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

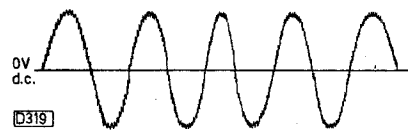


Fig. 1 (left): Tracking offset o.k. with respect to the 0V level.

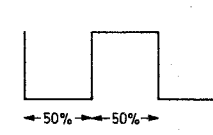


Fig. 2 (right): The correct MCES spindle motor waveform at pin 4 of the SAA7020 error correction chip.

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.

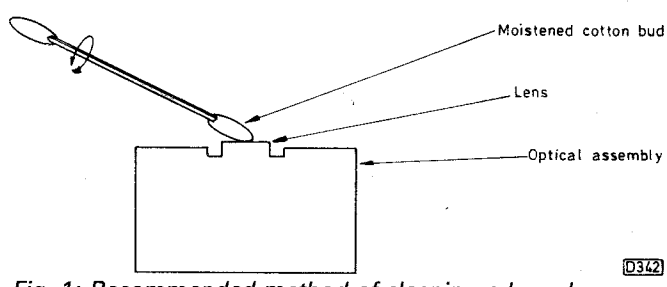


Fig. 1: Recommended method of cleaning a laser lens.

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.**

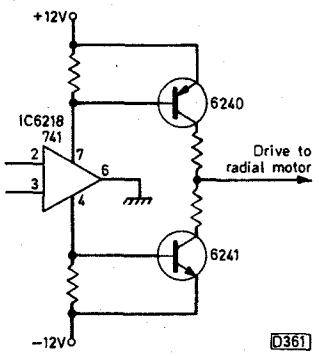


Fig. 1 (left): Radial motor drive circuit used in the B and O CDX player.

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

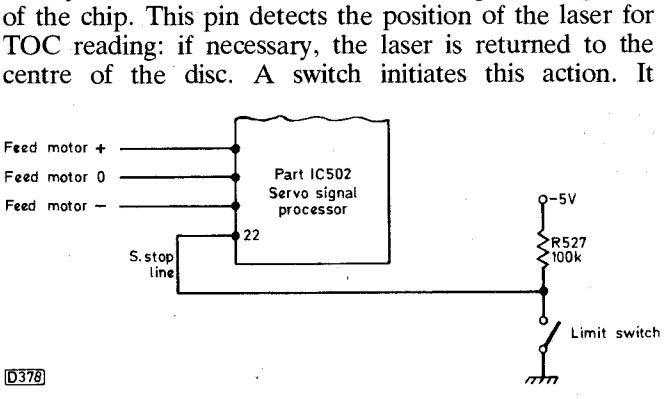


Fig. 1: Connections to pin 22 of the servo signal processor chip IC502 in the JVC Model XL-E300.

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 (0·22μF) 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

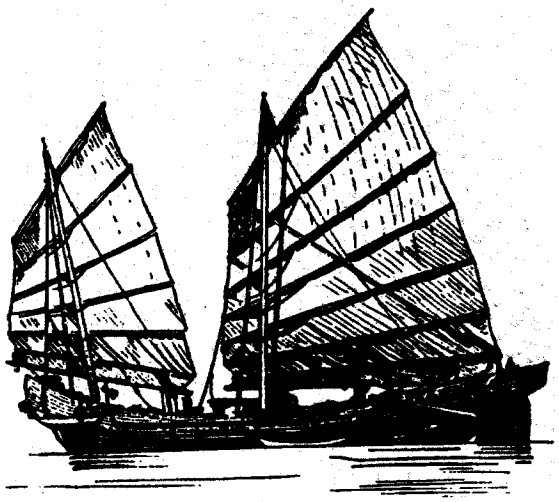
More Adventures in CD Land

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.

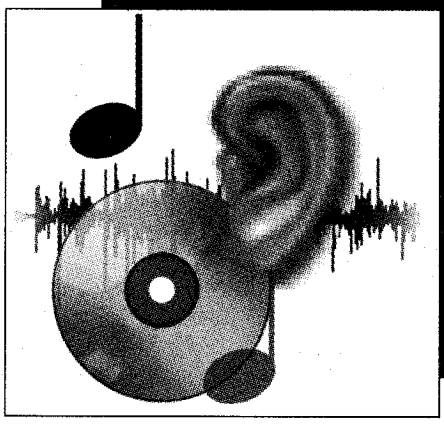
After replacing these items the voltage on the negative side of the supply was correct, but there was only about 2V on the positive side. Checks along the positive rail were obviously called for. I arrived at pin 23 (Vcc+) of the LA9200 chip and disconnected it from the board. This reinstated the full 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

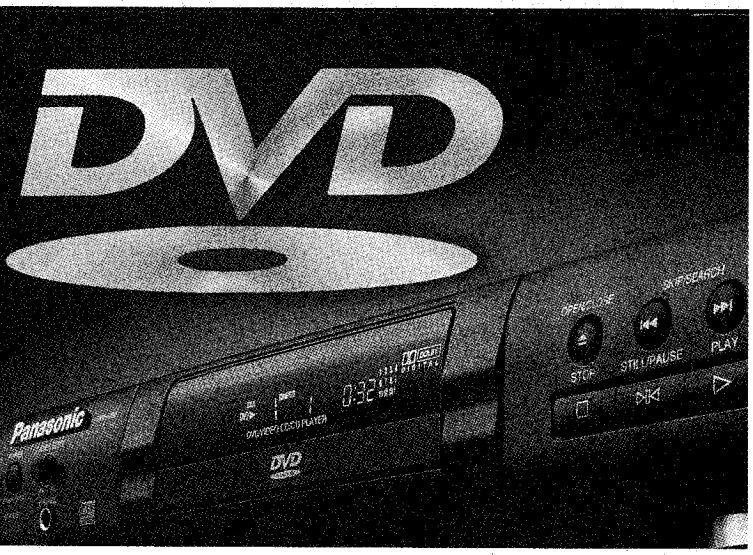
The disc motor ran out of control, the disc being just a blur. When we opened the drawer the disc clattered as it tried to go into orbit. The cause of the trouble was in the disc motor drive amplifier, where transistors Tr6511 and Tr6512 (BC337 and BC338) were both leaky and resistor R3570 (4·7Ω, safety 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.

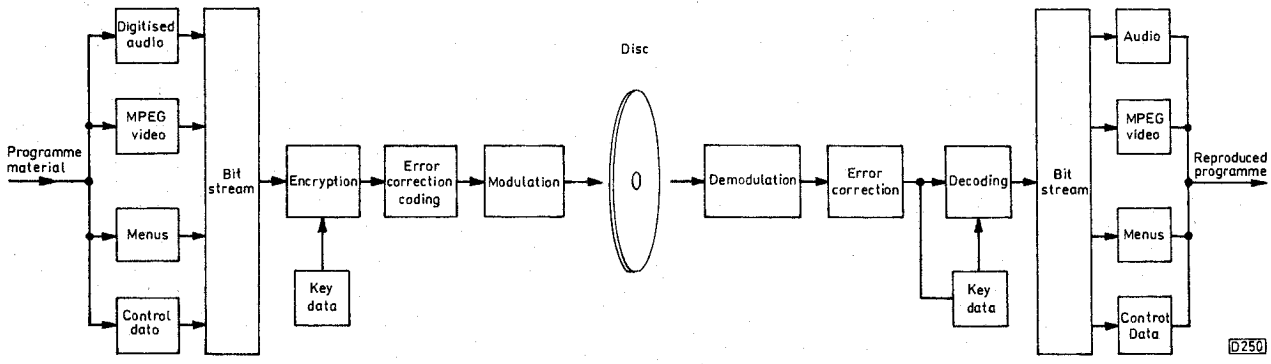
DVD is actually a family of discs, designed to store films, computer data, multimedia programs and games. The two basic formats are DVD Video (sometimes called DVD Movie) and DVD-ROM. The former has been developed as a means of recording and storing films and other video material. Up to 133 minutes of 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 0·1μF capacitor in series with a 22Ω 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 1,000μF, 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.**