245-87, and a new heatsink, part no. 4-248-611-01, cured the fault. **C.B.**

## Sony HCD-N355 (with D570)

There was no output from either channel. Trying to be quick and clever (a delusion at my age!) I needlessly replaced the STK4172 chip. I then checked at mute pin 1 of connector CN1204 to the output board. The voltage here was well below the correct 5V (not 7·5V as shown on the PCB and the circuit diagram), but rose when pin 1 was isolated. This meant that the cause of the fault was on the main PCB. C1220 (330μF, 10V) on this board indirectly decouples the mute line. When I checked it with the ESR meter it produced a reading of 0·32Ω, but my old and trusty analogue meter revealed a 7Ω leak. **C.A.**

## Kenwood KAF3030R

This amplifier's primary fuse blew violently at switch on. It didn't happen when the connector to the transformer's secondary windings was unplugged from the power amplifier board, where two bridge rectifiers reside. Easy, I thought – a short-circuit on the main board. But I couldn't find one. A closer look at the circuit diagram revealed that one of the secondary windings has two separate sections, with the common centre tap and connection to chassis completed at the main board via the connector lead. C660 (0·1μF) on the transformer board is a tiny disc ceramic capacitor that's connected across the outer ends of these two windings. This underrated component, a false economy, had gone short-circuit, but the short didn't show up until the windings were joined. **C.A.**

# DVD

**Fault reports from**
**Andrew Duggan**
**Geoff Darby**
**George Cooper**
**Roy Blaber**
**and**
**David Kerrod**

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**t.winford@highburybiz.com**

## Thomson DTH220U

This player appeared to be dead, with no display etc. Checks showed that the primary side of the power supply was intact, but there was a short-circuit across one of the outputs on the secondary side. D809 was the cause. My thanks to Thomson technical and RS Components for their help in obtaining a suitable replacement. **A.D.**

## Pioneer DV454S

This elegant slim-line player was dead. As the mains fuse was intact and no flames or smoke issued from any of the other components in the chopper power supply, I thought it safe to assume that the cause was probably an open-circuit start-up resistor or similar fault on the primary side of the supply. There's no controller chip, which made it a little more difficult to locate likely candidates, but a few voltage checks led me to R74. It's connected to the base of Q71, and had full HT at one end and nothing at the other.

Its last stripe was green, so the value was definitely something in the megohms range. But it was impossible to determine whether this minuscule resistor's first two stripes were red/red or orange/orange. I tried all the usual tricks – trying to compare the colour of the stripes to those on a good known-value resistor elsewhere on the board – to no avail. So I put in a call to Pioneer technical, who are always very helpful.

It transpired that there are two versions of the power supply fitted in these machines. The circuit diagram for one of them has the component values marked on it. The other one doesn't. Guess which power supply was fitted in this machine . . .

After some discussion it was agreed that the way to go about it would be to fit a 3·3MΩ resistor and see if the supply started up. It did, and the whole machine came back to life and played discs without any problems. A long soak test proved that it was OK. When the unit is working normally, the voltage at the Q71 end of this resistor is about 8·5V.

I always believe in returning help from companies that still maintain proper technical help lines with qualified people at the other end of the phone, and Pioneer always does its level best to point you in the right direction. So, to finish the job off, I rang the nice man back to confirm that the player had been fixed and that he could write 3M3 next to R74 on his circuit diagram. **G.D.**

## Smartmedia DVD4032

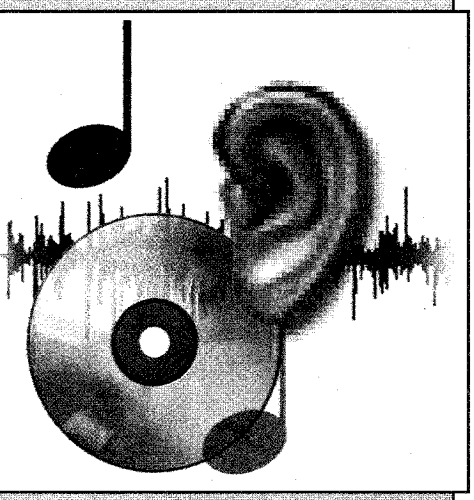
These DVD players are popular with enthusiasts as they will play any type of disc, with no macrovision. This one came in dead. There was no display and there were no functions. The first thing I noticed when I removed the top casing was that two capacitors on the power supply board, on the secondary side, were bulging at the top. This was not a good sign, as I have had other makes with similar problems and it usually means that the power supply voltages have gone high, often with catastrophic results on the video board. Undaunted, I removed the power supply board and replaced the two bulging capacitors, C7 (1,000μF, 16V) and C12 (470μF, 16V). I then tested the 1N5822 rectifier diode in this supply and found that it was quite leaky. So a replacement was fitted. To be on the safe side I also replaced the single capacitor on the primary side of the power supply, C21 (22μF, 50V). The player was then powered and tested. It worked perfectly. **G.C.**

## Thomson DTH210

This was a new machine to me. The job ticket said it was dead. I found that the mains fuse was OK and couldn't find any shorts on the primary side of the power supply. So I started to carry out checks on the secondary side, and soon found that D809 (SR160) was short-circuit. A replacement restored normal operation. **R.B.**

## Panasonic NVVHD1

This DVD/VCR combi unit had no video or DVD display and no mechanical operation. A check on the outputs from the power supply showed that the voltages were all correct. But voltage checks on the video PCB showed that the 12V supply was missing. This also feeds some of the 5V lines. Q1007 (2SC1959Y) was open-circuit base-to-emitter. **D.K.** ■



# AUDIO FAULTS

**Reports from**
**Eugene Trundle**
**Chris Bowers**
**Philip Rosbottom**
**Geoff Darby**
**and Roy Blaber**

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## Denon UD-M3

If the problem is that the CD drawer won't open you may well find that fuse PR003 (500mA) is open-circuit. Replacing it may solve the problem – temporarily! The only lasting solution is replacement of the traverse assembly, part no. 9280083806. This is expensive. **E.T.**

## Sony HCD-CP33

Poor LCD panel illumination, or complete lack of it, is now common with this music centre. It can be cured by fitting four LEDs and a couple of surface-mounted resistors – details are available from Sony. Be careful when removing the old LED assembles however. It's very easy, with a slip of the soldering iron, to damage the surface of the adjacent plastic viewing window or, worse, the LCD panel itself! **E.T.**

## Sony STR-DB940

There was no audio from the digital inputs and the blue decoding LED remained lit even when the unit was connected to a DVD player in the pause mode. Checks around the digital board inside the unit with a voltmeter revealed that the pull-up voltage on the D0 line was missing. The cause was poor soldering at the 10kΩ metal resistor R1101. A quick resolder restored normal operation. **C.B.**

## Sony HCD-EP303

There was no sound from the left-hand side of the main speakers. When I checked inside I found that the cause was poor contacts at the headphone connector board, i.e. the connections to CN301. Replacement of the board with five-stranded wire restored the left-hand audio to the main speaker system. **C.B.**

## Sony HCD-EX5

There was no CD rotation with this unit. A look at the CD slot opening revealed the cause: the ornamental plate had become detached from the mechanical panel and was touching the back of the CD – in some cases the disc can also go behind the ornamental plate. The solution is to replace the ornamental plate and mechanical panel with the new mechanical panel assembly, part no. X-4955-731-1). This will restore normal CD operation. **C.B.**

## Pioneer CT-F850

This cassette deck's reel motor had lost its power/torque. As the motor is no longer available but the deck was otherwise in good condition an alternative solution to straight replacement was required. So a capstan motor minus the speed regulator was fitted into the original housing. The original motor was a constant-speed type with centrifugal speed control. Including a 3·9Ω resistor in series with each feed to the motor kept the speed close to the original. **P.R.**

## Rotel RA820

This unit worked but the smoothing capacitors showed signs of stress – bulging tops. I replaced them with 10,000µF capacitors, twice the original value but in the same-sized case. These Rotel units and others seem to suffer from use of 'cheap-make' capacitors. They benefit from having good replacements fitted. **P.R.**

## Sony ST-5055L

This tuner, dating from the Seventies, required a blanket resoldering to restore operation of the tuning meter and reception quality. It was well worthwhile. **P.R.**

## Rotel RA610

Horrendous switch-on thumps can be stopped by adding a delay relay in series with the speaker output. **P.R.**

## Sony HCD-XB3

This unit came to us complete with a replacement laser – a genuine Sony part – and the complaint that it wouldn't play discs. I don't know why the owner had felt himself qualified to replace the laser but he had and, when he'd finished, the unit still wouldn't read discs. So he'd refitted the original laser and brought the lot to us.

The CD sub-deck in this model is accessible via a removable plate in the base pan. Once this plate has been taken off, removal of a single screw over one of the deck hinge pins enables the whole sub-deck to be withdrawn through the opening. It's connected to the main circuitry via a single flexiprint lead which is long enough for the assembly to be laid alongside the main unit on the bench. A disc can then be placed on the turntable and secured – I keep an old disc clamp magnet for this purpose. The CD player can thus be run in full view. When this was done I could see that the lens went up and down for focus search, but the laser didn't appear to be operating.

As a first move I decided to refit the new laser. This made no difference. I then removed the laser flexiprint lead completely to examine it, and found that two of the foil 'fingers' were folded back over themselves at the end that plugs into the servo board. I straightened these out and refitted the lead, but the results were still the same. So I decided to replace the

flexiprint lead as, in this model, the original is quite short and stiff and has a tendency to fracture at the sharp end, by the reinforcing strip. The replacement I use, part no. 1-757-055-11, is slightly longer and thinner and lays with a much more gentle curve. Once the lead had been fitted the unit read discs.

I refitted the original laser to see if it would work with the new lead. The disc spun, with much servo screeching, but the laser wouldn't read it and it eventually stopped with the 'no disc' message in the display. When the new laser was fitted again discs were read quickly and positively.

I've experienced a sequence of events like this before, and think that the owner probably 'double whammied' himself because of lack of experience. Almost certainly the original fault had been the defective laser but, when he had refitted the flexiprint, he probably hadn't pushed it home into the connector squarely, the result being the two peeled-back foil fingers. In removing it again and, possibly, refitting it several times, the flexiprint had fractured at the tight-bend point. After a few years these leads become fragile here anyway. From there on, with two connection problems and a faulty laser, he hadn't stood a chance.

He had actually cost himself a lot of money in his attempt at a DIY repair. According to the invoice that accompanied it, the replacement laser had set him back the better part of £60. If he had come to us in the first place the total price, including the laser, would have been little more. And he would have had a professional job done with a warranty. **G.D.**

## Sony TA-VE150

This AV amplifier had been in the workshop a few weeks previously because of an intermittent 'protect' condition, indicated in the display. As usual, all five pins of all five output ICs had been completely dry-jointed, and a blanket resolder of the whole output area had seemed to provide a cure – as it usually does. I've repaired many, many of these amplifiers with this problem, and can't recall ever having had one back, especially if the fan modifications recommended by Sony to relieve certain heat problems have been carried out. But this was the exception that proved the rule!

It was fine when first powered, but a few minutes later there was an ominous click from the output relays and the dreaded 'protect' message appeared. Poking and prodding on the PCB was inconclusive. Unfortunately the PCB has to be screwed down, and one rear panel screw has to be in place, to make the necessary ground connections, so it's not possible to retest between each board removal.

Much time was then wasted reworking the joints in the output area yet again. Eventually I decided to try to establish exactly what was making the protection circuit fire. When the fault occurred, all five output ICs had a DC offset at their output pins. This was in turn caused by an 'indicated' offset at the differential input pins. As I could see nothing that was common to the input circuitry of the five stages, I moved back to where the low-level signal processing takes place.

I found a spot close to IC100, the function control and volume IC, where the offset voltage could be made to come and go when gentle pressure was applied. After removing the PCB yet again I blanket resoldered this entire corner of the board. The problem had then been finally cured.

The reason why I said an 'indicated' offset earlier is because I don't think that the voltage was real. I believe that the cause of the trouble was a dodgy ground somewhere, allowing some point in the early stages of the amplifier to float up to an arbitrary level. **G.D.**

## Technics RS-EH750

This cassette deck is part of a four-piece EH750 system. The fault was no audio from either deck, although CD, radio etc. were OK. I headed straight for the record/playback processor chip IC101, on the basis that no audio in either channel from either deck must have a common cause.

With Technics products you often find that small electrolytic capacitors mounted close to ICs go short-circuit. So, before you start to get too technical with the fault diagnosis, it's worth going around each IC pin with an ohmmeter to see if there are any shorts to chassis where they are not expected. On this occasion I found that there was a virtual dead-short reading at pin 34 of IC101. This pin is connected to the 9V rail via two 22Ω resistors, R118 and R119.

The 9V rail has many decoupling capacitors, but they all turned out to be blameless when one leg was unsoldered from the board.

Eventually I came to Q303 and Q304. These are the bias oscillator transistors, and are connected across the 9V supply via the oscillator coil L301 at the collector side and the shared emitter resistor R307. Q303 was short-circuit.

I replaced both transistors for good measure, then reconnected all the unsoldered decoupling capacitors. But when the unit was powered again there was still no audio, because the 9V rail was at 2V.

The cause of this final problem was the 9V regulator transistor Q602. It had presumably failed as a result of the short across it caused by the faulty oscillator transistor. Curiously the 0·33Ω safety resistor R602 at the input to Q602 had survived. A new regulator transistor restored the full 9V supply and normal audio. **G.D.**

## Aiwa CX-ZA20K

This was a bizarre problem. I never really got to the bottom of it, though the unit was fully working when it was returned to the customer. The owner's complaint had been "not reading discs in position 1, OK in position 2, intermittent in position 3".

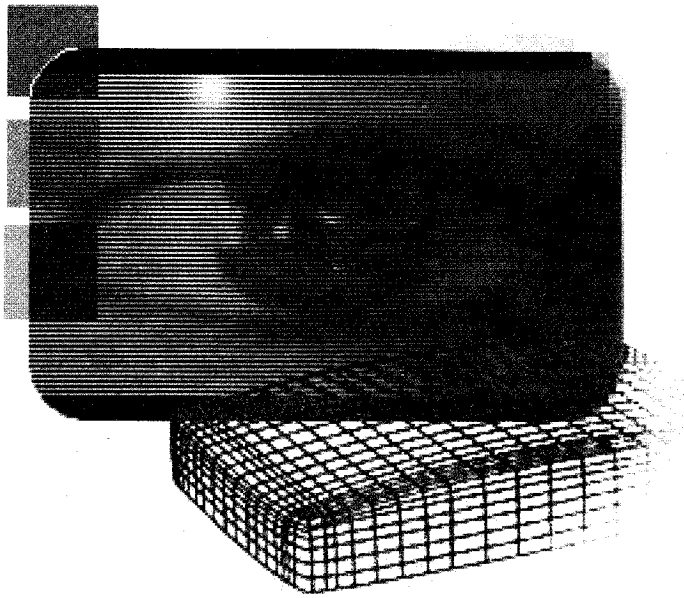
I loaded a disc into position 1 on the carousel and, as expected, it didn't play. But it did spin up, and produced lots of squealing servo noises. Just for sport I then moved the disc to position 2. It played without a fuss. When I moved the disc to position 3 it played once and didn't twice during three attempts. I repeated the whole test and found that the unit behaved in exactly the same way.

Now this situation is basically impossible with a carousel player, where the disc is picked up by the deck rising up under it. The deck and the optical assembly neither know nor care about where the disc has been picked up from, though the system microcontroller chip does of course. Before everyone starts to reach for their pens to tell me about carousel mis-positioning with Aiwas, I've got the T-shirt on that one – many times over. This was not a mechanical or positional problem of any sort. The disc was in each case picked up correctly, sat flat on the turntable and rotated freely.

As the KSS213F laser is quite easy to change I fitted a replacement, though without much hope. This action completely cured the problem however. I am at a total loss to explain why. If anyone has any ideas, I would be interested to hear them. Write to the editorial department or send us an email. **G.D.**

## Quad 33

This preamplifier produced an annoying crackle in the left channel. Careful scope checks led me to transistor TR400, which is on the plug-in board M12017 – it's the front panel of the two. A replacement BC109 transistor cured the fault. **R.B.**



# TV FAULT FINDING

**Reports from**
**Michael Dranfield**
**Philip Salkeld**
**Gary Laidler**
**Dave Gough**
**Jim Lesurf**
**Andrew Duggan**
**George Cooper**
**Roy Blaber and**
**Uel Harte**

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## Bush internet TV (Vestel 11AK20SAT chassis)

The power supply worked but the set was stuck in standby. A quick inspection revealed that R825 (100Ω) was getting very hot – which turned out to be a red herring. Not having seen one of these sets before, I decided to order a service manual. It then transpired that R825 drops the 16V supply to 5V, so it would naturally get hot.

Eventually, having checked almost everything else, I decided that the 24C08 EEPROM chip IC502 must be faulty, as in fact it was. The replacement you get is pre-programmed, so be sure to fit the right one. It's available from SEME. **M.D.**

## Sharp 28HW-53H (DA50W chassis)

The fault symptom with this widescreen set was sound but no picture. When I advanced the setting of the A1 control I was confronted with a rainbow pattern on the screen. This indicates that the field output stage isn't running, and a scope check at pin 11 of the output chip IC501 showed that there was no field drive input.

The most common cause of this is a corrupted EEPROM chip. A new one costs about £18 and is supplied blank. The default data is downloaded from the OTP chip at switch on, and it's very important not to interrupt this process – the set will appear to be dead while the data is being sent to the EEPROM. The process takes about a minute.

Sharp can however supply a special type of OTP chip that, when fitted in a set, blanks a corrupt EEPROM, after which new default data can be programmed into it. This special blanking chip costs twice as much as an EEPROM but can be used time and time again.

There are two different EEPROM-blanking OTP chips, one for use with a 3·3V supply and the other for use with a 5V supply. The blanking chip for use with the 27C4001 version of the microcontroller chip, which works at 5V, is part no. FW-SERV-JIG01; the blanking chip for use with the 37VF040 microcontroller chip, which works at 3·3V, is HW-SERV-JIG01. It is important to use the correct type. Once it has been fitted, leave the set on for at least one minute to erase the EEPROM. Then switch off, remove the blanking chip and put the original OTP chip back in. Switch the set on again and leave it alone. When the EEPROM loading process has been completed the set will come on. It takes about a minute.

When I carried out the above procedure with this set the fault had been cured. The only job left to do was to enter the service mode and set up the geometry, AFT and CRT drives. **M.D.**

## Matsui 1496R

If the picture is shifted to one side and the volume can't be turned down, with no OSD volume bargraph, check whether line-frequency pulses are present at R606. They come from a winding on the line output transformer. In this case I found that their absence was caused by a hairline crack in the print. **M.D.**

## Bush 3463NTX/4400

A word of warning about this 34in. model. To gain access to the chassis, do not remove the six screws that hold the back on. The back holds the set up: when you remove it the set will fall over on to the tube neck. I just caught this one in time.

To gain access to the chassis remove the two black screws above and below the panel, where the tube neck sticks out. This panel can then be removed and the chassis slid out. **M.D.**

## Sony KV29F3U (BE3D chassis)

This set came on all right but after a few seconds there was loss of contrast and flyback lines appeared. The screen then flooded red with flyback lines, as if there was a heater-cathode short in the CRT. While checking voltages at the CRT base I realised that the first anode voltage was too high. The cause of the fault was R722 (680kΩ), which was open-circuit. It's at

the earthy end of the A1 divider chain. **M.D.**

## Tatung T28NE51 (E series chassis)

This set's picture fluctuated, i.e. the width and height varied. Easy I thought, replace R814 (75kΩ, 0·5W, 2%) which is in series with the set-HT control. But it didn't work this time. When I contacted Tatung's excellent technical service a block replacement was suggested: CE550 (4·7μF, 50V), R435 (68kΩ, 0·5W), R436 (39kΩ, 0·5W) and D502 (1N4148) in the beam-limiter circuit. Was there any doubt about the outcome? Of course not! **P.S.**

## Alba CTV5984 (11AK19E3 chassis)

This set worked perfectly except when it was put into standby. There was then a ticking noise from the loudspeakers, as if the set was tripping. I know about R816 (1·5MΩ), but it's not present in this version of the chassis. Nothing for it but to check with Bush technical. I was told to check R811 (820kΩ), R890 (2·2MΩ), R821 (470kΩ) and R826 (470kΩ). If the values of these resistors are correct, there's a modification to carry out: add an 0·1μF, 50V capacitor between the cathode of D814 and the anode of D815. This worked. My thanks to Bush technical. **P.S.**

## Tatung T28NE51 (E series chassis)

The following information may be helpful if you don't have the service manual.

I've had two problems recently with these sets. First, volume lock. To cure this, press the remote-control unit's mute key and, at the same time, the volume + key at the front of the set.

The second set came in with the usual R814 problem (75kΩ, 0·5W, 2% in the set-HT control network), but when a replacement had been fitted there was excessive height. To correct this you have to go into the service mode.

Remove link 702 (next to the microcontroller chip IC701) then press volume + on the remote-control unit. Volume control + selects functions: brightness + and – provide adjustment. The height should be set at 09.

Press the mute key to store, then replace the link. **P.S.**

## Bush WS6674

This set, just out of guarantee, came in dead with a smell of burning. The line scan plug on the main board was the cause. I gave the area a good clean up with isopropylene alcohol, then hard-wired the scan coil leads. This got the set going, but the picture was narrow. Further investigation revealed that RV38 (2·2Ω, 1W) was open-circuit. All was well once this item had been replaced. **P.S.**

## Philips 25PT4101/05 (AA5 chassis)

This set was totally dead. As I've mentioned before, when I get this problem with a Philips set I always carry out a resistance check on the line output transistor. This one read 1kΩ between its base and emitter and the same between its base and collector, so it seemed to be OK. When the set was powered however there was a pulsing 25V supply at the line output transistor's collector. So I decided to remove it completely, to determine whether the fault was in the power supply or the line output stage. When I switched on again the 150V HT supply was present at the line output transistor's collector connection.

I checked the collector-base resistance again and found that there was a 50kΩ leak – so easy to miss when the transistor is in circuit. A check at the little scan-coil panel on the tube revealed a small burn-up here. I cleaned this and resoldered it, then fitted a new transistor. After that the set worked normally.

The line output transistor, Tr7445, is type BU1508DX (part no. 4822 13063569). **P.S.**

## Hitachi C28WD2TN

This set puzzled me for a bit. The customer complained about poor terrestrial TV pictures, and indeed the whites looked crushed – a bit like AGC overload – and the colour was weak. The customer had a DVD player, so this was tried. All inputs to the TV set via the scart socket produced perfect results. It was 5 p.m. on a Friday and, getting a bit desperate, I decided to look at the tuner section of the board. There were four blobs of glue here. Off they came and, to my surprise, a good picture then appeared. **G.L.**

## Black Diamond BDS32WS (11AK19 chassis)

We've had a few of these sets in recently with the tripping symptom. This one was no different. The line output transistor Q605 was short-circuit, R629 (2·7Ω) was open-circuit and C617 had a dry-joint at one end. I assumed that the latter was the basic cause of the trouble so, after replacing Q605 and R629, I carried out the necessary resoldering and switched on. R629 then went up in smoke.

To cut a long story short, after checking all the capacitors and silicon in the line output and EW correction stages I returned to C617 (1μF, 250V). It read perfectly when checked with a capacitance meter but, as a replacement cured the fault, it must have failed under load. The moral is: when a capacitor in this chassis is dry-jointed, replace it – don't give yourself a headache. **G.L.**

## Amstrad CTV3128N

This set was dead and the pressure was on – it belongs to my brother-in-law. As I couldn't find any shorts or signs of distress I decided to carry out cold checks in the power supply. It didn't take long to discover that R103 (47kΩ) was open-circuit. A replacement cured the fault – and restored family harmony! **G.L.**

## Ferguson 59J7 (TX100 chassis)

Field distortion was the complaint with this set. The usual culprits are C99 (100μF) and C98 (220μF), but this time they were both OK. Time to deploy the hairdryer and freezer, which soon led me to C101 (6·8μF). All was well once a replacement had been fitted. **G.L.**

## Wharfedale CTV850

The customer said she heard what sounded like a pop and lost her picture and sound. This was followed by a burning smell. A visual inspection revealed the cause: the line output transformer TR701 had a hole burnt in the top. A replacement obtained from SEME, part no. FBT40864, restored normal operation. **D.G.**

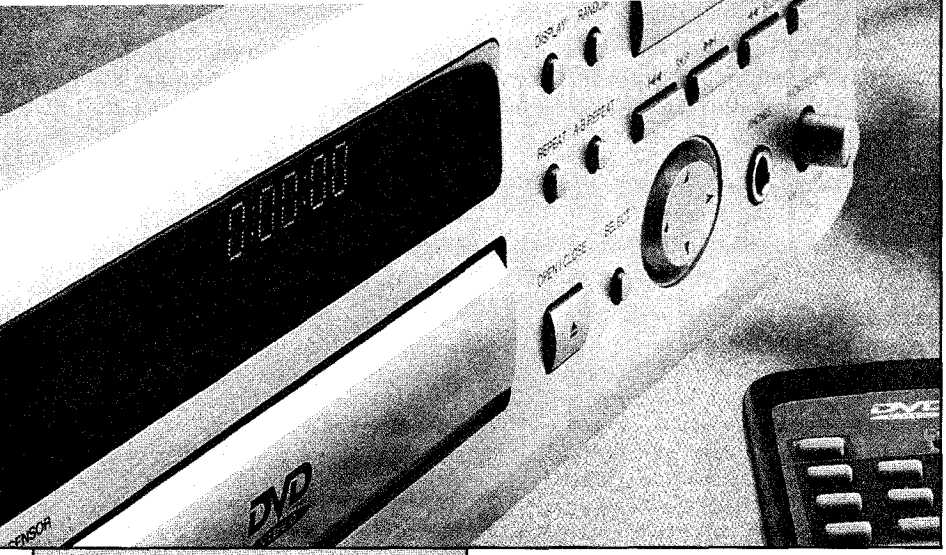
## JVC AV25S1EK (MX II chassis)

There was very bad vertical jitter, and a metallic ringing (oscillation) came from the set. The cause was not immediately obvious. It turned out, after some searching, to be a poor joint at pin 13 of the line output transformer. The reason why it was not obvious was that pin 13 is hidden under the plastic chassis-support framework. All was well once the joint had been resoldered. **D.G.**

## Bush BTV14

The picture produced by this TV/VCR combi unit at first showed all the signs of what looked like faulty heads. There was also a second problem, a tendency to go off intermittently, leaving a slow, decreasing motorboating sound as it did so. After five-ten minutes it would start again.

While I was happily banging around the chassis with a hefty-handled screwdriver the picture, when I was in the



# DVD

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## Sony DVP-S535D

When the power button was pressed this DVD player powered itself off. A look inside the unit revealed the cause of the problem: the optical block couldn't go to the initial position, because the sled motor was faulty (the sled motor is part of the optical block assembly and is not available separately). A replacement KHM220AAA/JIRP optical block, part no. A-6062-397-A, and an auto set-up restored normal operation. **C.B.**

## Sony DVP-FX1

There was no power with this DVD player. Multimeter checks on board MB90 revealed the cause of the problem: IC652 (part no. 8-752-404-72) was faulty. A replacement restored normal power on. **C.B.**

## Sony DVP-F5

This DVD player produced mechanical noise and would stop in the middle of playback. The cause of the problem was the mechanical deck/optical block AX202, part no. A-6066-015-A). A replacement and an auto set-up restored normal playback with reduced mechanical noise. **C.B.**

## Sony DVP-FX1

This DVD player's LCD screen remained black when the brightness dial was adjusted. Multimeter checks revealed the cause to be the inverter, which was confirmed by a call to Sony Technical. Replace the inverter with the new type, part no. 1-418-888-11. Make sure that the inverter is marked with a black line and that the number on it is X0530 or higher. The voltages at the inverter are high, so take care when checking and installing it. **C.B.**

## Pioneer XV-DV303

The complaint with this home cinema system was "powers up intermittently, and the timer symbol flashing". When I tried to get it out of standby a relay clicked then immediately dropped back out again, leaving the flashing timer symbol on the front panel and nothing else. I thought that this might be some sort of auto-shutdown because of a fault condition, and initially suspected something like a faulty output IC. But the period during which the relay closed was so short that it was impossible to make any measurements.

Once again those very helpful Pioneer people came to my rescue. It turned out that the flashing timer symbol is indeed a system error indicator, and that the most common cause is a failed thermal fuse at the primary side of the main power transformer. The relay that clicks is the one which supplies this transformer with mains power. When the supplies don't immediately start to come up the system controller detects this as an error and shuts the unit down again, flashing the timer symbol to indicate the failure.

It is Pioneer's belief that the cause of this problem is units being housed in poorly ventilated cabinets. I was unable to check on this, as the unit was a trade job from another dealer, but made a note on the job sheet that this should be checked when the unit was reinstalled. A replacement transformer restored normal operation. **G.D.**

## Panasonic NV-VHD1B

I had two of these DVD/VCR combi units from the same dealer. Both had apparently received recent attention at the manufacturer. The first was initially dead. I found that there was no mains voltage at the power supply because one leg of the mains connector was neatly folded under its plastic body. It wasn't even pushed through the board, let alone soldered. Once this had been put right power was restored, but the unit then showed F498 in the DVD display. This indicates the well-known flash-ROM problem, and a reflow of this device's pins (IC37001 on the underside of the DVD PCB) restored normal opeation.

The second unit had no DVD sound though the VCR sound was fine. With some DVD models you can be misled by 'no analogue sound' faults because of menu settings. With this machine however there were no relevant settings in the audio set-up menu, and analogue sound should have been present at the scart and phono sockets at all times.

On the basis that the unit had apparently been looked at recently, I decided that the first thing to do was to check for missed connections or possibly bad

joints. There's actually not much in these units by way of conventional connectors. The DVD board is directly connected to the one beneath it by means of a pair of PCB-mounted 'knife-blade' connectors. This lower board is connected to the power supply and main board by short, stiff open-wire connectors, fixed at one end and removable at the other.

Nothing was obviously amiss with these, so I set about removing the deck to have a look at the DVD PCB. Once the deck is out, you can see that the board is screwed to a metal frame which is, in turn, screwed to the chassis. After removing the three screws that secure the board, you usually have to persuade it to come off its connectors by applying gentle leverage with a small screwdriver. In this case however it just lifted off with no resistance from the connectors at all.

On closer examination it was clear that the connectors on the lower board were not high enough for the mating parts on the DVD board to push home on when the frame was in place. With the frame temporarily removed, I was able to connect the boards together properly and retest. The sound was then OK.

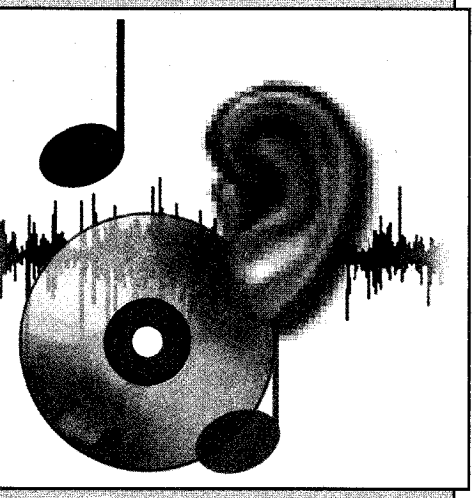
The cause of the problem was a slight bend in the lower PCB. The solution was to assemble the boards and frame together on the bench, then screw the assembly back into the case as a whole. It was possible to do this as all the fixing screws are around the edge, where you can get at them. Before putting it all back however I decided to re-sweat the flash-ROM to avoid future trouble. It looked as if one side had been done, not very well at that. I cleaned it up and redid both sides. After reassembly everything worked fine.

It's a mystery to me how the unit got the way it was. I assume that the original problem had been the old F498 flash-ROM one. This would explain why the DVD board had been removed and why there was evidence of resoldering, though why down one side only is another mystery. What I really can't understand however is how anyone who had repaired more than one of these units could have failed to spot that the very firm pressure normally required to seat the connectors on the boards, which normally link together with a good click, couldn't be applied with this one. **G.D.**

## Ministry of Sound MOS DV006

It's amazing how biased you can become in this business. This unit appeared amongst a batch of other trade repairs. I glanced at it and condemned it in my mind as the sort of cheap and nasty 'boxy' hi-fi that you buy for kids at about £40 in the local supermarket. When I finally got it to the bench however, expecting to issue a write-off note after five minutes of wasted time, I was amazed to discover that it's quite a heavy little DVD player. Once inside it I was again surprised when it turned out to be of remarkably good build quality.

The basic problem was that it didn't come out of standby. Several of the front-panel buttons felt 'wrong', so I started by dismantling the front panel from the rest of the unit. After stripping apart and then rebuilding this section, the mechanical action of the buttons felt much better. All was well when power was applied and the standby button was pressed. In fact I was rewarded with a very good picture on the test-bench monitor. **G.D.**



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## Sony STR-DB840

This unit didn't power up. A look round inside showed that the power transformer's connector CNP805 on board DC (2) required attention – the unit came to life when it was moved. A quick clean up restored normal operation. **C.B.**

## Sony CDP101

This old-timer was a first-generation player, released in the early Eighties and at the time very expensive. It's powerful, with a brilliant transport system and Aston-Martin build quality, also remote control. The years take their toll however and things can go wrong, though not a lot. A common fault is failure of the drawer to open on command: the unit goes through the motions but that's all.

Remove the lid and observe the drawer slides/guides. On close inspection you will see a small silver lever at the right side rear of the drawer's right-side rail. It should move back to allow the drawer to release, and reverse to lock the drawer in when closed. To gain access to the lever for service you have to remove the player's bottom cover. The lever will seem to be almost seized. Remove the circlip, detach the pull-back spring and spray a small amount of release agent on the pole, then pull the lever off gently. Twenty years of use and heat will have hardened the grease to a cement-like substance. A good clean and regrease solves the problem.

All grease points in a machine of this age will probably need similar attention. But it's great to work on such class gear, and owners don't mind paying. **D.G.**

## Yamaha A09

This amplifier was brought in because it was dead. After removing the cover I found that fuse F1 (1·6A) was black. Meter checks then confirmed suspicions that bridge rectifier diodes D601/2 (1N5402) were short-circuit. Once replacements had been fitted and further checks had been carried out all was found to be well and the unit powered up and worked correctly. **D.G.**

## Sony CDP-CX235

The reported fault was failure to play CDs: the unit would load a disc but not play it. I found that a disc wouldn't spin because there was no focus or sled movement. So I tried one of my usual tests in this situation: I moved the laser manually to the outside of the disc and switched on again to see if the laser returned to the beginning. It didn't.

Heating board BD produced some results. Application of freezer stopped operation again. Inspection of the board revealed some very poor looking soldering to the CXD2587Q digital signal processor chip. A reflow of the solder around this chip restored normal operation without need for IC replacement. The machine was returned to the customer after several days on soak test and never came back. **M.L.**

## Kenwood DPR28

The owner's complaint with this carousel-type five-CD player was that "when five discs are on the turntable they stop short of the position where they are picked up to be played". This seemed to be a very precise description and, as the owner is a police officer, one I was inclined to believe – though a part of me was sceptical. In fact the unit always played correctly with one or two disks loaded, but the carousel positioning became unreliable with three discs loaded. With four discs it became iffy, and with five downright erratic. As more weight went on the carousel the motor seemed to labour, which suggested that there might be a power-supply problem. The unit is part of a stacking system and is fed with low-voltage AC from the amplifier unit via the bus cable. It contains rectifiers, smoothing capacitors and regulators. I soon discovered that the problem corrected itself when the PCB was pressed in the vicinity of these devices.

To get the PCB out to examine its underside is no mean feat. The tray has to be removed from the changer assembly to gain access to two of its securing screws. Many connectors have to be unhitched, including more than enough of those dreadful stiff-wire 'snatch' types. Once the board had been removed I was able to home straight in on C501, where there was a whopping cracked-all-round dry-joint at the positive leg. While the board was out I decided to give it a good examination, using my headband magnifier. An alarming number of iffy joints were to be seen, many of which were fully cracked. A few years ago I would have spotted them at a hundred paces with the naked eye!

A blanket resolder, followed by refitting the board and tray, provided a complete cure. **G.D.**

## Sony HCD-H1600

This old-timer led me a merry dance. When it was powered a loud hum, unaffected by the setting of the volume control, came from the speakers. Scope checks in the power supply showed that there was huge ripple on the +12V rail and a lesser amount on the –12V rail. My ESR meter quickly proved that all was not well with C285 (4,700$\mu$F, 16V), the reservoir capacitor for the +12V supply. C286 (2,200$\mu$F, 25V), the reservoir capacitor for the –12V supply, read OK even though the scope had shown that there was considerable ripple at its negative terminal.

There was a sizzling sound when I applied my soldering iron to C285's joints, and my nose was assaulted by the immediately-recognisable smell of fuming electrolyte. When the capacitor had been removed I saw that it had indeed leaked. Several tracks pass under the capacitor, and there are through-plated holes nearby. The tracks had been stripped of their solder resist and looked very dull. There were no signs of distress in the vicinity of C286 when it had been removed, but I decided to fit a replacement before reassembling the unit.

I cleaned the leaked electrolyte from the tracks carefully, and spent some time with a strong light, magnifier and an Avometer set to the ohms range to see how much damage had been done. It was clear that the negative terminal of C285 and the positive terminal of C286 were no longer connected together or to chassis. I reinstated these connections using fine, insulated etch-revision wire. As there didn't seem to be any other problems I fitted new capacitors and, confidently, switched on. I was rewarded with a loud hum!

Out came the board again, then the two new capacitors. After a lot more Avo checks I found a through-plated hole that links an area of earth print on the top of the board to an area underneath. The reading between these two earth areas was about 1kΩ. Bridging the hole restored good bonding between the two earth areas, so the new capacitors went back in and the board was refitted. Guess what? When I switched on I was greeted with a gentle hum, which this time was affected by the setting of the volume control. Further scope checks showed that there was now no excessive ripple on any of the supplies, so I began to look at what I had done during the course of the repair.

When I had restored the connection between the two capacitors and from there to chassis I had picked a point, which was conveniently marked 'Gnd', at one of the board's connectors to terminate my rework wire. This point had read perfectly to chassis, and had clearly restored a good earth connection to the capacitors, because the ripple across them had disappeared. In view of the fact that since fitting this wire I had found another problem, in the form of the bad through-plated hole that had now been bridged, I decided to disconnect my added wire and see if the capacitors still had good connections to chassis. They did! So I removed the wire completely, then switched on. This time there was silence!

A final check on all functions showed that the unit now worked correctly in every respect. **G.D.**

## Luxman L309

There was no output from this 75W amplifier, another classic from the Seventies. Each power amplifier plugs into the main board – great idea! I found that the driver and output transistors were all short-circuit. The driver transistors are TO66 types that are not available, so I replaced them with TO220 transistors obtained from RS. Cut down (to TO220) heatsinks were fitted to the transistors as without a heatsink they run hot. The output transistors were replaced using MJ15015/16 pairs. **P.R.**

## Technics RS630T

This cassette deck was running the tape at high speed. It seemed that either the capstan motor's speed regulation had been lost or the take-up reel was pulling the tape too fast. I found that the spring had come off the pinch wheel. Refitting it cured the fault – after a struggle to keep the spring in position while slipping the wheel over the pivot! **P.R.**

## Sony TA-E77ES

This high-end preamplifier's phono socket outer connections were being lost – they were working loose as a result of plugging/unplugging. The top row of the sockets can be held by soldering a length of braiding along the line of the spigots at the back of the sockets. As the unit also produced spurious howling/oscillations, the braid was continued to earth points on the chassis. The case of the volume control was also earthed. The chassis is made of polymer resin, which could account for these problems. **P.R.**

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## Sony DVP-CX860

The fault with this unit was intermittent no power-on. Checks inside revealed that C301 (680$\mu$F) was faulty. To cure the intermittent failure the replacement should be 1,500$\mu$F, part no. 1-137-921-11. **C.B.**

## Sony DAV-S880/HCD-S880

When this unit was tuned to a station broadcasting RDS information the registered station's name would disappear. The cause of the problem was microprocessor IC901 on the DVD board. A replacement, type $\mu$PD703033BYGF-M31-3BA, part no. 6-803-244-01, restored the missing station names with RDS. **C.B.**

## Sony DAV-S550/HCD-S550

There was no operation with this DVD unit – it was stuck in the protection mode after a mains power blackout. I'd had this fault before with an HCD-S880. All that was required was to check on the power board, where the cause was confirmed as being C921 (2,200$\mu$F, 35V). A replacement restored normal operation. **C.B.**

## Sony DVP-NS330

The complaint with this DVD player was "makes a background noise with all discs". There didn't seem to be a problem at first, so I left it running for a while then removed the top cover to have a probe around. There was an odd rustle from the sound when the MPEG board was pressed, and the stereo 'spatial' feel changed. At first I thought that this was going to be a real nasty, such as a bad through-plated hole or a poor joint at one of the several 100+ pin ICs.

More careful prodding led me to connector CN601 however. It connects the MPEG board to the main board, and is an uninsulated open-wire affair – those with children will understand the description that it looks like the teeth of a metal nit comb set in a plastic frame. The 'teeth' had been subjected to a knock at some time. This had put a dent in them, drawing several of the conductors very close together at that point. So close in fact that two were just about touching. You could instigate the noise by literally blowing on the connector.

After disconnecting power from the player I was able to straighten the conductors easily by slipping a scalpel blade down between them and twisting it until separation was restored. This action provided a complete cure. **G.D.**

## Sony PlayStation 2

We have two of these at home. They've never given any trouble, so I have not previously had cause to look inside one. This unit had arrived in a bundle of other items from an engineer who specialises in TV and video – he tends to leave his HiFi and DVD repairs to me. The owners had been using the machine for normal DVD playback as well as for games. According to them it ceased to read discs after they had had some particularly dusty building work done.

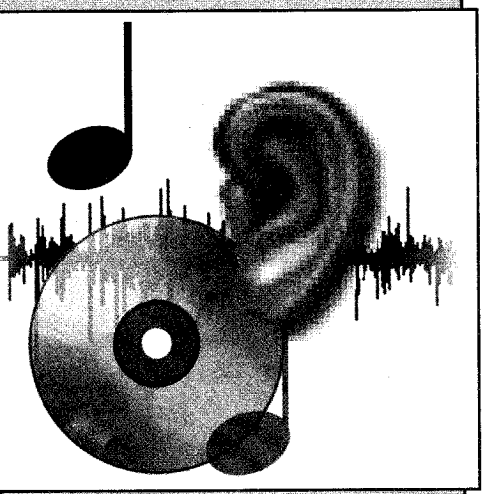
The unit proved to be very easy to take apart: remove six screws from underneath, four covered with clip-in plastic blinds and two with rubber feet. The DVD deck has its own plastic cover, which is secured by four very small Phillips screws. Once the cover has been removed the whole deck is in plain view, including the laser, as the disc clamp is part of the cover.

The deck, and the laser lens in particular, was very dusty. So I set about carrying out a full clean and relubrication. The laser unit is of a type I had not seen before, so I had no experience as to whether a clean was going to be enough. Once the unit had been reassembled however both game-play and regular DVDs were read faultlessly. A long soak test proved that this reading was reliable. **G.D.**

## Hitachi DV-P325E

This machine was completely dead, with nothing alight in the display. Checks on the secondary side of the power supply showed that there was a short across the 9V output, between the cathode of D1030 and chassis. The diode and its reservoir capacitor C1035 were both OK, the culprit being D1048, which is a zener diode.

Replacement of the diode is not easy: you have to remove the front of the machine to gain access to the PCB to unsolder it. Now maybe I missed something here, but getting the front off with the disc tray loaded is almost impossible. You end up with numerous removed screws and a pile of bits they wouldn't be able to piece back together on the Krypton Factor in two hours, let alone two minutes! Things got better however when, after replacing the diode, the machine powered up in its stripped-down state. All was then well. **M.L.**



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## Sony TA-VE100

This is a surround-sound 'multi-amplifier'. The problem with it was intermittent crackling and cutting out – probably because the overload-protection circuit was coming into operation. On investigation I found that there were dry-joints at the leadouts of two of the four power-amplifier chips, and at the legs of the two 12V regulator chips IC402 and IC403. The leadout wires of these warm-running devices should be double-kinked to take thermal expansion into account: this would remove the stress from the soldered joints. **E.T.**

## Denon DRA265R

No sound was the problem with this amplifier. Checks around the sound output transistors revealed that TR323 (2SA1633) was short-circuit collector-to-emitter while TR317 (2SD667) had been getting very hot. In addition R329 (330Ω), R331 and R333 (both 0·22Ω) were either open-circuit or burnt. Normal operation was restored by replacing these components and attending to various dry-joints, which I think were the initial cause of the failures. **R.B.**

## Peavy Studio Pro 112

"Loud buzzing without any other sound" said the report that accompanied this Chinese-made guitar amplifier. The point was proved when it was plugged in, the very loud hum confirming that there was at least a power-supply fault.

Construction differs from most audio equipment. The pre- and power amplifiers, control circuitry and power supply are built into a chassis that's housed at the top of the unit. A separate unit for reverberation etc. is mounted at the bottom of the cabinet, with the heavy-duty speaker front-mounted. At the rear there are sockets for special effects, remote operation and an external loudspeaker. Clearly the cause of the problem lay in the main chassis, which had to be removed (several screws plus leads to the lower chassis and the speaker) before diagnosis could begin.

Once this had been done I was surprised to find that the bridge rectifier had overheated to the extent that its case was being melted. I replaced it and the associated reservoir capacitors but the fault was still present. Attention was turned to the output section, where I found that some 40V DC with a high ripple content was present at the output terminal of the LM3886T power-amplifier IC. As this was directly coupled to the loudspeaker it was evident why such a loud hum was present!

A replacement LM3886T chip cured the fault but left me wondering what had caused the failure in the first place. It was likely that a short-circuit external speaker cable had damaged the power amplifier IC, overloaded the positive and negative power supplies and led to failure of the bridge rectifier.

The power-supply design is interesting, being based on a transformer with a centre-tapped secondary winding. The centre tap is used in conjunction with the bridge rectifier, which is fed from the ends of the secondary winding and provides separate positive and negative supplies. **D.I.S.**

## Marantz CD73

Having seen how much these 20-year old CD players are being sold for on the internet I decided to retrieve mine from the back of the cupboard and power it up. There was no illumination from one of the track-indicator LEDs and hum in both channels. When a CD was played there was considerable distortion in both channels. Several years earlier I had cured a similar distortion fault by replacing the LM317T 5V regulator and ensuring that there was thermal grease between this IC and the heatsink. This time I replaced all the electrolytics, using 105°C capacitors. This cured the hum, the distortion and the lack of light from the track indicator LED.

These capacitors lead a hard life, as they are next to a heatsink that runs hot – the player consumes 45W. Incidentally the service manual shows that the decoder is fitted with Philips ICs, but in my CD73 a Sony decoder board is fitted.

Now that it's fixed, what am I bid?! **K.W.**

## Technics SU8055

One of this 50W amplifier's channels had failed. Replacing the encapsulated output transistors restored normal operation – they are similar to the STK module package. **P.R.**

## Yamaha CR1000

This classic tuner-amplifier from the Seventies didn't produce any output. You first have to remove the chassis from the wooden sleeve. Make sure that the tuning cursor is towards the left-hand side of the scale, or a bracket will rip the wires from the pointer bulb. Remove the screws at the left- and right-hand sides of the front, and two screws just behind the tuner PCB. The whole of the front then pivots upwards, revealing the power supply PCB. The front two transistors are +/– regulators for the supplies to the driver stages in the power amplifier. The right-hand one (+50V) dies because of an inadequate heatsink.

Another of these units had low output with distortion. At the back of the power-supply board there's a mute signal (MU) that swings from about 0V to –15V at switch on. Two wires are connected to this. One goes to a PCB that swings up with the

chassis, to mute the preamplifier output. I never did find out where the other one goes to, but there's a similarly coloured wire on the tuner PCB. This second wire produced a low-resistance reading to chassis. Leaving it disconnected cured the fault and didn't cause any problems. **P.R.**

## Akai GX912

This is a semi-pro cassette deck that dates from the late Eighties. During eject the left-hand pinch wheel fouled the cassette holder. The grease on the pivot had solidified, which prevented the mechanism from returning to the rest position. Stripping and cleaning provided a cure. **P.R.**

## Sony TA88

This mini-amplifier dates from 1975. The right-hand channel produced terrible noises. I found that the two input transistors on the power amplifier PCB had horrid dry-joints. Blanket resoldering gave the unit a new lease of life. **P.R.**

## Sony MZ-R501

When this personal MD recorder came in the season for 'sand in the works' had just ended. I don't know in which part of the world the MiniDisc sand-burying championships take place, but wherever it is the grains are microscopic and exactly the right size to fit in all the gear teeth . . . This one had been rejected elsewhere as being beyond economic repair. Over the years I've repaired many of these recorders because of the sand problem, and have never found one to be uneconomic to repair. What is needed is a fair amount of patience and, if your eyes are anything like mine, appropriate optical assistance.

It's not a particularly lengthy job if you strip the unit properly. You will need to remove the lid from the upper chassis, the bottom cover, the PCB and the main chassis from the sub-chassis. When the main chassis has been separated, remove the laser unit and its drive gears. All this should take no longer than fifteen minutes.

You now need to employ a strong light source and a bench or head-band magnifier, a soft brush, and a scalpel tip to remove the sand grains from everywhere they have lodged. You must, at this stage, make your best effort to find every last grain and get it out. If you leave as much as one stray grain in the unit, I guarantee that it will find its way into a gear tooth two days before your repair warranty runs out.

Check wherever there is grease very carefully, particularly behind the door-catch slide. Check gear teeth in minute detail. The tiniest obstruction here will cause trouble as the motors, being so small, are only just powerful enough to do their job.

Once you've removed every grain that you can see, I recommend that you take a coffee break and let your eyes settle for a few minutes. When you return to the bench, check all the components again. You will inevitably find a couple of grains that you missed the first time round. The clean-up procedure normally takes 20-30 minutes, including coffee.

Finally, rebuild the unit in the reverse order, reapplying grease wherever you've cleaned it off. When the deck has had the laser refitted, check that the optical block runs smoothly up and down its track. Also check that the overwrite head up/down drive and motor run smoothly.

Once the unit has been fully reassembled, run the auto-diagnostic/set-up program. This should be done after any repair to a personal MD player, particularly after a major mechanical rebuild. This will ensure that correction is applied for all deck and electronic tolerances. Note however that the program can be run successfully only by using the official Sony test discs. While other discs may appear to work for some tests, the results can be unreliable.

If you've worked on the job steadily, the grand total of time taken should be about an hour. I've found that the owners of these recorders are prepared to pay well for a repair. A replacement is expensive, and your repair bill is likely to be less than the excess on their insurance policy. **G.D.**

# DVD

**Fault reports from Chris Bowers and Geoff Darby**

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## Sony DVP-NS705V

This DVD player was dead, i.e. there was no power up. Multimeter checks on the power board showed that IC101 was short-circuit. As a result, D103 had gone open-circuit. A check with Sony revealed that IC101 has to be replaced with a new, improved device, part no. 9-885-030-35. I managed to obtain a replacement diode from a spare board in the workshop. This was fortunate, as the diode is not available from Sony as a separate part: a full power-board block has to be ordered. Replacement of the two items restored normal operation.

Note that power boards with part nos. 1-468-648-12 and 1-468-651-13 are already fitted with the new IC. **C.B.**

## Sony HT-BE1

At power up this unit produced a load chirp from all the speakers. The cause of the problem was C914 (47$\mu$F, 50V). Simply replace it to restore the normal power-up sound. **C.B.**

## Aiwa HT-DV90HK

The job ticket said that this home-cinema unit "went bang". In view of this suggestion of violent behaviour I removed the top before applying power. As visual inspection of the chopper power supply didn't reveal any major problems and the mains fuse was intact, I plugged in. The power supply remained dead.

I then checked with an ohmmeter between each pin of the mains plug and each pin of the power supply's mains input connector, and found that there was continuity between the live pin of the 13A plugtop and the blue wire going to the power supply and between the neutral pin and the brown wire. Oh dear!

The 13A plugtop is actually an adaptor that links the moulded-on 2-pin Europlug (non-polarised) and a standard UK plug, enabling the manufacturer to use the same mains lead throughout the EU. The top of this adaptor hinges open when the screw is undone, the 2-pin Europlug sitting inside the space with its pin tips connected to a pair of brass hooks that are connected to the 13A pins. I've never been happy with this arrangement, as the Europlug can be reversed within the body of the adaptor. This probably isn't a problem with transformer-isolated equipment, but could be with a chopper power supply – depending on the front-end design. Whether the adaptor had come from the factory like it or whether the owner had undone it and inadvertently reversed the Europlug is hard to say. If he was looking for a fuse, the one concerned is readily and clearly accessible from outside the adaptor. In my opinion the screw that secures the adaptor should at least be a tamperproof type, not a regular Phillips-head type.

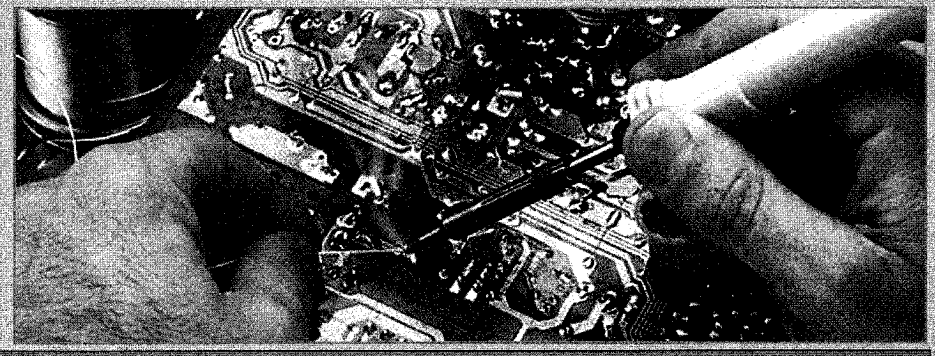
Having fitted the Europlug the right way round and confirmed that the live pin was now connected to the brown wire, I removed the power supply from the unit. There's a plastic cover under the 'hot' end of the PCB. Through this two added components could be seen, with large amounts of black glue around them and stuck to the cover. There was a nice blast mark between them.

I finally managed to unstick the cover and clean up around these components, then saw that about 1cm of print between them had been vaporised. They appeared to be resistors which were soldered to tracks that came directly from the vicinity of the mains bridge rectifier. The bodies of these resistors had been sleeved but, unbelievably, the legs had been left as bare wire. Where one of these was pressed right down to the PCB it had shorted to an adjacent track and blown it out.

When you consider the onus that is placed on us as engineers to carry out reliable and, above all, electrically safe repairs, it beggars belief that manufacturers can get away with such poorly-executed modifications, which are at best going to be unreliable and at worst downright dangerous.

Once the positions of the resistors had been redressed and the exposed legs had been sleeved I repaired the blown-out printed track. After that the unit came to life and worked normally.

As a final point with this repair, two very thin flexiprints connect the front panel to the main PCB. They pass over the power supply, lying against a heatsink that runs too hot to touch. There was just enough slack to pull them to one side and Tywrap them to the power supply's output harness. I also noticed that every hotspot in the power supply has an electrolytic capacitor sited by it, and that there are no cabinet ventilation slots over the power supply. So the units should be good earners in the not too distant future, when these capacitors start to fail. **G.D.**



# Bench Notes

**Engineers are occasionally tempted to tackle a repair that's obviously going to be uneconomic, maybe out of interest or for their own/family use. Adrian Gardiner describes such a job, with a Panasonic home cinema system**

## Engineering madness

I know few people in this trade who, at some point, haven't suffered from a moment of madness. You know the sort of thing – that totally scrap unit sitting on your bench, fit only for the skip, but somehow you feel tempted to repair it. One such item adorned my bench recently, a Panasonic SAHT70 DVD home cinema system with a five-DVD auto-changer mechanism. The unit had been struck by lightning, and the customer's insurance company had paid for a replacement. I had acquired the scrap unit and decided, during a brief lapse from normal business sense, that it would look rather nice in my living room. So I set about removing the lid in order to investigate further.

## The power supply

The unit was completely dead, and a quick inspection of the power PCB revealed a scorch mark and several vaporised printed tracks. As with other models in this series, power is derived from a large transformer. It has multiple wires and is brought into circuit by a relay that's operated by the microcontroller chip. A separate transformer, T502, provides a standby supply via a 5V regulator circuit that's based around Q592. It was in this area of the circuitry that the vaporisation had occurred: Q592 itself had gone short-circuit.

I replaced Q592 and remade the missing tracks. But when I tested the unit it was still dead. A quick check at the output of the regulator produced a voltage reading of only 1·5V. So it was obviously severely overloaded and, as it supplies power directly to the microcontroller chip IC601 and its associated circuitry, I came to the conclusion that this IC had suffered during the lightning strike and was in need of replacement. It's a 100-pin flat-pack device which is mounted on the front PCB. To gain access to this when the unit is dead you first have to open the tray. A special hex tool is required for this purpose. You insert the tool underneath the unit and turn it clockwise to open the drawer.

The 5V standby supply was normal once a new microcontroller chip had been obtained and fitted, and the standby LED on the front panel lit up. Pressing the power switch had no effect however. Checks around IC601 revealed that its reset pin 18 was being held low permanently. Reset is provided by the digital transistor Q601, which was short-circuit collector-to-emitter. After fitting a replacement I found that the power switch, when pressed, now operated the relay to activate the main power supply.

I was greeted with the Panasonic welcome message in the display. This was followed by immediate shutdown of the system, which reverted to standby. Clearly some kind of protection mode was in operation, but testing was going to be difficult as there was an on period of only two seconds.

A multi-regulator chip, IC502 (type STK470-050A), provides the main supplies in this model. Cold checks around it revealed a faulty PCB-mounted fuse, FP549. Hoping that I would be lucky, I replaced this fuse and reapplied power. Naturally the fuse immediately failed. So an order for a new STK470-050A regulator went off to Panasonic.

The regulator is mounted on the main PCB and, to gain access, a complete strip-down is required. The replacement duly arrived and was fitted. At last the power supply ran normally and the unit remained on. It accepted and read a DVD disc, but several faults remained. There was no audio from any of the outputs, including the auxiliary sockets; the remote-control system didn't function; and the five-disc auto-changer didn't work correctly. Returning to the front panel, I found that the remote-control problem was easy to solve – by replacing the IR sensor Z601.

## The mechanical problem

I decided to tackle the mechanical problem next. The unit would load a disc correctly. But when it was asked to change to another disc it 'parked' the first disc successfully then jammed. The cause of this was the disc-change solenoid, which failed to operate. Checks in the solenoid's drive circuit revealed a short-circuit transistor. A replacement sorted out the mechanical problem, but not the missing audio one.

## Loss of audio

The audio output from the DVD module is fed to the digital signal-processor (DSP) board. Here the analogue audio switch chip IC802 selects an input from either the DVD mechanism or the tuner pack. Checks showed that there was no output from this IC. Once a replacement had been fitted there was normal audio at the auxiliary output sockets, but elsewhere there was still no audio.

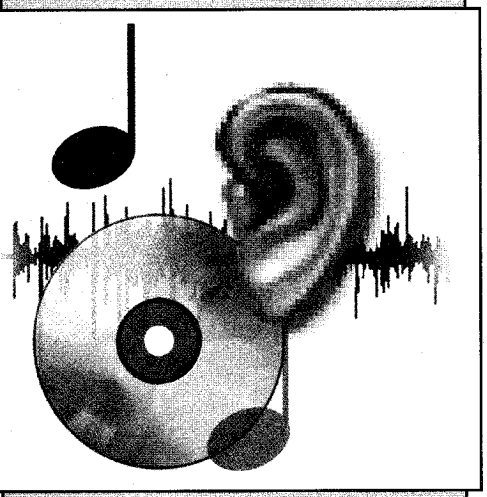
The unit uses a number of M5228 surface-mounted operational-amplifier ICs. These are common in Panasonic and Technics equipment and are prone to failure. I found that one such device, IC803 on the DSP board, was faulty. After its replacement there was normal audio from the front left-hand channel but from nowhere else. Turning my attention to the main panel I found another defective M5228 chip, IC402. Replacement of this restored normal audio to the front speakers, but the surround-sound, sub-woofer and centre channels remained dead.

Extensive checks in the audio circuitry failed to reveal anything amiss. The only other clue was that the volume control behaved erratically. So I came to the conclusion that the digital signal processor chip IC801 on the DSP board was defective. A replacement was ordered and subsequently fitted, after which I was delighted to find that the sub-woofer and centre channels were now OK and that there was normal volume-control operation. But there was still a problem with the surround-sound rear channels.

There's a small input board, which contains the scart socket etc., on the rear panel. Checks here showed where the surround sound was being lost. It passes through another M5228 op-amp, IC103. So a replacement was fitted.

## Success at last!

The DVD home cinema system was at last fully operational. My sanity was also restored – until the next time! ■



# AUDIO FAULTS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**Eugene Trundle**
**James Grant**
**J.S. Ogilvie**
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## Phoenix Gold ZX450

This large car power amplifier was basically dead, which is often the case when one of them is brought in for repair. I've found that there is a general lack of understanding amongst engineers of the principles involved with these units: this tends to put them off wanting to take a look. At a first glance they do tend to look very complex inside. They are rather less daunting when you realise that two thirds of the transistors or FETs bolted to the heatsink are part of the switch-mode power supply.

The reason why a switch-mode power supply is required is that the output powers quoted by the manufacturer, and desired by owners, from the huge speaker system simply cannot be achieved with a nominal 12V supply. Assume that 4Ω speakers are used. With a 12V supply the maximum current that could be driven through the speaker coils would be 12/4 = 3A. This would equate with a maximum theoretical power of 36W, which is nothing like the hundreds of watts often claimed. The switch-mode power supply boosts the 12V input to typically ±20V. The theoretical power then becomes 400W (current through the speaker coils 10A). Allowing for system inefficiencies, 100W RMS can easily be attained.

You don't get "owt for nowt" of course in this world. For the switch-mode section to deliver the sort of power required by the amplifier proper, the DC input power requirement is huge. This is the reason why these amplifiers have input fuses that the Electricity Board would be proud of, and power terminals to which you could connect welding cable (the owners often do . . .). It's also the reason why you may find up to ten switching transistors connected in parallel, and why the majority of faults occur in this area rather than the output stages, which are quite reliable.

You will often find that there's a blown fuse and one or more of the switching transistors is short-circuit. These are usually FETs, and are readily available from your normal general component supplier. When checking them, don't get carried away looking for the same readings across them all. If you look a little closer you may well find that some of the TO220 packages are actually double diodes – the secondary side rectifiers. If you find short-circuit FETs, check for burnt-out print tracks and open-circuit current-sharing resistors.

The cause of the vast majority of faults is easily found by checking as above. On occasion however you may find that the chopper control chip has failed. This can lead to the demise of the switching devices so, once you've replaced any faulty ones, you should attempt to trace the drive to them and disconnect it. Repower, remembering to bridge the 'remote' terminal to +12V, and check that drive pulses are present.

The fuse in this particular Phoenix amplifier was intact. The switch-mode control circuit was on a separate board, and a scope check showed that it wasn't producing drive pulses though the 12V input was present. Further checks on this board revealed a distinct lack of volts anywhere, other than at the input pin. While following the print round I came to a ZTX490 transistor that's controlled from the 'remote' input terminal. This transistor was short-circuit base-to-collector. A replacement restored normal operation.

It transpired that the owner had been attempting to fit a fancier fan, with rotating blue LEDs on it. Such things are available as accessories. He had been trying to connect it to the remote-control circuitry when the failure had occurred . . . **G.D.**

## Technics SU-X990D

The owner's complaint with this heavy hi-fi amplifier was "powers up but no output; crackling before, but was working". A fair amount of dismantling is required to get the main PCB out to examine its underside. Once I had reached this point and turned the PCB over I came across one of the worst cases of heat-stressed joints I've ever seen. Just about every semiconductor device on the board, both power and small-signal devices though, curiously, not the output hybrid, had cracked or crystallised joints on all legs. The worst were at the devices mounted on heatsinks. There was also similar trouble at the legs of more than a few passive components.

A lengthy blanket resoldering operation, followed by a close inspection using a strong magnifying glass, restored the amplifier to its former glory. **G.D.**

## Grundig M5C

What's that then? It's a smart-looking music centre and it worked well, except CD music playout stopped after one-two hours. The fault was in the laser unit, type KSS-213C. We replaced it with a bargain from CPC: order code AS00201 brings you the complete CD deck, with two motors and the laser assembly, for £13.50 (at the time of writing) net. **E.T.**

## Sony HCDH1600

This CD player attempted to spin up and read a disc but didn't, eventually saying "no disc". When I tried to open the drawer to get the disc out and see if the lens was dirty it wouldn't open, and a hum came from the speakers. There was also a smell, like electrolyte, from somewhere around the regulator circuits.

A close visual inspection failed to reveal anything amiss, and scope checks on the supply lines for any excessive ripple also drew a blank. Time to dig deeper. There's a row of electrolytics beneath the regulator heatsink. C280 and C282 (both 100µF, 35V) were leaking electrolyte and had damaged the print running through beneath their legs. Everything worked again once I had repaired the missing print and replaced the two electrolytics. **J.G.**

## Sony ZS-D50

This is a portable radio-cassette-CD player unit. The problem was that the tape jammed in the loaded position. This happens when the capstan belt, part no. 3-029-598-01, slips off. As a precaution, fit a complete set of belts. **J.S.O.**

## Kenwood SE-A551S

This three-year old AV control centre came in because its volume control was dicky. It's the first time I've had one of these in for repair, and I was very glad that the volume potentiometer was easy to get at. It lives on a little sub-board that can be removed without disturbing anything else. The part no. is T99-0559-05. **M.S.D.**

## Sony STR-DB930

This unit failed to power up. Checks inside with a voltmeter showed that the cause was the display controller IC102, part no. 8-759-641-15. There was normal operation once a replacement had been fitted. **C.B.**

## Sony HCD-CP300

Cassette playback was slower with deck A than deck B. The cause was the cassette mechanism itself, part no. 1-796-078-11. A replacement restored normal playback. **C.B.**

## Sony STR-DE475

There was no sound from this stereo FM/AM receiver's left and right surround-sound speakers. Checks on the main board, on the B side, revealed dry-joints at RY550 and RY601. All was well once these two relays had been resoldered. **C.B.**

## Sony PMC-303L

This personal component system made a skipping sound and wouldn't play CDs. The cause was the KSS-213B optical pick-up unit, part no. 8-848-379-31. A replacement restored normal operation. **C.B.**

## Sony HCD-CP333

There were missing segments in the characters displayed by the LCD panel. Checks on the main board, using a voltmeter, revealed that the cause was the system control chip IC601, not the display control chip IC602. A replacement, part no. 6-800-361-01, restored correct operation. **C.B.**

## Technics SL-QX200

This direct-drive turntable's arm lift didn't work. The actuator had come out of the lever/slot under the arm mounting. **P.R.**

## Technics RS-M253X

The mechanism didn't do anything, because the large square belt that drives the gear assembly for the functions was stretched. A replacement from CPC, 2mm by 51mm, restored normal operation. **P.R.**

# DVD

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## Aiwa HT-DV90K

A lot of engineers I know don't seem to like Aiwa equipment. But in general I've had no problems with overall build quality, performance or design. It's rare to get a fault that can't be fixed, or to find that a problem is difficult to work on because of poor mechanical design. This item was particularly noteworthy. The problem was simple enough, a defective laser, but it's got to be the easiest one in the world to change, bar none!

Once the unit's case has been removed the top of the deck is completely exposed. To remove the laser you take out a single screw at the end of the slide rod and disconnect the ribbon cable. The replacement is just as easy to fit, after swapping the plastic rack from the old one. Remember to unsolder the two very easy to get at shorting points at either side of its PCB after plugging the ribbon cable back in.

Aiwa parts are now supplied via Sony. The laser was very reasonably priced, making the repair economic – something that's becoming increasingly rare with DVD players. **G.D.**

## Technics SL-HDV600

This four-piece DVD/hi-fi system refused to read any discs, DVD or CD, and displayed error code H02. This indicates spindle motor trouble. The motor did in fact feel rough and stiff and in need of replacement. It's not supplied as a separate unit, coming pre-fitted to the plastic deck chassis (item 307 in the exploded view) with the turntable already fitted. A number of items have to be swapped from the old chassis to the new one. These include the optical block, its slide rods, clips, bias springs and screws, two gears and the suspension rubbers. Several other gears are pre-fitted, also the optical block tilt-adjustment screws.

I changed all these items over and refitted the deck. Then I tried it, only to have exactly the same problem. This is not uncommon, the usual cause being that the surface-mounted driver chip IC2501 (BA5823FM) on the board under the deck has been damaged by the faulty motor. Be careful when you order the replacement, as the other chip on the board is designated IC5201. If you want to be reasonably certain that the IC is faulty before you order a replacement you can check with a scope, set to DC, connected to TP5210. This is pin 17 of the flexiprint connector on the PCB. The signal here is called 'Spdin', and is the control signal to IC2501 to start the spindle motor. Once focus has been achieved, this line will shift level. If it does, and the spindle motor doesn't start, there's a good chance that the IC is faulty.

Once I'd fitted the replacement the unit read and played all discs correctly. One final task remained – to set the optical block tilt. This adjustment must be carried out whenever major mechanical work has been done on the deck, such as in this case where the slide rods had been swapped over and sat on arbitrarily adjusted screws. Fortunately it's easy to do.

Insert a DVD disc and allow it to be read. Then stop the unit and press the front-panel 'stop' and remote-control button '5' simultaneously. This will bring up the jitter display. Press 'play' and confirm normal playback. The first three figures in the display represent the jitter percentage, for example 092 indicates 9·2 per cent.

Once the disc is playing, move a few chapters in and confirm that a reasonably steady jitter figure is displayed. Next gently insert a 2mm hex wrench (Allen key) into one of the three holes in the chassis pan, immediately under the deck. The machine can be stood on four upturned coffee mugs to facilitate this. I usually start with the hole at the front. 'Feel' the wrench around gently until it engages with the head of the adjustment screw. Try to avoid pushing on or disturbing the deck. Wait until any disturbance has evened out to a steady display again, then adjust the screw gently one turn clockwise. Wait again for the display to settle. Note the figure, then turn the screw two turns anti-clockwise. Choose which direction produced the biggest reduction in the jitter figure, then continue adjusting in that direction until there is no further improvement. Repeat this procedure for the other two adjustment screws, which are accessible through the other two holes in the chassis pan. Finally go round all three again and tweak for the lowest jitter figure.

With this unit I was able to get a very respectable 6·5 per cent (065 indicated).

Treat anything below 8 or 9 as acceptable. This adjustment should also be carried out when the laser is replaced.

One final note. If, after working on the deck, one of these units seems to struggle to read a disc, either DVD or CD, and you get very high jitter figure readings, check the lens carefully for smudges or fingerprints. These units are extremely intolerant of this – I've been caught out on more than one occasion. **G.D.**

## Sony HCD-S500

There was no eject or operation in the DVD mode. Multimeter checks on the DVD board revealed that Q002, on side B of the board, was faulty. A modification is required when you get this fault. Remove Q002 and replace it with 'house assembly' part no. X-4954-896-1. The three wires must be connected as follows: with the B side of the board face up and Q001 upside down in front of you, connect the blue wire to the collector (top), the white wire to the base (bottom left), and the red wire to the emitter (bottom right-hand side) next to the Q002 print. Also replace chip resistor R011 (1kΩ) with a 470Ω chip resistor, part no. 1-218-949-1. This is the chip resistor just below the white (base) wire.

When you replace the board in the unit, screw the 'Q002' house assembly to the amp board, using the screw next to the flexible connectors. Don't touch any part of the DVD or power board when doing this. Normal DVD operation should be restored once these two components have been replaced. **C.B.**

## Sony HCD-S300

There was no power supply operation. The cause was found to be optocoupler PC901 on the power board. Normal operation was restored once a replacement had been fitted. The part no. is 8-749-019-04. **C.B.**

## Sony DVP-NS405

There was no display and the disc spun at high speed. A check on board IF89, side B, using a magnifying glass revealed the cause of the fault, a dry-joint at Q404. Once this had been resoldered there was a normal display and the disc rotated at the correct speed. **C.B.**

## Sony HCD-C770

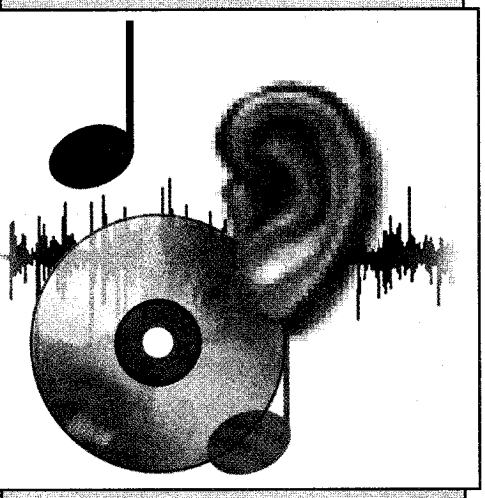
The pictures produced by this DVD player were all right for about an hour, after which they started to jump and freeze. A look inside revealed that the optical pick-up assembly was working correctly. Then, checking with a heat-gun and a can of freezer, I found that the cause of the fault was C702 on the DVD board. A small modification involving a couple of components was required to restore normal DVD playback. **C.B.**

## Sony SLV-D950GI

This DVD player/VCR wouldn't play DVD discs. I tried a quick play with a normal CD disc, which played back all right. So it seemed that the cause of the trouble was the optical pickup H211, part no. 9-885-037-37. A replacement restored full normal operation. **C.B.**

## Sony DVP-F21

The problem was that the disc dropped at eject. A call to Sony technical provided the solution. The push switch, part no. 1-762-594-64, on board MD91 needs to be attached at the centre of the fixing. Fit a replacement, then check while holding the unit vertically so that the disc slot is face down: insert and eject a disc three times to ensure that it doesn't drop. **C.B.**



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## Marantz 75CR2020/2A

I had no service manual for this flat-format tuner/amplifier/CD unit. It looked as if it could be based on a Philips chassis, as Marantz equipment often is, but it was not one that I recognised. It certainly used a Philips CD deck however, and this is where the problems lay. Although the tray would open and close, the laser unit stubbornly refused to home. There was no lens movement even when the sled had been homed manually. All hope of it doing anything ended each time with the message "Disc Err" in the display.

Once I had the deck out to examine the PCB mounted beneath it I was able to check the supply voltages – they are conveniently silk-screened by the side of the connector that brings them in. All were present and correct. I then turned my attention to the other wiring loom, which leaves the board. Checks on the two pins marked SCL and SDA were inconclusive but felt wrong.

I followed the cable to a sub PCB that's mounted between the output hybrid chip's heatsink and the front panel PCB. There's a largish surface-mounted IC, which I took to be some kind of microcontroller, on this board. By the side of it there was one of those large-value green memory back-up capacitors. More by instinct than anything else, I switched off and discharged this capacitor with a screwdriver blade. When I repowered the unit, the reset forced by this action cleared out the processor and everything then worked normally.

This wasn't quite the end of the story however. The unit was left unpowered on the soak-test bench overnight. When power was applied the following morning the fault was back. A new back-up capacitor, followed by several days of re-testing after overnight power removal, proved that the capacitor had been the cause of the problem. **G.D.**

## Crown CDTV99

This all-in-one radio/CD/TV combi unit was dead. When it had been dismantled, which turned out to be surprisingly easy, I discovered that the DC fuse on the main PCB had failed. It had not blown violently, but had significantly melted. As there were no obvious shorts present I replaced the fuse and switched on. Everything appeared to work until I came to turn the unit off with the front-panel on/off switch. The unit stubbornly remained on.

Suspecting a short-circuit power-switching transistor somewhere, I slid the board right out to see if I could follow the print round to a likely candidate. What I found was that two tracks of fine print that went to the switch were totally vaporised. I thought this was going to be the end of a practicable repair, fearing that something very nasty must have occurred to burn out the tracks, which were controlling some sort of remote switching element somewhere on the board. The fact that the unit did basically work however persuaded me to carry on, at least as far as bridging the misssing tracks. Remarkably, once this had been done the operation of the switch was restored and a detailed check on all functions proved that the unit was now fully operational. **G.D.**

## Sony HCD-XB6

This hi-fi unit came to me from another dealer, with most of the case screws missing. He, in turn, had taken it from his friend John, who "deals a bit . . ." The basic problem was no audio with any functions. The output protection relay closed correctly however, and a wet-finger test produced a healthy hum from both channels. In addition the hum level was correctly controlled by the volume encoder.

The next step was checks at the MC14052 input-select chip IC102. With a CD playing, scope checks showed that there was a good level of audio at input pins 5 and 14 but nothing at output pins 3 and 13. Further checks showed that the inhibit pin 6 was high instead of low. This pin is connected to pin 30, "port C", of the volume control and equaliser chip IC201. When I unsoldered pin 6 of IC102 the voltage at pin 30 of IC201 dropped to zero but pin 6 of IC102 remained high. This suggested that there was an internal problem with IC102.

When a new MC14052 multiplexer chip had been fitted the voltage at pin 6 was at the correct level and normal audio was present with all functions. **G.D.**

## Sony and Samsung speakers

I've recently had two speakers with a similar type of failure that I have never before seen during many long years in this trade. The first was from a Samsung home cinema sub bin. It buzzed on each hefty bass note. Once the unit had been dismantled to the point where I could see the speaker, I found that the cone had become completely and cleanly unglued from the polystyrene surround.

The second unit was a Sony hi-fi speaker that made a similar buzz on bass notes. This time the cause was the flat, concertina piece behind the cone: it serves to keep the voice coil central in the magnet gap and prevent ingress of dust etc. into the gap. I found that it had become unglued from the speaker cone virtually the whole way round.

In both cases application of EvoStick impact adhesive reunited the detached items and provided a complete cure. **G.D.**

## Aiwa ADF660 and ADF770

These twin-capstan three-head decks are of excellent quality and are well worth repair. Spares are in short supply however. There are two drive belts, the main one that measures 79·578mm diameter, 250mm circumference and 4·4mm width and the flywheel-to-flywheel belt that measures 73·21mm diameter, 230mm circumference and 3·8mm width. The flywheel-to-flywheel belt, the reel idler and the right-hand pinch roller are at present available from CPC. The left-hand pinch roller is a special order item. **M.J.A.**

## NAD 3130

The output was distorted, as though the output stage had expired. But the cause turned out to be the smoothing capacitor in the negative supply to the dual IC used in the tone/filter circuit. It was shorting. There are several of these low-quality capacitors around the PCB. Any of them could give trouble! **P.R.**

## Pioneer CT-F2121

This cassette deck, dating from 1974, would stop after five seconds. I found that the encapsulated auto-stop switch didn't operate when there was tape movement. Tapping its case a few times cleared the fault. It's on top of the mechanism, behind the cassette housing, and I suspect that there's a reed switch with a rotating magnet inside. **P.R.**

## Nakamichi 700 Tri Tracer

This unit wouldn't record one channel. Inside there's a statement about the quality and the superior engineering. But you can never allow for bad connectors after 25 years or so. The plug-in daughter board on the main PCB had bad connections. In addition the tape monitor switch worked intermittently. Switch cleaner cured that. **P.R.**

## Sony TC-TX333

This tape deck's buttons seemed to operate the wrong function. The cause of the trouble was traced to the system control processor IC04 on the main board. A replacement, part no. 8-759-497-87, restored normal operation of this single-tape deck. **C.B.**

## Sony STR-DB830

There was no tuner reception with this unit. Voltage checks on the main board soon revealed that the 15V regulator IC401 and the 12V regulator IC399 were faulty. Replacements restored the tuner reception. **C.B.**

## Sony STR-KSL5

This unit powered up then went into the protection mode. The cause of the trouble was found on the amp board, where jumper wire JW802 had poor soldered connections. Resoldering this item restored normal power up. **C.B.**

## Sony HCD-H117

The problem with this unit was intermittent FM reception. The cause was traced to a short-circuit in the ceramic filters CF301 and CF303 (part no. 1-577-070-8). Replacements restored normal FM operation. **C.B.**

# DVD

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**Chris Bowers**
**Andrew Duggan**
**and**
**Martyn S. Davis**

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## Pioneer CLD-D515 LaserDisc player

Karaoke George has been bringing his kit to me for years. It's usually pretty battered around the edges, because of the hard life it leads out on the road, travelling from pub to pub. But he started out with good-quality equipment all those years ago and, apart from its cosmetic appearance, it has stood up to its daily bashing pretty well.

This player arrived on Friday morning and was needed on Sunday night. The complaint was that it played the first half minute of any track then skipped back to the start. It sounded as if there was some kind of problem with the free movement of the optical pickup. Considerately, George brought a disc along with the player. They are monster things, of 12in. diameter, that look like a silver LP. There are recordings on both sides, and a wonderful mechanical arrangement in the machine enables both sides to be read without having to turn the disc over.

Basically a sort of 'railway track' runs from below the turntable in the centre of the deck towards the back. Here, the track curves up and over in a U shape, on its side, after which it returns to the centre of the machine across the top surface of the disc. There's a rack gear along one edge of the track. The sled motor is mounted on the optical block and, via a worm and two other gears, one of which meshes with the rack, drives the block, either at high speed for disc access or at low speed for tracking – in much the same way as with a CD deck. Once the end of the lower side of the disc is reached however, or side B is requested by use of the front-panel controls, the optical block runs off past the edge of the disc, climbs the vertical section of the track, turning upside down in the process, then carries on to track across the upper side of the disc.

To see what was going on I loaded the disc (Sing the Hits Made Popular by Neil Diamond, Vol. 1!) then requested side B. The optical block steamed along its track under the disc, came up at the back, and found its way to the end of the upper track at the centre of the disc. The machine then proceeded to play, albeit in black and white as it was an NTSC disc . . . As reported, after about thirty seconds there was much servo grunting and screeching and the play point jumped back. By watching closely I could see that the optical block didn't move on. So, when the lens had been deflected as far as possible by the tracking motor, the servo just 'lost it' and the lens relaxed back to its zero deflection point about 30 seconds back.

Once the disc had been ejected and the optical block had returned to its rest place on the lower track, taking out five screws enabled the top section of the track to be removed. I was then able to wind the worm gear manually until the laser had moved along far enough to come off the end of the lower track. When the flexiprint had been unplugged the laser could be removed completely to examine its mechanics.

It was immediately apparent that one of the drive gears was not parallel with the other one. The 'open-frame' gearbox is secured to the optical block by two screws, and the motor to the gearbox by two more. Once these had been removed, the motor could be dropped away and the gearbox lifted off. The cause of the problem was then clear. The two gears sit on pins that are moulded to the side of the gearbox. One of them had sheared off. The pins are supported at the far end by being located in a slot that's machined into the side of the laser, so the sheared off one had remained basically in place but had allowed the gear to twist out of alignment. When the motor was being driven hard for disc access, it was able to turn the gear train without problem. But when it was being driven at only very low power, for optical block tracking, it all just locked up.

I quickly discovered that the gear concerned fitted very nicely on some 2mm diameter enamelled copper wire that I had to hand. I was able to drill out the side of the plastic gearbox at the shear site and insert a new pin, made from a suitable length of copper wire. I secured it initially with Superglue, then reinforced the short stub left poking through the wall with a small amount of Araldite. When it had set solidly, I refitted the

gears and motor to the gearbox, then the gearbox back to the optical block. The flexiprint was reconnected, the optical block was wound back on to the lower track, and the upper track was refitted.

The original exercise of loading the disc and requesting side B was then repeated. This time the disc played on beyond the thirty seconds point. Careful observation of the optical block showed that it now moved on, by a minuscule amount, every few seconds. A long soak test proved that the player was now fit for another stint on the road.

Finally a quick phone call brought a delighted George trotting around to the workshop, wallet ready in his hand, and opened, as he approached the door ... **G.D.**

## Dansai DVD1010

The designer of this budget machine must have been new to the idea of reliability. The power supply is mounted upside down over the MPEG board, which has chips that generate lots of heat on it. In addition there are numerous electrolytic capacitors in the power supply, most of which are mounted close to hot-running diodes and heatsinks. This cocktail for potential disaster is rounded off by having only a few ventilation slots at either side of the cabinet.

I found that the following electrolytics in this player were either bulging, open-circuit or had a very high ESR reading: C14 (1,000µF, 16V); C16, C17 and C18 (all 1,000µF, 10V); and C10 which was 47µF, 16V though marked on the board as 10µF, 16V. Once these capacitors had been replaced the power supply came back to life and the machine produced good results. **G.D.**

## Sony DVP-NS305

The unit produced no display and the disc spun at a high speed. The cause of the trouble was traced to a dry-joint at Q404 on side B of board IF89. Once this transistor had been resoldered there was a normal display and discs rotated at the correct speed. **C.B.**

## Sony SLV-D950GI

This DVD player/VCR wouldn't eject DVDs. A look inside revealed the cause: rectangular belt H105 (part no. 3-078-583-01) had come off the loading mechanism pulley. A replacement belt restored normal DVD-eject operation. **C.B.**

## Sony HCD-S550

There was no CD playback though DVD and SACD discs played back normally. The cause of the fault was traced to a ceramic chip capacitor on the DVD board, C428 (3,300pF, 16V). A replacement restored CD playback. **C.B.**

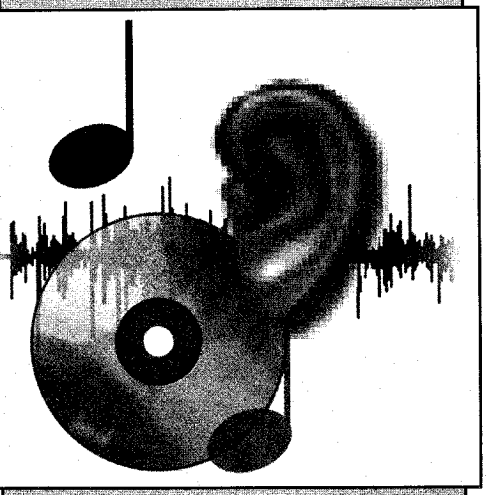
## Apex DVD1100WB

This DVD player seemed to be stuck in standby. Some quick checks in the power supply led me to C20 (470µF, 25V, 105°C) which, when removed, seemed to be slightly swollen. A replacement brought the unit back to life. **A.D.**

## Sanyo HVDX1E

This new DVD/VCR combi unit was dead. In the absence of a service manual I decided to carry out a quick 'bleep' test around the power supply with my meter. It didn't take long to discover that D111 (1N5822) was short-circuit. The part no. is LG0DR158220AA.

We've had a similar problem with some **Philips** DVD players, so maybe this will become a stock fault. **M.S.D.**



# AUDIO FAULTS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**Steve Roberts**
**Chris Bowers**
**Philip Rosbottom and**
**Geoff Darby**


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## Hughes and Kettner 15W guitar amplifier (purple version)

There must be hundreds of these small practice amplifiers out there just waiting to go wrong. Their build is nothing special, but they are easy to work on and take apart. Unfortunately they were imported from Korea and there is now, to my knowledge, no UK agent. If the fault is electrical/electronic however parts can easily be obtained and fitted. The soldering leaves something to be desired, so a good blanket resoldering job should be undertaken before a repair is carried out.

This particular amplifier emitted a loud hum from the speaker when it was switched on, so I suspected an output stage fault. This is based on a TDA2050V amplifier IC, which proved to be faulty. When a replacement had been fitted the hum had disappeared but there was no response to any input.

The preamplifier uses op-amps that are marked JRC. This means nothing to me, but when I drew out the circuit I reckoned that an LM358M would probably do the job. As a precaution I replaced all the chips marked JRC with the LM358M type. I was then rewarded with a fully functioning amplifier. The cost of the replacements was less than £5 in total, so it's worth taking on repair of these amplifiers.

I can't say definitely how the output-stage failure occurred, but my guess would be the connection of an extension speaker of incorrect impedance to the external speaker socket. As for the failure of the preamplifier op-amp, I would suspect an overpowering effects pedal or something similar. I have on a number of occasions come across faults of this type where op-amps are used in the preamplifier circuitry. **S.R.**

## Sony HCD-EX100

This unit wouldn't eject discs. I found that the loading belt, item 111, part no. 4-999-537-01, slipped on the motor pulley because it was covered with grease. Once I had fitted a new belt and cleaned the pulley there was normal eject operation. **C.B.**

## Sony TA-H3600

The display flickered on and off. Checks on the front panel board revealed that a number of the display tube's pins were open-circuit because of dry-joints. A quick resolder cured the intermittent light problem. **C.B.**

## Sony STR-KSL5

The speakers produced a hissing sound on all functions. I found that a small amount of freezer applied to the digital audio/if receiver chip IC1101 on the digital board would clear the fault. Normal sound output was restored by replacing this IC. **C.B.**

## Sony MZ-E510

This MiniDisc player wouldn't play discs. When I checked the sled mechanism I found that there was insufficient play between the SSA gear (part no. 3-244-868-01) and small plastic washer (part no. 3-338-645-31) and the screw block assembly. Replacement of these two items restored normal operation. **C.B.**

## Sony HCD-SE1

This unit wouldn't play CDs. It just made a scraping noise and showed "no disc" in the display. When I checked the CD-loading assembly I saw that the small gold screw washer that holds the chassis MD assembly to the holder BU assembly was missing. As a result, the CD mechanism didn't rise sufficiently to spin a disc freely without catching and scraping on the CD drawer. A new screw washer restored normal loading and playback operation. **C.B.**

## Sony DTC1000ES

This data recorder snapped the tape. When I looked inside I saw that the right-hand tape guide didn't return to the rest position. The problem was cured by increasing the tension on the hair-spring that acts on the guide. **P.R.**

## Technics SE-A2000

This monster worked OK except that the large display lights didn't. It looked like "a couple of bulbs required". In fact there are 16 of them, connected in series in banks of four. 14V, 40mA wire-ended bulbs fit OK. **P.R.**

## Akai GX912

This professional cassette deck dates from the late Eighties. One VU level display kept going off. The cause was dry-joints behind the display tube, at the pins for the level segments. **P.R.**

## JVC CA-MXS3BK

I decided to replace the laser unit as poor performance was not improved by internal cleaning, a rare event. The laser is nothing special, just an ordinary Optima 150S, and is easy to fit. When the replacement was installed however the CD player didn't work at all, with a "no disc" message appearing in the display. After a couple of false starts I discovered a short on the laser PCB: two points were bridged by a solder blob.

"Ha!" I hear you cry, "how could he be so stupid?" Well, quite easily actually. I have never before known one of these

lasers, whatever the source, to be shorted in any way other than by the thin metal plate that's inserted in the flexiprint connector. This one was no exception on that score: it had the plate as well, and I had of course removed it in order to be able to fit the flexiprint.

The laser was a genuine JVC replacement part – it had a JVC sticker on the box – and had been obtained from a well-known supplier. Another of life's little mysteries, but one to be looked out for in future. **G.D.**

## Samsung MAX-N75

There was no output from this unit. A 'wet-finger' test around the main PCB proved that the output stages were working, a loud buzz being produced from each speaker. I then switched to radio and tuned in a local station. With the help of a scope it was easy to find the audio outputs from the tuner module and follow the print tracks down to FIC1. As far as I could see, nothing emerged from this 80-pin flatpack IC.

Suspecting that the device's supply might be missing, I carried out some meter checks. There were reasonable positive voltages at several pins. I then noticed a zener diode symbol silk-screened on the PCB, near the IC, and found that there was no voltage at either end of it. After switching the unit off I checked the diode with an ohmmeter and got a dead short reading. An electrolytic decoupling capacitor, FC8 (220$\mu$F, 10V), is also present here. More on a hunch than anything else, I unsoldered and lifted one end. This proved that it was the cause of the fault. A replacement, rated at 16V, restored the negative 6V supply at pin 72 of FIC1 – and normal audio. **G.D.**

## Sony HTC-H2800

I've mentioned before the one, two or three 47$\mu$F, 4V surface-mounted electrolytic capacitors on the CD servo board in many Sony models – the number depends on which board is fitted. What I haven't mentioned is that the type of replacement is critical for correct operation.

This unit came in because of a poor tray belt, made worse by the owner who had oiled it. Once this had been dealt with I cleaned the laser, relubricated the motors and slides then refitted the deck. On test, playability was poor. But before condemning the laser unit I checked the servo board electrolytics. There were three, and this version is usually one of the worst for trouble with them. When their ESRs were checked two read off the scale and the third produced a reading of 39Ω. Capacitance checks showed that they were all close to 47$\mu$F however, proving once again that ESR is the only true test of an electrolytic capacitor's 'goodness'.

Things went wrong when I went to the drawer to get replacements. It was empty, though I can't remember using the last of them. As the job was urgent, I fitted three conventional sub-miniature electrolytics rated at 16V. When the system was tried out, the performance was worse than ever. Puzzled, I tried a replacement laser unit, just in case. This made no difference.

A phone call to another repairer in the area brought me three surface-mounted electrolytics rated at 6·3V. This is the type I normally use, as the 4V originals are hard to obtain. They are slightly larger, but fit well. Once they had been fitted a retest showed that the servo performance was back to normal. I was then able to refit the original laser unit, after which there were no further problems. **G.D.**

# DVD

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## Panasonic DVD-LA95

The owner of this personal DVD player complained about "laser drive sticking". This turned out to be uncannily accurate. If the machine could be persuaded to play at all, it certainly wouldn't move on to another chapter on a DVD disc, or another track on a CD, when asked to do so.

Once it had been dismantled, the cause of the problem was easy to see – fluff! The unit was full of it. I guess that the owner probably uses it a lot in the bedroom (this is certainly the norm with my daughter, who has a similar model). Two screws enable the sled motor cover plate to be removed. Once this is off the laser, complete with its worm drive, can be lifted clear of the deck. Careful removal of the dry fluff, and the fluffed up grease, followed by relubrication, restored full operation once the unit had been reassembled. **G.D.**

## Sony HCD-S800

The owner of this home-cinema system complained that there was no DVD sound, though aux was OK. In fact all other modes, including tuner, produced normal audio. But, as claimed, the DVD section stubbornly refused to produce audio – most of the time, that is... Twice while I was carrying out initial tests sound did appear. But as soon as a chapter search was carried out it had gone again.

If, when there was no disc sound, I went into the audio setup menu and invoked the six-channel test tones they were reproduced correctly. All this suggested a software problem. The output stages were certainly working correctly, and the unit was capable of decoding a multi-channel audio stream being produced internally.

I next tried switching the decoding options manually with the front-panel 'sound field ±' buttons. This resulted in correct, uninterrupted audio, even after a chapter search, for all modes except the default AFD (audio format decode). I have to say that the chapter search didn't feel right, although it was nothing that I could put my finger on. So my next move was to go into the test mode (depress the front-panel display and stop buttons simultaneously, together with a clockwise twist of the volume knob) and review the setup data stored in the EEPROM. I followed this by a full auto setup (option 1 followed by option 0).

As a result of this operation the machine made significant alterations to its stored servo data, the final result being closer to the values you normally see. These are usually within a few hexadecimal digits of the centre of range for each parameter.

While the unit was in the test mode I ran a system-wide diagnostic test (option 0 in the first menu), which includes audio tests. As these all came back clean I exited the test mode (power off) and restarted the system, putting it back into the auto format decode mode. This time the correct mode for the owner's disc was selected, and normal sound was present at all times. I also tried a variety of other discs in the machine, which now performed faultlessly. **G.D.**

## Bush DVD1005

This DVD player produced no sound. Investigation inside revealed that R8 (220Ω, 0·5W) in the power supply was burnt. When I checked with Bush technical I found that it's a common fault. The action required is to replace R8, the 12V zener diode D4, R9 (1kΩ, 0·5W) and the three 220μF, 25V capacitors C6, C12 and C31. The capacitors leak and short-circuit D4. Many thanks to Bush technical. **P.S.**

## Sony DVP-LS500

Only the power button seemed to work: the remote-control handset failed to produce any response from the unit. A check inside revealed that the seven-core flat-wire which connects the function switch board (SW384) to the interface control audio/video out board (AF26) had not been placed into the connector (CN402). Normal functions were restored once this flat wire had been pressed in. **C.B.**

## Sony HCD-S300

There was no sound in the DVD mode. A check on the DVD board showed that there were dry-joints at the digital processor IC904. There was normal DVD sound when this IC had been resoldered. **C.B.**

## Sony HCD-M700

There was no DVD playback and the error message 'C81' would sometimes appear in the display. Inspection inside the unit revealed that IC503 on the DVD board had blackened pins, which is a sign of corrosion. All was well once a replacement IC (part no. 8-752-409-87) and a new CMD cushion had been fitted. The latter should be the improved type, part no. 4-241-284-02. **C.B.**

# DVD AND HOME CINEMA

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**Chris Bowers**
**Geoff Darby**
**and**
**Mike Leach**

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## Sanyo JCX-TS750

This machine, just out of warranty, worked sometimes but not often! There's a row of big regulators on a separate PCB at the back: they are cooled by a metal block with a fan inside. I found that they were rather poorly hand-soldered. The input pin of IC405 (7805) was dry-jointed, but I resoldered the lot to be sure.

I was careful when unsoldering the mains lead, to avoid having to fight one of those plastic clamp things for an extra few mm of cable length when reconnecting it. **J.T.**

## Sony HCD-DP1000D

This unit played CDs but not DVDs. The cause of the trouble was traced to the KHM-240AAA optical pick-up assembly, part no. 8-820-144-06. All was well after fitting a replacement followed by an auto adjustment set-up. **C.B.**

## Sony HCD-S300

There was no FM reception right after powering on. The cause of the trouble was C602 (100$\mu$F, 16V) on the audio board. Initialisation data was being sent to the tuner before the FM +7·5V supply had stabilised. Removal of C602 restored normal radio reception after power up. **C.B.**

## Sony HCD-M700

This DVD/CD machine would play DVD discs but not CDs. The cause of the problem was the KHM-240AAA optical pick-up, ref. 277, part no. A6062705A. A replacement and setting up restored normal operation. **C.B.**

## Sony HCD-S300

There was no monitor output with this unit. Multimeter checks inside revealed that IC701 and R705 were faulty. Replacements restored the monitor-out display. The part nos. are 875966394 (IC701) and 121602200 (R705). **C.B.**

## Sony HCD-C700

The fault symptom with this unit was as follows: when the RDS information changed, parts of the previous display remained visible. Checks inside, on the DVD board, and a call to Sony technical confirmed that the microprocessor IC901 would have to be replaced. Normal display operation was restored by fitting an S500 IC kit (V113) assembly, part no. X-4954-876-1). **C.B.**

## Philips DVD733/051

The fault ticket with this one said "had power surge – now dead?" The mains fuse was intact and there was no sign of any distress in the power supply, so I began to look for a start-up supply. There isn't one! The very ordinary-looking 14-pin DIL chopper chip, type TY72011AP2, is connected directly to the 380V DC supply across the mains bridge rectifier's reservoir capacitor.

Scope checks showed that this chip's pins were all devoid of voltages and waveforms, so a replacement was ordered. When this had been fitted there was an improvement in that there were now voltages at some pins, but the power supply remained stubbornly quiescent.

I then carried out meter checks on the secondary side of the power supply. These revealed that diode D6280, transistor Tr7280, and the surface-mounted transistor Tr7282 connected to its base were all short-circuit. The purpose of this little lot appears to be to produce a negative low-voltage supply. Once replacements had been fitted the machine sprung to life and worked normally. **G.D.**

## Toshiba SD220E

The complaint with this first-generation DVD player was "intermittent power". It came on when taken out of standby, then the display scrolled a message across itself from right to left. This got as far as "welcome to t" then the unit returned to standby, with a faint squeak from the power supply.

The supplies were all present and correct while the unit was on, so the power supply was not shutting down because of an overload. A check at pin 4 of connector CN801 showed that the power supply control signal went back cleanly from high to low when the machine shut down. I followed the source of this signal back to pin 12 of connector CN603 on the MPEG board. This connector goes via a flexiprint to the front-panel micro and display controller. There's a tiny 5-pin chip, IC602,

between pin 12 and the power supply. It contains a single and logic element.

As soon as I applied my meter probe to pin 12 the unit came to life properly. It could, with a certain amount of provocation, be made to go off again. But it was impossible to say exactly what I did, or quite how I poked it, to achieve this result.

The connector is a surface-mounted type, so its pins are clearly visible. I couldn't see any soldering problems here, even with the aid of my magnificent new long-reach stereo microcope. While the board was out I also checked the connections to IC602, which is on the reverse side, and all its associated components.

Eventually I just went ahead and reflowed all these connections, using new solder. All was well once this had been done and the board had been refitted, and no amount of provocation would made the unit go off again.

Incidentally the stereo microscope, an excellent piece of kit that's extremely well made and optically superb, is available from Farnell at only £199. The order code is 722232401. **G.D.**

## Sony TA-VE25

This home-cinema system's chopper power supply had suffered a fairly catastrophic failure. It's housed in the SS-MS25 subwoofer unit. The STR-F6267D hybrid chopper chip IC901 was short-circuit between pin 3 (drain) and pin 2 (ground). Instead of input fuse failure two parallel-connected resistors, between pin 2 of the IC and the mains bridge rectifier's negative terminal, had exploded. These resistors are R903 and R904: their value depends on the exact model – either 0·15, 0·12 or 0·22Ω. In addition two variants of IC901 are listed. When ordering replacements from Sony, be careful to check in the parts list the correct resistor value and IC type for the machine you are repairing.

When the replacements had been obtained and fitted I covered my eyes, steeled myself for the bang, and switched on. There was no explosion, but the unit still didn't work. There was some gentle pulsing at the various pins of IC901, but nothing to suggest that it was making much of an effort to start up.

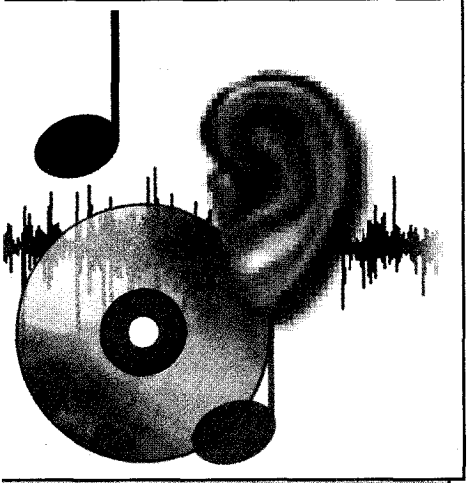
I spent a few minutes checking various diodes and other semiconductor devices in the area, but everything seemed to be OK. Eventually, more by luck than judgement as the voltage at pin 1 of the IC was more or less correct at 0·5V, I measured the resistance between this pin and ground (the bridge rectifier's negative pin). It read very high. This was obviously wrong, as the pin is returned to ground via R901, which is a minuscule 220Ω surface-mounted resistor. It looked fine, but was open-circuit.

The power supply sprang to life once this resistor had been replaced, and a long soak test proved that all was now well. **G.D.**

## Sony HCD-S300

The fault description that came with this combined DVD player/tuner/amplifier said "no sound". When you get this problem it's a good idea to take a close look at the audio output ICs, in case any of them are cracked across the middle. If one of them is cracked the protection circuit may shut down the audio completely, though the other output stages are OK. In this case however the output chips appeared to be all right. A circuit diagram and a bit of logical thinking would be required!

The oscilloscope told me that the output stages were working, as there were audio 'squiggles' at the output pins of the ICs. This is before the audio outputs go to the relays then on to the speakers of course. The relays weren't switching over because transistor Q405 on the amplifier board was faulty. It's a surface-mounted device, type 2SC2712. A replacement restored the sound. **M.L.**



# AUDIO FAULTS


**Reports from**
**Amrith Ramjewan**
**Carl T. Heinlein**
**Chris Bowers**
**Roy Blaber**
**Philip Rosbottom**
**and**
**Geoff Darby**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## Sony HCD-XB6

There was no audio output from this hi-fi system though the audio amplifier was OK. I discovered that audio wasn't reaching the output stages because IC102 (MC14052) was faulty and didn't switch the audio through. **A.R.**

## Kenwood A71

This 15-year old amplifier didn't work because of a blown and inaccessible thermal fuse in the primary winding of the mains transformer – the cause had been a shorted speaker line. An official Kenwood agent had been unable to repair the amplifier as the transformer is no longer available. It was otherwise in good condition, and is the vital link in a system that consists of a graphic equaliser, tuner, turntable and cassette player.

The transformer has two secondary windings, one providing a 16V output and the other 34/25/0/25/34V feeds. The supply obtained from the 25/0/25V winding is fed to all the early stages of the amplifier and also the output stage when the loudspeaker load switch is set to 4Ω. The higher supply obtained from the 34/0/34V tappings is used by the output stage when the loudspeaker load switch is set to 8Ω.

I drew up a specification for the transformer with the intention of having a replacement wound, but unfortunately a one-off transformer would have cost over £100 (half a dozen would have cost £25 each). So an alternative approach was necessary. I found that feeding the amplifier with 24/0/24V produced an acceptable 36W into an 8Ω load, the output into a 4Ω load being in the 40W range. So I decided to fit two separate RS transformers to provide 15V and 24/0/24V. The ones selected were the RS 805-316 (24/0/24V at 2A) and RS 805-142 (0-15V at 3·3A), the total cost being just over £20 plus VAT.

The transformers were fitted with external hum-reducing copper bands before installation. This was done because the original transformer had one, and it was safer to fit them as a precaution rather than having to remove the transformers later and fit bands if hum had been found to be a problem. It's advisable to link out the 4/8Ω load switch: I did this on the PCB. The modification was a complete success.

It must be remembered that the amplifier is of double-insulated construction and that the original transformer had a thermal fuse while the RS ones require separate fuses. The need to ensure the integrity of the double-insulation must be kept in mind when rewiring. The ratings of the two fuses inserted in the live mains feeds to the new transformers were 315mAT for the 15V unit and 630mAT for the 24/0/24V unit. **C.T.H.**

## Sony CDP-XE370

The drawer of this CD player would open automatically when the unit was switched on or when the play button was pressed. A check on the CD loading assembly revealed the cause: the loading belt was slipping on the loading mechanism pulley, because excessive grease from the pulley had got on to the belt. Once the belt and pulley had been cleaned there was normal loading and playing. **C.B.**

## Sony TA-VE100

This unit would switch itself off intermittently. The cause of the problem was dry-joints at connector CN505 on the small power switchboard on the front panel. Resoldering the pins cured the trouble. **C.B.**

## Sony MDS-JE520

This unit was stuck in standby. A check on the printed side of the main board revealed the cause, which was dry-joints at C411 (15,000μF, 16V, 85°C working). Normal power-on operation was restored once the capacitor had been resoldered. **C.B.**

## Sony CFD-S38L

The CD player simply showed 'no disc' in the display. A look inside the unit revealed the cause: a fine layer of dust or talc on the optical pickup. The lens was cleaned using a Sony CD lens cleaning solution and a cotton bud. This restored normal playback operation. **C.B.**

## Sony CFD-S28L

There was no CD operation and distorted audio with this unit. A check inside soon revealed the cause: poor soldering at transistor Q955. Once it had been resoldered there was normal CD playback and sound output. **C.B.**

## Sony HCD-101

This compact hi-fi system wouldn't accept a CD or play one if it was loaded manually. The cause was no 7V supply to the motors. There are several fusible resistors that can go open-circuit in this unit, but on this occasion replacing the 28-way ribbon cable between the power board and board BD cured the fault. **R.B.**

## Sansui AU505

The complaint with this unit, which dates from 1975, was crackles and pops from the speakers. I found that there were dry-joints on the filter board and the transistors were noisy – they were replaced with BC184LCs obtained from Farnell. In addi-

tion the preamplifier transistors in both channels, on the preamplifier board, needed replacement (they must have had a bad batch of 2SC871s) and the power amplifier board needed a general resoldering. **P.R.**

### Sony TA1140

This unit, which dates from 1973, was cutting out on one channel – the small thermal cutout Sony used in the early Seventies was tripping. Checks on the power amplifier transistors showed that they were OK, and resoldering the PCB provided a cure initially. Then, after resoldering the other channel, the amplifier started making pops etc. through the speakers. I ended up by removing the old solder from the transistor connections, and all the old solder flux. This, followed by resoldering, cured the faults in both channels. The solder Sony uses, even now, leaves something to be desired. I suspect that the old flux had become conductive. **P.R.**

### Technics SU-V60

This amplifier worked when using the 'CD direct' facility but none of the other inputs worked. The preamplifier/main amplifier links were missing! **P.R.**

### Harman Kardon Citation 16

This monster amplifier (see photo) that dates from 1977 had a fault in one channel, whose output was at –60V with an unnerving current capacity: any speaker connected to it would have been vaporised. There are no fuses nor offset protection – it dates from the time when amplifiers were amplifiers and speakers were nervous. The output from the UA739 input op-amp was at –10V (its supplies are ±10V), while the output to the speakers was as above. Not quite right!

I suspected a fault in the op-amp circuit and replaced the chip (it's a high-gain, 14-pin device with a bandwidth of 1MHz – I obtained one from CPC). This cleared the output offset, but the quiescent current was non-existent. All the Uniwatt transistors on the PCB were replaced, and the MJE340/350 pair. The two neon 'on' indicators had to be replaced, and one of the relay contacts had been bridged with a solder blob.

After sorting all that out the amplifier produced stunning dynamics! For the sake of my speakers' sanity, I added a couple of 5A fuses in the outputs.

Subsequently I found that setting the quiescent current as specified in the service data, i.e. for 10mV across the 0·5Ω resistor at the top of the heatsink, resulted in the output transistors running excessively hot. The voltage had to be set a lot lower. I then found that the resistor's value was lower than the 0·5Ω it should have been. **P.R.**

### Technics SL-P1

This 1984-vintage CD player wouldn't play discs because the traverse rails were jammed with dust. All that was required was cleaning and lubrication. **P.R.**

### Denon UD-M3

There was no mechanical action with the CD deck. When the open/close button was pressed the display said "open" but that's as far as it went. The cause was simple: the 500mA protector PR003 for the 8V motor supply was open-circuit. It's not so simple to replace however, being buried at the very bottom of the unit, on the underside of the PCB, where you can't get at it.

Failure of this protector is quite common, and has been mentioned before. It has been suggested that the basic cause is a dodgy motor associated with the traverse assembly. All I can say is that I have replaced several of these fuses and have never had a comeback. **G.D.**

### Philips CDR765

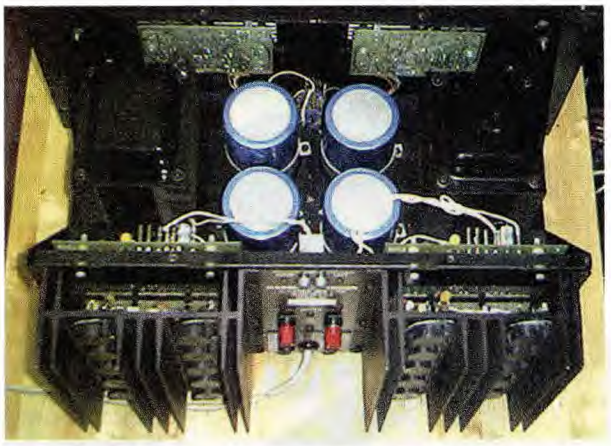
This CD recorder/copier has two decks, one record/playback and the other playback only. It arrived dead, with a note that said "power supply fault". When I applied power there was very little activity from the chopper power supply apart from some gentle pulsing. It was much the same as what you get with various Philips DVD models when one of the rectifiers on the secondary side of the power supply has failed.

In view of this, my first move was to check each of the diodes in the power supply with an ohmmeter. D6120, which produces the 5V supply, proved to be short-circuit. A replacement got the unit working again but, in my humble opinion, this device runs far too hot for its own good. So I added a small, flat heatsink to its plastic flatpack. The result was a significant drop in the diode's case temperature. Hopefully this will ensure future reliability. **G.D.**

### Panasonic SJ-MR200

This personal MD unit read and played discs perfectly – provided it was left alone on its back. If it was picked up it could be shaken in the horizontal plane quite violently without problem, but as soon as it was tilted by about 45° in any direction it stopped playing and the disc could be heard and felt running up to a high speed.

I thought this was going to be a really nasty problem but, when the lower cover was removed, a surface-mounted crystal of some 16MHz or so fell out on to the bench! It was easy to see where it had come from on the PCB – the circuit reference number is X101. There was plenty of solder on the PCB pads, but none at all had adhered to the component's feet. Once these had been tinned and then solder-mopped flat I was able to reposition it and, with a fine-tipped iron, reflow the solder. The player then behaved faultlessly, tipped at any angle and shaken as hard as you like! **G.D.**



*The Harman Kardon Citation 16 amplifier.*

### Denon DC35

When power was applied to this unit the tray of its CD three-changer kept ejecting and returning every few seconds. After removing the covers I noticed that two screws were missing from the top part of the changer assembly. So I guessed that it had been off recently, probably to remove a jammed disc or to clean the laser.

When I looked a little closer I saw that a small white flexiprint on the left side of the changer was disconnected. Its socket is hidden under a little sub-board. It appears to carry data from the deck position sensors, so this would account for the symptoms.

Whoever had removed the top had probably inadvertently pulled out this cable and not spotted it during reassembly. Plugging it back in restored normal operation, and two screws to replace the missing ones completed the repair. **G.D.**

# DVD

**Fault reports from Geoff Darby and Chris Bowers**

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## Technics SL-HDV600

This unit is part of a four-piece system. The complaint was that its surround, centre and subwoofer outputs were missing. This sort of problem is often caused by incorrect user settings. As I didn't have the user manual for the system I went into the menus blindly, hoping that experience would soon lead me to a wrong setting. But I wasn't able to find anything that immediately looked suspicious, or indeed even relevant. Just in case, I carried out a system-initialise operation – 'stop' on the front panel and '>10' on the remote-control unit. I reasoned that if the problem was a software one this would at least restore some basic surround sound. But there was still none. Time to set about fault finding.

The AV decoder chip is a 204-pin beast. It provides three data streams that are fed to the six-channel DA converter chip IC4211. 'DIN2' at IC4211 was missing, and I was also able to confirm that it didn't emerge at pin 93, 'ADOUT1', of the decoder IC. I was loathe to believe that either of these ICs was faulty so, unable to find any relevant information at the Panasonic website, I put in a call to the very competent and helpful Panasonic Technical Support team. I wasn't disappointed. The chap I spoke to knew exactly what the cause of the problem was, and soon put me straight. But it's a rather complicated operation.

You first need to go to 'setup'. This is done by pressing the handset's 'shift' and 'display' buttons simultaneously. Next, use the remote right-arrow button to navigate along to the third tab. The top item in this menu is 'speaker setting'. When you press the handset's 'enter' button you will get a picture of an armchair. L, C and R speakers should be shown to the front, an SW one to the right, and LS and RS ones to the rear. Six small windows should be scattered amongst these icons, variously labelled 'dB' and 'mS'. To the left of the chair there are 'exit' and 'test' button icons. At the lower left there's a representation of the left/right/up/down and 'return' handset buttons. 'Active' ones are highlighted in yellow.

In this case the only speakers that showed were the front ones. This is where it gets complicated. There is no indication as to how you should turn on the missing ones. I stumbled on the procedure accidentally, by using the arrow buttons that were highlighted as being currently active. The result was a yellow box that suddenly appeared in front of the armchair. By next hitting the 'enter' button that was still, curiously, symbolised in white I was able to use the up and down arrow buttons to find three centre-speaker settings – 'none', 'small' and 'large'. Having discovered this trick, I was able to navigate to other locations around the chair and find the remaining speakers that were missing (subwoofer and rear surrounds).

There is one final stumbling block, which the man at Panasonic warned me about. To save the new settings, you must depart from the page only by using the 'exit' icon: if you use the 'return' one, everything will go back as it was. Only you wouldn't know this . . .

Once I had managed to get all the speakers showing on the screen I was able to use the on-screen 'test' icon, which starts a rotating white-noise output from each speaker in turn. This proved that all the audio outputs were now present. After exiting (correctly!), I tried a disc again. This time there was full surround-sound playback. **G.D.**

## Sony DVP-S9

This unit wouldn't play DVDs: all other functions were OK. The cause of the trouble was the microprocessor chip IC302 on board MB. A replacement, part no. 8-759-828-01, restored normal operation. Use the improved version, which can be identified by having three white dots on the top. **C.B.**

## JVC DR-MV1

This combi unit's DVD tray would get stuck on the front-panel flap when loading a disc. Inspection of the loading tray revealed that the front-panel flap, which moves up and down and slides along the disc tray bottom, was getting caught up on the silver trim at the end of the tray. The solution was to put three self-adhesive strips on the front panel runs, enabling the silver trim on the tray to clear the closing flap. This restored normal disc loading and closing. **C.B.**

would solve all my problems. Inside it there was an 18-way ribbon cable, part no. 1-769-119-11. I fitted it with great care, then applied power. The unit sprang to life. I selected MiniDisc at the front control panel, which was balanced somewhat precariously as the unit had not been reassembled. When a disc was inserted, the unit responded: it sat there 'chattering' away, trying to read the disc's table of contents. And there it continued to sit, trying to read the TOC.

How can one unit have so many faults? This question went through my mind repeatedly. In addition to failure to read the TOC, the unit refused to eject the disc: it seemed to crash the microcontroller chip when eject was selected.

Normally when you replace the optical block in a Sony MiniDisc unit you will get away with just installing it. But Sony suggests a fairly lengthy set-up procedure that involves adjusting the laser power, traverse, focus bias and an error-rate check. I concluded that my present problems were caused by the need to set up these various parameters. The exact procedure is too long to describe here, and the service manual is required. You start by selecting the service mode however: press the bass/treble, clock and MD buttons simultaneously.

When I put this unit into the service mode there was more strange behaviour. Every time I tried to select the various settings the unit just froze, and the only way to reset it was to remove the power. I clearly had another major problem.

When I keyed the model into Sony's assist program a technical bulletin that suggested the cause came up. The main suspect was the primary digital signal decoder chip IC121. This is a 100-pin flatpack device that lives on the control panel. A modified version is now supplied, type CXD2535BR, part no. 8-752-375-36. The EEPROM should also be replaced. Several settings in the EEPROM are then altered to new values. So another order went off to Sony and, to remain consistent, I awaited the following Tuesday to fit it!

## Nearly there!

The MJ1 had been such a trial that I was no longer confident of success after fitting the replacement digital signal decoder chip and EEPROM. I applied power, entered the service mode and initiated the EEPROM settings in order to enter the modified values. After that the unit no longer crashed, and appeared to update OK. So I took the bull by the horns and prepared to perform the full optical block set-up. This time there was success and, after about twenty minutes of careful effort, I was more than happy with the results.

I inserted my original disc. The unit attempted a TOC read and successfully displayed the results. It also played correctly, and seemed to record all right. Eject was then selected, which is where it went horribly wrong. The unit had failed to write a TOC and promptly crashed again. The way to reset it this time was to disconnect the power and remove the disc manually. The whole procedure could then be repeated.

Tests on the MD micro IC201 showed that the appropriate output pin went low when eject was selected. When I checked at the BA6287F motor-drive chip IC431 I found that the signal reached it. But the IC appeared to ignore the request, so it had to go!

A replacement, part no. 8-759-040-83, was ordered and duly arrived. After fitting it the unit at very long last worked as it should do. TOC writing now took place correctly, and the disc was ejected on request. All that was now left to do was to reverse the dismantling procedure and return the unit to its very patient owner.

## Moral

So, did I learn anything from this experience? Yes! Never again try to avoid a repair by quoting high!

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## Bush MN35RM

The owner of this smart-looking blue and silver midi system said it had "gone off" after he had extended the speaker leads! Realising that this wouldn't be covered by the guarantee, he had then tried to dismantle the unit and, in the process, had pulled out the CD drawer too far. When I checked inside I found that fuses F601 and F602 (1·6A) had blown while the AN7164 audio output chip had a hole in the side of it. Sound was restored once these items had been replaced and the speaker leads had been attended to, but that left the problem of the CD drawer.

As I didn't have a service manual I had to reset the gears by trial and error, which is not as simple as it sounds. With the CD tray removed, turn the mechanism to the point where the tray would be fully out. Unclip the small blue cog from the baseplate, and line up its arrow with the dot on the large blue cog. Then turn the small cog one tooth anti-clockwise before clipping it back into place. Refit the CD drawer and all should be OK. **M.McC.**

## JVC CA-MXG9BK

The complaint with this four-piece system was "CD fault". The first thing I noticed however was that none of the VFDs on any of the units worked. Suspecting a problem with the negative VFD supply, I went straight to the RX-MXG9 tuner/amplifier unit. A quick check at the heater pins of the VFD in this unit showed that the supply was indeed missing. This is always an easy place to check, with any manufacturer's equipment, as the AC heater voltage is 'floated' on the main negative DC VFD supply.

A look at the circuit diagram showed that the negative voltage is produced by a voltage-doubler arrangement, with C816 (220$\mu$F, 16V) the first capacitor in the circuit. It's a widely-used method of generating the supply, and it is very common for this capacitor to go open-circuit. So it proved to be here, a replacement restoring all the displays. The silk-screening on the underside of the PCB showed the polarity of the capacitor reversed compared with the upper-side marking, which agreed with the circuit diagram. I fitted the replacement to agree with the circuit diagram, i.e. the correct way round!

With basic system operation now in order, I turned to the XL-MXG9 CD unit. On test playability was found to be poor. The laser unit is an Optima 150S, which is generally very reliable. Its performance is readily compromised however when dust is present. It's not dust on the lens that causes most trouble, but dust that gathers on the critical-angle mirror inside the optical block. It is easy to clean.

First, manoeuvre the laser to a position that provides ready access. Carefully unclip the black plastic cover around the lens. Once this has been removed you can, if you shine a strong light into the top, see the mirror – with its dust – a few millimetres below the lens. Take a small-ended cotton bud and tease the end out to a point. Next use a small scalpel tip or something similar to move the lens, gently, as far to one side as it will go, being careful not to damage or distort the delicate suspension wires. Then. using it dry, carefully feed the cotton bud down into the gap created until you reach the mirror. Small movements will remove the dust and polish the mirror. Remove the cotton bud, again being careful not to damage the lens mount. Then proceed with a normal lens clean, using your favourite alcohol or whatever.

Refit the cover and finish the deck service by relubricating the slides, motor bearings etc. In at least nine cases out of ten you will find that the original performance of the laser has been restored, and that the repair will be long-lasting.

As a final measure the electrical set-ups should be checked, in particular the E-F balance, as the sensitivity of the pickup diodes can alter over the lifetime of the laser. When this happens the correct balance point shifts. **G.D.**

## Panasonic SA-XR10

The job ticket that came with this rather elegant slimline AV amplifier/tuner said "crackles with the volume control after thirty plus minutes". I found this description odd because, as six audio channels have to be controlled at once, the unit employs a rotary encoder rather than a conventional potentiometer for volume adjustment. I left it to run on its internal tuner, set to a local station, and put it at the back of the bench. After about an hour I rotated the volume control up and down. There was indeed a loud burst of 'crackle' from the speakers, but this was actually a brief burst of full volume. If you rotated the control very carefully you could get this burst to remain on, but this wasn't going to do my test speakers a lot of good!

During the brief periods when I allowed the full volume to occur I noticed that the dB reading in the display didn't alter. I also found that the point at which the burst occurred during the encoder's rotation wasn't consistent. All this suggested a fault with the electronic volume control system, or the data fed to it by the system microcontroller. The former seemed more likely,

as the display remained correct.

There followed a few frustrating minutes while I tried to get the unit apart. It looks as if the top cover will slide off once the screws have been removed, but in fact the sides have to be removed by undoing the screws at the back of them, then sliding them backwards and upwards. By this time the system had cooled down and was operating correctly again so, with the top cover loosely in place, I left it to warm up while I studied the block diagram.

As the amplifier is almost entirely digital, this didn't help much. After the input selector chip IC801 all the analogue signals go to the AD converter chip IC101. At this point I decided that there was nothing to be gained by continuing with 'proper' fault-finding, and that it was time to resort to a can of freezer and a soldering-iron tip.

First stop was the digital signal-processor chip IC1014, to which the volume-control encoder is directly connected. It didn't produce any reaction. Next, mainly because it is easy to get at, being on top of a sub-PCB at the front left, I tackled the AC3/DTS/AAC decoder chip IC1002. A few drops of freezer on this IC immediately put a stop to the problem, and it was ten minutes before the fault returned – if the chip was left alone. Freezer again cured the problem, and I was then able to instigate it by applying the tip of my soldering iron to the top of the IC for five seconds. So a replacement was ordered and fitted. This provided a complete cure. **G.D.**

## Hughes and Kettner WARP7

I have had the following fault on a couple of occasions now with this German-made 'combo' head guitar amplifier: the primary winding of the mains transformer goes open-circuit. It's a simple repair, but spares for this amplifier are no longer available in the UK as there is no appointed agent. A suitable replacement transformer can be obtained from CPC however, order code no. TF00648. Earlier this year the cost was £21.

Most amplifiers manufactured by Hughes and Kettner are worth repairing, but bear in mind that replacement parts/components will have to be obtained from various suppliers. **S.R.**

## Aiwa ADF660

The tape speed was being reduced because of excessive tension on the supply side. The symptom had become progressively worse, until the point was reached where the last ten minutes of a C90 cassette were unplayable. There were several causes.

I had to remove the supply reel shaft from its socket and lubricate the socket with RS contact treatment oil (494-720). The shaft can be pulled from its socket without need for excessive force.

The guide on the left-hand pinch roller was causing excessive tape friction. Cleaning the guide with BIB anti-static cleaning fluid cured this fault. If the pinch roller is not misshapen, cleaning it will suffice.

To change the reel-idler assembly you have to remove the flywheels. The idler supplied wouldn't work in the play mode because the shaft protruded from its top side. The simplest solution is to change the tyre over to the old unit.

When the flywheels have been dismantled it's a good idea to clean the drive surfaces with isopropyl alcohol. Also retension the solenoid return spring.

After reassembling the unit, check the tape path with a known good test tape. I've found that a test recording on metal tape with 5kHz at +2dB on the right-hand channel is useful.

Recording drop-out and channel balance should also be checked. Inject 4kHz, 8kHz and 13kHz tones equally into the right- and left-hand channels from a good-quality chrome tape. The playback result can be monitored on the bar-graph VU meter display. Twitter on the display indicates drop-outs. If this is excessive from one channel, adjust the head-height nut. This is a micro-fine adjustment. It takes some patience to get optimum results. **M.J.A.**

## Sony HCD-SD1

The sound would cut out after three or four minutes. The cause of the problem was on the connector PCB, where the connections to the audio output relay RY501 were poor. A quick resolder restored the sound. **C.B.**

## Sony HCD-D117

The problem with this unit was intermittent FM reception. The cause was in the IF amplifier section, where there was a short-circuit in ceramic filter CF301. A replacement filter restored normal reception. Ceramic filter CF303 could cause the same fault. **C.B.**

## Sony HCD-CP100

After twenty minutes the LCD section would show only one fully-lit, seven-segment section. Checks inside the unit with a voltmeter, a heat gun and a can of freezer proved that the cause of the fault was the main processor chip IC802. A replacement IC restored the display. The chip is glued as well as being soldered. **C.B.**

## Sony HCD-ED1

This unit wouldn't read discs. A close inspection of the optical pickup and the spindle motor was carried out. The cause of the trouble turned out to be the spindle motor, M101, part no. X-4950-343-1. There was a hairline crack on the black plastic disc plate. As a result it was being pushed down too far on the motor's shaft and the laser was unable to focus. Replacement of the spindle motor base outsert restored normal CD playback. **C.B.**

## Sony CFD-121

The CD door wouldn't close when the open-close switch was pressed. The cause was simply that the push-switch, part no. 169296011, was defective. A replacement restored normal open/close operation. **C.B.**

## Sony HCD-SD1

When this unit was turned on a popping sound came from the speakers. The cause of the problem was on the amplifier PCB, where there were dry-joints at the two power amplifier chips IC801 and IC851. Resoldering them cured the fault. **C.B.**

## Nikko STA301

The ICs that Nikko had designed for the preamplifier in this tuner-amplifier, which dates from 1972, had expired. They can be replaced with two 5534s on small Vero boards as plug-ins. **P.R.**

## Sony DTC1000ES

This large DAT recorder, which dates from 1987 and was the first model made, would work only after it had been switched on for at least ten minutes. In addition to hundreds of dry-joints, the 10$\mu$F, 16V electrolytics on the drum PCB, under the drum assembly, needed replacement. There are four of them (silver, surface-mounted). They were leaking and almost open-circuit. **P.R.**

## Pioneer CT676

This cassette deck dates from 1991. The drawer had come off its locating slot and was loose, and the motor ran at full speed. An exact replacement motor can be obtained from CPC. It's easy to change: three screws hold the plate, which can be removed without further dismantling. **P.R.**

# DVD

**Fault reports from**
**Geoff Darby**
**Chris Bowers**
**Amrith Ramjewan**
**J.S. Ogilvie**
**and**
**John Coombes**

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## Samsung DVD-HD935

There was no video output from this unit's scart and composite-video output sockets, though there was a signal of sorts at the component-video Y output socket. After spending many years in the trade you develop a nose for things that don't 'feel' right – and this one didn't. I suspected that the owner might have been playing with the unit's software, probably as a result of something he'd read in DVD Hackers' Weekly. . .

A quick call to Samsung technical, who are always helpful, confirmed my suspicion. They had come across this problem before, and it could be cured by a forced system reset. To do this, start with the front-panel display reading 'no disc'. Then press and hold the front-panel 'stop' and 'play' buttons simultaneously for five seconds.

After carrying out this procedure, default scart output was restored along with access to all the normal menus. A final test, with a DVD disc inserted, proved that all was now well. **G.D.**

## Sony SLV-D950GI

The problem with this machine was intermittent DVD playback failure, with freezing up. The cause was the motor-feed assembly H210, not the optical pickup. The white-labelled motor (Johnson brand) should be replaced with a Mabuchi brand one, which has the code printed on the motor casing itself – the part no. is 9-885-037-22. **C.B.**

## Sony HCD-SC5

This unit would intermittently freeze with the DVD function keys not working. Oscilloscope checks revealed a possible problem with the AV decoder chip IC306 on the DVD board. If C2 (not C1) is printed on this IC, check the bus clock waveform at pin 203. This should be clearly rectangular. If not, fit the new type, part no. 6-703-540-01. This restores normal DVD operation. **C.B.**

## Sony DVP-NS700V

When this unit was powered off and back on again with a disc inside, the front speaker level would change to 0dB but would continue to show the originally set value. The cause of the problem was IC107 on board MB101. A replacement and a look at the new check-sum number, which showed 2830 in the "syscon diagnosis" while the unit was in the test mode, restored the correct speaker display level. **C.B.**

## Sony HCD-S880

This unit would play DVD and SACD discs but not CDs. The cause of the trouble was on the DVD board, where the ceramic chip capacitor C428 (3,300pF, 16V) was faulty. A replacement restored normal CD playback. **C.B.**

## Panasonic DVD-S35

When this unit was switched on the tray would open and close with the loading/sled motor running continuously. The reason was that the 3·3V surface-mounted regulator IC6251 was faulty, with no output. **A.R.**

## LG FFH-DV25AD

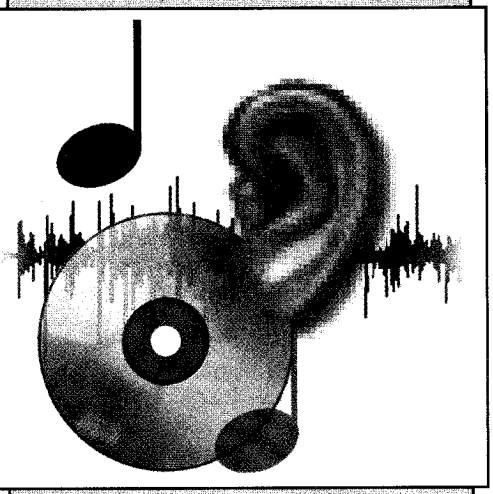
The problem with this DVD micro hi-fi was intermittent loading and failure to read a disc and eject it. Replacement of the loading belt and a clean up provided a cure. **J.S.O.**

## JVC XV522SL

If there is no picture/freeze frame while the unit is reading a disc, suspect the spindle motor (part no. FXL-V6SPSV-2C). Check the resistance reading of the motor: if this is less than 13Ω, fit a replacement. A temporary check, to prove that the fault is caused by the spindle motor, is to connect a battery across its terminals (with the motor out of circuit) to clear muck from the commutator. This should restore operation, proving that the motor is the cause of the trouble. **J.C.**

## Panasonic DVD-RV31

If the picture freezes when the machine has warmed up, resolder the spindle motor and the components next to it. This usually restores normal operation. If the fault persists, the spindle motor may have to be replaced. **J.C.**



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## Sharp CD-DP2400

The reported fault with this unit was "all controls except volume lock when playing a CD or a tape: power has to be removed to restore". This was in fact an almost perfect description of a very odd fault. But there was another factor, which the engineer who brought the unit in had missed. It made the problem even more bizarre.

If 'play' was pressed in say the CD mode, the disc would spin up and play as requested. All other functions worked correctly. You could skip forwards or backwards, stop the disc, open the drawer, change function, anything – until the volume was altered. The display would then change correctly to read 'volume', plus a dB level as the control was rotated. When the control was left at the new setting the display reverted to track information after a couple of seconds, as it should – but no controls other than volume worked! I discovered, by accident, that if the volume control was rotated rapidly normal operation of the other controls would sometimes be restored.

This suggested a software problem so, as a first move, I decided to reinitialise the system. You might think that this happens to a hi-fi unit when mains power is first applied, but in fact all that happens is a system master reset. If the system control was reinitialised, all stored radio stations would be lost together with timer information, clock information, last set function, last set volume etc. So sleep power to the microcontroller's core/memory is usually maintained, by means of a large-value 'goldcap'.

As I didn't have the service manual I was unable to locate such a capacitor with any certainty. So, with the unit completely disconnected, I clipped a crocodile lead to chassis at one end and to a 10Ω resistor at the other end. I then stroked the other end of the resistor around all the microcontroller IC's pins several times, to ensure that any capacitors connected to the pins would be thoroughly discharged.

When the system was repowered the problems had all been cleared. An extended soak test, with several overnight depowerings, proved that the cure was permanent. **G.D.**

## Aiwa FD-LM88K

A very long time ago, when I was an apprentice, many parts would be repaired, made or modified daily. Poor mechanical design or construction could often be improved or corrected by a judiciously positioned screw or washer. Sometimes a new spring would need to be made, or reworked from an existing one in the junkbox. These skills were passed down by our workshop mentors, and learning them was an important part of our training.

Nowadays such practices are frowned upon, and often regarded as bodging by the university graduates in power. Doubtless many of the things we did back then were bodging, and would thus not be acceptable today. But the lateral thinking and mechanical skills we learnt all those years ago can still be pressed into service sometimes, in particular to rescue something that would otherwise be dead in the water.

In this case the job ticket said 'CD lid jammed'. It's a motor-driven lid that opens, clam-shell style, in the top of one of the two system units. The motor made an initial grunt, but nothing further happened. When the case had been dismantled and the gear train block had been removed it was clear that two gear teeth had broken off the quadrant-shaped rack, which is part of the lid itself. Once they had been found, jammed in the teeth of one of the drive gears, and removed the motor drive operated freely. This left me with the problem of the missing teeth on the rack. They are the two that engage with the final drive gear when the lid is fully closed and at rest. Thus when the open button was pressed the lid just bounced as the drive gear caught and slipped on the remnants of the broken teeth.

As many of you will know, obtaining parts for Aiwa products has become nigh on impossible since the brand was taken under the Sony umbrella, particularly small or obscure ones for cheaper products such as this one. So it was that I brought some of the old skills and lateral thinking to bear on the problem of the damaged lid.

Clearly any replacement teeth would need to be strong and reliable. Thus any kind of gluing, or profile rebuilding with epoxy resin, was out of the question. The rack is about 3mm thick, so I took a scalpel and planed down the remnants of the broken teeth to leave a flat surface. I then used an 0·7mm PCB drill bit to make two holes, side by side, at each of the missing tooth sites. Next I took some 0·9mm lacquered copper wire and made a sharp hairpin bend at the end. This was cut off, at a length of about 5mm, and the two ends were pushed into the previously drilled holes.

A soldering iron was used to heat the wire loop until it pushed down into the tight pilot holes in the rack. I continued until the top of the loop was level with the adjacent tooth. The whole process was then repeated for the other missing tooth. A small amount of epoxy resin was next mixed and teased in around the bottoms of and between the new teeth. This was to ensure that no movement could take place

between the copper wire and the remaining, original teeth.

After leaving this overnight to harden really solidly, I finally touched up the profile of the newly created teeth with a rat-tail file. When all had been reassembled, I was rewarded with a lid that operated as smoothly and faultlessly as the day it came out of the factory.

This may seem to have been a long-winded procedure that was not worthwhile in view of the value of the equipment, but in fact it took no longer than a 'normal' repair. There was the added bonus that a piece of otherwise working equipment had been saved from becoming just another piece of landfill. **G.D.**

## Sony HCD-ED1

There was no power on though the record and DBFB lamps were lit. When I carried out some voltage checks I found that the master control chip IC201 was faulty. A replacement restored normal power-on operation. **C.B.**

## Sony STR-KSL60

There was no fluorescent display – only the function-indicator LEDs lit up. Multimeter checks on the display board proved that the supplies to the FL/LED driver IC were present and correct, so a closer look was taken at the connections to FL101's pins. Inspection with an eyeglass revealed a hairline crack across the track that leads to the pad of pin 64. I soldered a small wire link between the pin and a test pad on the track just before the break. This restored the display.**C.B.**

## Sony HCD-ED1

There was an intermittent CD playback problem with this unit. The cause was on the volume/power board, where R516 (470Ω, 5%, 0·25W fusible) was defective. A replacement restored correct operation. **C.B.**

## Revox B226

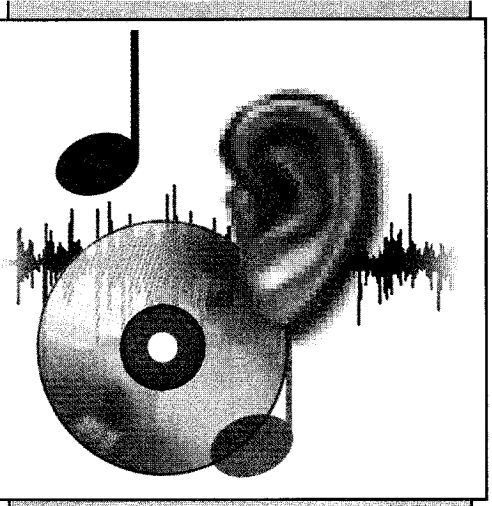
There were a few faults with this CD player. The display wasn't visible, the operation of the CD tray was erratic because the guides on one side had come loose and one of the O rings on which it rests had split, the BD136 transistor in the power supply was short-circuit collector-to-emitter because of the excessive current drawn by the display driver circuit, and a 220$\mu$F capacitor had blown its top!

The BD136 transistor was replaced with a BD140, the tray loading rings were replaced and a new 220$\mu$F capacitor was fitted. These were the easy things. The display in this model has a special illumination circuit – normal models use standard bulbs. A ferrite toroid drives an illuminated back plane that needs 110V AC and costs about £140 to replace – a dim display is a sign of impending outlay. In this case the transformer also needed replacement. The owner didn't want to replace it because of the cost and the fact that he used the display in a pair of Meridian digital speakers, through the digital output.

My thanks to a Revox service engineer in Cheadle, Cheshire for information and help with this one. **P.R.**

## Nakamichi BX2

This cassette deck dates from 1983. After repairing the usual idler (between the reels) problem, which causes no fast forward/rewind or play, I found that with some cassettes the output from one channel (left) was lower than that from the other. After tweaking the record/playback levels I discovered that the metal plate behind the cassette, the one that covers the cassette workings, wasn't located in the guide pin slots. So everything had to be reset to the correct levels. **P.R.**



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## NAD 3020B

At switch on there was a loud hum that faded out slowly to leave normal operation. Scope checks during the brief presence of the fault showed that a large ripple was present around the muting FETs Q509 and Q510. These are powered by a –62V supply that's obtained from a voltage-doubler arrangement. Checks here revealed that C533 (47$\mu$F, 50V) had a high ESR which gradually reduced as the operating temperature rose. **C.A.**

## JVC CA-D672

The owner said he had been wiggling the headphone plug to get a headphone signal but there was now no speaker output. Easy-peasy I thought: go straight to the headphone socket soldering, which was badly cracked of course and, my lucky day, accessible without removing the front panel with its dozens of screws. Just resolder, connect up, switch on and wait for the sound of music.

Unfortunately it was the sound of silence. I then discovered that the owner's earlier gymnastics with the plug had succeeded in leaving a broken tip stuck down the end of the socket, operating the mute contacts permanently. It would have taken time to obtain a replacement socket, and neither I nor the owner wanted the job to be delayed. So it was time for the mother of invention.

As it was impossible to pull the tip back out through the front of the socket, I removed and tediously dismantled the front panel to gain access, eventually, to the headphone socket board. I removed the socket, carefully drilled a small hole through the back, and used a small screwdriver to push out the remains of the plug. Resistance checks on the socket showed that the internal connections had not been damaged and that the important mute contacts were OK. After reassembling everything I tried again. This time I was rewarded with music to my ears. **C.A.**

## Pioneer XC-L11

There were two reported problems with this unit. First, that it suffered from odd, intermittent powering down. The usual cause of this is the capacitors in the VFD supply inverter, which is located behind the square connector that goes out to the display panel at the top of the system – I've described the problem before. In this case the capacitors read OK when checked with an ESR meter but the inverter transistors, which run quite hot, were badly dry-jointed. So I treated them to a rework, using fresh solder.

The other problem was that the 'feather-touch' controls for open/close and play/pause intermittently lost their sensitivity. They are for 'finger-brush' operation rather than having any moving parts. The sensing contacts are part of the front panel, which is itself part of the upper case. Connection is made via two termination PCBs, using phosphor-bronze spring contacts. In both cases these had quite a tarnished appearance, as were the wire-contact faces with which the springs make. Treatment with a fibreglass contact-burnishing pen, following by contact retensioning, provided a complete cure. **G.D.**

## Sony HCD-CP300

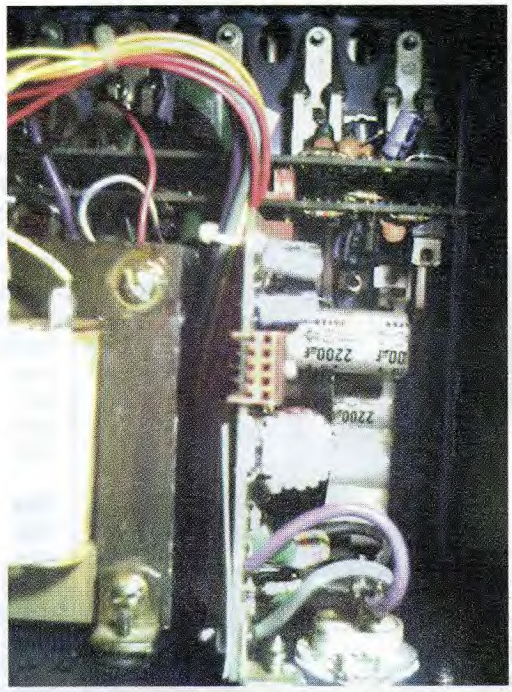
This one had me guessing for a while. The owner's complaint was that the tape decks didn't work. On test I found that they carried out all their mechanical functions correctly but neither of them produced any audio. I checked for a supply on the record/playback sub-board and found that this was missing. Maybe the decoupling capacitor C412, at pin 18, was short-circuit. It didn't read short to ground at its positive leg, but then it didn't at its negative leg either! When I checked back at the flexiprint connector on the main PCB I found that there was a supply voltage and a good ground connection. It then dawned on me – the flexiprint had been inserted in the connector upside down, the result being no connection to the main PCB at all. Once this had been corrected the tape decks worked normally.

When I later quizzed the dealer who had sent me the unit, to find out whether there was any story to the job, I was told that the owner had had a CD fault repaired elsewhere some time back. This had been dealt with satisfactorily, and she didn't use tape very much. It was only a considerable time after the CD repair that the tape fault was discovered, and by then she felt that it had been too long to return the unit to the original repairers to get them to sort out what had gone wrong. It had come to us instead! **G.D.**

## Sony HCD-A490

The complaint was that every time a different function was selected for tape deck B a loud mechanical noise came from within. It sounded like slipping nylon gear teeth, and I initially suspected that it was something to do with the main cam drive. As it turned out I was right about my identification of the noise, but not about the location from which it came.

The deck mechanism employs a separate motor and drive system for take-up, fast forward and rewind. Its shaft has a small nylon pinion that meshes with a drive gear



*Left – The Carver Cube's rear panel.*

*Right – Internal view of the Carver Cube.*

on a swinging-arm arrangement. The cause of the problem was simply that the pinion had worked its way up the shaft until it was only just meshing with the gear. When the motor started up initially, the gears slipped until they caught. The problem was easily fixed by repositioning the pinion and securing it with a spot of superglue. **G.D.**

## Sony HAR-LH500

There was no power with this CD/hard-disk audio recorder. Checks on the power board revealed the cause, which was C412 (220$\mu$F, 400V). When this item fails the replacement should be 150$\mu$F, 450V, part no. 1-110-970-11. The replacement restored normal operation. **C.B.**

## Sony CDP-XE370

This unit's CD drawer went in and out when it was switched on. Investigation of the CD mechanism revealed the cause, which was grease on the loading belt. It had come from the CD tray, and as a result the belt slipped on the loading pulley. Cleaning the grease off the belt restored normal closing and loading operation. **C.B.**

## Sony MZR-700PC

No sound came from the left-hand side of this MiniDisc player's audio jack. The cause of the fault was quickly traced to the headphone amplifier chip IC302, which had become unseated on one side from the main board. All that was required was to resolder this surface-mounted IC, after which there was normal sound output. **C.B.**

## Sony HCD-CPX1

Every time this new unit's standby button was pressed the function mode would change instead. Investigation inside revealed the cause, which was a solder splash that shorted pins at the microcontroller chip IC401 on the main board. Normal standby operation was restored once the solder splash around the IC had been carefully cleaned off. **C.B.**

## The Carver M400

The Carver Cube was introduced by Bob Carver in 1980 in an attempt to produce a high-power amplifier that was compact and light, for "a dollar a watt". It's a 6·75in. cube with two rows of LEDs for the left/right channel outputs on the front panel and speaker and input connections at the back. Early models also had a mono/stereo switch at the back. It altered the power-supply regulation.

The power supply was the main area for updating/modifications. The supply uses a triac in series with a transformer, a simple circuit consisting of a LED and a phototransistor being used to vary the phase-angle of the triac's firing point. The LED and phototransistor were discrete in early models, later ones using a 6-pin DIP chip. Reliability wasn't a strong point with early models, and several modifications were introduced. Small TO5/TO220 triacs were used until, in later versions, a TO3 type was adopted. There are two adjustments, a 'smooth firing' potentiometer and another one to adjust the 75V supply on the secondary side.

If the amplifier makes a ticking sound, this indicates that the triac isn't firing at the correct point during the cycle (the circuit is triggered at twice the input frequency). In later versions there's a single potentiometer, to adjust the HT supply.

The power amplifier section remained basically the same throughout the life of the unit, with only minor changes. Basically there's a 20W amplifier for each channel, with ±25V supplies. When the drive to the output transistors reaches a level close to maximum power, another pair of transistors in the ± feeds is switched on to increase the supplies to ±50V. If the drive is increased still further, another pair of transistors switches on to provide ±75V supplies. The transistors are OEM branded, but I suspect that they are complementary MJ115015/16 pairs or similar.

An unusual aspect of the 400 is that one channel is a standard non-inverting amplifier while the other is an inverting type. This enables the 400 to be used as a mono bridged amplifier with no switching, as the inverted output is reversed at the speaker connections when one speaker is connected as shown on the rear panel. Model 400T was introduced to emulate the valve sound, but the circuitry was little different from the standard model.

Access to the inside is quite easy. The front panel with the LEDs on a small PCB can be pulled off when the four screws are removed from the sides. The LED PCB can be unplugged from the front panel. Most of the power supply is then accessible. For better access the U-shaped cover can be removed by taking out the nine screws towards the back. Plenty of heatsink is used on the surfaces, so it can be messy.

The small vertical PCB is the power board. The triac should be at the front, mounted on the case as a heatsink. The two large capacitors towards the back smooth the 75V supplies – they are fastened to the PCB. Other capacitors on the PCB smooth the 25V and 50V supplies.

The LED in the optocoupler is fed from a couple of transistors that monitor the 75V supply. If the LED is full on, the triac is prevented from firing by the phototransistor, which is connected across a diode bridge. This is also the overload condition, which is monitored as the DC level at the speaker terminals. I'm not sure if this circuit detects the negative voltage at the output, as a diode is used for each channel.

The large bridge rectifier on the board is for the ±75V supplies. There are smaller ones in parallel for ±25/50V.

The accompanying photos show the rear panel and internal views. **P.R.**

# DVD

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## Sony DAV-S400

The complaint with this all-in-one home-cinema system was no sound output with the word 'earphone' shown in the front-panel display. On investigation several dry soldered joints were found at connector CN309 and both ends of C313 were unsoldered. These items are on the audio amplifier PCB. There was normal sound once they had been resoldered. **E.T.**

## Pioneer DV-U7

This DVD player was completely dead. The power supply is easy to work on once it has been removed from the unit. I soon found the cause of the fault: R74 (2·2MΩ) was open-circuit. **D.I.**

## Sony AVD-K150G

The problem with this DVD/video unit was dots on the display with video playback. Investigation inside showed that the cause was a poor earth connection between the mechanical deck assembly and the main board. All that was needed to restore normal picture playback was to raise the earthing plate below the deck assembly slightly to ensure a better connection. **C.B.**

## Sony DVP-NS300

The problem with this unit was no power. Meter checks on board IF-80 revealed that the 1A fuse PS401, which is an IC link, was open-circuit. A replacement restored power and normal operation. The part no. is 1-576-509-21. **C.B.**

## Sony SLV-D930GI

This DVD/video unit had no display and appeared to be dead. Checks in the chopper power supply on the main PCB revealed that diode D1SS17, type F1T4, was faulty. It's the rectifier for the 24V line. A replacement restored full operation. The part no. is 1-804-412-22. **C.B.**

## Sony HCD-S800

There was no DVD operation. Voltage checks on the DVD PCB revealed that the 12V supply at connector CN008 was missing. Tracing back, I found that the 10μH inductor L904 on the power board was faulty. A replacement restored normal operation. The part no. is 1-414-398-11. **C.B.**

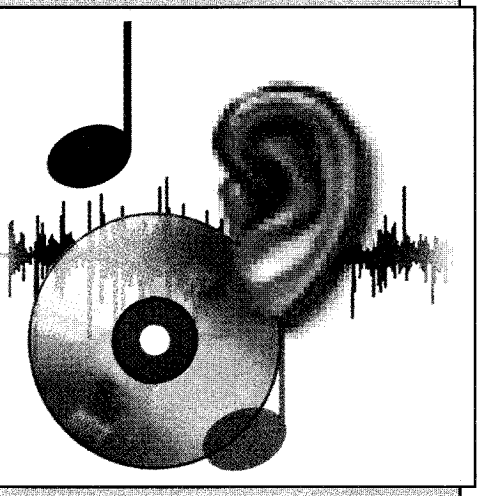
## Toshiba SD42HKSB

This home-cinema system came to me from another dealer. The reported fault was "noise from the speakers". When I powered it there was a harsh rasping hiss from the centre channel only. When the input to the centre speaker was disconnected the other channels were quiet. FM radio could be selected, and a station could be tuned in. RDS data appeared in the display, which suggested that the tuner was working correctly. But the other five channels remained quiet, apart from an occasional pop when the volume encoder was rotated. At this stage the DVD deck's laser didn't home, the drawer wouldn't open, and the disc motor ran backwards at high speed. After about five minutes the unit burst into life, producing normal audio from the five channels still connected and, when the centre speaker was reconnected, from that one too. The DVD section remained much as it had been before, except that disc motor had stopped.

About the only thing that connected these various symptoms was the power supply. Blasts here with a can of freezer were inconclusive, so I decided to check the ESR of C939 (470μF, 10V) because it had very slight doming at its top. The reading was over 11Ω, which was clearly out of specification. But a replacement, rated at 16V, made no difference at all to the fault symptoms.

I was still convinced that the problem was in the power supply, so I decided to check the ESR of the rest of the electrolytics there. The first one I tried, largely because it was right by a heatsink and the board in the area looked a bit heat-stressed, was C938 (1,000μF, 16V). The ESR reading was off the scale. When I removed it from the board I saw that the sealing bung had forced its way out of the bottom of the can. This is the alternative way in which electrolytics are designed to fail safe when pressure builds up inside, and doesn't result in the can rupturing along the deliberately weak spot lines at the top.

A replacement, uprated at 25V, restored immediate clean sound from all channels and full DVD section operation. C938 and C939 seemed to be part of the same supply. **G.D.**



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## Technics SL-PJ44 CD player

This old-timer was reluctant to get a disc to spin. Sometimes it would just 'bump' the disc a couple of times. At others it would lazily roll the disc backwards. Occasionally it would spin the disc in the right direction sluggishly and, if left long enough, might just get up enough revolutions to read the TOC.

As the spindle motor is a direct-drive type, similar to the capstan motors used in many VCRs, I initially suspected a power-supply fault rather than something motor-related. A closer look however revealed, under the metal lower bearing plate, a PCB with electrolytics on it. This plate is easy to remove after taking out two screws. The PCB that's then accessible has the three motor stator coils, the drive IC, three normal electrolytics and two surface-mounted ones on it. One of these, with a value of 33$\mu$F and rated at 25V, had leaked.

I cleaned up the PCB and fitted a replacement capacitor. This restored the fast spin-up and TOC read normal with Technics players. **G.D.**

## Sharp XL1500H

Fuse blowing was the complaint with this unit. Initial checks revealed a dead short across the main smoothing capacitor C131 (2,200$\mu$F). A print track lead from it to the output IC, which was my first suspect as being the cause of the problem. With its pins unsoldered however the short was still present. Second favourite was C115 (10$\mu$F), a decoupler that's right up close to the IC. Again this proved to be blameless.

The culprit finally turned out to be C116 (22nF), a ceramic disc HF bypass capacitor for C115. Once it had been removed the short disappeared. With a replacement fitted the unit performed normally, with no signs of fuse blowing. **G.D.**

## Behringer Eurodesk MX3282A

The note that came with this monster 32-channel professional mixing desk simply said "went bang". It has a separate rack-mount power supply that delivers ±18V, +12V, +5V and +48V for phantom feeding. The bang certainly hadn't come from this unit, as the outputs were all correct. A quick look inside showed that it used a simple linear design and that there were no signs of any distress.

Before going further I decided that a bit more knowledge about the failure circumstances would be helpful. The owner said he had been listening with headphones that had gone bang. After that the deck had ceased all operation.

Armed with this information I removed the covers and powered up. The only signs of activity were that the power LED lit up, also the 48V phantom-feed LED when this facility was enabled using the rear-panel switch. My next move was to check for voltages on the three PCBs. Some large multiway cables run between them, also a six-way with quite chunky wires. –18V was present at two of these wires, but little else. As they were the middle two pins, and a quick glance at the contents of the boards revealed a lot of op-amps, it seemed reasonable to assume that +18V should have been present at two more pins.

I switched off and checked the resistance to chassis at all pins. The two that I thought should probably carry +18V read dead short. It was easy, next, to unplug the boards from one another and recheck. The board at the right-hand side, top, with the front towards you, contains the final mix-down stage, headphone amplifiers, LED bargraph, line-out drivers and eight of the 32 input channels. The connections from the external power supply arrive at this board first. The other two boards are identical 12-channel input/tone/fader modules. I was able to establish quickly that the suspected +18V pins read OK on the mix-down board and one of the 12-channel boards but dead short on the remaining one.

This is where the problems started. The PCB is secured to the main body of the unit by about 16 screws, and there are a number of connectors to uncouple. To remove the board however 156 – yes, that's correct – twiddle knobs and slider knobs have to be removed.

Once the board was out I checked for any obvious problems such as bulged or exploded electrolytic capacitors, but none were apparent. I then spent some time metering all the electrolytics. Once again, this failed to reveal anything amiss. So there was no option other than to fault-find on it the hard way. The rail with the short on it went as a print run from the connector right over to the other side of the board, with twelve through-plated holes on it, one above each of the twelve channels. When you tried to see where these went to on the component side of the board you were lost, as the entire upper surface of the board is covered with potentiometers that obscure all the print runs.

Although I am always loath to do it, there seemed little option other than to employ the 'half-split' short-location method. This involves making small print cuts at carefully worked out places on the print 'tree' to isolate the short to a single branch, then unsolder each component on that branch in turn to find the faulty one.

Using this method, I was able first to isolate the fault to a single channel out of the

twelve and then to the vicinity of two NMJ-series SIL op-amp ICs. I managed to isolate the positive supply pin of each of these devices, but the short remained. This left only C283, an 0·1μF ceramic capacitor that's connected directly to the supply pin of IC55. It was of the blue type you used to see sprinkled liberally around logic boards a few years ago, as supply decouplers. When this item was removed it was proved to be the cause of the elusive short.

After bridging all the print cuts I'd made during the fault-location process, and replacing the faulty capacitor, the tedious job of rebuilding the unit had to be undertaken. The knobs are all colour-coded, so they had to be selected from the tub in which they had been stored during the repair. Just refitting them all took the better part of an hour.

When the unit was reassembled and switched on it lit up like a Christmas tree, and I was rewarded with a fully-working piece of equipment. It may seem that a lot of effort was required to carry out the repair – but it seemed worthwhile when I wrote out the bill . . . **G.D.**

## Grundig UMS12

The ticket with this one said "sound from headphones only". I never got as far as checking that because, when the unit was powered with speakers connected, a very violent buzz came from them.

The cause was obvious once the covers had been removed. A nice easy one for a change. The main smoothing capacitor (3,300μF, 35V) was bulging at the top and bottom. A replacement restored normal audio from the speakers and headphones. **G.D.**

## Denon UDM30

The complaint was no sound output. Checks in the output stage revealed that it was working but was muted. This led me to the DTA114EK transistor T211, which was open-circuit. **R.B.**

## Sony HCD-CP555

This audio system's five-disc interchanger was faulty. A look inside revealed that a disc had become stuck between the top bracket, ref. #163, and the stacker. A new bracket, part no. X-2022-668-1), was required to restore normal CD operation. **C.B.**

## Sony STR-LV500

All the segments of this FM/AM stereo radio receiver's display were lit up. Checks on the display board revealed that the fluorescent indictor tube FL801, part no. 1-518-903-11, was faulty. It had become shorted, because the customer had spilt a small amount of liquid on the front of the unit. I checked around the front display PCB for any further liquid damage then fitted a replacement tube. After that everything worked normally. **C.B.**

## NAD 514

This compact disc player wouldn't play a disc when it was inserted. When I examined the CD mechanism I found the cause of the fault: the loading pulley had become stretched and was unable to raise the CD mechanism when the tray closed. A replacement belt restored normal loading and playing. **C.B.**

## Sony HCD-SD1

This unit failed to operate. Checks inside, on the sub-tran PCB, revealed that relay RY901 was faulty. A new relay restored normal operation. **C.B.**

## Sony SA-WMSP501

This active sub-woofer made a rattling noise with bass notes. The front silver panel can be levered off slowly at the bottom, using a flat screwdriver. When I did this I saw the cause of the trouble: a loose circular cushion pad, near the top of the unit between the front silver panel and the case, was vibrating. All that was needed to restore normal rattle-free sound output was to glue or tack the circular pad in its right position – then replace the front. **C.B.**

## Sony HCD-HP7

There was no sound in the tuner mode. Checks on the main board revealed that diode D102 was defective. A small modification is required when this fault occurs. Replace the diode with a zero-ohms resistor chip, part no. 1-216-864-91, then fit a 10ED40-TA1B2 diode, part no. 6-500-522-11, in place of the tinned wire JW415, with its anode and cathode the same way round as D102 had been. **C.B.**

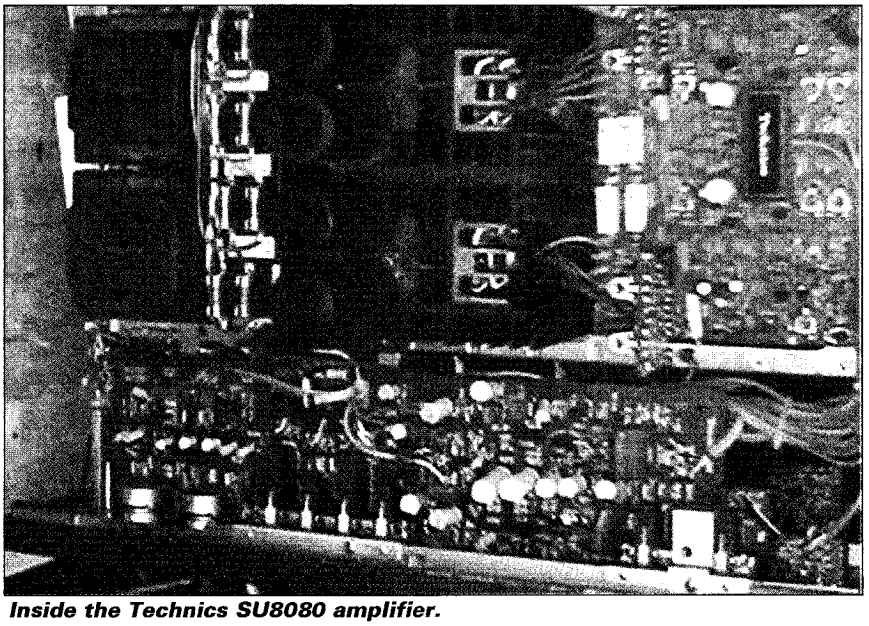
## Technics SU8080

Intermittent sound was the complaint with this amplifier, which dates from 1978. The cause turned out to be the speaker connections. These are in the form of a collet arrangement that tightens the wires. Where the wires fit inside it there were small bits of plastic that had broken off something and prevented tightening against the wires. To repair, the connector assembly had to be removed from the chassis and dismantled. I removed the back panel but even so it was a fiddly business to get the connectors off.

This was one of Technics better amplifiers, producing 72W RMS per channel. It doesn't like a low speaker impedance – below 4Ω. The over-current circuit will limit the maximum current.

I've had to deal with many of these amplifiers that have had no component failures, only noisy potentiometers and switches.

A common complaint is no sound from any input. Check that the preamplifier-main amplifier links are present! There's a bunch of fuses under a plate to the right of the transformers (see photo). These may be missed if you don't know they are there. **P.R.**



***Inside the Technics SU8080 amplifier.***

# DVD

**Fault reports from**
**Chris Bowers**
**Geoff Darby**
**and**
**Steve Roberts**

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## Sony HCD-SB300

This new SACD/DVD/receiver produced no output from the speakers but showed a headphone sign in the display – with no headphones plugged in. As soon as the top was removed the speakers worked. Investigation inside, on the H/P board that's mounted off the front panel, revealed the cause. The back of the connector that connects the H/P board to the amplifier board was shorted to the chassis base. All that was needed to restore normal output from the speakers was to stick a small piece of insulation tape on the edge of the rise chassis base, just under the connector on the H/P board. **C.B.**

## Sony PlayStation 2

This was yet another 'must-do' item, this time to win my daughter's boyfriend some Brownie points at his new job. The unit belonged to one of his colleagues, the complaint being that it wouldn't play discs and made a funny grating noise.

Once I had the case off I was able to remove the deck cover, which supports the disc clamp. So, when I loaded a disc, I had to quickly pop an old clamp magnet down on top of it to hold it down on the turntable. The machine spun the disc OK and made all he right servo noises. The laser zipped backwards and forwards busily across the disc, and the 'loading' message appeared on the monitor. But this was all that happened.

The laser light on a DVD deck is so intense that the beam can be clearly seen through the disc. When I watched carefully the beam, despite all the sled activity, never moved farther than about half way out to the edge of the disc. So my next move was to examine the sled's mechanical operation in detail.

With the tray open the sled drive is all clearly visible and easily accessible. It's a simple arrangement, with the laser running on two slide rods, driven by a long worm-drive extension to the sled motor shaft. The interface between the laser and the worm is a plastic 'flap'. This has two ridges moulded in its underside, pitched to engage with the coarse 'thread' of the worm shaft.

The shaft is easy to rotate by stroking a finger across it. When this was tried the laser moved smoothly for the first half of its travel. It then became tight however, and the result of further rotation of the shaft was that the plastic pawl slipped rather than moving the laser assembly. This was the cause of the reported grating noise.

The laser is easy to remove. Undo a single screw that retains the slide rod on the worm-drive side of the deck. The laser can then be lifted clear of the deck and the other slide rod, after disconnecting the flexiprint. Once I had done this I was able to feel, clearly, that the laser was generally stiff on the slide rod still fitted to it, particularly so from about half way along. The bearing holes on the laser are lined with Oilite phosphor-bronze type material. I gave them a good clean, and also cleaned and polished the rod. After that I added a couple of drops of very light machine oil to each bearing sleeve and left it to soak in.

When the slide rod was reinserted there was so little friction that you could have blown the laser along it. Once the deck had all been reassembled I repeated the finger-roll test on the drive worm. This time the laser moved easily from one end of its track to the other.

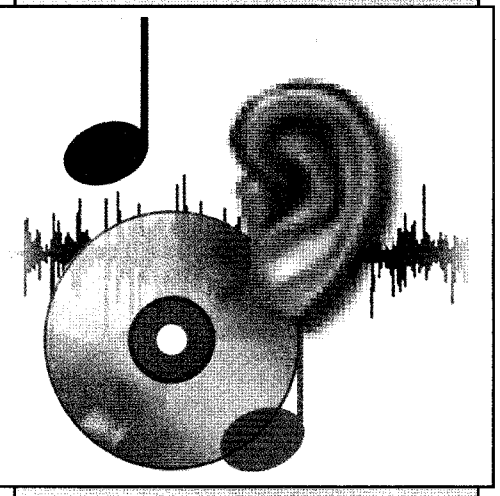
The whole machine was then reassembled and tried. It now read any type of disc put in it – PS2 game, DVD or audio – without incident. The Brownie points were won and, much more importantly, my reputation as a worker of magic was preserved! **G.D.**

## Toshiba SD125E

The customer complained that the DVD drawer wouldn't open, using either the front-panel button or the remote-control unit. It took me a while to locate the cause of the problem, which turned out to be dry-joints on the PCB where the power supply is connected to the front panel. A grey ribbon cable (four-core) is soldered through the board. It's directly behind the drawer-open button on the front panel.

I can only assume that continual button pushing eventually made matters worse. The track leading from the ribbon cable is extremely thin, and could easily fracture. I gave the four connections a good blanket of solder, which seemed to cure the problem. If the track had been damaged as well as being dry-jointed, I guess that repair would not have been possible, thus sending another DVD player to that great scrapyard in the sky!

Other engineers will probably have experienced the problem with this machine. If not, they soon will do. **S.R.**



# AUDIO FAULTS

**Reports from**
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**Philip Rosbottom**
**Charles Coultas**
**Peter Graves**
**and**
**Chris Bowers**

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## Goodmans 2728

The complaint with this all-function budget hi-fi midi system was that when power was applied the CD carousel just went round and round without stopping. When I tried it, this is exactly what happened. In addition if the tray was ejected, once it had come out it wouldn't go back in.

There are four small sense switches on a small board under the CD deck, which is a long-winded job to remove. Two of them are worked by levers, one from the deck carrier to detect the deck up/down position, the other from the centre of the carousel. This second one is pushed by a bump moulded in the underside of the carousel at disc position 1, to give the control system a reference. Cleaning and lubricating the contacts of this switch cured the ever-rotating carousel problem.

The remaining two switches are operated by bumps moulded in the side of the track in which the tray slides to eject. They sense tray in/out. Cleaning and treating the contacts on these two switches cured the problem of the tray refusing to go back in. **G.D.**

## JVC CA-MXGT88

This item was dead apart from a brief relay click when power was first applied. There was no display, and no action from any of the front-panel buttons. In addition to the main power transformer there is also a small standby transformer, on the main PCB. This was working, and a raw standby supply was being produced.

This led me to PIC01, a 78L05 regulator IC. The board was quite discoloured in the area where it is located, which suggests that it probably runs too hot for its own good. There was about 12V at the input but only 1V at the output. There should have been about 5·6V, as there's a diode in series with the chassis pin. I replaced it with a standard 1A 7805, in a TO220 package, rather than using the little 100mA TO92 type originally fitted. A 7805 will drop straight into the board, pin for pin, with the same pin spacing. As a further precaution I fitted a small heatsink to the device's tab.

When I tested the unit the 5·6V standby supply was correct and the whole system powered up and performed normally. **G.D.**

## Quad 405-2

The complaint with this classic old-timer was that it crackled after five minutes. I found that it did exactly this, from the left channel. My trusty can of freezer soon revealed the cause, which was the TL071 BiFET op amp at the front end of the left channel. When it was touched with the tip of a soldering iron the crackling immediately started up again. A replacement IC cured the fault. **G.D.**

## Audiopro A4-14

These active-three-way speakers, of Swedish design, worked but produced no bass output. When I removed the base, which houses the amplifier section, of the first one I saw that the 5in. bass units (two in push-pull) had the rotted-surround problem and needed replacement. The original type of surround is of unusual design, with a flat section to the speaker frame and a raised lip where it's attached to the cone.

The obvious thing I noticed when I inspected the amplifier was that the PCB-mounted fuseholders had begun to break away, losing their springiness. So these were also replaced. There are five per PCB. The design of the bass-drive circuit applies positive feedback at low frequencies to compensate for the restricted LF response with the small cabinet.

When I opened the second cabinet I found that the 4,700$\mu$F, 40V smoothing capacitors had begun to leak, discolouring the PCB etc.

Back to the first one. The positive supply fuse for the bass amplifier was blowing. The output stage uses BDW93/4 Darlington transistors. These, along with a collection of BC546/556 transistors, were replaced. Two of the latter are in a delay circuit (a resistor from collector to base and a 22$\mu$F capacitor to 0V) to the drive section of the amplifier. It prevents switch-on thumps – or, in this case, didn't when the fuse blew. As I couldn't get any quiescent current through the output transistors I checked the presets, which had a similar problem to the fuseholders and fell apart when I tried to adjust them. So these were also replaced. The amplifier then powered up all right.

The other channel had no quiescent current through the output transistors. New Darlington output transistors sorted that out. The heatsink arrangement is borderline in view of the dissipation. I suspect that the output transistors had overheated.

These active speakers received rave reviews in 1983/4, because of the excellent bass response – down to 30Hz – from such a small cabinet. **P.R.**

## Pioneer SA9100

This 65W per channel amplifier dates from 1974. It would work all right for about ten-fifteen minutes, then trip the DC protection. A couple of Fuji 2SC1451 transistors on the power amplifier board run at gas 6 and were suspect. I have noticed that some transistors have tarnished leads and turn out to be faulty. Whether the leads are oxidising and allowing oxygen to reach the

junction I don't know. Anyway once I had replaced them and the other transistors the amplifier worked reliably.

There was another problem however. This didn't show up until some probing was called for. A regulator PCB is mounted under a screen that runs the length of the front panel, just behind it. See Photo on the right. The regulators for the drive stage in the power amplifier are inside, and there are small holes in the cover to allow the heat to dissipate. They are more of a token gesture than being of any practical use. As a result all the electrolytic capacitors on the board were open-circuit and needed replacement.

The amplifier also has a wooden cover that would be better left off when it's in use, as the heat is unable to escape. Just a thought! **P.R.**

## Behringer MDX1400 audio processor

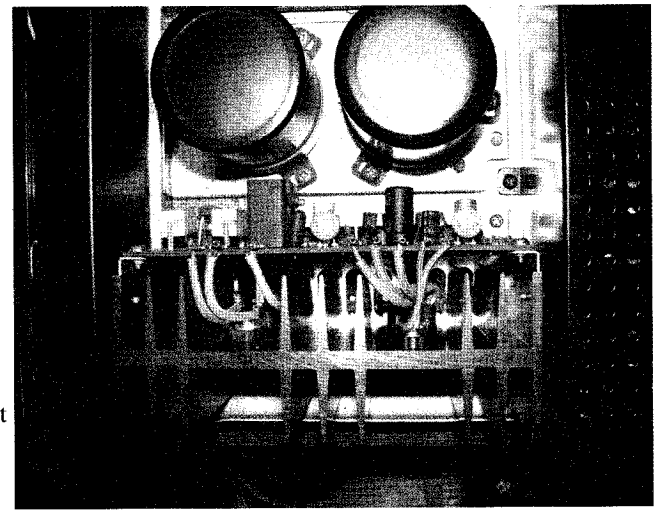
I was called out to a local sound recording studio to investigate a loud 100Hz buzz that had developed in one of the stereo output channels. After checking a few things I discovered that the buzzing stopped when the output jack from an auxiliary output socket of the Behringer compressor was unplugged. It seems that the buzz started during a thunderstorm, just after a nearby flash of lightning.

I opened the unit, expecting to find blackened components, but no such luck. Not having a circuit diagram, I traced back from the stereo output jack socket of the offending channel and carried out a few measurements. The output is balanced, but the jack's hot and cold pins were both at –14V, almost the negative-supply voltage. I replaced the dual surface-mounted op-amp chip IC4580 that drives the output jack, then tested the unit. There was a large output from the hot pin but only a tiny output from the cold pin. Fortunately there are two almost identical channels side by side and the other one was OK, so I used a meter to compare the resistor values. I quickly found that a resistor marked 60Ω on the board read about 600Ω. When I replaced this item with two 120Ω resistors in parallel I was relieved to get a good output from both the hot and cold pins, in anti-phase of course. It seems that the cold side of the channel was connected to ground via the mono jack plug, thus effectively shorting the cold output to ground.

The cable attached to the jack plug is over a hundred metres long, and I suspect that the lightning had induced enough voltage along the cable run to damage the op-amp chip. A stereo jack plug was fitted, leaving the ring disconnected as the driven equipment doesn't have a balanced input. The whole system was then tested and found to be OK. **C.C.**

## Cambridge Audio T500

"The display went black on the left-hand side, then the middle went black, then it all went black!" the customer said. For once it was a very accurate fault description, not even followed by "I think it's the fuse". This is a standalone FM tuner for use with an external amplifier, and the display was indeed completely black.



***Regulator PCB in the Pioneer SA9100 amplifier.***

The illumination is provided by three bulbs that are mounted directly behind the display, in a plastic reflector box. They had all blown, one after the other, to create the left to right display failure. The PCB on which this lot is mounted has to be removed to gain access to the display which, in terms of size and the number of pins, is very similar to a VCR digitron. It has to be unsoldered and removed to reach the bulbs, which can then be unsoldered and changed.

The bulbs are connected in parallel and are powered from a winding on the mains transformer via an 0·5W resistor, the combined resistance of the bulbs being used to reduce the voltage partially. Thus when one bulb fails the voltage across the remaining two increases quite dramatically, hastening their failure. Reassembly is the reverse of removal, accompanied by strong language.

When I switched on I discovered that the tuning range had changed! It was now 76-90MHz, which is not much good for local radio. And all I did was replace the bulbs! To restore normal conditions, power up while simultaneously pressing the programme up and down buttons, holding them down until every icon in the display is illuminated. This takes about ten seconds. You can now let go and rotate the tuning knob, until it shows 'E'. Next power down. When you power up again, normal conditions should have been restored. If not, you are in the wrong country – there are a few other choices, such as 'O', 'A' and 'J'. 'A' is interesting, as this option gives you an AM receiver! All this fuss because of a blown bulb! **P.G.**

## Sony HCD-C33

This midi box would power up and greet you with "initialising" then do nothing. It should check its five internally-stacked CD drawers in turn and, once satisfied that all is well, continue with the show. All was clearly not well, so removal of the CD mechanism seemed a good opening move.

I removed it from the rear of the unit after disconnecting the two ribbon cables at the side of the assembly. There are four screws at the bottom of the machine. Once these have been removed there is sufficient play to be able to remove the CD mechanism, which is held in place by four more screws. I found that there was a full complement of CDs inside, and one DVD that shared an already occupied compartment! It's fairly straightforward to remove discs by turning the mechanism manually. Once it had been emptied it was ready for reassembly and testing.

Fortunately no damage had been done. The machine powered up with "initialising", checked itself and began. Reloading the CDs, minus the extra DVD, proved that all was as it should be. **P.G.**

## Sony SA-WBE1

This unit's power/standby button would flicker green but with no audio output. The unit produced an odd popping sound when touched. Inspection inside revealed that one of the wires at CN404 on the jack PCB had split, causing a short to the metal back plate. All was well once the wire had been repaired, with shrink-wrap applied to it. **C.B.**

## Sony HCD-MDX10

There was an incorrect display when a name was inserted via the 'name-in' function. Multimeter checks inside revealed that the microcontroller chip IC601 wasn't working correctly. You have to fit an improved IC, part no. X-4952-960-1, also an improved chip (IC316, part no. 8-759-657-09) on the MD digital board. **C.B.**

# DVD

**Fault reports from Geoff Darby Chris Bowers A. Haq Richard Lewis and Uel Harte**

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## Sony DVP-PQ1

The complaint with this curious little clam-shell style unit was that it refused to play discs. When it was powered it emitted a noise that can only be described as sounding as if an angry wasp was trapped inside. Closer examination revealed that the laser was at the far end of its travel and not homing. The sled motor is a miniature stepper type, and I suspected that the buzzing noise was caused by the drive waveform applied to it.

The deck is very easy to get at. When the four screws under the little cover discs have been removed the whole top and door come off. Removal of three further screws, and disconnection of two readily-accessible flexiprints, enable the deck to be lifted clear. Once it was out, removal of the motor was a two-minute job (four solder joints on a flexiprint and two screws). The motor's shaft is several centimetres long, and it's also the drive worm for the laser. It was seized solid.
The motor is not available as a separate part. But a quick hunt through the scrap box turned up an almost new deck that had been discarded because of a faulty laser. It used exactly the same motor. When I fitted this in the player it worked perfectly, saving the customer the unnecessary expense of a whole new deck.
**G.D.**

## Sony HCD-SA30

The complaint with this unit was "drops back to standby sometimes". In fact it did this every time after just twenty seconds. It's not a problem that I have come across before, but is apparently a common one. I am indebted to a colleague for drawing my attention to the cause, which is the surface-mounted crystal X450 on the digital audio output board. It appears to be the clock-generator crystal for the three digital-processor chips that drive the output ICs.

As a matter of interest it's a very sensitive circuit. If you try to scope the crystal to check for activity, even using a ×10 low-capacitance probe, all audio immediately disappears and the unit goes into a shutdown condition. **G.D.**

## Philips DVD755VR/05

I wonder why it is that Philips DVD players and DVD-VCR combi units, such as this one, suffer so much from short-circuit diodes on the secondary side of the power supply? Typical symptoms, as with this unit, are a machine that's to all intents and purposes dead. A standby supply is sometimes present and, occasionally, a very faint chirping can be heard.

This time D113 had failed. A replacement restored full operation. **G.D.**

## JVC XV-THV70R

This was a good example of making promises you are not sure you can keep. The complaint was that the machine played OK but there was some rotational noise. I had a quick listen, and it didn't sound serious. So I promised it back the same day.

When I took the machine apart to determine the exact problem my heart sank. There's a phosphor-bronze pressure spring on top of the disc clamp. A thin Teflon disc is fixed to the underside of this. It bears on a plastic pin that sticks up from the centre of the disc-clamp moulding. The rotating pin had worn through the Teflon bearing disc and then worn itself away on the underlying metal. This had allowed the phosphor-bronze spring to get close enough to the outer metal rim of the disc clamp to start rubbing against it, hence the noise.

I quickly found a suitable piece of hard-wearing plastic to replace the Teflon disc, but this left the problem of the worn-down pin. Eventually I had a brainwave. I have some two-part epoxy resin made by a company called Handy Helper. I had bought it from one of those downtrodden looking youths who call at the door in the worst weather, trying to sell you dishcloths and suchlike. They are usually on some sort of grant scheme, and I had bought it more out of sympathy than need. But it's actually the very best Araldite-like material I have ever used. It sticks like the proverbial to almost anything, and sets like rock in about fifteen minutes at room temperature.

I mixed up a quantity then put a small blob in the centre of the clamp, using the remains of the pin as an anchor. Half an hour later I had a solid, perfectly formed shiny 'dome' where the stubby worn-

down pin had been. I put a tiny smear of general-purpose grease on it, then replaced the click-fit pressure spring with its disc of new bearing material. The edges of the spring now cleared the disc clamp, and there was smooth rotation when a disc was inserted.

Some may consider this repair to have been a bodge. But, looking at the materials used in the original items, I'm pretty sure that my replacements will be at least as durable – and will probably outlast the machine. **G.D.**

## Sony HCD-SA30

An easy one! Don't ask me how, but the turntable had come right off the spindle motor's shaft and was generally jamming up the works. Once it had been refitted, set to the correct height and secured with a spot of superglue, introduced to the turntable's centre hole (be careful to keep it off the upper part, where the cone-shaped moulding in the disc clamp locates), the unit was tried again. All was now well, with normal disc playing and tray operation. **G.D.**

## Sony SLV-D930GI

This DVD/VCR unit would freeze when playing DVDs but played CDs all right. The cause of the problem was the pick up assembly H211, part no. 9-885-061-34. A replacement restored DVD playback. **C.B.**

## Sony DVP-NS355

This unit would switch off when different buttons on other remote-control units, including non-Sony programmable ones, were pressed. If the firmware is not v6.3 (check in test mode) you need to replace IC204 on board MV-044 with an improved version, part no. 6-805-288-01. This will restore correct operation. **C.B.**

## Sony DVP-NS300

This unit had no power. I checked the supply lines on board IF-80 with a multimeter and found that the IC link PS401 (1A) was open-circuit. A replacement, part no. 1-576-509-21, restored the power. **C.B.**

## Sony DVP-S735D

Digitalised square blocks would appear in the DVD picture and also in the different menu displays. The cause of the fault was IC504, a 16M SDRAM, on board MB-86. A replacement restored normal pictures. The part no. is 8-759-463-47. **C.B.**

## Ferguson DVD430FE

The symptoms with this DVD player were no functions and no display. The cause was C807 (1,000$\mu$F) which had gone low in value. **A.H.**

## Grundig GDV520A

The problem with this home-cinema, 5.1 surround system DVD player was intermittent or no drawer operation. The cure was to replace R603, which is a 47Ω surface-mounted resistor. **R.L.**

## Philips LX3700D/25S

Suffering from lack of confidence, I kept this home-cinema unit to the last repair of the day. 'Not working' was written on the job card. From my experience with the shop staff, this can mean anything. I removed the top cover and homed in on a shattered mains fuse. Component checks then revealed a short-circuit mains bridge rectifier, circuit reference BR901. Further extensive checks showed that there was nothing else amiss on either the primary or the secondary side of the power supply.

Two days later the replacement, part no. 99650014176, arrived. I fitted it and, with bated breath, switched on. This unit takes a few seconds before the display appears. I then inserted a disc and tested the unit. Everything was OK. **U.H.**

Christopher Bowers

## HCD-S500

There was no eject, or operation in DVD mode. A look inside the unit on the DVD board using a multi-meter soon revealed the cause of the fault to be, (Q002) on side B of the board, which had become defective. A ring to technical soon revealed that a modification would be needed.

Remove old (Q002) and replace, with "House Assy", part number (X-4954-896-1) I was told don't forget to solder the three wires correctly. If the the-B side is, face up and (Q001) is upside down in front of you. Connect the blue wire to the collector (Top). The white wire which is Base, (bottom left), and the red wire which is the Emitter (bottom right hand side) next to the Q002 print, and replace (R011) a 1k chip resistor, with a 470 ohm chip resistor part number (1-218-949-1). Which is the (chip) resistor just below the (white Base wire).

Plus when replacing the board back in to the unit, screw the housing (Q002) assembly, to the (Amp board) using the screw next to the flexible connectors being careful not to touch any part of the DVD board and power board. A replacement of the two parts should soon restore the normal DVD operation again.

## Sony DVP-NS305

This unit had no power. A look inside on the Power Board soon revealed the fault to be caused by a blown Fuse F202. All that was needed to restore the normal operation again was to replace P/N (1-533-593-11).

## Sony DVP-NS305

This unit had no sound through the Scart connector. A look inside the unit on the AV61 Board soon revealed the fault to be caused by poor solder contacts on CN203 all that was needed to restore the normal operation again was to re-solder.

## Sony DVP-NS305

This unit would power up, then go back to standby straight away, (Plus when the unit was in test mode the picture was green). A look inside the unit on the MB 103 Board soon revealed the fault to be IC403 a replacement P/N (8-752-416-45) was all that was needed to restore the normal operation again.

## Sony HCD-S300

This unit had distorted sound coming from all of the speakers and the headphone output but the line-out was ok. A look inside the unit on the DVD board using a multi-meter soon revealed the fault to be caused by (IC507) a defective volume IC a replacement soon restored the normal sound.

## Sony HCD-S300

This unit would show no disc in CD and DVD mode. A look inside the unit with an Oscilloscope soon revealed the fault to be caused by (IC001) a defective oscillator generator P/N (8-795-949-1) and all that was needed to restore the normal operation again was to replace it.

## Sony SLV-D950E

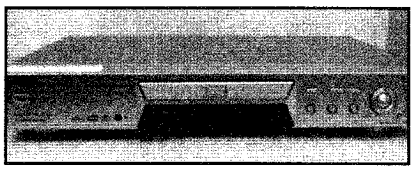
This unit's DVD picture would freeze (with block noise). A look inside the unit on the DVD mechanism assembly soon revealed a faulty (H210) motor feed Assembly P/N (9-885-037-22) and it was just a case of replacing the faulty motor to restore normal playback again.

Sony HCD-SB100

This new unit after powering up, would suddenly power off after ten minutes. A close look inside the unit on the Power Board, soon revealed the fault to be caused by (IC901) which had become defective P/N (9-719-947-79).

A call to technical soon revealed that a ZD955 Zener diode P/N (8-719-947-79) would need to be added over (C907) Cathode to the positive side, and the Anode to the negative terminal of (C907) to restore the normal power operation again.

## Sony DVP-NS300



This unit would show No Disc on the display when trying to play DVD and CD's. A look inside the unit, revealed the fault to be the (CN) Connector on the small (KPC-K-H) board on the KHM2SOAAA Optical Block Assembly, that connects to the MB-98 board Via (CN201). All that was needed to restored normal DVD operation was to resolder the connector again.

## Sony DVP-NS355

This unit would show no-disc on the display after loading the disc into the DVD player. A look inside soon revealed a faulty KHM-3lOAAA/C2RP Optical pick-up, base assembly. ref (104) P/N (8-820-237-06). A replacement was all that was needed to restore the normal DVD play-back again.

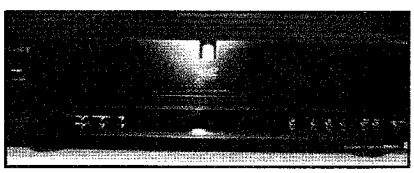
## Sony DVD HCD-S800

There was no DVD operation, a quick voltage check on CN008 connector, on the DVD board revealed no 12v supply. The fault was soon traced back to a defective 10uH Inductor L904 part number (1-414-398-11) on the power board. A replacement of this part soon restored the 12 volts supply and the normal operation again.

## Sony HCD-SC5

This units would not switch off into standby. A look inside the unit on the (Control PWB) using a multi-meter soon revealed the fault to be (S803) Play button which had collapsed causing a constant contact, a replacement of the push contact switch soon restored the normal play and standby operation again.

## Sony DVP-S9000ES



Sometimes the tray would not be loaded completely on this DVD unit. A look inside the unit, revealed the fault to be the "loading assy"(104) and the "tray assy" (101). A ring to the technical department soon revealed that improved replacements, of the two parts would be needed to restore normal operation of the tray loading. P/N (A-6062-471-F) and P/N (X-3950-950-6) these soon restored the normal operation again, and for future references (If the number printed on the MD cover contains the letter F or higher the new loading assembly is already fitted).

# Audio Faults

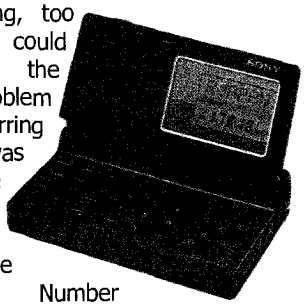
## Christopher Bowers

### Sony ZS-D50

This portable unit had a tape stuck in the tape deck. A quick look inside the unit revealed the cause of the problem, the capstan belt had slipped of the motor pulley, and having seen this problem several times before, a quick ring to technical was in order. The solution came in the form of a new improved belt, part number (3-229-349-01) and also a guide belt assembly part number (X-3380-302-1) with a note to change the collar (#152) and "(gold) screw"(#151) As soon as this was done, the tape deck player was restored back to normal again.

### Sony ICF-SW100E

This unit only showed the Clock Display, and would Not turn (On) a quick look inside, the small world band radio showed, (a hair line crack) on both the PCB (Signal wire) part Number (1-651-256-11) and the flexible PCB (Key wire) part Number, (1-651-257-11) had developed between the Display panel, and the main board (but before ordering the two flat wires) I gave Sony technical a quick ring, too ask how I could help stop the same problem from reoccurring again, I was told the answer, "Order this MCB Flexible Kit", part Number (X-337-234-01) it has a new type of front display cabinet with the flat wire's. This solved the Power-up problem, and No sound problem, straight away.



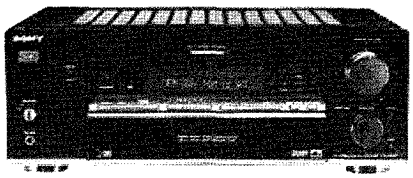
### Sony ST-S370

This unit had an incorrect tuner frequency range (76-90 MHZ). A look inside the unit around IC602 soon revealed a Faulty E-EPROM and all that would be needed to restore normal operation again would be to replace P/N (8-759-720-89).

### Sony ST-S570ES

When you switched between the preset memories, the RDS station name of one preset would become over-written by another preset station. A look inside the unit around the micro controller and call to technical revealed the fault to be caused by a faulty Micro and an improved version uPD75512GF-117-3B9 would be needed PIN (8-759-053-74).

### Sony STR-DB940B



On this unit, A clicking noise could be heard just before the unit would switch off (intermittently). A look inside the unit using the (bottom) service plate, on the Main Amp PWB revealed the fault to be dry joints on both audio output relays (RY601) and (RY701) and all that was needed to restore the intermittent fault was to re-solder the relays.

### Sony ZS-D10

This unit (brought in with a 10V mains adaptor which was split on the wire) was off dead. A look inside the unit by first removing the six screws from the back of the unit, then the screws hidden behind the (hand removable) front silver mesh. Soon revealed that the T2.5mA fuse had just blown inside the unit. A replacement of the fuse and a repair on the split adaptor wire was all that was needed.

### Sony HCD-BEI

This units Power/standby button would intermittently flicker green with no audio output. A look inside the unit on the Main PWB revealed the fault to be (C914) a 47uf 50V Electrolytic Capacitor which had gone faulty. All that was needed to restore the normal operation again was to replace the Capacitor.

### Sony HCD-GPS

This units would stop playing CDs after only after a few tracks into the disc. A look inside the unit on the CD block assembly revealed the fault to be the (16 core) flat wire (173) that connects the optical pick-up to the BD board P!N (1-757-O55-11) and a replacement of the flat wire soon restored the normal playback operation of the CD again.

### Sony HCD-RX90

When switching off the unit, all the tuner preset memories are lost. A look inside the unit, around the Micro (IC701) the Main board using a multi-meter, and a call to technical soon revealed that a New type of Micro would need to be fitted P/N (8-759-532-08) to restore the normal memory operation again.

### Sony HCD-RX80

This unit had no CD playback and "No Disc" would appear on the display. A look inside the unit, using a multi-meter soon revealed the fault to be caused by a short between the BD board flexible cable (#104) and 5801 on the Motor slide board, and all that was needed was to protect the ffexible cable with some isolation tape or to re-arran~e the flexible cable so that it runs in front of the TCB Board to restore the normal CD playback.

### Sony HCD-XB6

This unit would lose its preset memory after a power failure (but only when the timer was set). A look inside the unit, around the Micro (IC301)on the Main board using a multi-meter, and a call to technical soon revealed that a New type of Micro would need to be fitted P/N (8-759-499-02) to restore the normal memory operation again.

### Sony HCD-MDX10 (1)

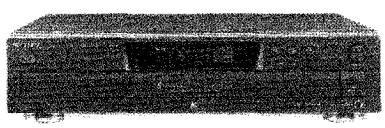
This unit had no audio output. A look inside the unit on the main transformer board revealed that the two (T6.3A) fuses had blow. A replacement of the fuses and a test, soon showed a short that lead back to the Power Amp IC (IC801) on the Main board P/N (8-749-O15-45) All that was needed to restore the normal audio output was to replace the Amp IC and fuses.

### Sony HCD-MDX10 (2)

This unit had no audio tape operation. A look inside the unit on the tape deck assembly soon revealed the fault to be the (MI) capstan motor P/N (A-2004-628-A) and drive Transistor (Q336) P/N (8-729-118-00). A quick replacement of the parts soon restored the normal tape playback operation again.

### Sony CDP-CE375

This (five disc) CD exchanger system looked totally dead. Cold checks inside the unit, around the transformer using a multi-meter soon revealed the cause of the problem, the main power transformer (T601) had gone O/C on the primary side. A quick replacement of the transformer, part number (1-435-3431-1) soon restored the normal operation of this five disc CD unit again.



## Sony HCD-CP101

This unit would do a number of faults, Skip on playing CDs, not read the discs or evenjump to the next track. A look inside the unit on the CD stage soon revealed a faulty Gear (A) on the base assembly, and all that was needed to restore the normal CD operation was to replace with a new type P/N (2-626-907-11).

## Sony HCD-MD313

This unit would occasionally not load MD discs, the problem could sometimes be solved, by unplugging the power cable. A quick look inside reviled a possible micro fault a ring to technical soon give me the answer and the solution to this problem replace (IC316) with the new micro M30610MC-116FP part number (8-759-525-28) to restore the normal loading operation again.

## Sony HCD-ED1

This unit had a fault of not reading disc's a close inspection of the optical pick up and spindle motor revealed the fault to be the spindle motor or M101 (Base outsert) part number X-4950-343-1 due to it developing a hair line crack on the black plastic disc plate, causing it to be pushed down on the motors shaft so the laser was unable to focus. A quick replacing of the spindle motor soon restored the normal operation of the unit again.

## Sony CDP-K1.

This unit's CD draw would not close. A look inside the unit on CD mechanism using a multimeter, revealed the fault to be the open and close leaf switches which had become higher in resistance, located under the CD tray. All that was needed to restore the normal closing and loading operation again is to clean the leaf switches (lowering) the resistance to restore nornial operation again.

## Sony CDP-211.

This unit's CD draw would not close after opening . A look inside the unit on CD mechanism using a multimeter, revealed the fault to be poor contacts on the limit switch on the BD board (this fault can also be interniittent). All that was needed to restore the normal closing and loading operation again is to replace the lirait switch P/N (1-572-085-11).

# Audio Faults

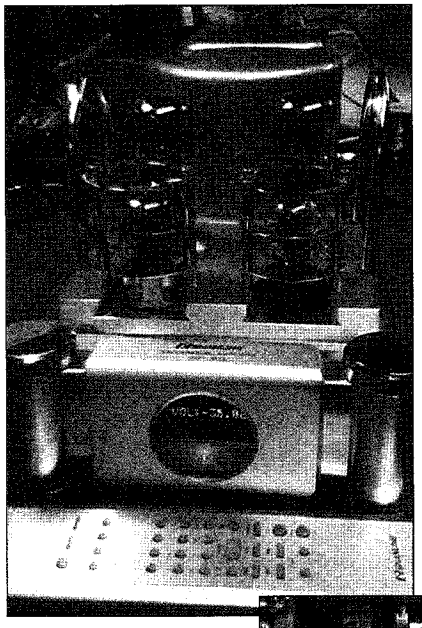
## Aiwa PX - E860K Phono Deck

If you get one of these with the complaint "No audio output", don't be fooled, as I once was...

The deck has a built in preamp, and this has an On/Off switch, cunningly hidden under the turntable. Its at the back of the deck, and accessible through one of the holes in the turntable, once these have been revealed by removing the mat, and one has been rotated to be over the switch.

This time, employing my elephantine (!) memory for such faults, I went straight there, and as expected, someone had set the switch to the " OFF " position. Normal output was restored as soon as this was reset to " ON "

## Shanling SP-80

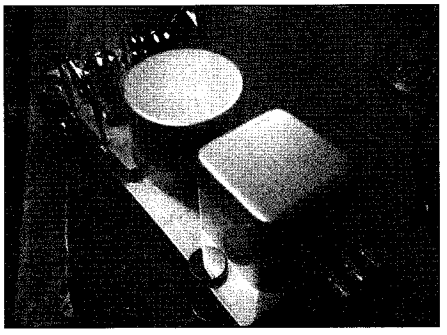


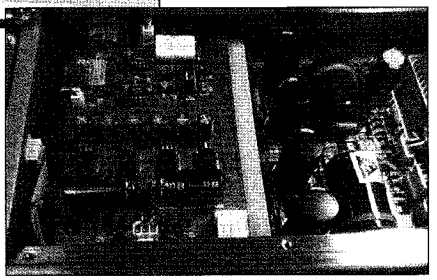
This beautifully presented, and very well made, monoblock amplifier – see photos - originates in China. It is a very high-end item, and carries a price tag that not so long ago, you would have expected to see on a decent second-hand car !

It uses a diverse mixture of technologies, having a solid state front end, employing two Burr-Brown top quality opamps, and a Burr-Brown electronic volume control IC, driving a power amplifier comprising a 6N9 and 6N8 double triode pair, and two EL34s in a classic push-pull configuration.

There are two huge transformers, one being for the various power supplies - there's a lot of them including +/-5v, +/-15v, 6.3v AC and + 6v DC for the valve heaters, + 350v for the valve HT rails, -60v for the output stage bias supply, another +5v rail for the control logic processor, and filament and negative supplies for the VFD fitted to the front panel. The other transformer is a beefy output type to match the valves' output impedance to that of the speaker, and to provide the coupling between the two valves, and from them to the speaker.

The described fault was " Whistles ". When powered, as the valves warmed up, it produced what can only be described as an air raid siren 'all clear' sound. I also noticed that the VFD was producing no display. It should produce a welcome message, followed by a dB display for the volume. If you have a pair of the amps for stereo use, they are coupled together by a thin data cable. One amp is then set to "master" and the other to "slave" by rear panel minature switches. The master receives infra red data via a sensor co-located with the VFD, and passes this to its own processor, and the remote processor in the slave amp. Both units' processors then send volume control data to their respective volume control ICs, and display data to their VFDs, causing them to track one another.





My first move was to check all of the supply voltages. This quickly led me to U10, a 7805 regulator IC, which had no output, and was very hot. Removing the volume control IC from its turned-pin socket, immediately restored the supply, and a cool regulator. The amp was also now quiet. A new PGA2311chip was ordered and fitted. This, however, still left the display problem, and no actual output from the amp.

The display has its own processor, connected via a flexiprint, back to the board with the main system control processor on it. Checks at the main processor showed that although remote control data was going in, there was no activity on the serial control bus going to the volume control IC, and its mute pin was being activated. Further, there was no activity on the parallel bus going out to the display processor.

Based on the fact that a number of pins on the previously faulty volume control chip, connect directly back to pins on the processor chip, I decided to swap it for one from a working unit. This immediately restored full normal operation of the unit, so a replacement was ordered and fitted, completing the job.

## Thomson AM 1555

The complaint with this HiFi was "No volume". Commonly, these suffer from no output on one channel only, due to a failed output capacitor, so I was expecting the fault on this one, to be something different.

In fact, the problem was just that this time, both the output capacitors were open circuit. The originals are 2200uF @ 16v working, and are mounted upright on the pcb, immediately under the output heatsink (what is it about designers, electrolytic capacitors, and heat sources...?)

I always replace them both anyway, using 25v rated, low ESR 105 degree types, laid over on their sides to keep them away from the heatsink. This action restored audio to both channels, as expected.

It's curious that both caps seemed to have failed together. I think that it is more likely that one channel had been down for some time, and the owner only saw fit to put it in for repair, or possibly only noticed a problem , when the remaining channel had faded away, as well.

## Sony TA EX70/ST EX100

These two items, part of a four-piece stack system, both had their displays missing. They are VFD types, and at a first glance, I thought that maybe the 'TA' unit, being the amplifier, and main

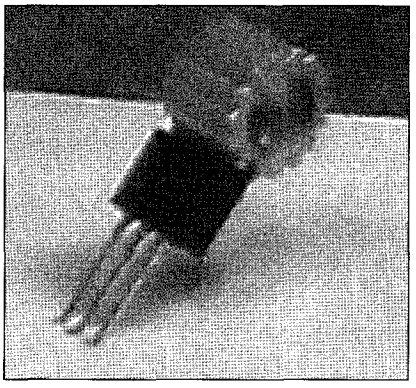
power unit, supplied power for both displays, giving a common cause for the failure. However, a more detailed evaluation of the problem, revealed that the CD player, which shares the same bus, had a correct display when it was selected as the source.

The first thing to check with dark VFD faults, is that the negative ' high ' voltage supply ( typically -25v to -35v ) is present. In both cases here, it was. The next most likely cause, is filament supply failure. This supply is normally derived from a dedicated winding on the mains transformer, and is usually of the order of 1.5v to 3v ac. In the cases of these two items, however, the filament supply was derived from completely different sources.

In the tuner, it was derived from the main AC input, which is supplied by the mains tx in the TA unit, and in the amplifier, from a similarly high voltage transformer winding. In both cases, there was a 100uF 40v capacitor in each leg and, additionally, four parallel-connected 470 resistors in each leg.

The resistors were all very distressed looking, and the caps were on their last legs. Replacement of all of these items, restored both displays. The locations for the caps in the tuner, were C161 and C162, and in the amplifier, the corresponding devices were C971 and C972. The resistors were R971-R978, inclusive.

## Goodmans System 4212



Failure of the CD to operate in this budget Hi Fi, with the laser not even homing, was caused by a defective 8v regulator transistor, Q701. Its type was completely unrecognisable, even to www.datasheetarchive.com and it's very rare to beat this excellent free-to-use web resource.

One of the transistor's junctions was still intact, and this indicated that it was an NPN device, so I fitted a BD239 with a small heatsink of the TO39 type. This heatsinking technique (see photo) is one that I have learnt recently, from some commercial boards that I repair. The gap in the circular 'crinkly' heatsink is pushed down over the transistor's metal tab, until it contacts the device's plastic body. The spring tension created by flexing the gap open, maintains a firm mechanical contact between the tab and the heatsink. Although the actual contact area between the two pieces of metal is small, the heat transference is remarkably good.

Whilst on the subject of web resources, its worth mentioning a site that I have used for a long time, to help with identifying surface mount transistors and diodes. It can be found at www.marsport.demon.co.uk/smd/mainframe.htm


## Goodmans GCE5002DVD Personal DVD Player

The job ticket with this one said: "Screen in black and white only, but picture perfect. Sound OK. Same on external screen – owner thinks it will be BER."

I wondered why the owner thought that it was likely to be beyond economic repair.

I was pretty sure that it was just going to be a menu setting causing the trouble, and so it turned out to be.

In the basic setup menu, was an item 'Screen Type', and this was selectable for PAL or NTSC. It had, of course, been set for NTSC. Once this had been reset to PAL, all was back in glorious colour.

The only other thing which had me wondering, was when I phoned the shop which had taken in the repair, to give them the good news for their customer. "Oh great," they said. "He will be pleased – although maybe not, because he did originally bring it in for an insurance report." Hmmm...

## LG LH - C62351

The complaint with this DVD/VCR combination was that it kept going back to standby. When powered, this seemed to be the case. Sometimes, it would stay on long enough to open the DVD tray, but never long enough to play a disc.

On the power supply section of the audio output board, are a number of regulator devices, on individual finned heat sinks. One of these, IC705, was so hot that it burnt your eyeballs just to look at it!

Once the board was out, I was able to examine what the device was – a standard 7805 regulator. What I was then amazed to discover, was that it was leg-for-leg, paralleled up with another identical device, IC706. This is a practice that I have never seen done with monolithic shunt regulators, and not one that I would personally condone. Presumably, it is in an effort to double up the regulator's supply current capability. If there is any imbalance between the two devices, they will fight with each other, and I am not quite sure what exactly the results of that may be - but probably the sorts of problems that this machine was suffering.

As a next move, I unsoldered the 'out' legs of both devices to check what voltages they were producing.

The one which had been very hot, had an output of exactly 5V, whilst the other, produced only about 1V. I replaced them both, with two from the same batch, and repowered. This time, everything worked, and a long soak test proved that there were no further issues.

## Marantz DV110/N1S

This unit would play absolutely fine, until it got to about the middle of the disc. It would then start freezing, and jumping back, while making distressed mechanical noises.

I removed the deck, followed by the main sled drive gear, such that the sled was now free to move up and down the slide rod. At around the middle of its travel, it became slightly tight - enough for the drive gears to have slipped, causing the mechanical noise.

No amount of polishing or lubricating would improve the situation, so I adopted a rather more radical approach, and slightly 'eased' the plastic yoke part of the laser body moulding, with a very fine rat-tail file, until it slid easily from one end of the shaft to the other, consistent with not being a 'sloppy' fit at any point.

Once the deck was all reassembled and refitted to the unit, a long soak test proved that all was now ok.

## Bob Longhurst

### Panasonic DVD/VCR combination

The DVD's drawer refused to open. The display showed the word 'locked'. It transpired that the unit was in the 'Sales Demo Mode', which prevents customers pinching show room discs. To resume normal service, press 'STOP' on the DVD front panel, followed by 'STOP' on the hand-unit. According to Panasonic Tech, this state can be caused by dry joints on IC 37001, which resides under the DVD drawer. I thought I would take the easy option at this stage, and worry about the dry joints if the job 'bounced'. The toddler probably caused the fault.

### Sharp DV740 DVD

This was basically dead although the primary power supply voltages were normal, which led me on to the secondary components. Initial checks on diodes soon established an in-circuit short circuit D4. This short circuit was confirmed upon removal of the diode. The next problem, without a circuit, was "what type was it?" It only had two numbers printed on it. Luckily CHS were able to identify it and supply a new one under their Order Code SH4669. Once fitted all was well.

## Charles Brundel

### Daewoo model DF-4150/6150 DVD Recorder

Some faults have been reported where the usual 'WAIT' message appears on the display when the machine is first switched on, but after 30 seconds the machine has not booted up, the 'WAIT' message remains and the machine will not function at all.

This is because the Micom in the main board is not able to communicate with the Micom on the M.PEG board, via the $I^2C$ bus. This could be due to a bad connection between the two boards.

Therefore, remove all connections to the M.PEG board and replace them carefully and power up the recorder again. If this does not effect a cure, replace the M.PEG board.

Sometimes the firmware in the Micom on the M.PEG board may require updating for possible timer recording problems. Updated firmware is available from Daewoo, or it can be downloaded from the Internet.

N.B. When the update disc is inserted in the machine, there is an indication on the TV screen that says, 'Update Disc detected'. You must wait until the disc ejects, which takes about 3 minutes. If you remove the disc before it ejects then you will corrupt the EEPROM. Unfortunately, there is no reset back to factory defaults on this machine.

Another problem that can occur with this machine is that it doesn't load up the disc and read the TOC (table of contents) because it doesn't recognise the disc manufacturer identity (MID). This is because the software in the machine has not been loaded with every possible manufacturers' MID of blank recordable discs.

To overcome this situation, there is an update disc available from Daewoo or on the internet. However, it is more difficult to conduct this software update because when the update disc is inserted there is no indication on the screen.

Therefore, as the updating process takes about 5 minutes the customer may think, nothing is happening and may eject the disc. You must wait for the disc to eject itself. If not the software on the DVD loader PCB will be corrupted. This cannot be reset, so the whole loader will have to be replaced.

### Daewoo model DS6080P Digital Set Top Box

Intermittent picture break up not due to a poor reception. Check for loose plug between tuner PCB and main processor PCB.

Intermittent lock out/green screen. This was cured by software over air downloads, which occurred during several weekends in February 2003. If this problem is still apparent return the box to Daewoo for updating.

Not tuning into some channels especially the middle frequency MUX A or MUX B. This is due to the 20.48 MHZ crystal on the tuner PCB, being slightly out of spec.

'Found New Channels' keeps appearing on switch on from stand-by mode. This is usually due to poor reception but can also be due to previously scanned channels not being held in memory, due to a faulty MVBN.

Interference with other analogue channels. This Set Top box has an RF modulator, as well as SCART output, so its output frequency could be sitting close to another analogue channel received by the customer.

Unfortunately, the User Instructions do not show you clearly how to alter the RF frequency. The procedure is to press the red button on the rear of the box until the green LED flashes. The Daewoo blue screen will appear and after a few seconds, the RF frequency shows along the bottom of the picture. The frequency will be rising sequentially. When you see the frequency you want, press the select button twice.

## Michael Brantfield

### Toshiba V231UK

This video was dead when cold but the customer said it he left it for a hour or so it would come on, the cause was simple enough a dud electrolytic capacitor but a new one had to be specially ordered; it was C1SR12 a 22microfarad 16 volt NON POLARISED connected to the chopper transformer on the primary side.

## D Buckingham

### Panasonic VCR/DVD Model NV-VP31EB

This is a fault that I have just had in for repair on a fairly new machine. Dead machine - no display. I decided to check the power supply, the obvious place to start, and noticed two 1M resistors which looked like forming part of the start-up circuit. Upon placing meter probe on one end of R1150, the machine burst into life. I removed power board and checked value at R1150 and R1154 both 1M – R1150 read about 10M so I changed them both. This provided a cure.