

Tips, guides and reports for people repairing televisions and electronic equipment

# TELEVISION

AND HOME ELECTRONICS REPAIR

APRIL 2001 £3.00

## FREE SPARES GUIDE 2001

Servicing the  
Sony BE3D  
chassis

CES 2001  
show report

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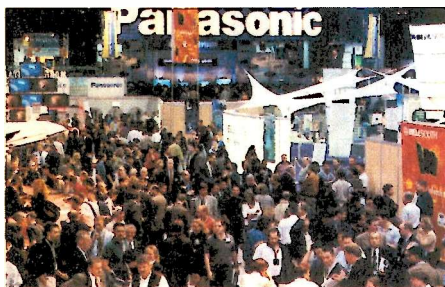
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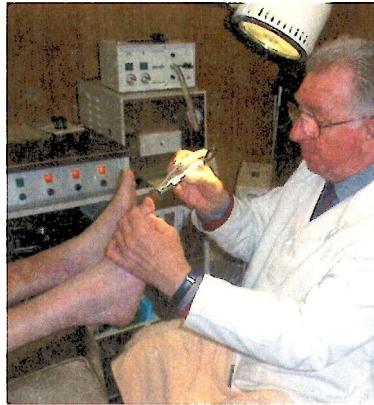
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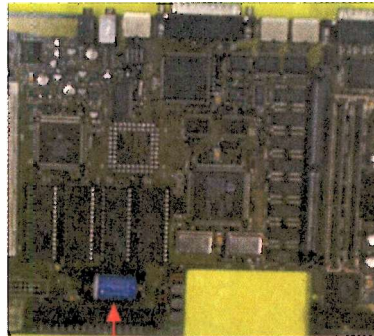
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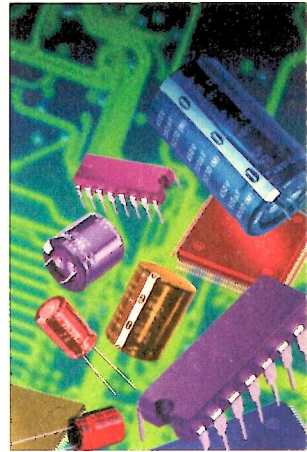
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Cover photography  
Mark Swallow

### Editor

Martin Eccles

### Consultant Editor

John A. Reddihough

### Publisher

Mick Elliott

### Advertisement Sales Manager

David Wilson  
0208 652 3033

### Group Advertisement Sales Executive

Pat Bunce  
0208 652 8339  
Fax 0208 652 3981

### Editorial Office

01782 870684  
Fax 01782 878233

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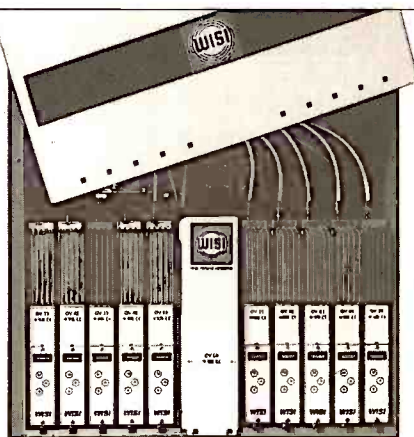
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# Too many goodies?

There has never been a time when so many new consumer electronic products have been introduced and are in the pipeline. Advances in communications and recording technology have made much of this possible. Major CE manufacturers are combining that and that into units they hope will catch on and meet consumer needs. There are also various totally new developments.

George Cole mentions a number of innovations, including various TV/DVD/VCR combinations and Microsoft's Ultimate TV system, which combines a hard-disk recorder (PVR) with interactive TV and the internet, in his report from CES 2001 on page 334. Intel, the world's largest chipmaker, has decided that it should enter the consumer electronics field and took the opportunity of CES to launch its new products, which include a portable digital music unit that doubles the memory of current models and is compatible with various formats including MP3 recordings. Two other products, for launch later this year, were highlighted: ChatPad, an instant-messaging and e-mail device, and WebTablet, which enables users to surf the internet via a wireless screen the size of a hardcover book – it communicates with a home computer and employs the PC's internet connection. Intel's new interest in consumer electronics stems from the fact that PC sales growth is slowing. Many PC manufacturers have recently announced lower profits or reduced earnings expectations. Intel is to sell these products direct from its website as well as through CE stores.

Leading PC manufacturer Compaq, which made a loss of \$672m in its last fourth quarter after writing off \$1.8bn of internet investments, has come up with the iPAQ, a handheld device that combines the functions of a PC with those of a mobile

phone. It can, as with so many recent and upcoming devices, access the internet and be used for e-mail. Demand for this new unit has far exceeded initial expectations, but sales have been held back by a shortage of the high-resolution screen it uses.

There are developments in video games hardware as well, at a time of uncertainty in this field – some users have been put off by the number of new, incompatible games systems. Microsoft has recently entered this field with its Xbox. Pace and Sega have launched a combined digital STB/PVR/games unit that enables users to download instantly and play several hundred games. Its hard disk can store about sixty games. NTT DoCoMo has, with six overseas partners, agreed to develop technology and services that will link their mobile phones to Sony's PlayStation games console. The partnership includes companies in Japan (DoCoMo), the USA (AT&T Wireless), Europe, Hong Kong and Taiwan. Each company will develop an interface to connect its mobile internet service with the PlayStation. DoCoMo originally reached an agreement with Sony last August.

The question of course is how will all these new innovations fare? You would think that major manufacturers would carry out extensive consumer research before committing themselves to new products/systems that can involve vast investment. A number of recent examples suggest that they don't. Maybe, in the current frenetic state of the electronics, computer, semiconductor and communications industries, there simply isn't time. The approach seems to be get on, try it and see.

You might think that the PVR would be a winner, with the recording capabilities and flexibility it provides. So far however TiVo has not had much success. In the two years since the company launched its PVR

in the USA it has attracted only some 200,000 customers. In the UK TiVo, which launched its product last year in a high-profile marketing operation with BSkyB, is said to be selling only a couple of hundred units a week. TiVo is now in talks with cable operator NTL to form a joint venture to push the unit. The problem with TiVo seems to be its price, which suggests that customers are quite price-conscious when it comes to innovative products.

Another product that looked a good bet is Amstrad's e-m@iler, a combined phone and keyboard e-mail system with display screen at a modest (subsidised) price. Only some 80,000 have been installed since the launch in March last year however and, during the six months to December 31st, the company reported a loss of £3.9m in its Amserve joint venture with Dixons. Amstrad nevertheless intends to persist. The e-m@iler is supposed to generate income through Amserve, so the installed base determines the profitability of the system. Amstrad also hopes that it will be possible to generate income from advertising via the e-m@iler's screen. But profitability is not expected until next year.

These are exiting times in the consumer electronics field. Unfortunately it looks as if quite a lot of firms will get their fingers burnt. There could be just too many goodies on offer, with inadequate market research. ■

## Don't use this phone number!

Some readers continue to try the NEI Spares Division phone number listed in our Spares Guide a couple of years ago. BT has since reallocated the number to a private household, which has been put to a lot of inconvenience. The correct number to use is 01484 842 761 – for Iain Stewart, who has taken over the remaining spares.

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### INDEXES AND BINDERS

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# TELETOPICS

## Digital TV transition

The government is clearly concerned about the feasibility of an analogue TV switch off during the proposed time scale of 2006-2010. In the recent White Paper on Enterprise, Skills and Innovation the government outlined a proposal to offer thousands of free digital set-top boxes to accelerate the move to digital terrestrial TV. Initially there would be several small-scale pilot schemes that provide free conversion to digital TV for "defined communities". According to the White Paper "a start will be made by offering conversion to a small number of households, building up rapidly to convert a wider community of a thousand or more households. Those taking part in the project will be given intensive support so that viewer requirements can be assessed, and whether these are being met by the equipment and services under development. As a result, the selected communities will have an opportunity to shape the future of digital TV." The offer would include aerial adjustments as necessary, and the set-top boxes would be connected to the home telephone line for access to interactive TV and the internet.

The retail trade is naturally displeased with the idea of more give-away set-top boxes, this time from the government, and the proposal does seem to have been poorly thought out. Why should particular communities be favoured in this way, and would the government eventually be prepared to offer free set-top boxes to all

those who obstinately fail to convert to digital TV in time? Only days before the government announcement Greg Dyke, BBC director-general, told the Culture, Media and Sport Select Committee that a major give-away of digital set-top boxes might be required to allow the government to switch off analogue TV. This doesn't, somehow, seem to be the right way to go about it – unless the government was desperate to close down analogue TV in order to flog off spectrum space, which might pay for the free digiboxes. In this event the whole procedure would be a bit pointless. Why should anyone convert to digital TV when you can simply wait for a free digibox from the government?

Meanwhile sales of IDTV sets, the ideal means of digital TV reception, have failed to take off. According to Sony UK, of the 1.3 million widescreen TV sets sold in the UK last year only 130,000 were IDTVs. UK viewers bought some 4.5 million TV sets in all during the year. The trade has a

problem with IDTV sets. They are not as easy to stock and install as a digibox, and you're lumbered if you have to take the set back because of reception problems. There are difficulties with conditional access, and few models have provision for SkyDigital reception. The give-away boxes, introduced to secure pay-TV subscriptions quickly, are giving rise to many long-term problems.

A report on Digital TV from Continental Research says that while one in four UK households has adopted digital TV in the two years since the first service was launched, many still don't fully understand how to make use of the services. Some twelve million adults have digital TV in their homes, but apparently only five million are aware that the system provides on-line access. An even smaller number, 0.9 million, use any of the on-line services available. This compares with 10.7 million who go on-line via a PC in their home.

## Video breakthrough

A breakthrough has been claimed by Forbidden Technologies with software that improves video via the internet. The company's compression technology is said to enable videos to be played via a standard 56k modem at the same speed as a VHS VCR. A promotional video runs via the company's website at 41kbits/sec – the

present industry standard is 8kbits/sec. At present the technology is best suited to 'talking head' type material, but is under continuing development. The company plans to supply its technology to video producers who will be able to sell services to web sites that want to provide simple video clips.

## Sony research

With the development of a 13in. prototype, Sony claims to have made a significant advance in the field of organic electroluminescent displays (OLEDs). These are based on the fact that certain

organic materials glow when an electric current is passed through them. Pioneer has also been working on this technology (see report in *Television* February 1999): Kodak holds basic patents for the technology. The new display uses an active matrix of thin-film transistors to drive the cells, with what Sony refers to as "top emission adaptive current drive". To compensate for different pixel characteristics, each pixel is driven by four instead of two transistors. As the TFT structure is on the opposite side to the light emission, there is increased light output. A peak intensity greater than 300cd/sq.m is claimed for an 800 x 600 pixel SVGA display.

Sony's new approach provides higher, more uniform luminosity with improved resolution. Advantages of an OLED in comparison to other flat-screen technologies such as the LCD include a wider viewing angle, fast response, high contrast ratio and good colour reproduction. One drawback for the

present is a short operating life.

Sony has also unveiled a prototype video camera that provides broadcast-quality digital images shot with all-round vision (360°). By using a PC or a games console such as the PlayStation 2, the user can 'look around' a live-action scene as if actually present. This turning-the-head effect is created by using a conventional keyboard or console controller to pan 360° within a full-motion image.

The main problems with achieving realistic three-dimensional interaction have been file size and processing power: every second of 360° video consists of almost 2Mbytes of data, which is a large amount for processing in real time. A powerful processor is required to manipulate this data and, at the same time, calculate constantly changing perspectives, lighting and shadows. Hence the use of the PlayStation 2's 300MHz processor, which can handle 6.2bn calculations a second – three times faster than the Pentium III.





## Interactive TV

The Independent Television Commission (ITC) has published guidelines for the regulation of interactive TV services. It aims for regulation that is "as simple and light-touch as possible". The ITC adds that the regulations will not cover TV-internet services, which it argues are different from interactive TV: with TV-internet services the set is used basically as a computer screen and the content is not created by broadcasters.

The BBC plans to offer interactive services to digital satellite viewers from this summer.

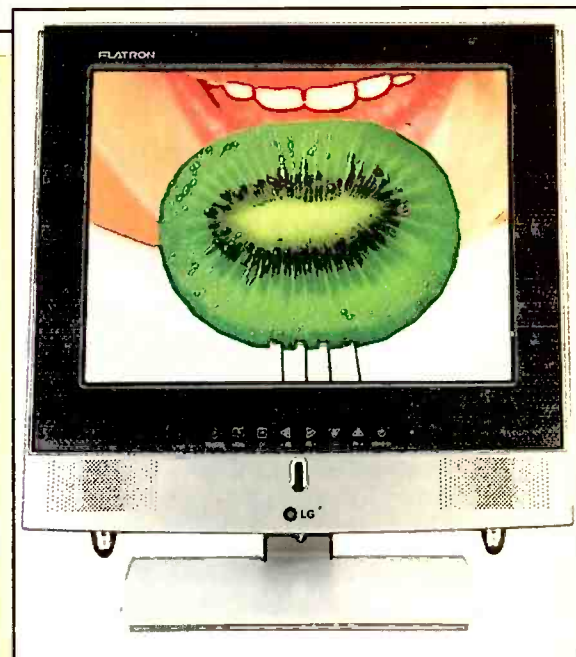
Energis Interactive is to launch a virtual high street via SkyDigital this spring, using technology called BrightBlue. This gives viewers access to the Energis Interactive portal with shopping, banking, travel, betting and recruitment services. There will also be interactive advertisements.

Interactive TV developer Two Way TV has teamed up with computer games developer Infogames to co-produce games for the Two Way TV channel. The

new games will use the Mediahighway middleware inside ONdigital set-top boxes. The Two Way TV games channel has now gone live for Telewest's 377,000 Active Digital subscribers.

Abbey National has reduced its TV advertising after finding that digital viewers use their sets for interactive services instead of watching the commercial breaks. An experiment, with viewers being filmed, showed that they repeatedly ignored screened advertisements and used the time to shop, bank or send e-mails.

Open has announced that the police are investigating about twenty cases of credit-card fraud which takes advantage of the way in which the interactive TV service operates. Most credit-card transactions where the owner is not present, such as telephone-based services, deliver only to the address listed with the owner's credit card, but Open's interactive service delivers goods to the set-top box owner's address. Open is to investigate means of improving security.



**Could this be the year of the LCD TV? LG started the ball rolling with its 15in. Model LE15A10, called the Flatron LCD-TV, announced in early February (see picture above). It's thin enough to hang on the wall and, with a dedicated PC input connection, can also be used as a PC monitor – the screen is XGA capable. The set has a 150° viewing angle and a power consumption of 30W. This was followed by Sanyo's launch of its 15in. domestic monitor Model LC1, which has a 160° viewing angle and a contrast ratio of 300:1. The LC1 can be connected to an S-VHS VCR, a DVD, a PC or an Apple Mac. Other features include USB connection for peripherals and five on-screen language options. Sharp is to launch 13, 15 and 20in. LCD sets this summer (Models LC13C2, LC15C2 and LC20C2). They will use a low-reflective black TFT display with 921,000 pixels and a 160° viewing angle.**

## BSkyB reports

BSkyB's latest results, for the six months to December 31st, show revenue as £1.09 billion, an increase of 28 per cent in comparison with the same period in the previous year. Pre-tax losses rose from £61.5m to £260m. The loss is attributed to investment in building up BSKyB's services. During the period the number of subscribers rose by 512,000 to 9,750,000, with an increase in DTH subscribers of 328,000 to 5,050,000. Sky says that its churn rate is flat at 9.8 per cent. The company is confident that it can increase the average revenue per user (ARPU) from £286 to £300 by the end of the year and £400 by 2005.

Revenues from betting quickly reached £33m – 15,000 betting accounts have been opened. The Open interactive service is being brought under the Sky Interactive banner: Open has 37 interactive sites which two thirds of SkyDigital subscribers have used, making over 30m individual connections to the service. There are also 1.3m registered e-mail accounts.

## Set-top boxes

Pace and Sega have developed a combined digital set-top box, hard-disk video recorder and games console. In effect, Sega's Dreamcast technology has been incorporated in a Pace STB to provide a DTV home gateway with video games capabilities. Users can download Dreamcast games via satellite, cable, terrestrial TV or a DSL connection – broadband technology is not required. The 40Gbyte disk can store up to sixty games. The STB has twin processors, a PSTN telephone link for the return path and two modems – one for digital TV and the other for Sega's system. Two games distribution systems can be used, a carousel-type that offers about sixty games or a cable modem link that offers all 350 Dreamcast games. According to Pace copy protection might involve combining Sega's encryption technology

with a CA system. The latter could be part of a broadcaster's CA system or separate. It will not be used in the Pace XTV box for BSKyB, which also incorporates a hard-disk recorder. This box is due for delivery later in the year.

Pace has bought Xcom Multimedia Communications, which is the leading digital STB manufacturer in France and also supplies firms in other parts of Europe, the Middle East and Asia. The company has a manufacturing and distribution partner in China. Xcom has developed an ultra-low cost digital TV adaptor that's designed for the analogue TV switch-off and to serve additional TV sets in peoples homes, and has two new CA systems.

German STB manufacturer galaxis technology ag has formed a joint production venture with the Turkish electronics firm Vestel, which is one of

the world's largest OEM suppliers of TV, home entertainment and IT equipment, also white goods. Last year six million TV sets and monitors and a million satellite receivers, DVD players and internet appliances were produced at Vestel's factories in Izmir. galaxis sells STBs in most European countries and also supplies international pay-TV broadcasters.

Telewest has appointed Scientific-Atlanta as a second supplier of digital set-top boxes, in addition to Pace.

The US semiconductor company Broadcom claims to have developed the world's first universal cable STB system-on-chip IC, integrating the functions of four equivalent-sized chips into one.

Compaq is developing a Sky PC – a combined PC and digital STB – which is intended as a secondary system for use in bedrooms and other locations.



The other morning Steven and Paul went to the wholesalers, so I was to open up. When I reached the shop I found this dapper chap sitting on the step stretching about. A practical-looking lady sat on a set by the window. The dapper chap sprang up when he saw me.

"Ah, Mr Butcher" he gasped, "me name's Ringstead, Ron Ringstead. Me set's in the car. Grundig. Can't depend on it. Comes on quick sometimes, takes ages others. Never came on at all last night. 'Well, I mean, this ain't on Madge' – Madge is the wife, see –" I said. 'First thing termorrer, Madge, I'm getting this set to that Mr Bunter'."

Once he'd gone the lady brought her set in and bounced it on to the counter. "I'm Gertie" a deep male voice said. I turned around to look, but there was no one else about. "Gertie Gunwright" the lady said in that same voice. "This Daewoo of ours keeps playing up. All right sometimes, useless others. Like my ol' man, 'smatterafact. Har, har. Front controls work when they like. As to teletext, well! Turns to rubbish words, pops off, sometimes 'e can't get it at all."

I reached for a job card.

"Phone me when 'e's ready, dear" she said. "I works at the foundry. Chief welder there."

### Repairs

Ringstead's Grundig was a Model ST55-725 (CUC7350 chassis). When I plugged it in it came on straight away. So I tried it again a bit later. This time it didn't come to life. Last time I'd had this trouble the cause had been the UC3842N/AN chopper control chip IC60030, so I fitted a replacement. Silly move really. It made no difference. Best to check voltages first. There was a miserable 1.4V at the chip's supply pin 7. The reservoir capacitor for this supply, C60031 (100µF, 35V) was weeping and leaking. A replacement sorted out the starting problem.

Now for Gertie's Daewoo set, which was a Model T512 (CP330 chassis). It's not a chassis with which I'm familiar, but we had a circuit diagram. I had a look at it for clues. Could the cause of the trouble be the 27MHz clock crystal XT01, which is connected to pins 3 and 4 of the text chip IT01? It was worth a try. So I fitted a replacement. After that the set worked normally.

### An outside call

As regular readers will know, I don't like calling on customers one bit. I must have called on a hundred thousand or more by now. They trot out the same nonsense today as they did forty five years ago. Don't think I can take it any more.

"Can't see how you missed me yesterday and the day before. I only popped out for a paper, and to the Co-Op to buy Bonzo his tin of donkey. I love animals."

"I 'ope it won't cost anything much this

# WHAT A LIFE

TV faults, outside calls and which were the strangest households visited? Donald Bullock's servicing commentary

time. After all it's nearly new. Only five years old. My neighbour's never had any trouble with her set, and she's had it for ten years."

"My husband says it's the condenser. He says the part you put in last time has made it go."

"Now, for next time, which *is* the best make of set?"

"Stop nuzzling Mr Bullock, Rebel. Oh! He likes you dear . . ."

These thoughts came to me when Steven arrived and asked me nicely whether I could manage a call that had come in the day before but he hadn't managed to fit in. "It's in Chestnut Paddock" he added.

Chestnut Paddock! That was different. I like Chestnut Paddock, a peaceful oasis of rural beauty on the edge of the town. Like another world!

I recalled my last trip there a couple of years ago, to fix farmer Lobb's old Ekco valve wireless. Just rounding that bend and stopping the van there had been therapeutic. The patch of gorse-dotted scrubland with its greenfinches and linnets, the old Dutch barn and its swooping and chattering swallows, the old cowdrink with its bullrushes and moorhens. Those few grazing cows, and the old cockerel supervising his harem of roaming fowls. On the far side, beside the tall hawthorns with their big, round magpies' nests, that huddle of tumbling cottages, with blue wood smoke curling above against the red sky. The people, old countryfolk – couldn't find better.

Yes, it would be nice to slip from the concrete and go to Chestnut Paddock again. I smiled happily, took the job card and left. As I speeded along in the van life became good. I broke into song.

At last the bend in the road came into view. Now to enter paradise. I swung the van round it to the track beside the green.

Only there wasn't a green, or a track. Just a wide concrete road and several blocks of flats set in a car park of old bangers and plenty of litter. No scrubland, no Dutch barn, no linnets or swallows. No cottages with their wood smoke, no cows or fowls. Another bit of my world gone for ever. Another bit of my comfort.

Then I looked at the job card. Mrs Marris, Top Flat, Councillor Dawes House. I walked around the first building and found a few smears of paint that had once been numbers. As a cutting breeze fast chilled me I pushed a button and got a series of echoing noises and clicks, then a voice: "Whuh whuh hthp nuh". I pressed another and got a screaming child. A third brought me a pack of yelping bloodhounds.

As I walked to the next block to try again an old girl in curlers came along.

"Wotja want, duck?" she asked.

"I'm looking for Mrs Marris. Wants her TV done" I said.

"Tha's me" she replied. "You'm too late. I asted yesterday and you never come. So I got Snoddys instead."

What a happy release. But I was frozen. A pack of dogs howled their goodbyes as I reached the van. So much for Chestnut Paddock.

### E-mails

Most of the many readers who have contacted me from England and the rest of the world since I gave my e-mail address have referred to my critical comments on the BBC's current programming. They all agree!

One thing which strikes me about e-mails is that, unless the writer mentions it, there is no indication where they are from. This seems to leave them somehow in limbo. Frank Martin, of Somewhere, comments on the many unusual characters I've encountered over the years. He asks which of them I would consider the most memorable half dozen? It's hard, very hard, to select the best – or is it the worst? I hope the following two will do for now.

### Mr Mbabwa

In my early days I worked for a medium-sized company as an outside engineer. My first call one day was to Mr Mbabwa's newish Regentone radiogram. The complaint was that it had never played records loudly enough, and was now silent.

When I arrived I knocked at the door several times. After an age, during which various muted sounds came from within the house, an upstairs window flew open and a man in an open-shirt looked down at me.

"What you want, man?" he asked.

"I've called about the radiogram" I replied.

He bounded down to the door and, looking a bit sheepish, waved me up to a small room that was big enough for only a double bed and the huge radiogram.

"Dere it is. No sound at all" he declared.





I had to scramble across the bed to reach the radiogram, while taking care not to awake the young lady in it, who seemed to be fast asleep. The volume control rotated loosely and endlessly. I looked at the man's large hands.

It took the two of us an age to get the radiogram into the van. But we managed it, and I returned to the service department which was above the shop.

A couple of hours later the man came into the workshop with one of the salesmen.

"I want de lady's t'ings" he said.

As we watched, he opened the radiogram's lid and dived his hands into its huge record compartment. What he brought out made me blush – I was still a callow youth.

"Now she can get up" he said.

The trouble with the radiogram was that, on the assumption that the more the volume control was rotated the louder the sound would be, Mr Mbabwa had wrenched it free of its connecting wires.

### The Prowsters

Another call that stands out was to the Prowsters. They lived in a large house with a Bentley in the drive. A mob of barking dogs started up as I rang the bell. Mrs Prowster, dressed and made up like a Forties film star, invited me in and took me to the most untidy room I'd ever seen.

Thickly carpeted and musty, it was an Aladdin's cave of valuables, mostly new, which lay around everywhere. There was an electric organ and a huge projection TV set. They were cluttered with several outrageous hats, a fox fur, jewellery of all sorts, and the latest Pentax camera. The expensive armchairs and sofa were piled high with clothes, fishing rods, books, boxes of expensive chocolates and

**The noise was incredible. Five or six white poodles were yelping, and three young children bickered.**

children's toys and boxed games.

The noise was incredible. Five or six white poodles were yelping, and three young children bickered. Mrs Prowster walked up and down waving her arms about. She was engaged in a row via a huge portable telephone – the first I'd seen – with what turned out to be a dating agency.

"The man was hideous" she complained, "shock of thick black hair, staring eyes, teeth like fangs and a Charlie-thing on his back. What d'you think I am? What d'you mean by it? Where the devil did you find him, eh? Eh?"

When she'd finished she led me through to an even more untidy room where the faulty set resided. It was a huge Philips G6 model. I just wanted to run.

"Er, they can be a bit troublesome at times" I ventured.

She spun round. "Look, I pay what you ask. Right? No quibbling" she said. "But I expect good service. You come when I call, and if it isn't right you come again when I call. Fast. OK?"

I wished that she hadn't called but, since I was there, I decided to have a go at the set. I lowered the chassis and the single-stranded leads that snaked everywhere from the power supply began to break off, which was normal with a G6. As I was engrossed in the business of trying to find out where they'd originally been soldered to a slim, dark and immaculately-groomed man, dressed in a charcoal-grey suit,

came in with his briefcase.

"Come and play snakes and ladders with us Daddy" yelled the children. He crouched down with them and began to toss the dice. After a while a squabble broke out.

"You went up a snake Daddy. You can't do that. Only down. Up ladders, down snakes."

"Of course you can go up snakes" he screamed, "I can anyway."

He went on going up snakes and down ladders and won that game and all the others, until the children lost their tempers.

"You're just a cheat, like Mummy says. Clear off and leave us to play" one of them said. "You can't go up snakes and you know it."

Daddy jumped up off his haunches and waved his arms about. He screamed about his innocence in a voice so fast and shrill I couldn't believe I was listening to a grown up.

"Stop annoying me" he shouted. "You asked me to play, and now I'm winning you get nasty. Just stop it."

The game changed to a frantic shouting match. The children screamed and stamped and their father outdid them. They were out of control.

"Shut up" shouted Mrs Prowster.

"It's them" Mr Prowster said, pointing to the children.

"It isn't, it's him" they screamed back.

I got out. Later I learned that the family was loaded because the father was a senior partner in a large and eminent firm of accountants.

What a life it's been!

### Keep up the e-mails

Finally, do keep up those cheery e-mails.

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Part No	Code	Price	Part No	Code	Price	Part No	Code	Price	Part No	Code	Price
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3714002	LOT02	£ 8.00	2434141	LOT33	£10.00	TLF 14520 F	LOT40	£15.00	3714002	LOT02	£ 8.00
043714002J	LOT02	£ 8.00	2434274	LOT44	£ 9.00	TLF 14521 F	LOT39	£15.00	043714002J	LOT02	£ 8.00
43700000	LOT02	£ 8.00	2434393	LOT405	£18.00	TLF 14567 F	LOT39	£15.00	43700000	LOT02	£ 8.00
<b>AMSTRAD</b>			2434593	LOT44	£ 9.00	TLF 14568 F	LOT40	£15.00	7140002	LOT02	£ 8.00
3714002	LOT02	£ 8.00	2435006	LOT401	£15.00	TLF 14584 F	LOT41	£15.50	<b>SHARP</b>		
043714002J	LOT02	£ 8.00	2436201	LOT90	£10.00	TLF 14586 F	LOT42	£15.00	RTRNF 1220 CEZZ	LOT39	£15.00
43700000	LOT02	£ 8.00	2433891H	LOT23	£12.00	<b>PHILIPS</b>			<b>SONY</b>		
<b>FERGUSON</b>			<b>MATSUI</b>			3119 108 31260	LOT90	£10.00	1-439-332-41	LOT100	£12.00
06 D-3-084-001	LOT23	£12.00	3714002	LOT02	£ 8.00	3119 198 62930	LOT57	£10.00	1-439-332-42	LOT101	£12.00
06 D-3-087-001	LOT23	£12.00	043714002J	LOT02	£ 8.00	3122 138 36920	LOT57	£10.00	1-439-332-52	LOT100	£12.00
<b>HINARI</b>			43700000	LOT02	£ 8.00	3122 138 36922	LOT57	£10.00	1-439-387-11		
3714002	LOT02	£ 8.00	7140021	LOT02	£ 8.00	3122 138 36923	LOT57	£10.00	LOT311	£12.00	
043714002J	LOT02	£ 8.00	<b>MITSUBISHI</b>			3122 138 37620	LOT90	£10.00	1-439-387-21	LOT311	£12.00
43700000	LOT02	£ 8.00	731003	LOT51	£13.00	3139 128 30400	LOT90	£10.00	<b>TOSHIBA</b>		
<b>HITACHI</b>			334 P 18506	LOT51	£13.00	4812 140 10369	LOT90	£10.00	2433751	LOT01	£13.00
2424593	LOT44	£ 9.00	<b>ORION</b>			4812 140 10421	LOT90	£10.00	23236098	LOT288	£14.00
2433751	LOT01	£13.00	3714002	LOT02	£ 8.00	4822 140 10274	LOT123	£11.00	23236198	LOT288	£14.00
2433752	LOT01	£13.00	043714002J	LOT02	£ 8.00	4822 140 10306	LOT57	£10.00	23236255	LOT289	£13.00
2433891	LOT23	£12.00	43700000	LOT02	£ 8.00	4822 140 10381	LOT128	£11.00	23236425	LOT288	£14.00
2433893	LOT23	£12.00	<b>PANASONIC</b>			4822 140 10384	LOT127	£15.50			
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<b>16 volts</b>				1000uF	CAP60	435p	10	<b>100 volts</b>			
330uF	CAP30	175p	10	2200uF	CAP61	245p	2	0.47uF	CAP91	50p	5
470uF	CAP31	175p	10	3300uF	CAP62	1000p	5	1uF	CAP92	85p	10
680uF	CAP32	210p	5	<b>50 volts</b>				1.5uF	CAP93	70p	5
1000uF	CAP33	210p	10	10uF	CAP63	50p	10	2.2uF	CAP94	50p	5
2200uF	CAP34	525p	10	22uF	CAP64	70p	10	3.3uF	CAP95	50p	5
3300uF	CAP35	500p	5	47uF	CAP65	85p	10	4.7uF	CAP96	50p	5
4700uF	CAP36	610p	10	100uF	CAP66	85p	10	10uF	CAP97	95p	10
<b>25 volts</b>				220uF	CAP67	175p	10	22uF	CAP98	105p	10
10uF	CAP37	45p	10	330uF	CAP68	245p	10	33uF	CAP99	155p	5
22uF	CAP38	45p	10	470uF	CAP69	435p	10	47uF	CAP100	175p	10
47uF	CAP39	48p	5	680uF	CAP70	490p	5	100uF	CAP101	210p	10
100uF	CAP40	70p	10	1000uF	CAP71	525p	10	220uF	CAP102	600p	5
150uF	CAP41	95p	5	2200uF	CAP72	325p	2	470uF	CAP103	600p	5
220uF	CAP42	120p	10	<b>63 volts</b>				<b>250 volts</b>			
330uF	CAP43	140p	5	0.47uF	CAP73	35p	10	3M3	CAP104	175p	10
470uF	CAP44	190p	10	1uF	CAP74	35p	10	10uF	CAP105	260p	10
680uF	CAP45	315p	5	2.2uF	CAP75	35p	10	47uF	CAP106	435p	10
1000uF	CAP46	365p	10	3.3uF	CAP76	50p	10	<b>400 volts</b>			
1500uF	CAP47	390p	5	4.7uF	CAP77	35p	10	1uF	CAP107	215p	5
2200uF	CAP48	200p	2	10uF	CAP78	50p	10	2.2uF	CAP108	225p	5
3300uF	CAP49	220p	2	15uF	CAP79	95p	5	4.7uF	CAP109	315p	5
4700uF	CAP50	365p	2	22uF	CAP80	75p	10	10uF	CAP110	400p	5
6800uF	CAP51	390p	2	33uF	CAP81	85p	10	22uF	CAP111	250p	2
<b>35 volts</b>				47uF	CAP82	95p	10	47uF	CAP112	350p	2
10uF	CAP52	50p	10	68uF	CAP83	130p	5	<b>450 volts</b>			
22uF	CAP53	45p	10	100uF	CAP84	120p	10	1uF	CAP113	280p	5
33uF	CAP54	50p	5	150uF	CAP85	280p	5	2.2uF	CAP114	320p	5
47uF	CAP55	85p	10	220uF	CAP86	280p	10	4.7uF	CAP115	495p	5
100uF	CAP56	85p	10	330uF	CAP87	400p	10	10uF	CAP116	550p	5
150uF	CAP57	95p	5	470uF	CAP88	525p	10	22uF	CAP117	415p	2
220uF	CAP58	145p	5	680uF	CAP89	500p	10				

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RCTRH8147 Mechanism	... £10.00
CDM12.1 Mechanism	... £20.00
KSM2101ADM Mechanism	... £18.00
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## Digital Satellite Spares

### Sky Digital Remote Control



Order Code : RCSKY  
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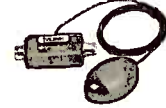
### Sky Digital Remote & TV Link Eye Combination

Price : £ 18.50 + vat

### Magician 4 Remote & TV Link Eye Combination

Price : £ 18.00 + vat

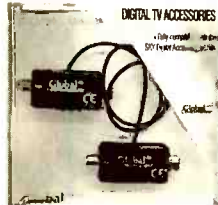
### Sky Digital TV Link Eye



Order Code : TVLINKEYE  
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5 plus ....£ 7.99 + vat each

### Sky Digital Amplifier By-Pass Kit

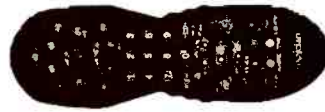
This is designed to allow operation of the TV link Remote Eye in situations where the existing amplifier cannot be replaced with one of the Global Communication UHF/VHF distribution amps.



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Operates all SKY digital TV box functions  
Operates any combination of TV , VCR & Cable/Satellite systems  
Full teletext and fatstext functions  
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Ergonomic & tactile design



Order Code : MAGICIAN4  
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BU2525AF 220p	BUZ80 135p	MJ11015 250p	TIP121 35p	HA13153A 900p	STK4171 900p	STR4512 400p	TDA1175 175p	TEA2018A 80p
BU2525D 240p	BUZ80AF 200p	MJ11016 300p	TIP122 30p	HA13155 920p	STK4172 II 680p	STR50103A 260p	TDA1180 120p	TEA2037 200p
BU2527AF 400p	BUZ90A 180p	MJ15003 250p	TIP125 30p	HA13157 950p	STK4191 II 900p	STR54041 320p	TDA1518BQ 240p	TEA2164 160p
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BU508D 75p	IRF510 70p	MJ15016 350p	TIP29A 22p	LA4460 120p	STK5332 180p	STR6020 270p	TDA2004 150p	TEA2262 275p
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BUH515D 250p	IRF710 150p	MJE18004 125p	TIP36C 65p	LM2416T 650p	STK73605 375p	STRS6707 1000p	TDA4565 150p	UC3844 70p
BUH517 275p	IRF720 85p	MJF18004 175p	TIP41A 20p	LM324 30p	STK73907 700p	STRS6708 575p	TDA4600 200p	UC3844AN 80p
BUH517D 175p	IRF730 125p	MJF18006 200p	TIP41C 22p	LM339 35p	STK7406 650p	STRS6709 600p	TDA4600 II 160p	UC3845AN 80p
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\* All components are brand new

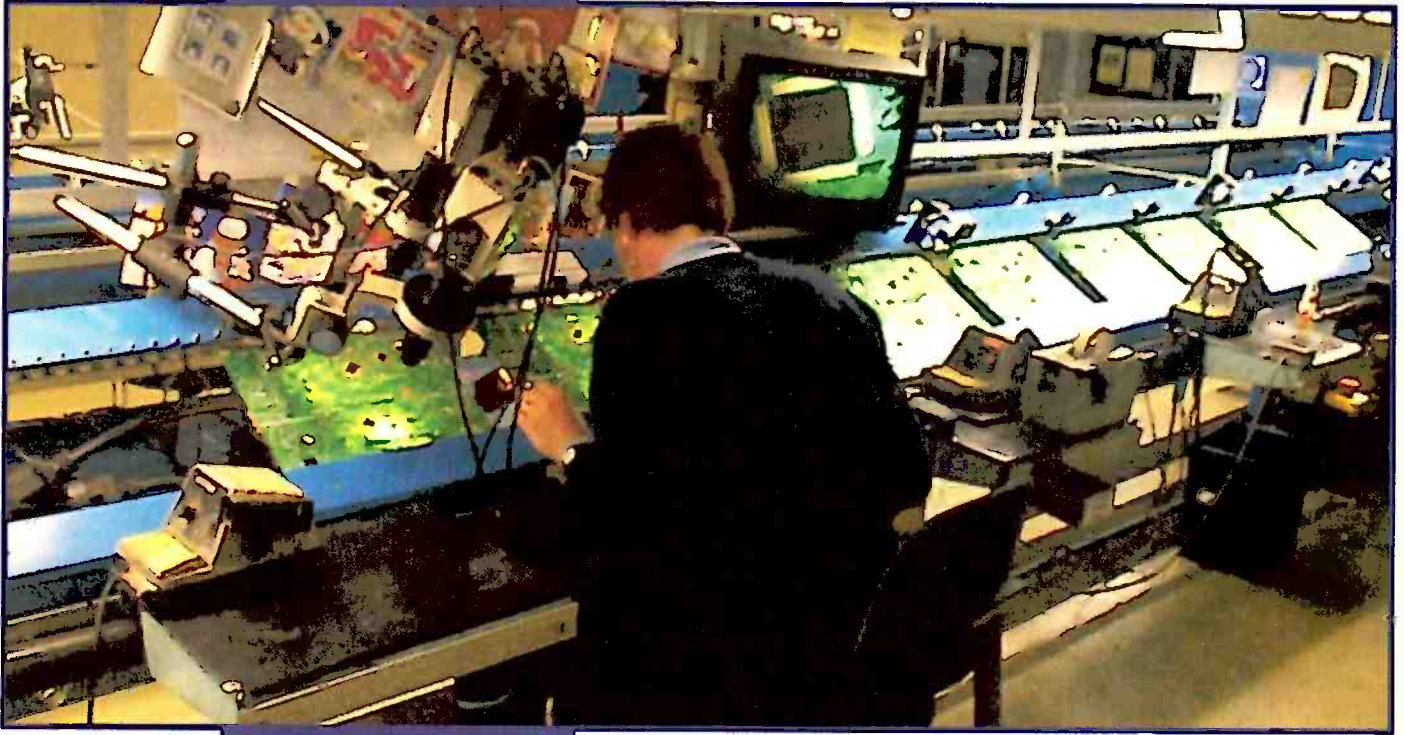
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# A

**Joe Cieszynski provides an insight into how one of the UK's leading VCR and microwave oven manufacturers - Sharp - continues to succeed in a tough market.**

## Sharp insight

**B**ecause of my heavy involvement these days in teaching and training in the electronics servicing industry, I find myself speaking quite often to the technical support staff of various manufacturers. Among these I have always found the staff of Sharp UK particularly helpful.

During one of my many telephone conversations with Bill Wilcock, head of Sharp's Consumer Electronics Technical Support, he asked if I would be interested in visiting Sharp's manufacturing factory in Wrexham, North Wales.

For a service engineer who is used to seeing equipment only after it has failed, this was an opportunity too good to miss.

I arrived at the factory on a wet November morning at the height of the floods. During the course of the day, I was able to see the production processes for VCRs and microwave ovens. As a bonus, I gained an insight into the running of a large manufacturing plant.

It is fascinating to see SMD insertion machines place 300 components on to a board in just a few seconds, and to watch the flow solder bath simultaneously connect these components. It sure beats using a pyropen!

However - and perhaps more importantly - during my visit I was able to gain an insight into where the company sees the future of home entertainment equipment. It is this insight that I want to share with you here.

Officially known as the Sharp Manufacturing Company of the UK, the company enjoys much autonomy from the giant Sharp Corporation of Japan. This means

### Sharp facts...

Phase 1 of the Wrexham factory opened in 1985, initially for VCR production. In 1987 phase 2 was opened and provided the necessary capacity for microwave oven production to begin. In its time the factory has also produced CD players, font writers, plain paper copiers and electronic typewriters.

During this last year the factory has produced 800 000 VCRs and 1.2 million microwave ovens. These have been produced largely for the European market, but product has also been made for Australia and Israel.

Phase 1 has three lines of VCR production. Phase 2 has four lines of microwave-oven production, plus a large paint shop area where the specialised processes needed for coating oven cavities are located.



that it is largely up to the UK subsidiary how it remains ahead in a competitive market and how it deals with fluctuations in exchange rates.

### Plans for the near future

Naturally I was interested to hear how a large manufacturing plant was faring in the current climate of a strong pound, coupled with the difficulties of competing with factories in countries where labour is cheap. As we know, these two factors alone are sending many UK manufacturing companies to the wall.

In the case of Sharp Wrexham, although these problems exist, the current demand for the two products they turn out – VCRs and microwave ovens – is such that the plant is working to capacity for much of the time. Current output is more than enough to justify the UK arm's existence.

For the moment, Sharp is committed to its UK manufacturing operations. It is not in a hurry to make any knee jerk reaction in the light of the current economic climate, which can alter very quickly at any moment in time.

So, with the Wrexham plant currently working flat out to keep abreast of the European demand for its produce, its short-term future appears bright. But what of the longer term?

### Long term predictions

When I asked general manager Bill Thomas about the plant's long-term future, his response was simple; the factory is successful at present because it is able to produce a quality product that everyone wants, for a competitive price.

For the factory to survive into the future, it needs to identify new product that people will want. "And what might that product be?", I asked Bill. Not surprisingly, he wouldn't say.

"So are there any plans to down-scale VHS production to make way for new technologies?" I enquired. The reply was a definite "No". Sharp is currently able to move every VHS machine it produces. And the current demand in Europe shows no sign of abating.

Bill pointed out the obvious; while it is possible to buy a basic VHS machine for under £100, how many consumers will want to pay many more times that amount for a re-writable DVD? I agree entirely.

### Made in the UK?

A criticism sometimes made of Japanese companies producing in the UK is that in truth they are no more than assembly plants putting together modules that have been manufactured abroad. This is not the case here.

Although a lot of individual components may be imported, the manufacture of the product all takes place in the factory.

The only exception to this is the new VHS mechanism used in the basic models. Here, Sharp has had to bow to international economics and import the assembled chassis from Malaysia.

In the case of microwave oven production, many of the components are made locally – including the metal cabinet parts, which are pressed and painted at the factory.

A prime strategy in the survival of the plant is to maintain quality; a factor that is too easy to let go of when financial savings need to be made.

In a recent talk at the factory, Mr Mitarai, Executive Corporate Director, said that it was essential to maintain the necessary quality level – and not just a sufficient quality level.

Quality is certainly a factor that is embedded in the entire factory operation. It is one thing for a company to display its portfolio of quality certificates such as ISO9001/2 and ISO14000 – which Sharp, Wrexham has. But from my experience it can be quite another thing for that company to be able to demonstrate that these procedures are being truly adhered to in the normal working day.

During my visit I could see at first hand the steps that are taken to ensure that every box going out of the factory contains a product that meets the criteria set out in the quality manuals. Quality samples are taken at every conceivable point from components entering the factory, all along the production line, to final product and packing.

Even the cartons are inspected to ensure that the gap between the flaps is within the specified limits once they have been taped shut! Other checks regularly carried out are drop, vibration and compression tests.

As an engineer, I found the most interesting part of the quality inspection to be that made on VHS machines that have been removed from the production line just prior to final cabinet assembly. Each day

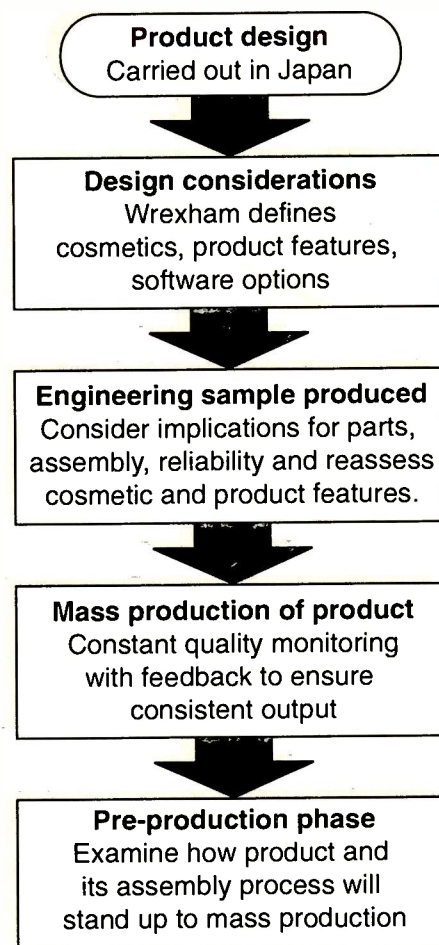


Fig. 1. Sharp product evolution. VCRs and microwave-ovens are designed in Japan, but when they reach the UK, they undergo further development to fine tune them for the local market.

a number of machines are put through their paces. Tests are carried out to ensure that the mechanical and electronic adjustments, s-to-n ratio performance and audio and video signal quality are all to within both the VHS and Sharp specifications.

### Sharp ears

Of course, quality checks are no use unless there is feedback. At the factory this may come in a number of ways, from simply having each person on the production line telling the last person when they have made an error, to the discussion of more involved problems at regular meetings.

There is even evidence that comments made by us service engineers through the Technical Liaison Executives (TLEs) get back to the factory and are acted on. Apparently someone listened to us when we complained about the high component density on the CS



chassis colour TV board; the new DS chassis PCB is much wider, with a corresponding reduction in component density.

Final inspection of boxed items taken from the warehouse is also carried out. It was here that I was able to take a close look at Sharp's new S-VHS model, the VC-S2000.

As you might expect from S-VHS, the picture quality was very good. What was more interesting for me though were the effects of the digital picture enhancement technology. When used in conjunction with the built-in time-base corrector, this proved to be very effective.

Digital enhancement was especially evident in the extended-play mode, where the tape transport speed is reduced by a factor of four. The signal-to-noise ratio becomes poor as a result of the much reduced width of the video tracks.

For me, the extended-play standard VHS picture quality was superior in terms of noise levels to that of some other machines operating in the long-play mode. However, the narrow tracks do give the servos a run for their money. It is recommended that tapes recorded in the extended-play mode are only replayed on their original machine.

### Tweaked for the UK

All new product designs begin in Japan. Once an item of equipment lands at the Wrexham factory though, staff have the task of customising it for the UK market. Such things as cosmetic appearance, product features and software programs may be customised.

Once a design has been approved, an engineering model is produced. This is used to evaluate performance, mass-production

methods, component ageing and equipment behaviour.

Following further fine tuning, a pre-production run of a few dozen units is made to assess both the factory and equipment performance. This enables any final bugs to be removed from the system before mass production begins. A flow chart for new model introduction is shown in Fig. 1.

For me, the visit was worthwhile. For someone who is used to seeing the industry from the service point of view it is very interesting to pay a visit to the 'other side'.

I was encouraged by the positive attitude of the management at Sharp, and I was able to come away feeling that it is not all doom and gloom for manufacturing in the UK.

Thanks to Bill Wilcock, Bill Thomas and Peter Jones for opening up their world not just to myself, but also to you. ■

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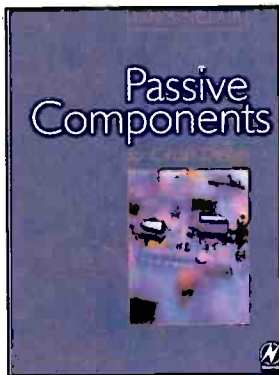


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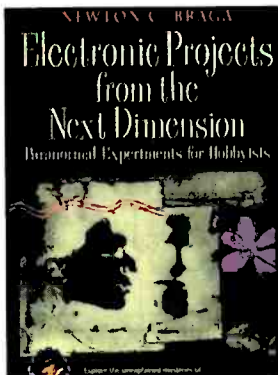


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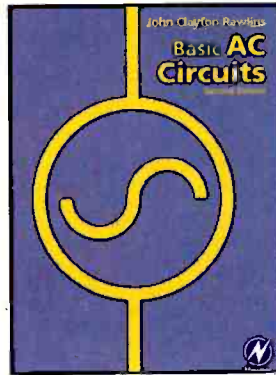


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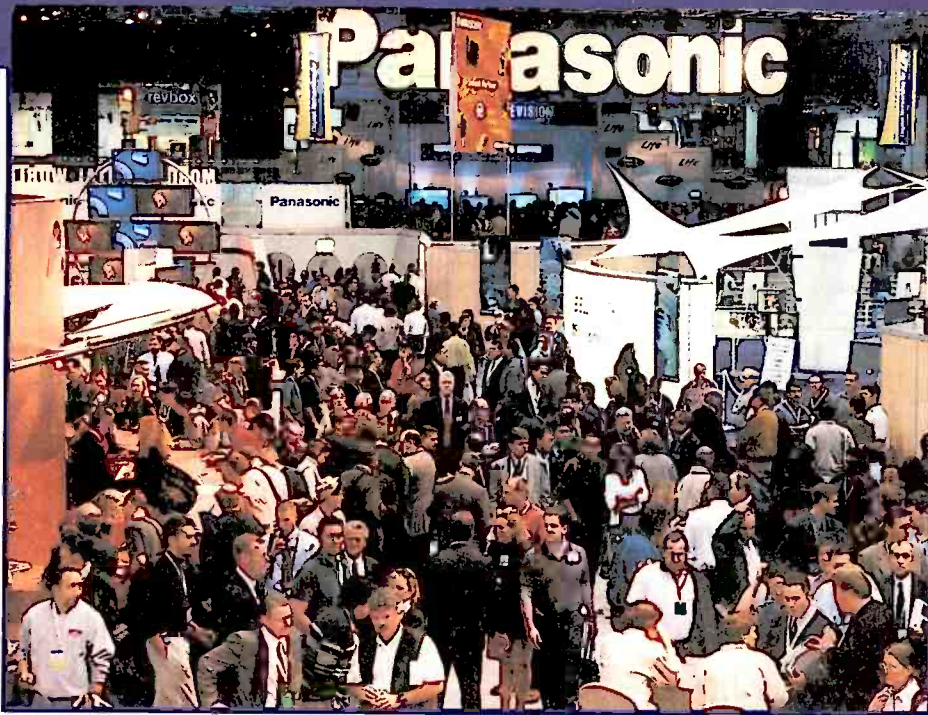
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**The US Consumer Electronics Show is the world's foremost presentation of the latest in CE products. George Cole was there to report on new developments and the latest innovations from manufacturers**

# CES 2001

**T**his year's Consumer Electronics Show (CES 2001) was held in Las Vegas in late January. It covered over 1.2 million square feet, equivalent to 261 basketball courts. The show was dominated by digital TV, recordable DVD and new types of storage media. In a sign of the increasing convergence between the computer and consumer electronics worlds, the four keynote speakers were all from the PC industry. They included Bill Gates, Microsoft's chairman, who demonstrated the company's new Xbox games console which has DVD-Video playback capability. Perhaps CES will one day be renamed the Computer Entertainment Show...

## Digital TV

The first digital terrestrial TV services in the USA, using the Advanced Television Systems Committee (ATSC) standard, were launched in 1998. Despite the fact that take-up has so far been slow, the Federal Communications Commission (FCC) has said it would like to see analogue broadcasting switched off in 2006. Few expect this to happen, and Federal legislation says that analogue transmissions can continue where access to digital services is less than 85 per cent.

The ATSC standard incorporates eighteen different specifications that cover the number of lines (720 or 1,080), the scanning system (interlaced or progressive), the screen shape (4:3 or 16:9) and other parameters. This gives broadcasters much scope in transmitting various types of programme

material, but is also a recipe for consumer confusion. As a result, the US Consumer Electronics Association (CEA) has established a number of 'definitions' for digital TV equipment, covering HDTV sets, HDTV monitors, HDTV tuners, Enhanced Definition (ED) sets, ED monitors, ED tuners, Standard Definition (SD) sets and SD tuners. EDTV equipment sits in the middle and typically provides a progressive-scan display. HDTV equipment must be able to display 16:9 pictures: this aspect ratio is not specified for EDTV or SDTV equipment.

During the first year (1998) sales of digital TV sets in the USA amounted to only some 13,000. This was partly because of the high cost of HDTV sets and also because of the lack of HDTV programming. The situation has improved as digital TV set prices have declined and more and more broadcasters are transmitting HDTV material. Most major US broadcasters, the main exception being Fox, now offer HDTV programming, though the amount varies from several hours a week to 24-hour movie channels. The major digital satellite broadcasters, DirecTV and Echostar, and several cable companies also offer HDTV.

The CEA estimates that some 625,000 digital TV sets were sold in the year 2000, and expects the figure to reach 1.1 million this year. All the major consumer electronics companies, including Sony, Philips, Panasonic, Toshiba, Sharp and Samsung, showed HDTV sets, many of them 50in. projection models. Prices ranged from the

US equivalent of £1,500 to £6,000. Samsung claimed that its new 30in. HDTV Model TSL-309HR offers improved screen resolution, with advancements in beam focusing, shadowmask design and a finer dot pitch. It certainly looked impressive.

## Other TV news

Philips announced that it has shipped a million 16:9 TV sets in Europe: many of its sets at CES were in this format. Flat-screen display technology was presented on many stands. Fujitsu's SlimScreen PDS-4222 is a HDTV plasma screen that can also display XGA, SVGA and VGA outputs from a PC. The company says that its ALiS (Alternate Lighting of Surfaces) technology achieves 80 per cent higher brightness and definition than a conventional plasma display. Sharp had many LCD TV sets on display with screen sizes ranging from 10-20 inches. The 20in. Model LC-20A2U is less than 2in. deep and provides a 160° viewing angle: the suggested retail price is about £4,000.

Several companies, including Hitachi, Mitsubishi and Panasonic, have developed rear-projection sets that use Texas Instruments' Digital Light Processing (DLP) technology. This is based on the Digital Micromirror Device (DMD), a chip that accepts a digital input and creates a display by means of an array of up to 1.3 million microscopic hinged mirrors. These act as optical switching devices that create a high-resolution colour image.

Thomson unveiled what could be a revo-



lutionary new display system called Liquid Crystal on Silicon (LCOS). The heart of the system is a 'light engine' that uses an ultra high-pressure lamp (produced by Philips) whose output is passed through a series of integration optics to produce a laser-like light beam. This is passed through a prism to produce RGB light components which are directed to three colour-specific LCOS imagers, each of which is modulated by a high-definition video signal. The reflected components are then recombined into a single light beam, magnified by an eleven-element optical lens system and displayed on a flat HD screen. There is no need for a convergence system.

Thomson developed the LCOS technology with several partners – ColorLink, Three-Five Systems and Corning Precision – and has thirty engineers working on it. The first product to use LCOS technology is the RCA-branded Model L50000, an HDTV set that weighs about 46kg and is just 18in. deep. The 50in. screen has 2.76 million active pixels with 1,280 x 720 progressive-scan resolution and no visible scanning lines. So how did it look? Superb! I was sitting in the front row and had a great view. The L50000 is expected to sell for about £6,000. The Philips lamp, which has a life time of about four years, will be available for about £300. The new set is being launched in the USA this spring. There were no details of a European launch.

### DVD Video and Audio

DVD-Video has been a spectacular success in the USA. According to the DVD Entertainment Group (DEG), a consortium of DVD hardware and software companies, US sales of DVD-Video players reached 9.8 million in 2000, three times the number sold in 1999. In fact almost as many players were sold in December 2000 as in the whole of the previous year. The DEG forecasts DVD-Video player shipments of 13 million this year, giving a total installed base of 27 million players by the end of the year. During the first four years after launch, VHS recorder sales in the USA had reached some three million: with CD players the figure was about 4.5m. In the same period DVD-Video player sales reached 15 million.

Of the twenty million DVD-capable products expected to be sold in the USA this year, 13 million will be DVD-Video players, 500,000 DVD-Audio players and 6.5 million games consoles such as the Sony PlayStation 2. DVD-Video sales have been helped by falling hardware prices: the price of an average player fell from \$490 in 1997, when the system was launched, to \$240 in 2000 – it's not hard to find players at about \$150 at present. The large number of DVD-Video software titles has also helped. US viewers have more than 8,500 titles to choose from.

To stimulate sales and raise 'price points', DVD player manufacturers are adding new



*Thomson's Liquid Crystal on Silicon (LCOS) display, used in the RCA TV Model L50000.*

features. Samsung and JVC had on display DVD-Video players that can also read MP3-encoded audio CDs. Panasonic and Sharp had portable players with 8in. LCD screens. Many manufacturers were promoting DVD-Video players with a progressive-scan output socket, designed to link up with the growing number of digital TV sets able to provide this type of display. Samsung and Panasonic both showed combi products that combine a DVD player and a VHS deck. There was a combined TV, DVD player and VHS recorder on the Panasonic stand.

VM Labs, the company behind Nuon, had a large stand near one of the show's entrances. Nuon is a chip-set and operating system designed to enhance DVD-Video player functionality. Nuon-enabled players have additional features such as a light show and the ability to call up on-screen menus while watching a film. They can

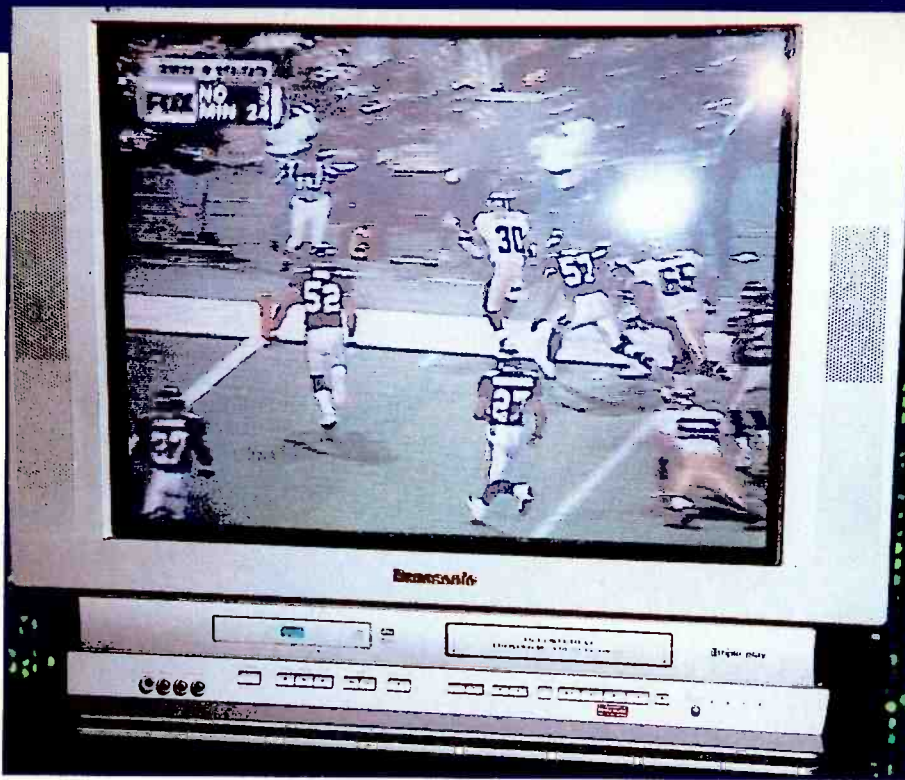
also play games, and access the internet via an optional plug-in modem and browser. To date, Samsung and Toshiba have launched Nuon-enabled DVD-Video players: LG is expected to join them later this year. But there was no sign of Nuon products from the likes of Panasonic, Philips and Sony.

DVD-Audio players were present on a number of stands, but the system was unexpectedly low-profile for one that is being presented as the next step on from the audio CD. The DEG forecasts that some 160-170 DVD-Audio titles will be made available during the first half of 2001, with up to thirty DVD-Audio/Video players available from companies such as Panasonic, JVC, Kenwood, Technics and Toshiba.

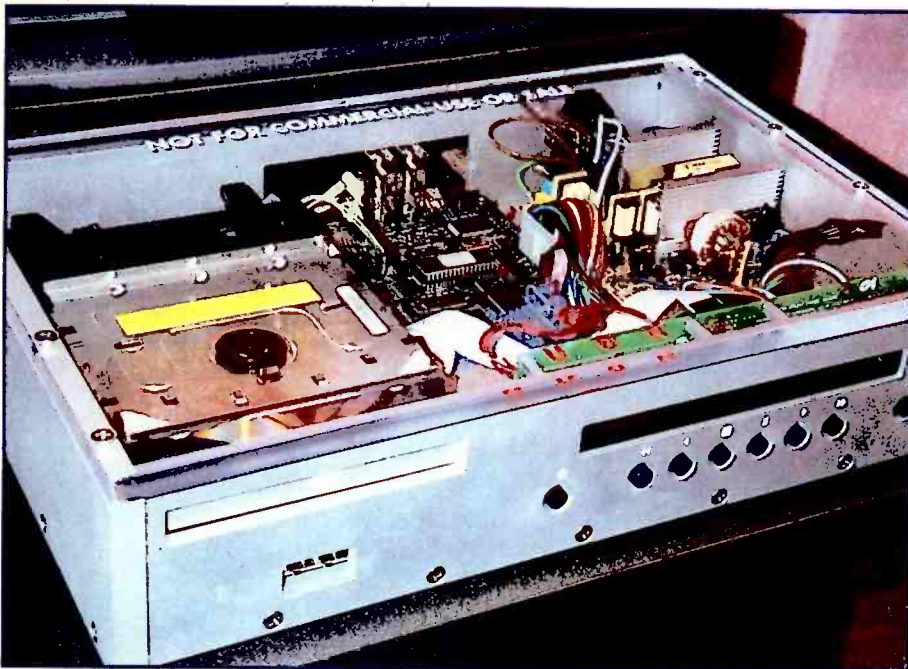


*Samsung's Model DVD-V1000 DVD/VCR combi unit.*





*This Panasonic combi model consists of a TV receiver, a DVD player and a VHS recorder.*



*The innards of a prototype Samsung Nuon-enhanced DVD player.*



*Prototype Sony dual-compatible DVD+RW/-RW player.*

## DVD recorders

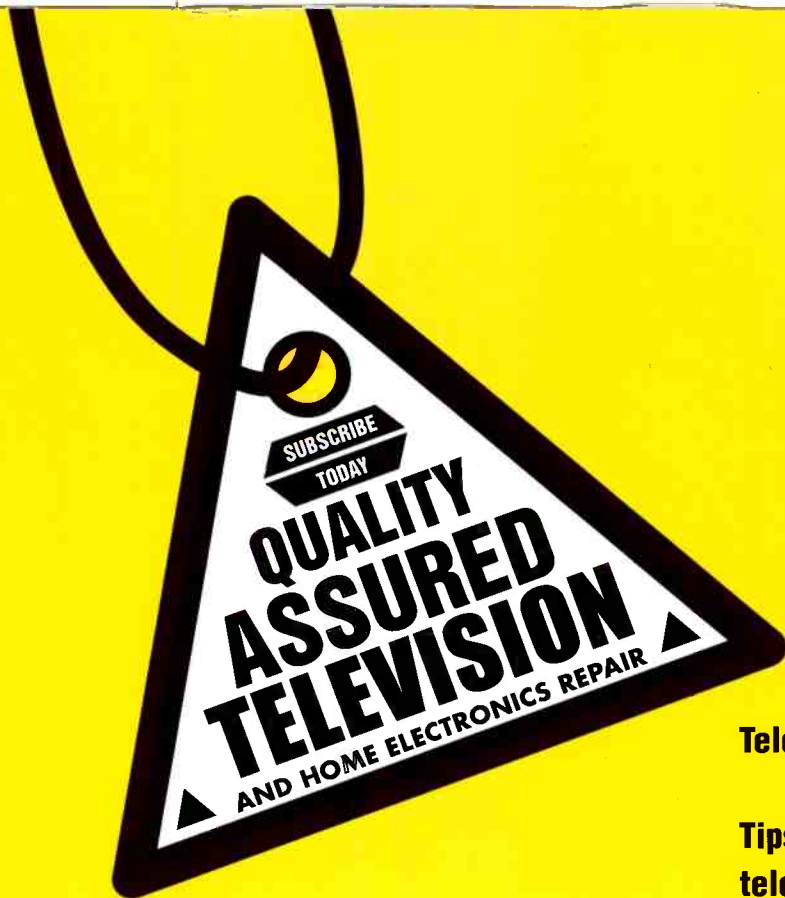
My report on the Comdex computer show last month covered the technologies used by the different recordable or, to be precise, rewritable DVD formats, so the following is just a brief résumé. All use phase-change recording and 4-7Gyte capacity discs that can store several hours of MPEG-2 video. The DVD-RAM format, which uses a protective caddy (though caddyless discs are also part of the format's specification), is supported by companies such as Panasonic, Toshiba, Hitachi and Samsung. Pioneer, Sharp and LG are amongst the companies that support the DVD-RW format, while the DVD+RW format is supported by Sony, Philips, Ricoh and others. The first two formats are part of the official DVD specification, but DVD+RW is an unofficial format. As CES opened, rumours suggested that DVD-RW and DVD+RW might be about to join forces to form a single format. But this didn't happen, and there is now the alarming prospect of four or even five types of DVD recorders appearing on the consumer market.

The RWPI (RW Products Promotion Initiative) association, which was formed to promote the RW format, revealed during a briefing that it now had 41 members including two newcomers, Thomson and NEC. A number of companies showed -RW recorders, including Pioneer, Kenwood, LG (under the Zenith brand) and Sharp. The RWPI confirmed that a feasibility study involving three members (believed to be Pioneer, Sony and Sharp) had been set up to investigate how the -RW and +RW formats could be made interoperable.

Sony announced that it is to launch a dual-compatible DVD+RW/-RW player next year. Thus consumers could be faced with DVD-RAM, DVD-RW, DVD+RW and dual-compatible recorders. Added to this there is the prospect of DVD Multi players and drives, a new generation of machines designed to play all the official DVD format discs. The DVD Multi specification is still being finalised however, and we are unlikely to see any hardware this year.

DVD+RW supporters were bullish. Guy Demuynck, CEO of Philips Consumer Electronics, described DVD+RW as "compatible with existing and future DVD products". When I asked whether this meant 100 per cent compatible he replied "the compatibility is in the 90 per cent region". He refused to say whether that meant the low nineties or high nineties, simply adding that DVD+RW should be compatible with every DVD-Video player made during the last two years. Philips sees DVD+RW as the successor to the audio CD recorder: it points out that more than 2.7 million audio CD recorders have been sold worldwide, making it the fastest-growing audio product in consumer electronics history. During the CES the DVD+RW group performed its usual party trick of recording video on a DVD+RW disc then playing it back via off-





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the-shelf PC DVD-ROM drives and DVD-Video players.

Sony gave visitors a glimpse of what it sees as the future of DVD recording – DVD Blue. This involves a blue-violet wavelength laser and a 22Gbyte disc that can store up to two and a half hours of high-definition video or more than ten hours of standard-definition video. Sony admitted that it would be some years before such a recorder became available as a commercial product and, in view of the size of the box in which the recorder was housed, a lot of chipset integration and laser-optic development work remains to be done before this stage is reached.

### SACD

Philips hosted a session on SACD. Worldwide sales of SACD hardware in 1999 had totalled just 6,000 units. This year the total is expected to top 3.6 million. There was an impressive array of SACD players in the briefing room, including the Pioneer DV-AX10 and Luxman DU-10, both of which can read DVD-Audio, DVD-Video and SACD discs. Philips and Sony have launched combined DVD-Video and SACD players, but there are no plans to launch combi plays with DVD-Audio compatibility.

### Other optical disc formats

DataPlay had a massive stand to demonstrate a new 32mm micro-optical disc. It's about the size of a ten pence piece and can store up to 500Mbytes of data. Blanks sell at just £7 each. There's a variety of disc types: write-once, multi-session, pre-mastered ROM and hybrid read-only/write-once. The format is aimed at the audio, games, imaging, e-book and PC markets. According to DataPlay a 500Mbyte disc can store up to five hours of CD-quality music or eleven hours of MP3-encoded music.

Last October DataPlay announced that it was entering into a partnership with Toshiba, so it was no surprise to find a large number of Toshiba prototype products, including a digital still camera, on the stand. Samsung is another DataPlay supporter and showed many DataPlay products including audio players, mobile phones, games players and hand-held computers.

The DataPlay format is to be officially launched in the USA this autumn, along with a number of DataPlay prerecorded software titles. These include 500 music titles from companies such as Universal, BMG and Sony.

DataPlay faces formidable competition from the new generation of memory cards such as SD and the Memory Stick, both of which are targeting the same markets. The massive SD stand had many prototype products, including an audio player, digital cameras, fax machines and a Nintendo GameCube games console. Sony

announced that a larger, 128Mbyte Memory Stick will be available this April.

Sony showed the first product to use the iD Photo disc, which has been developed by Sanyo, Olympus and Hitachi Maxell. This 50mm disc can store up to 730Mbytes of data, sufficient for two hours of moving video or 11,000 hours of still images. The iD Photo disc uses magneto-optical technology and has a writing speed of 20Mbits/sec. Sanyo will use the disc in its IDC-1000Z iDshot digital disc camera, which will sell for about £1,000 when launched later this year. Blank discs will cost about £20 each.

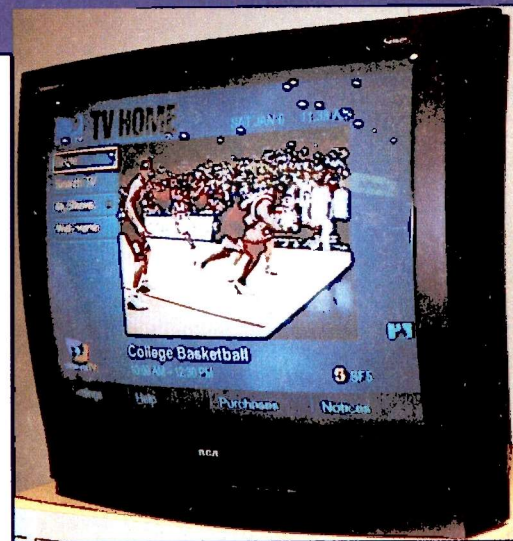
TDK held an invitation-only talk about its alliance with Calimetrics to promote MultiLevel Recording (ML) technology. This is the technology behind a new recordable and rewritable optical disc format that offers three times the storage capacity and three times the speed of CD-R/RW discs. The ML format has gained a number of supporters, which now include Sanyo Semiconductor, Mitsubishi Chemical and Plexor. The aim is to build ML Recording technology into a new generation of PC drives based on the CD-R/RW system. They will be able to write more than 2Gbytes of data at 36x speed on a blank ML disc or 700Mbytes of data at 12x speed on a CD-R/RW disc. Blank ML discs will cost about £1.50 each.

### Hard-disk technology

At the CSE you could see how hard-disk technology is finding its way into a growing number of products. The best known hard-disk product is the TiVo Personal Video recorder (PVR). This uses a hard disk to store many hours of programmes and provides features such as the ability to pause a live programme and get the PVR to know the types of programme you like to watch, then record them automatically. The TiVo company held a press conference to provide an update on progress. TiVo was launched in the USA just over a year ago, with Sony and Philips marketing products. There are now also DirecTV digital satellite set-top boxes with integrated TiVo technology. TiVo reached the UK late last year, with PVRs manufactured by Thomson and marketed by BSkyB.

A TiVo PVR with a recording capacity of thirty hours now sells for about £200 in the USA. But despite its high media exposure, only 75,000 TiVos were sold there during the first nine months following the launch. The company was asked about the problem of using TiVo technology in the UK, where programme start and stop times are unreliable. Current machines lack PDC technology and the ability to extend the recording time manually. There are plans to deal with this problem, although it was unclear whether any of these new features could be added to existing models.

TiVo's US rival ReplayTV is supported by Panasonic, which showed three hard-



The Microsoft Ultimate TV system combines a PVR with interactive TV and internet access.

disk recorders, Models PV-HS1000, PV-HS2000 and PV-HS3000. These provide recording capacities of twenty, thirty and sixty hours respectively, with suggested prices of £300, £400 and £500. In addition Microsoft launched its Ultimate TV system, which combines a PVR with interactive TV and internet access. The first product can store up to 35 hours of video on a hard disk.

But the most interesting hard-disk product was shown by JVC. Model HM-HDS1 is a combined S-VHS and hard-disk recorder. The latter has a 40Gbyte capacity and can store twenty hours of VHS-quality video at a data rate of 2Mbits/sec, fifteen hours of S-VHS-quality video at a data rate of 4Mbits/sec or six hours of what JVC describes as 'high-quality' video at 6Mbits/sec. Other features include ET technology, an on-screen menu system and an editing system. There were no price details nor any indication of when it might reach the UK.

### Home networking

The idea of linking consumer electronics equipment via a home network is not new – anyone remember the D2B system? But there are high hopes of a system that's supported by companies such as Sony, Philips and Toshiba. Known as HAVi (Home Audio-Visual interoperability), it's based on the FireWire IEEE 1394 connection, which is also known as I-Link. HAVi coding uses the Java computer language, with 'Havlets' (software packets) that enable different devices to communicate with one another.

Supporters of HAVi say that users will not have to insert floppy discs and type commands, as they do with a PC-based system. Unfortunately the demonstrations given suffered from various glitches, with systems having to be rebooted or devices displaying error messages. The idea of a home network is fine, but only as long as it doesn't turn reliable, simple-to-use consumer electronics products into clunky, unreliable and user-unfriendly ones. ■

# Servicing The Sharp CS chassis

**This concluding instalment deals with the audio circuitry, adjustments, software reset and the multi-purpose service kits**

**Table 3: Multi-purpose service kit components.**

Component	51CSCHASSISKIT	59CSCHASSISKIT
C601	RC-FZ0147BMZZ	RC-FZ0152BMZZ
C604*	RC-EZ0122BMZZ	RC-EZ0122BMZZ
C619	VCEAGA1JW107M	VCEAGA1JW107M
C708	RC-FZ9683BMNJ	RC-FZ9638BMNJ
C714*	VCEAHA1AB108M	VCEAHA1AB108M
D609	RH-DX0503BMZZ	RH-DX0503BMZZ
D610	RH-DX0504BMZZ	RH-DX0504BMZZ
D718	RH-EX0419BMZZ	RH-EX0419BMZZ
D720	RH-DX0045BMZZ	RH-EX0045BMZZ
F701	QFS-C3226CEZZ	QFS-C3226CEZZ
Q601**	RH-TX0125BMZZ	RH-TX0144BMZZ
Q701	RH-TX0166BMZZ	RH-TX0166BMZZ
Q702	RH-TX0102BMZZ	RH-TX0102BMZZ
Q703	RH-TX0102BMZZ	RH-TX0102BMZZ
R706***	VRN-VV3ABR47J	VRN-VV3ABR47J
R707	VRS-TV1JD221J	VRS-TV1JD221J

\*High-temperature type.

\*\* Different transistor type for 51 and 59/66cm Models.

\*\*\* In Models 59CS05H and 66CS05H only R706 is part no. VRN-VV3ABR33J.

Note that R707 and C708 were not identified in Fig. 2 (January issue page 156). R707 (220Ω) is the resistor between D720 and the base of Q702. C708 (68nF) is the capacitor between the source of Q701 and the base of Q703.

**P**revious instalments (see January and February issues) dealt with the power supply, the basic operation of the set (micro-computer control) and the line and field timebases. The chassis is compact, and a number of its circuit features were adopted because of the need to reduce power consumption. As with the field timebase, the audio output stages operate in the class D (switched) mode.

## The audio circuitry

The audio output stages (left and right) are similar to the field output stage, though the method of producing the pulse-width modulated output differs. Fig. 15 shows the circuitry. Pulse-width modulation is carried out by IC303. In each channel positive feedback from the output stage results in the whole amplifier oscillating at about 130kHz. L302/C333/C357 filter the left-channel output, L304/C340/C358 the right-channel output. To prevent a beat between the left and right channels, the two oscillators are coupled via C352 and R360. If one of these components should go open-circuit, an audible whistle may be heard from the speakers.

Another cause of audible whistle is associated with the muting system. Fig. 16 shows the mute circuit. When conductive, Q313 and Q314

provide muting by shorting out the bases of the driver transistor pairs Q303/4 and Q309/10. They conduct when the 40V supply generated in the line output stage is missing. If there is excessive ripple on the 40V supply, usually because C619 is leaky, this signal will be fed to the output stages which will start to whistle.

The output transistors may, depending on model, have heatsinks connected to their bodies. The higher the output power, the larger the transistors. But they are always surface-mounted devices which are on the component side of the PCB.

In the event of audio output transistor failure, the zener diodes and 47nF capacitors in their base circuits should also be replaced.

There are two types of speaker connector on the main PCB, either a four-way socket as shown in Fig. 17 or two two-way sockets. As the socket pinouts are identical, the two types can be interchanged simply by cutting a four-way plug in half or fitting two separate plugs into one four-way socket.

Dolby Pro-Logic models have an additional PCB for the Pro-Logic output amplifiers and processing stages. There's also a separate Pro-Logic power supply in these sets to power the extra circuitry. Note that this power supply is not switched off during standby. If the set is left in standby, intermittent popping



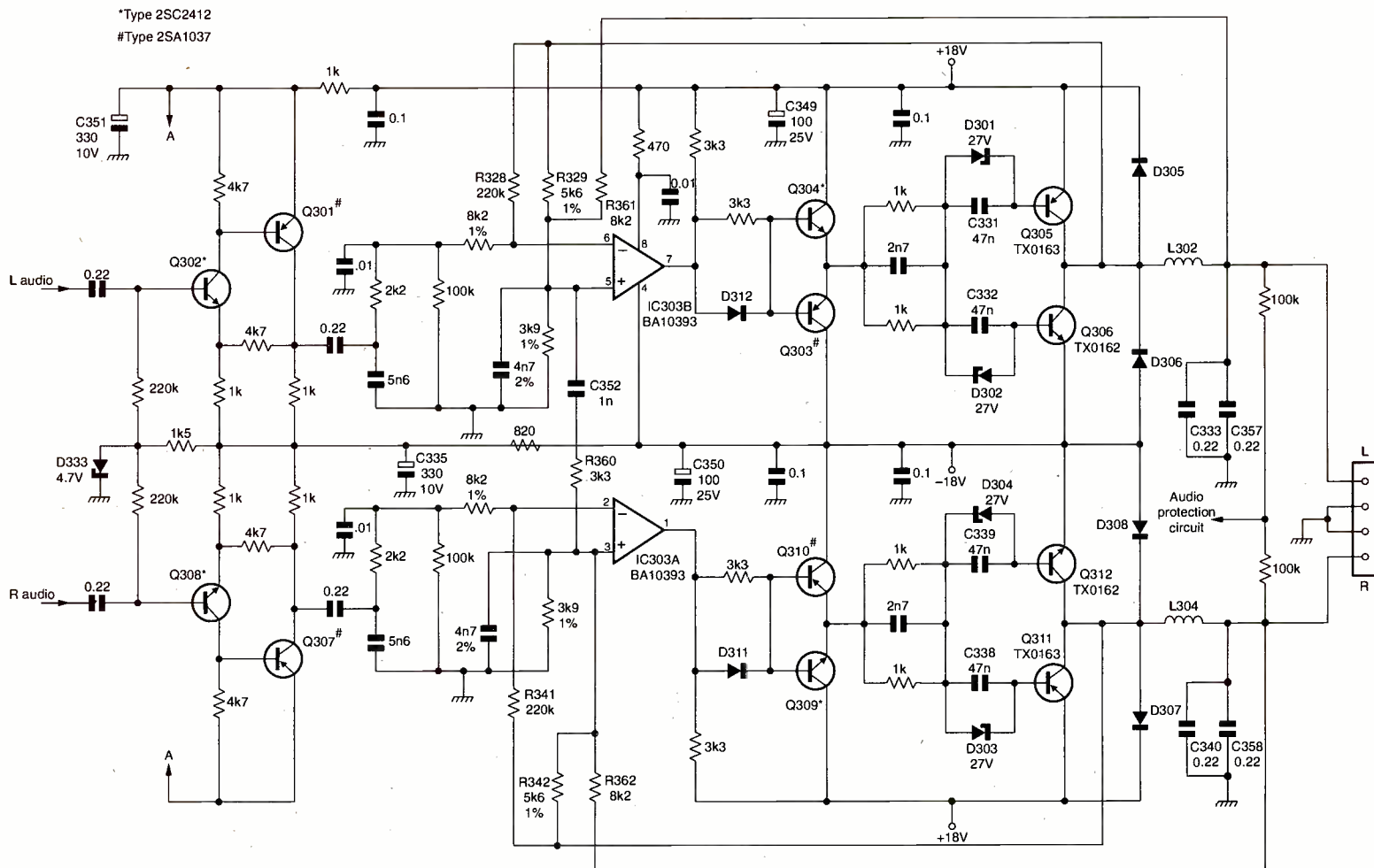


Fig. 15: The left- and right-channel audio circuits, Model 51CS05H.

noises may be heard from the speakers.

### Adjustments

Adjustments are relatively straightforward once the service mode has been entered. To enter the service mode, proceed as follows:

- (1) Connect a signal generator to the receiver's RF input and tune a free channel to this source.
- (2) Switch the receiver off, using the mains switch at the front.
- (3) Press the channel up and the volume down buttons.
- (4) While keeping these buttons pressed, use the mains switch to turn the set on.
- (5) Keep your fingers on the two buttons until a picture appears. The receiver is then in the service mode.
- (6) Release the buttons.
- (7) The channel buttons can now be used to select functions.

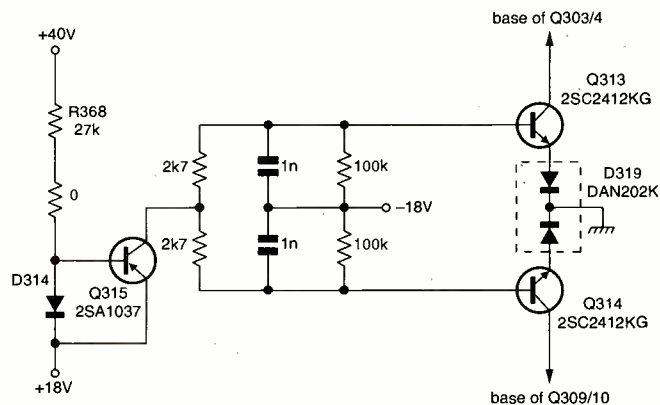


Fig. 16: The audio mute circuit.

- (8) Use the volume buttons to change the data.

- (9) Use the remote-control unit's standby button to store data (this must be done for each adjustment).

### Changing the NVM values

It's sometimes necessary to access the NVM memory and reprogram individual locations. Sharp Electronics (UK) Ltd. does not provide a map, so data should be changed only if this has been

advised or proved to cure a particular problem.

### Software reset

It's possible to reset the default values within the NVM if you suspect that the NVM is faulty. This can be done only when the set is operational and it's possible to enter the test mode. Problems that may call for the NVM to be reset include erratic Nicam reception, intermittent or no text, intermittent tuning, etc.

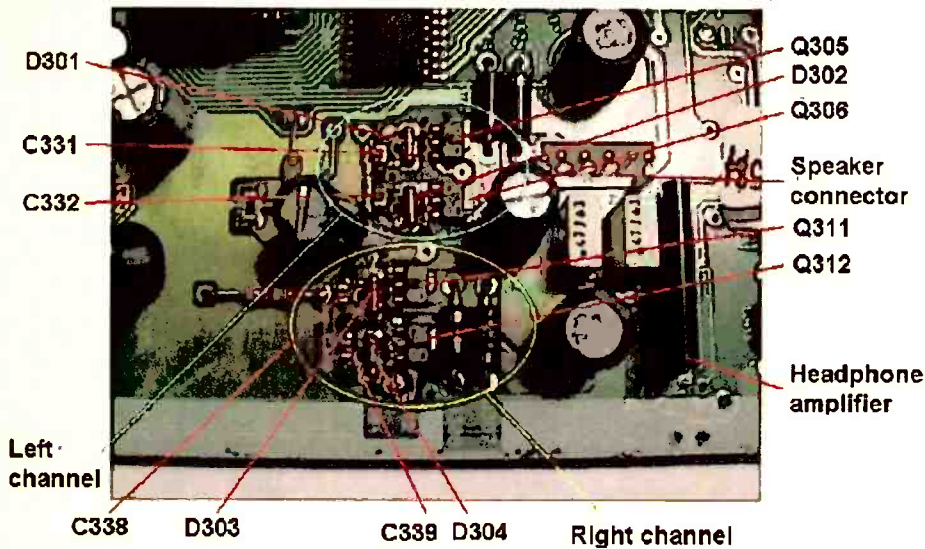


Fig. 17: Audio circuit component locations, Model 51CS05H.

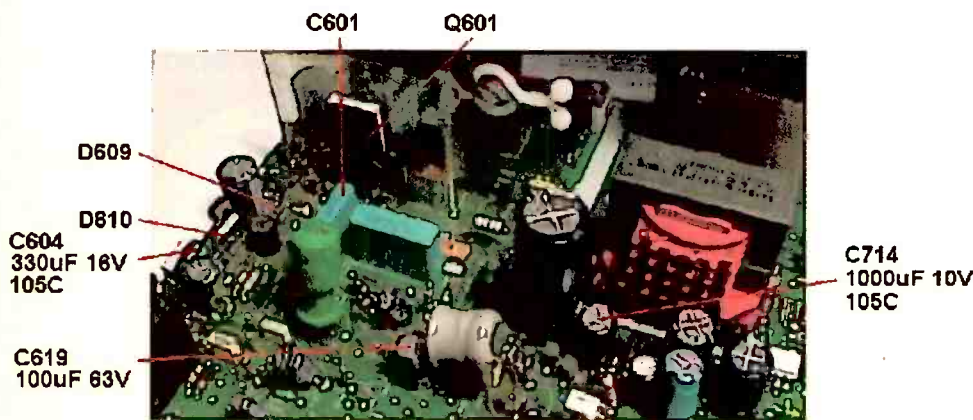


Fig. 18: Location of service kit components on the secondary side of the power supply.

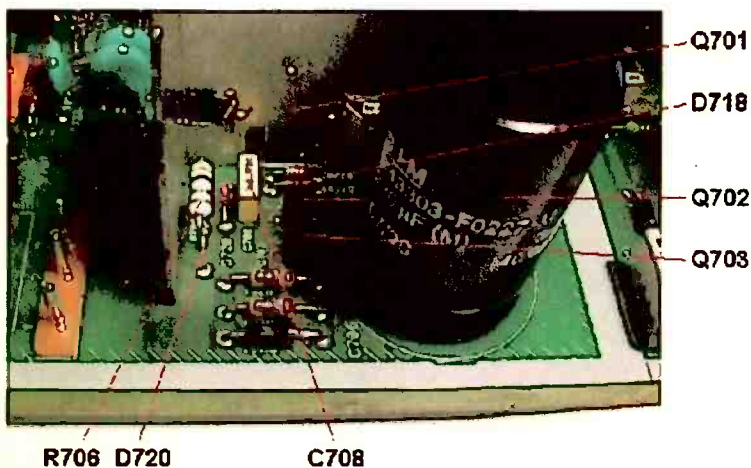


Fig. 19: Location of service kit components on the primary side of the power supply.

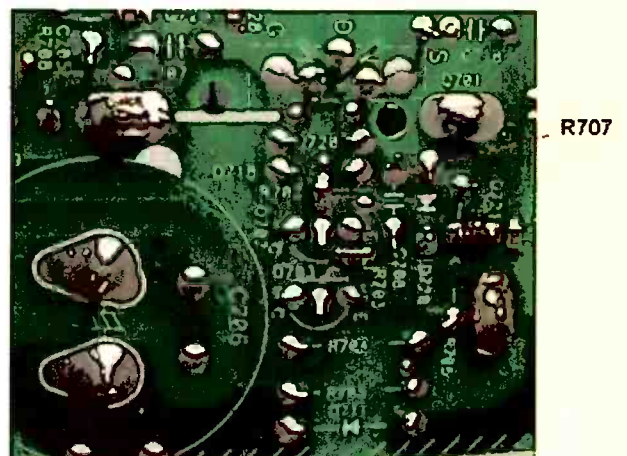


Fig. 20 (right): Location of R707 on the print side of the PCB.

To reset the NVM, proceed as follows:

- (1) Put the set in the test mode.
- (2) Go to NVM location 00.
- (3) Change this to 01.
- (4) Press the remote-control unit's standby button to store.
- (5) Turn the set off at the mains.
- (6) Turn the set back on again at the mains.
- (7) The set will then take 20-30 seconds to turn on, as the default data is downloaded from the ROM to the NVM.

It will be necessary to reset the linearity and grey-scale after resetting the NVM. It's also important that the AFT VCO is adjusted: if this is not done the tuner may drift.

### Multi-purpose service kits

Because there are several known fault conditions with the CS chassis, kits of parts to cover them all were introduced.

The fault conditions are as follows: intermittent failure of Q601; intermittent failure of Q701; no start up; slow start up; Q601 running excessively hot.

The kits contain sixteen parts, see Table 3. Although they won't all be required to cure a particular fault, it is recommended that in the interests of reliability they are all fitted. Note however that these are not cure-all kits. Other failures may cause other problems.

Always check for dry-joints at the scan coils and scan coil plug. Ensure that resistor R638, next to C604, is at least 5mm away from the body of the capacitor. Check that R706 is 0.33Ω in Models 59CS05H and 66CS05H.



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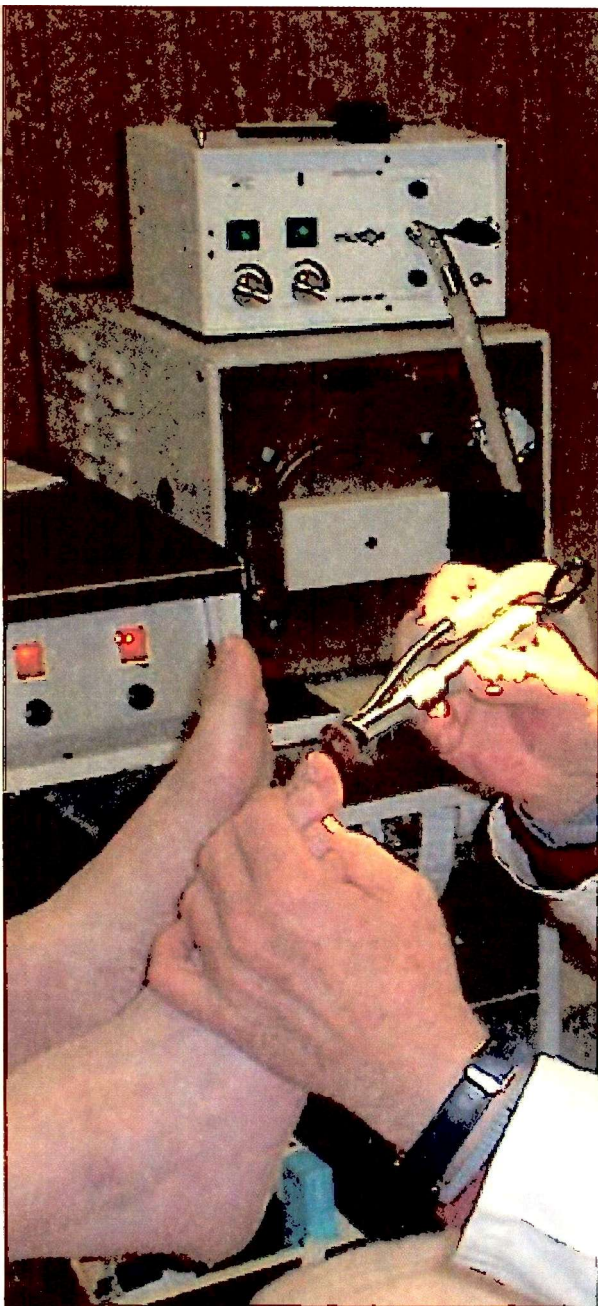


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# Chiropody drills

Brian Berry describes another prospect for servicing work, the chiropodist's drill. Repairs are straightforward and spares are readily available. The work can provide a useful return



A chiropodist at work with his drill – the power/vacuum unit can be seen on top of the autoclave (steriliser).

About a year ago I stumbled, almost by chance, on a servicing prospect that few engineers will have thought about. In these hard times for TV and VCR repair it brings in a reasonable return. Although securing your first job in this particular field may need a bit of effort, you will find that news travels fast in this area: before you know it, you will have customers knocking at your door quite regularly. What am I on about then? Why, feet of course!

## The chiropody drill

Chiropodists use what amounts to a souped up vacuum cleaner and grinder. The drill has to withstand extremely heavy use on a daily basis. My local chiropodist, who regularly works a ten-hour day, tells me that during a single half-hour consultation his drill will be in use for fifteen-twenty minutes. Compare this with the one twenty-minute session a vacuum cleaner can typically expect per day and you will see that the chiropody drill is pretty hard working!

A chiropody drill's brushes wear down with alarming regularity, commutators become concave with wear, the bearings disintegrate, and the electronic speed control goes haywire. Here is work that's crying out to be done! The chiropodists that come to me have a common complaint, that their machines have to be sent away when they go wrong and sometimes take a considerable time to repair. They can't afford a second machine, and can't afford to be without one.

The machines I'm talking about cost over £1,000 apiece, but are very simple in design and construction. They consist of a hand-held drill and a power unit. The small, 12 or 24V drill has a chuck that accepts a range of grinding tools. It's connected to an electronic control unit that enables the chiropodist to vary the speed. The drill has an integral vacuum pipe to remove the ground off debris. The power unit contains a large

240V motor to provide the vacuum, a step-down transformer to supply voltage for the drill, and the electronic speed-control unit.

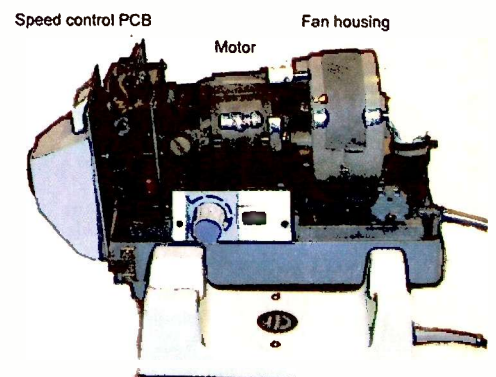
## Repairs

The items that can be repaired are the vacuum motor and the speed control unit. The hand-held drill is a precision DC motor: the only cure for a fault is replacement of the motor as a whole. Because of the precision and the build quality of this part of the equipment, faults and wear rarely occur. So a 'dead' drill head should lead to a look for other causes before you suspect the drill itself. Note that with many chiropody drills the hand-held unit must be plugged in before the vacuum motor will start.

The vacuum motor, which is normally a 240V series-wound commutator type, is the most common cause of faults. Occasionally you get problems with the electronic speed control unit.

The vacuum motor needs regular brush replacement. Normally the brushes are supplied with the correct concave end radius. If not, you will need to bed them in by wrapping a narrow strip of fine-grit silicon-carbide paper around the commutator and working the abrasive back-and-forth against the brush ends

Vacuum motor and speed control unit



Internal arrangement of an older-style chiropody drill.



until they take on the correct shape. From time to time the commutator needs a light skim to correct for wear. Don't try to flatten it off with emery cloth – it needs to be skimmed properly on a lathe. At longer intervals the motor bearings need to be replaced. I've also had to replace the occasional armature.

The step-down transformer gives very little trouble, but I've had suppressor capacitors fail on a couple of occasions.

The speed-control unit is simple. It consists of a three-terminal regulator that's controlled by a simple potentiometer circuit which enables the speed of the hand-held drill to be varied. Regulator replacement is a simple job. I've never yet encountered a faulty potentiometer. Vibration is a problem with some units as the speed-control PCB is normally mounted on the motor casing. This can play havoc with both the wiring and the soldered joints. A quick inspection and a tug on the wires during a repair or service will help prevent call-backs

With some machines internal fuses for the motors and the speed-control unit are located beneath the main vacuum motor – they cannot be seen or checked until the motor is detached from its mountings. This is not a difficult job, but unless you are aware of their existence the fuses can be difficult to locate.

Most chiropody drills have a contoured rest for the drill on the main unit. This rest contains a microswitch that cuts off power to the drill when it's laid down. The microswitch receives very heavy use and does from time to time fail.

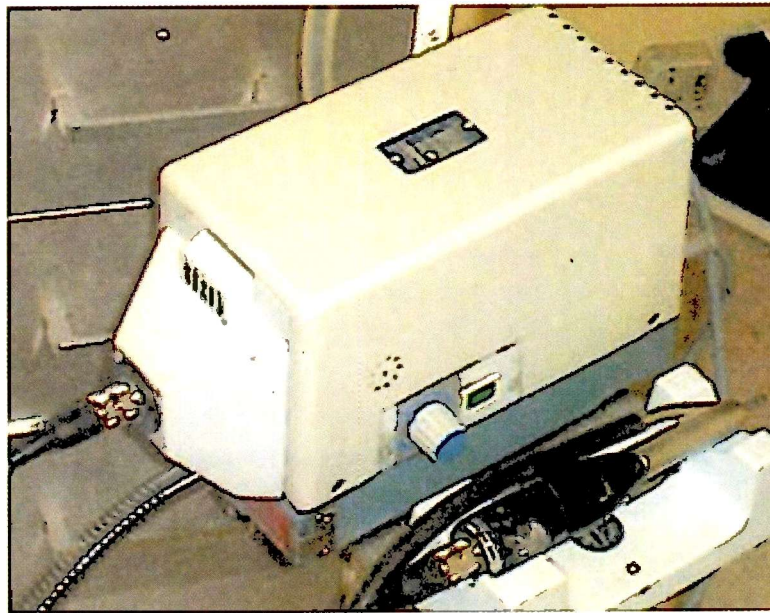
### Portable machines

In addition to the large type of machine considered so far there are small portable ones that chiropodists use for home visits. These are much cheaper and don't generally have a vacuum unit. The drill portion is still a precision instrument however and, if faulty, will have to be replaced as a whole. Repairs are possible to the power supply.

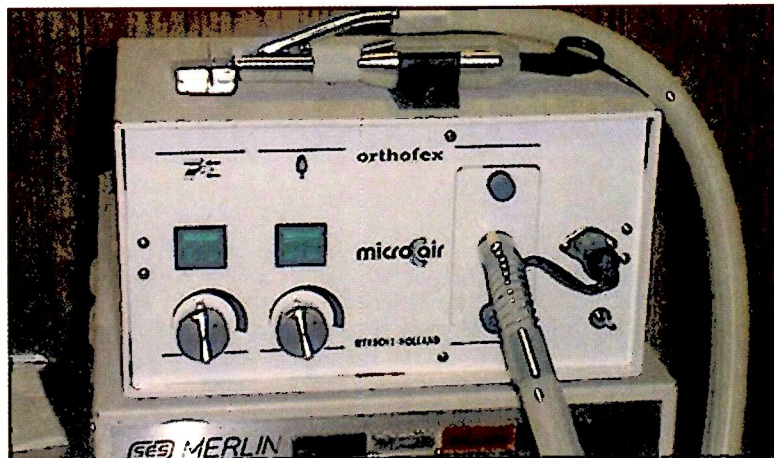
Many chiropodists rely on these small machines as back-up units when the main unit is in for repair.

### Spares

Spares are readily available from manufacturers, and you will usually find that the chiropodist has the address. I've never had any problems about obtaining spares.



*An older type of chiropody drill. This is the type you are most likely to encounter, as most of these drills have now reached the stage where they require regular attention.*



*A modern chiropody drill. The drill head rests on top of the case.*

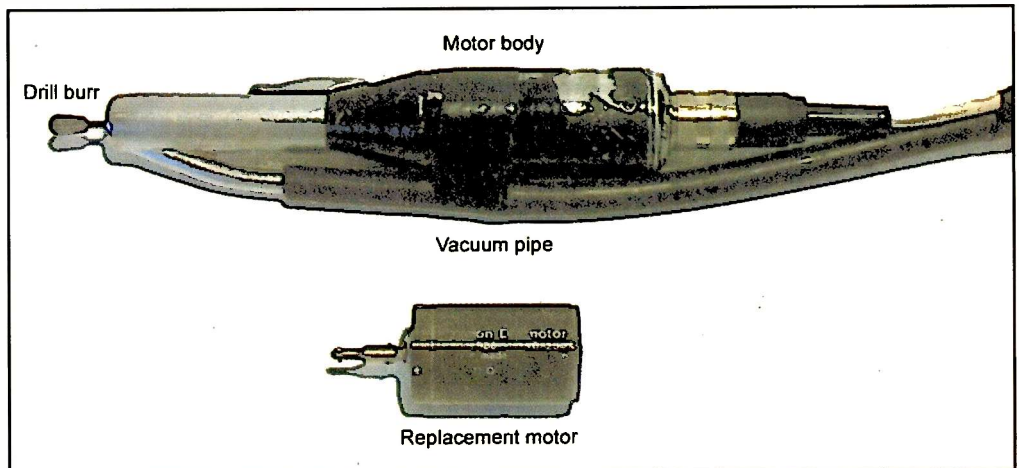
Safety is of course paramount with equipment of this type. You must ensure that any replacement part you use conforms to or is better than the manufacturer's specification.

### Getting work

Most chiropodists belong to a local

organisation, which usually publishes a newsletter for its members. Try asking your local chiropodist for details, and see if the organisation will accept a small advertisement for publication in its next issue – you'll probably find that the organisation is only too delighted to do this. ■

*The chiropody drill head – note the attached vacuum pipe. The motor – a replacement for which is shown below – is a precision part that must be replaced as a whole.*







**Ian Field comments on lead-acid battery recharging prospects and suggests an adaptable circuit for the purpose**

# Charging lead-acid cells

In a previous article (see the March 2001 issue) I described the advantages of pulse charging with Ni-Cad batteries. The only times I've tried pulse charging with lead-acid batteries have been when the plates were so badly sulphated that there was nothing to lose. Pulse charging will break down the sulphation, but I've never yet had a battery in this condition that recovers satisfactorily. Other techniques I have tried provide much better results. So I don't recommend, under any circumstances, using a charger of the type described in my previous article with lead-acid batteries. On reflection it's surprising that lead-acid batteries don't like the pulse charging method, since most car alternators superimpose a half-cycle charging waveform with widely-varying frequency on a large to very large load current.

## Maintenance-free batteries

With sealed 'maintenance-free' (MF) lead-acid batteries in particular, deciding whether to use pulse charging is irrelevant – since you can't see the plates. Certain changes to the internal construction with MF batteries mean that sulphation is 'normal'. Thus attempts to revive such a battery may destroy a perfectly serviceable one. This type of battery is being used in an increasing number of applications – in UPS power supplies for example, and for security systems. During

the Eighties they started to find their way into the engine bays of cars.

I've known for some time that MF batteries used with UPS equipment are often scrapped in a condition that's very easy to revive, but discovered only recently that 'service charging' is officially sanctioned in the manufacturer's data sheet.

## Charging process

A fully-discharged (<10.8V/6 cells) battery will rapidly form sulphate crystals. When connected to a constant-voltage charger, the sulphate will inhibit sufficient current flow to convert the crystals back. The information in the manufacturer's data sheet is fairly clear: if the battery has not been left discharged for more than two weeks, increasing the charge voltage to about 30V/6 cells will convert the sulphate crystals. The charging supply must be current-limited. I find that approximately a quarter of the one-hour Ah capacity works well.

As the terminal voltage falls to 10.8V/6 cells when the sulphation disperses and plate charging commences, this provides a convenient trigger threshold – the data sheet indicates that this is the correct point to switch from constant-current to constant-voltage charging. The correct charging voltages are: normal lead-acid (with filler caps) 14.4V, MF (sealed NPO series etc.) 16.9V.

## Charger circuit

The method I've been using to revive these batteries involves a Selex Minorcook table-top oven! See Fig. 1. The oven element draws a current between 1.75-2.5A depending on temperature. As this current is similar to that required to service-charge MF batteries, I inserted a bridge rectifier, BR1, in the neutral lead.

With such a crude set-up, the most appropriate way of controlling the constant-voltage phase of the charging would be to use a hefty zener diode. The only type I can think of would be that used on British motorcycles. These are still obtainable and, I think, are similar to the Philips BZY91-C15. It would be better to use, if readily available, a 16.9V regulator diode of this power rating to protect MF-type batteries from gassing their electrolyte away, since they cannot be topped up.

I don't bother with voltage control for ordinary lead-acid batteries – I just leave them on current-controlled charge until they start gassing. They can always be topped up with distilled water before being put into service. An alternative is to use a second bridge rectifier and a thyristor crowbar to stop charging at the required voltage, as in Fig. 1 (BR2 and Thy1).

Both bridge rectifiers must obviously be rated to carry the maximum current of the element when cold. When working out the zener voltage required, the two bridge rectifiers cannot be assumed to have



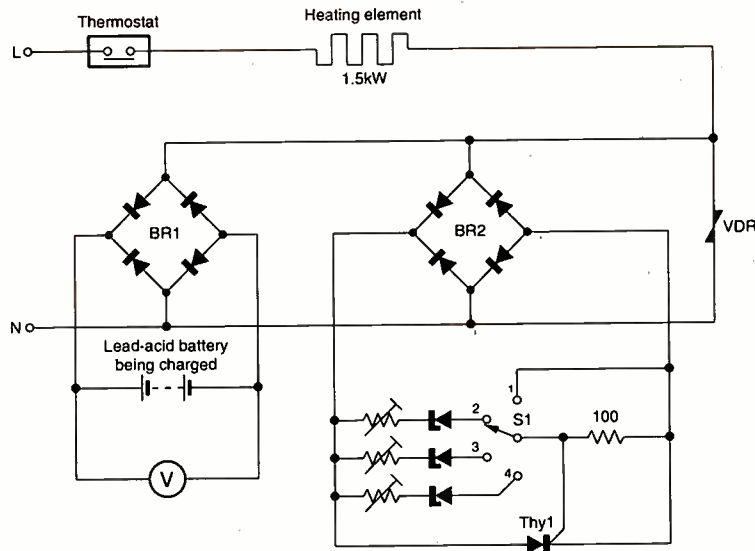
similar voltage drops, since BR1 is carrying all the current and BR2 none until the thyristor is triggered. The thyristor's gate trigger threshold voltage must also be taken into account, so it's not simply a matter of adding up the forward-voltage drops.

The voltage crowbar will clamp on a per half-cycle basis so, if the terminal voltage for any reason falls below the preset trigger voltage, the crowbar will be cut off, allowing charge again until the terminal voltage rises back above the trigger voltage.

The official de-sulphating voltage is given in the data sheet as 29V. As it's possible for a heavily-sulphated but recoverable battery to arc internally when sufficient voltage is applied, a second thyristor can be added across BR2 to prevent any voltage higher than 29-30V being applied to the battery.

If de-sulphation fails to commence at 30V, there's little to lose from disabling the 30V crowbar to allow a higher voltage to be applied. But a battery in this poor state will not recover to its full capacity.

To save on heatsinks full of expensive thyristors, a single-pole



**Fig. 6: Circuit used by the author to revive lead-acid batteries. Switch positions are (1) no-limit 'gloves-off' for severe sulphation; (2) 30V limit for manufacturer-sanctioned desulphate treatment; (3) 14.4V limit for normal lead-acid batteries; (4) 16.9V limit for MF/NPO etc. batteries.**

four-way switch can be used to select (1) no voltage limit, (2) 30V limit for manufacturer-sanctioned de-sulphating treatment, (3) lower-limit for charging normal lead-acid batteries at 14.4V, and (4) a higher limit for charging MF/NPO batteries at 16.9V. As can be seen from Fig. 1, the three controlled positions connect the thyristor's gate to a zener diode

in series with a trimming preset.

The gate-shortened position is the 'gloves-off' mode for severely sulphated batteries – this is a kill-or-cure last resort, so don't expect the battery to recover to its full rated capacity.

The VDR is included to protect the thyristor and rectifiers from thermostat switching transients. ■

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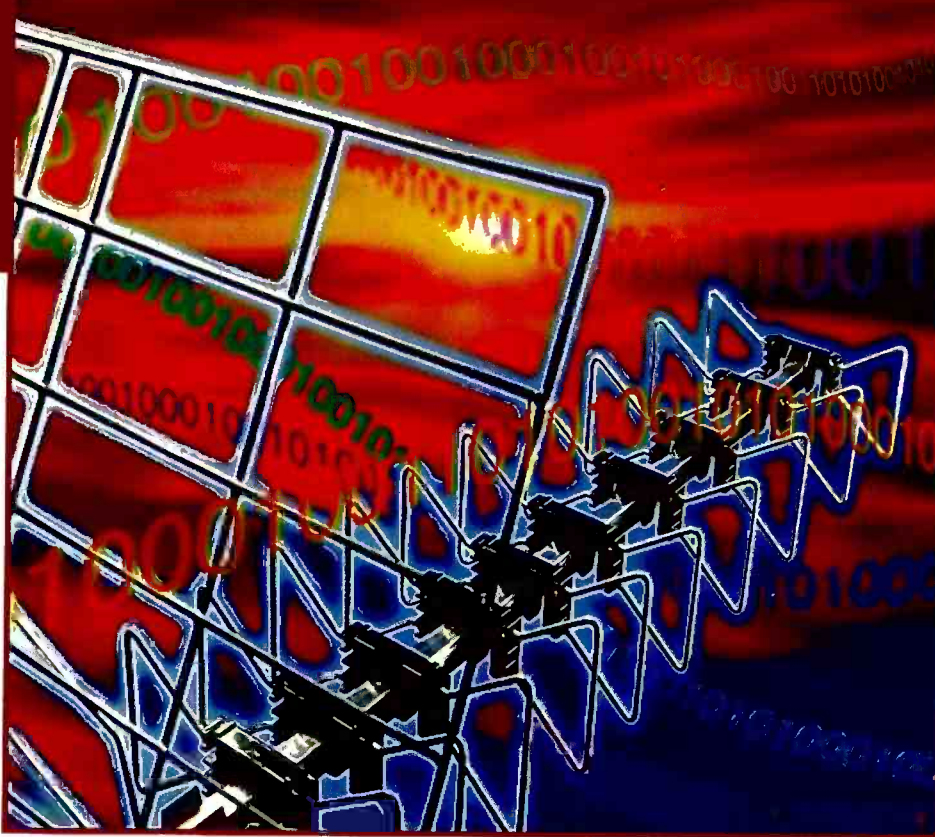
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In this second instalment **Bill Wright** deals with processing digital signals separately, co-channel and impulse interference, STB/IDTV installation and trade prospects

# Digital terrestrial TV reception

**P**art 1 last month covered basic matters such as the digital transmitter network in the UK, the characteristics of digital TV reception and the use of various types of receiving aerial. There are several important points still to be considered.

## Separate processing of digital signals

When digital and analogue signals are on adjacent channels diplexers and channel-pass filters cannot separate them. This means that they must be processed together, and their relative levels cannot be adjusted. But a range of possibilities opens up when digital and analogue signals are not adjacent.

The most satisfactory arrangement is to use separate channel-pass filters throughout. Each channel passes through an individual series of one-channel filters and a variable attenuator. The only disadvantage is cost, which would be about £150 for the five analogue and six digital channels. But it can be worthwhile in some circumstances. Examples are:

(1) Building a head-end for a medium or large distribution system.

(2) Where some multiplexes are on permanent low power.

(3) At difficult receiving sites, where propagation effects weaken some channels much more than others.

(4) Where long cable runs need equalisation because of excessive loss at higher frequencies.

(5) Where it's necessary to use more than one aerial to receive all the required channels.

(6) Where other signals, such as set-top box RF outputs, will be added but there is no clear channel for them.

Less costly solutions include the use of notch filters, bandpass filters and grouped aerials to attenuate the analogue signals, thus allowing amplification of the digital multiplexes without cross-modulation. Notch filters are usually tuneable and stop one channel. Bandpass filters pass one channel group but attenuate another. A good-quality diplexer can be used as a bandpass filter by connecting one input only and terminating the other with 75Ω.

## Co-channel interference

The very full use of the UHF TV bands in the UK has led to frequency allocations that make co-channel interference a distinct possibility. In some locations co-channel interference can be the main factor that limits coverage. Co-channel interference can be digital on analogue, analogue on digital, or digital on digital. It can also be analogue on analogue of course, but that's an old story that does not concern us here – and won't, I suppose, concern us at all before long.

Co-channel interference with a digital signal, whatever the source, reduces the signal-to-noise ratio. If it falls too far, the familiar stop-start effect or even complete loss of reception will occur. Digital on analogue co-channel interference produces a snowy picture, just as if the signal is weak.

I'm sure that the network planners know what they are doing, but some of the digital channel allocations do seem to be a bit perverse. In this part of the world for example Emley Moor and Chesterfield, which have a considerable service area overlap, both use channels 40, 43, 46 and 50. Although the polarisation differs, there are severe problems in some districts.



In the battle against digital co-channel problems we have to use the familiar weapons used against analogue co-channel interference and ghosting. I mention ghosting because the problem is fundamentally the same – the presence of an unwanted off-axis signal. Highly-directional aerials and very careful positioning are required. If the aerial has to be of the wideband type things will be that bit more difficult. The use of buildings and topography as a screen against an unwanted signal can work very well. Stacked and phased arrays can also be helpful – see my optimistically titled article 'Eliminating Ghosts' in the November 1978 issue of *Television*.

But digital reception brings its own special problem: it is often not possible to assess the result of work carried out to reduce co-channel interference simply by looking at the TV screen. The work might take the signal from just above threshold to well above it – which is a worthwhile boost when you consider possible propagation fluctuations. The unwanted signal is, after all, likely to be of fairly distant origin, so might vary considerably. But at the time of the alterations to the aerial no improvement will be seen.

The job will probably have been undertaken because of a complaint about occasional loss of a digital signal. It is of course necessary for the signal-to-noise ratio to exceed the threshold figure comfortably. This applies whether the 'noise' is thermal noise or an unwanted co-channel signal. But the 6dB attenuator test will prove nothing in the case of co-channel interference, because it will reduce the wanted and unwanted signals equally. The fact is that we are going to need sophisticated, i.e. expensive, test equipment and a lot of intuition (priceless) as the digital revolution rolls out.

### Impulse interference

We are all familiar with the interference that can be caused to analogue-signal reception by next door's lawnmower or faulty central-heating thermostat. Impulse interference consists of one or more very short-duration spikes. The spikes are broadband, with an energy distribution that usually falls off above the VHF band. Nevertheless the amplitude of a spike at UHF can be surprisingly great, with only its very short duration preventing it from completely swamping the signal. A whacking great burst of noise, even if it lasts for only a few milliseconds, has the potential to play havoc with digital-signal reception.

In areas of very low field strength where impulse interference is often visible with analogue-signal reception, be prepared for digital pictures to freeze periodically. The receiver might occasionally lock up, calling for a press on the reset button.

The peak amplitude of the spike, if we could measure it accurately, would probably be many dBs above the signal.

Although re-siting the aerial and so forth could improve the signal-to-noise ratio by as much as 15dB, the effects of the interference might not be eliminated. The spike could still be 15dB or more above the signal. The only effective action is to stop the interference at source. This might be possible with a faulty thermostat (if it can be found), but not with traffic interference.

### The finishing touches

Many aerial contractors consider that their responsibility ends when they connect good signals to a set-top box. But to go just that far is unlikely to satisfy the customer, since bad reception is bad reception, whether the cause is on the roof or in the living room. To complete the installation, scrounge a cup of tea and give some time to those little tasks that make all the difference to the final results.

### Set-top box installation

If the STB or IDTV (Integrated Digital TV) set is brand new, it is usually only necessary to follow the on-screen menus. All available programme services will be found and stored. If the unit has been installed before, for a different transmitter, select 'store channels' rather than 'add channels'. With some STBs you have to key in the four-digit parental code at this point. If this happens and you don't know the code, remove the viewing card and try again. For some strange reason this usually works.

When re-installing a box, remove the card first. Its presence seems to produce the "no channels found" display with some boxes even though the signal strengths of all channels may be shown as "good".

Where the field strength is very high, cross-modulation in the receiver can reduce the number of channels found. Fit an attenuator and try again. The on-screen signal-strength display is useful, but cannot tell you when to fit an attenuator because a full-scale reading equates to only about 12dB above threshold. Half-scale is roughly 3dB above threshold, 'satisfactory' is only 1-2dB above threshold while 'poor' is just on the threshold.

What happens when a box receives signals from more than one transmitter? A 'channel list' is compiled, taking signals from both transmitters. But the channel order seems to be haphazard, so extensive use of the 'change channel numbers' facility is called for.

I recently re-installed a receiver (using 'store channels') that had previously been used with the Emley Moor transmitter. At the new location all but one of the Bilsdale multiplexes were at good strength while the Emley Moor signals were all poor. The receiver stored BBC1, BBC2, ITV and Ch4 from Emley Moor at positions 1-4, with terrible stop-start reception. Good reception of these channels from Bilsdale appeared at positions 8, 16, 34 and 35. Other channels were from either transmitter, apparently at

random. An auto-update didn't help.

To save a lot of time shuffling channels, attenuate the incoming signals temporarily so that the receiver 'sees' only the strongest transmitter, then operate 'save channels' again.

### IDTV peculiarities

You might be confused by the RF connections when dealing with an unfamiliar Integrated Digital TV set. Three Belling (aerial) connectors will be found at the rear of the set, not necessarily near to each other. These are (a) for the aerial input to the digital tuner, (b) for the RF output from the digital section of the receiver, carrying the aerial signals and the digital section's modulator output, and (c) for the input to the analogue tuner. In other words (a) and (b) are the input and output RF connections to the digital box and (c) is the set's analogue aerial input. Normally, the aerial is connected to socket (a), with the VCR connected between (b) and (c).

But it's not always obvious which connector is which. With some receivers an identical symbol (horizontal dipole) is used for (a) and (c), while the RF output could be a male or female Belling, probably with no identification. Having figured out which connector is which (if all else fails, read the instructions!) you can, for RF purposes, treat the IDTV as two separate items in one box. The unfamiliar remote-control unit should open up the more familiar digibox menu pages to allow setting of the RF output channel etc.

Some IDTV sets do not provide RGB operation, which I think is ridiculous. There is no effect when you set the digital section's output to RGB. You might or might not find a scart socket that carries the output from the digital section. If you don't, the digital channels can be recorded only via the aerial lead, with inferior picture quality and mono sound. It seems to me that the manufacturers of some budget IDTV sets have not really taken the word 'integrated' seriously, and have simply shoved two pieces of equipment into the same case without much thought for the interconnections that the user might want.

### STB scart connections

Back now from IDTV sets to the still far more common STB. The STB and the TV set it's used with should be connected via an RGB scart lead. If the TV receiver can accept an RGB input, set the STB's output to RGB. If the TV set goes to scart input when the STB is on and this is not convenient, cut the connection to pin 8 of the scart plug. This is necessary because there is no 'scart control', as there is with a Sky digibox. Use a scart lead to connect the STB to the VCR.

Show the customer how to select the TV set's correct RGB AV input and how to record programmes via the VCR's RGB input.

If the STB's RF output is not to be used, 'park' it on an unused channel.

### RF interconnections

As far as possible, use scart connections between the STB and the main TV set and VCR. RF links can't always be avoided however. A single aerial normally provides the analogue and digital signals, and the customary loop-through arrangement will be used, with the STB first in the chain. Apart from the fact that the STB's output should pass to the VCR and the TV set, it is best to provide the STB with a clean aerial feed.

When RF loop-through is used it's vital to find clear channels for the output from each modulator. This can be surprisingly difficult in some parts of the country. It's worthwhile compiling a chart that shows channel use in your area. Include all the local analogue and digital transmissions, and those from any other transmitter that provides a significant signal in the area.

This will often show that only half a dozen channels are clear. Some cannot be used for modulator outputs because they are adjacent to a broadcast analogue channel. Channel relationships  $n + 5$  and  $n + 9$  are best avoided, especially when an old TV set is in use. Older VCRs often have a modulator whose output is restricted to channels 30-40 or thereabouts. It can be very difficult when the customer wants you to daisy-chain the STB, a satellite receiver and a VCR in an area where virtually every channel is occupied by broadcast transmissions.

Things can be worse – much worse – when the first item in the chain is a mast-head amplifier, since the unwanted transmissions and interference picked up by the aerial will enter the system at a much higher level.

A distribution amplifier is often an additional item at the end of the daisy-chain. This method of feeding all the TV sets at a location with off-air and modulator outputs is widely used and is usually unsatisfactory. With this arrangement it's not possible to adjust the relative signal levels of the off-air and modulator channels, and the noise and spurious signals from each unit are cumulative.

Since the early days of VCRs, the loop-through has been the time-honoured method of connection. But times have changed. I won't set up any but the simplest and most innocuous daisy-chains without warning the customer about the likely problems, since I don't want to take the blame for the patterning and noise that might appear as soon as my back is turned. If the customer wants to feed the outputs from the STB and the VCR all round the house, offer him/her a proper system with channel-pass filters. If the customer balks at the cost and then suffers from poor reception, you can't be blamed!

### Does DTT bring in work?

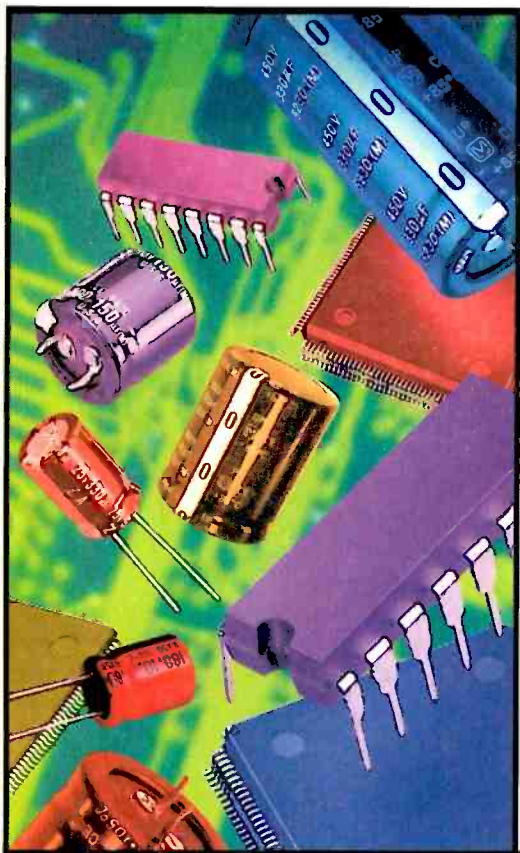
Retailers who supply DTT set-top boxes are provided with a booklet that tries to predict, on the basis of the post code, whether or not reception will be possible at a customer's address. Individual post codes can also be checked at [www.ondigital.co.uk](http://www.ondigital.co.uk)

Anyone who knows the first thing about UHF propagation will find the idea of predicting conditions at a particular address on the basis of the post code highly amusing. It can provide only wide (wild?) generalisations, and cannot take into account the small-scale local variations that often make all the difference.

Although lots of customers with good DTT signals are turned away, which is a pity, the converse is that aerial contractors can expect calls from those who, armed with a 'correct' post code, have obtained an STB only to find that reception is poor or non-existent. The ONdigital subsidised aerial scheme seems to leave a number of discontented customers in its wake. They turn to a local contractor to get the thing sorted out properly.

So DTT does bring in work and, as the changeover from analogue to digital reception progresses, it will undoubtedly increase. When IDTV sets become the norm, lots of people will take them home from the shops, plug them into their knackered old aerials, then hastily contact their friendly local aerial rigger.

As I said at the start, some viewers might well be happy with snowy analogue pictures but they won't be with the digital equivalent – either stop-start pictures or no reception at all. Furthermore, successful DTT aerial installations in difficult reception areas can be achieved only by installers who have good equipment and knowledge. So DTT should separate the sheep from the goats rather more certainly than has been the case with analogue TV reception ■



## Make sure of your copy of Television

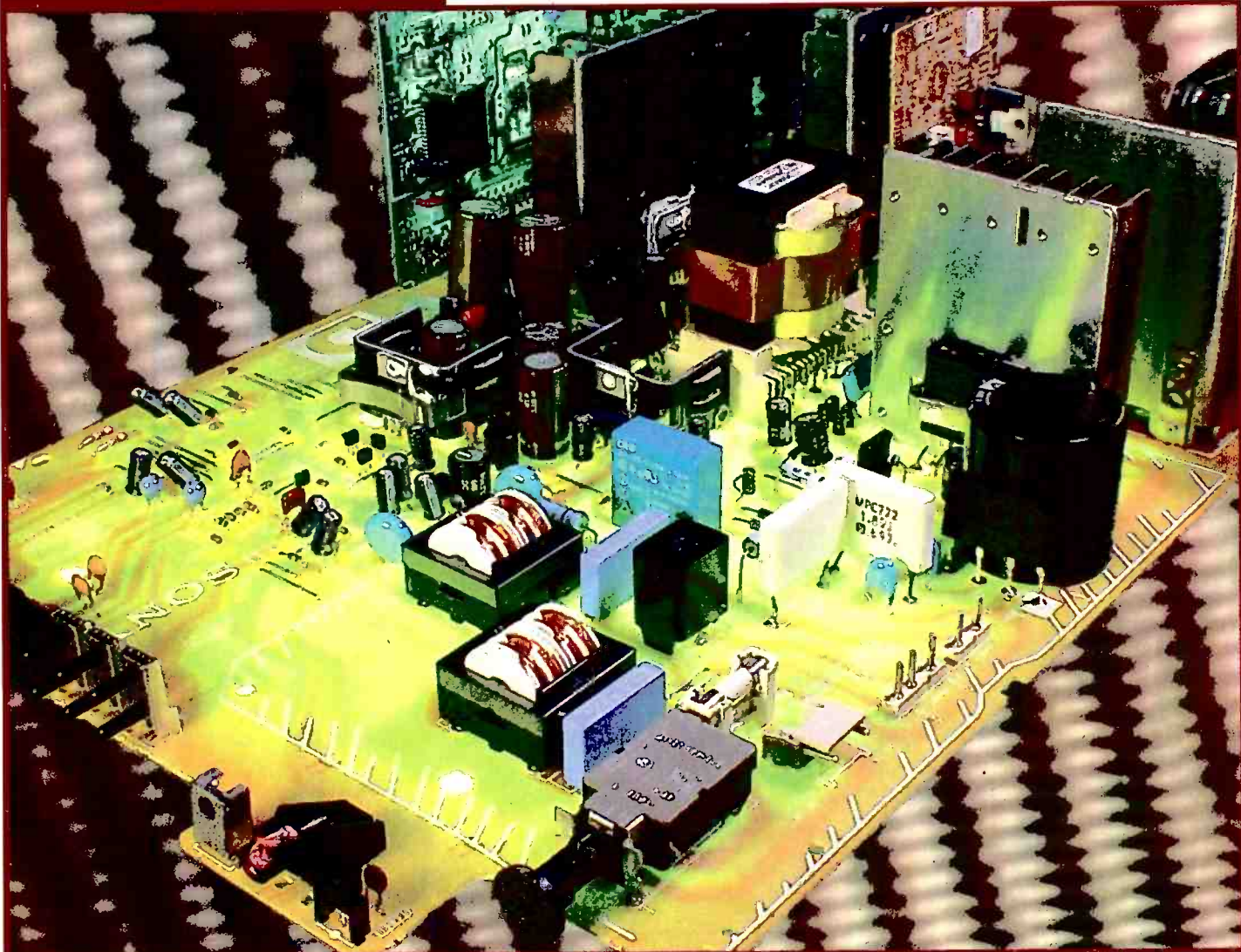
It can be difficult finding a copy of Television at local newsagents. The number of magazines being published keeps increasing, which means that newsagents have less shelf space for the display of particular titles. Specialist magazines in particular get crowded out.

There's a solution to the problem. Most newsagents provide "shop-save" and/or home-delivery services. There is no charge for a shop save. You simply ask your newsagent to order a copy for you: it will be kept on one side each month ready for you to collect. Home-delivered copies are ordered in the same way, but generally incur a delivery charge.

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If you buy your copies of Television from a newsagent and want to make sure you get every issue, just ask at the counter.





# Servicing the Sony BE3D Chassis

In the first of two articles  
Giles Pilbrow deals with  
the power sections of the  
chassis

**T**he BE3D is Sony's core 50Hz chassis, designed to drive 4:3 and 16:9 CRTs in screen sizes up to 32in. diameter. It consists of three main PCBs. Board D, the largest, contains the power supply and the audio and deflection output circuits. Board A, which is plugged into board D, is a high-density board that contains the signal-processing circuitry and the tuner. The RGB output stages are mounted on board C. In this first article we will consider the circuitry on board D.

Table 1 lists the models fitted with the BE3D chassis.

## Power supply operation

Fig. 1 shows the power supply circuit, which is based on the Sanken STR-S6708 chopper chip (IC600). It produces an HT output of 135V which is maintained by optocoupler feedback. The SE135N error detector-amplifier chip IC602 drives the optocoupler IC601, providing the LED section of IC601 with increased current as the HT rises.

The feedback loop is also used to reduce the power consumption in the standby mode. When standby is selected, pin 62 of the microprocessor chip IC1

(on board A) goes low. As a result Q604 switches off and Q603 switches on, connecting pin 2 of the optocoupler to chassis. The HT voltage falls to 25-30V, with all other outputs being reduced proportionately. To maintain a constant 5V supply for IC1, Q602 switches on. The 5V regulator IC604 then receives an additional input from D608/C612.

If Q602 goes open-circuit the set will operate normally until standby is requested. It will then pulse in and out of standby. The symptom can give the impression that there's a fault on board A, because a substitute A board from another set appears to clear the problem.

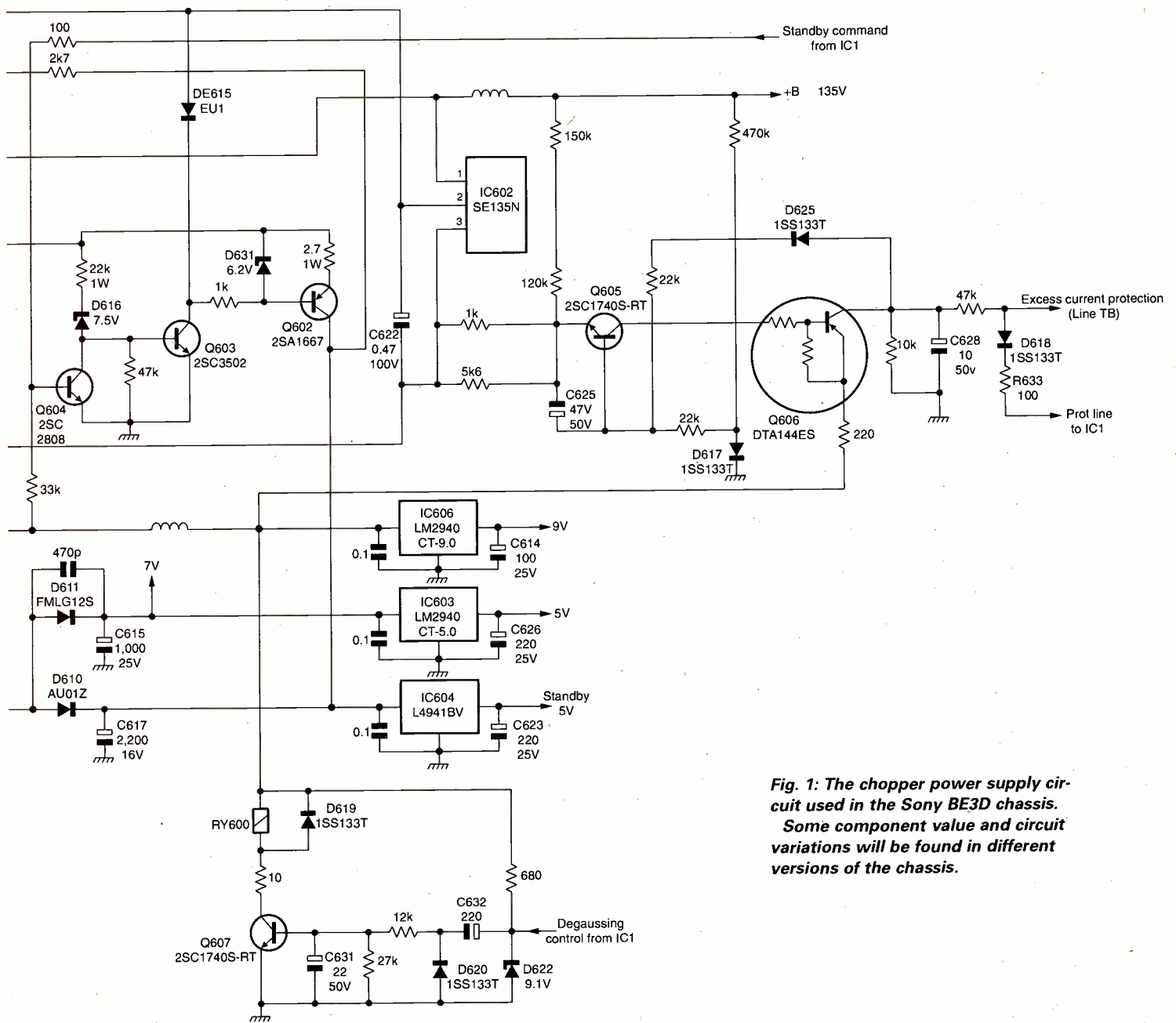
If Q602 goes short-circuit C617 will burst, because its maximum voltage rating is exceeded. This can occur when the HT is high, in which case IC602 or IC601 is suspect.

## Excess-current protection

The chassis incorporates two means of providing excess-current protection. In the event of a heavy load, such as a short-circuit line output transistor, the power supply will trip. This mode of operation is based on monitoring the voltage across







**Fig. 1: The chopper power supply circuit used in the Sony BE3D chassis. Some component value and circuit variations will be found in different versions of the chassis.**

### Over-voltage protection

The chopper chip IC600 is powered from a winding on T601. Should there be an over-voltage condition its supply will rise. When the voltage at pin 9 rises above 10V the chip will shut down and remain in this state until the mains supply is interrupted. Shut down is very rapid, so reliable measurements can be made only with an oscilloscope.

### Degaussing

To reduce power consumption and ensure good colour purity, even after a prolonged period in standby, the degaussing circuit is fed via a relay, RY600. This is normally energised for about ten seconds each time the set is

switched on. RY600 can fail, the result being incomplete degaussing and colour-purity problems. An improved replacement is available, part no. 1-755-018-11.

### The Lumispander

The BE3D chassis has a feature which goes way back into TV history: a photocell that monitors the ambient light level in the room and adjusts the brightness level to suit. The device is IC901, whose output is fed to IC1 to set the picture level. This action can be somewhat abrupt, and sometimes gives rise to customer complaints. It can be disabled by switching off 'auto picture' in the customer menu.

### Field output stage

The STV9379 field output chip IC500 requires -15V and +15V supplies which are derived from the line output transformer. There's no feedback to the jungle chip IC301 on board A. This simplifies fault-finding, as drive (at pins 1 and 7 of IC500) should be present whenever the set is on.

There's a protection circuit to alert the microcontroller chip in the event of a field output problem. This safety system is necessary because the field output stage is DC coupled to the scan coils. Thus a faulty field output chip could pass a heavy current through the scan coils, with the potential for further damage.

Once a field output problem is detected, the set will be put into the standby mode

and the standby LED will flash twice (the same as for excess current). For fault-finding purposes the protection can be disabled by lifting D505. If the set now remains on, IC500 is likely to be faulty. Also check R509 and R510 (both 0.47Ω, 5% non-flammable) in the +15V and -15V supplies, R505 (1.2Ω, 5% non-flammable) in the output filter network and the boost reservoir capacitor C510 (220μF, 50V).

### Line output stage

The line driver and output stages are conventional, with the drive provided by IC301 on board A. The 2SC2688L driver transistor Q803 is transformer-coupled (T804) to the 2SC4927-01 line output transistor Q802. Always check the soldering at T804 and R819, which is in series with the base of Q802, as dry-joints here can result in failure of the line output transistor.

The capacitor tap-down network C816, C817 and C815 in Q802's collector circuit produces pulses (HFBCPs) which are fed back to IC301 and IC1. If they are missing there will be no picture or on-screen display. The 5.6V zener diode D817 acts as a clamp to provide square-topped pulses. If this diode is leaky the picture may be partially blanked out.

Widescreen sets can suffer from some line tearing when used in the 4:3 mode – this tends to happen when the set has been running for some hours. The problem can be cured by replacing the driver transformer T804 with a new type, part no. 1-437-195-14.

The focus potential is obtained from the line output transformer. Some large-screen models incorporate a dynamic focus circuit which is mounted on board D4. It corrects the focusing at the edges of the screen by applying a line-rate parabolic waveform to pin DF on the line output transformer to modulate the focus voltage.

### EW correction

A standard diode modulator circuit is employed in the line output stage for EW correction. The two diodes are in the same package, D812. Their centre tap is connected to the collector of the 2SC4793 EW driver transistor Q801 via an AC blocking choke (L801) and R835 (27Ω).

**Table 1: Models fitted with the Sony BE3D chassis.**

Model	CRT	Dolby Pro-Logic	Remote control Unit
KV25F1U	4:3	No	RM862
KV29F1U	4:3	No	RM862
KV25X1U	4:3	No	RM839
KV29X1U	4:3	No	RM839
KV25F2U	4:3	Yes	RM862
KV29F2U	4:3	Yes	RM862
KV25F3U	4:3	Yes	RM862
KV29F3U	4:3	Yes	RM862
KV24WX1U	16:9	No	RM839
KV28WX1U	16:9	No	RM839
KV24WS2U	16:9	Yes	RM862
KV28WS2U	16:9	Yes	RM862
KV32WS2U	16:9	Yes	RM862
KV28WF1U	16:9	No	RM839
KV32WF1U	16:9	No	RM839
KV29FX11U	Flat WEGA	No	RM886

All models have Nicam sound.

The base of Q801 is fed with a pulse-width modulated signal. IC301 provides, at pin 33, a parabolic waveform that's fed to the inverting input of an operational amplifier in IC800: line flyback pulses are fed to the non-inverting input. The output at pin 7 of IC800 is a line-rate squarewave whose mark-space ratio alters in relation to the field scanning.

### Audio output stage

In Nicam-only models the TDA7264 audio output chip IC1200 receives its input from the digital signal processing chip IC202 on board A: in sets with Dolby Pro-Logic the input comes via a more complex route, from IC1201 on board A1.

### Audio muting

Audio muting is applied to pin 4 of IC1200. The muting circuit, see Fig. 2, is based on transistors Q1200 (2SC1740S-RT) and Q1201 (DTC143TS-TP), which are connected as a gate arrangement that enables muting to be applied from four sources. The microcontroller chip IC1 produces a mute output at pin 7. This is fed to the emit-

ter of Q1200, whose base is biased via Q1201. When this muting is off (pin 7 of IC1 is low), Q1200 is conductive, holding the voltage at pin 4 of IC1200 low. Q1201 prevents 'thumps' at power on. It receives base bias from the 7V supply that feeds the main 5V regulator IC603 (see Fig. 1). Because of the charging characteristic of the reservoir capacitor C615, this supply is not established when the set is first turned on, so muting is applied during this period. Q1201's collector is connected to the main 5V supply, which is not maintained in the standby mode. Thus muting is also applied during standby operation.

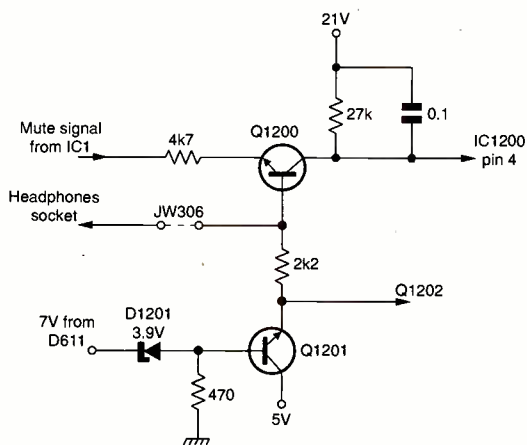
The fourth input to the muting circuit is from the headphone socket, which can mute the audio when a headphone plug is inserted. This feature is not implemented in UK sets, in which the speakers and headphones can be controlled separately – the headphone socket has its own amplifier and volume control. The headphone socket could be made to mute the audio by inserting link JW306.

### Dolby Pro-Logic models

Dolby Pro-Logic models have an additional board, K1, that contains an IC amplifier for the centre and rear loudspeakers. The circuitry here is identical to that around IC1200 on the main board. Models KV24WS2 and KV28WS2 can suffer from a 50Hz buzz via the rear speakers. This can be cleared by carefully positioning the lead that runs between CN1307 on board K1 and CN1407 on board D.

### Next month

Topics covered in Part 2 will include system control, the service mode, the I<sup>2</sup>C bus, teletext and signal processing. We will round off with a list of some faults that can occur with these sets.



**Fig. 2: The audio mute circuit. Q1202 is part of the separate headphones amplifier muting circuit.**



The following list gives spares department addresses and telephone numbers or, where these are the same, service department or head office addresses and telephone numbers. Also included are details of various spares distributors. Stocks of spares may no longer be available for defunct brands.

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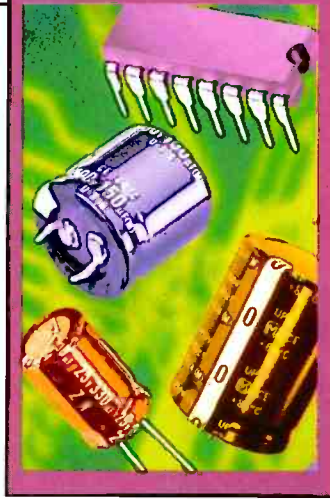
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See also CPC.

**Binatone** Electronics plc., Unit 1, Ponders End Industrial Estate, East Duck, Lees Lane, Enfield EN3 7SP.  
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**BPL** Spares for TV sets made in India available from Falmouth Hi Fi, 14 Market Strand, Falmouth, Cornwall TR11 3DE.  
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**Etron** Brand name used by Nikkai Imports Ltd.

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**GenServe (GTS) Ltd.**, 11 Caen View, Rushy Platt, Swindon SN5 8WQ. Tel 01793 886 332 Service 01793 886 333 Spares 01793 886 322 Fax 01793 886 323.

**GoldStar** See LG Electronics UK Ltd. Also A.R.D., CPC and SEME.

**Goodmans** See Alba Radio Ltd. or Comet Group plc. depending on model. Also CPC.

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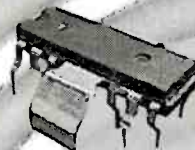
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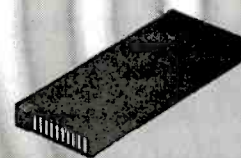
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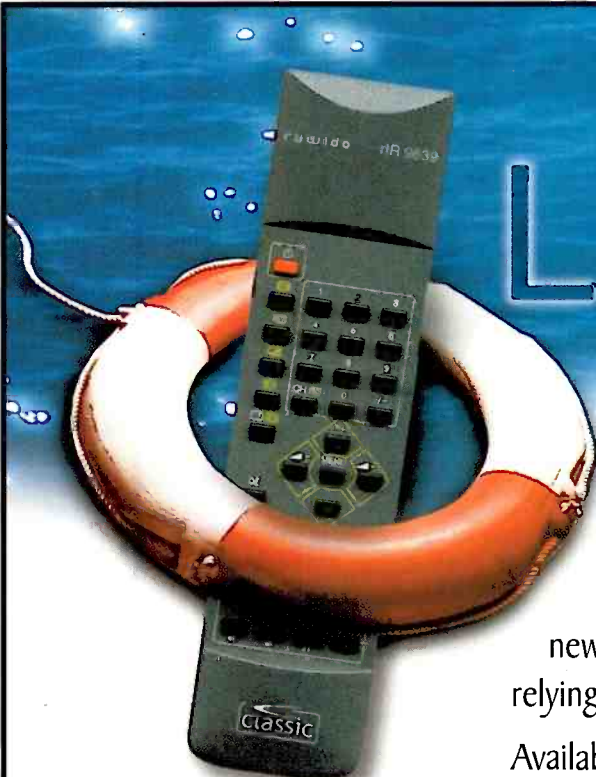
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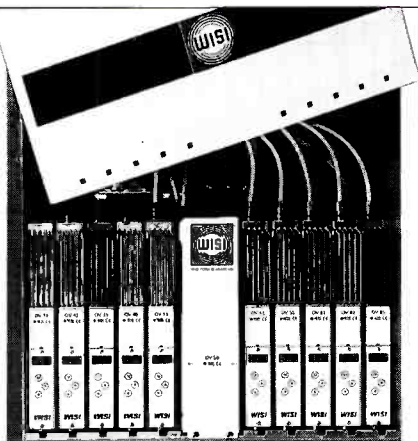
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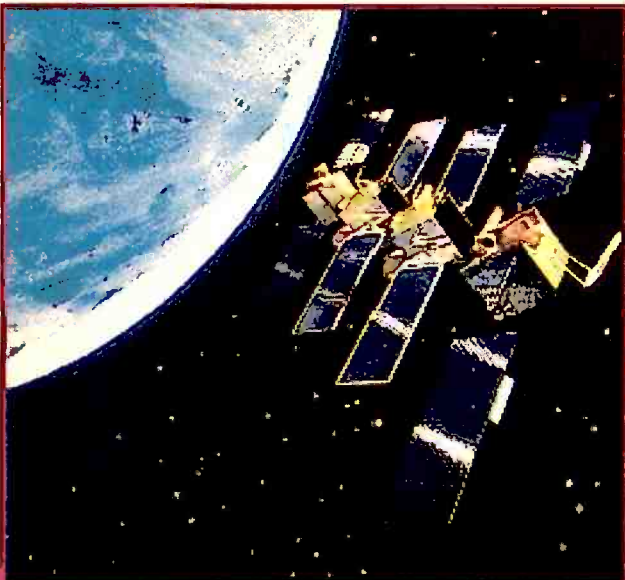
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**Terrestrial DX and satellite TV reception reports. News on terrestrial TV and satellite band changes. The Velleman-kit K2622 AM-FM aerial amplifier tested. An inexpensive VHF/UHF receiver with AM/FM radio. Roger Bunney reports**

# DX and Satellite Reception

January and early February were almost dead as far as terrestrial DX-TV reception is concerned. An Essex enthusiast logged some Sporadic E signals on January 3rd, 4th, 7th and 21st, and there was a more intense opening on the 24th. Several enthusiasts received RAI (Italy) chs. IA and IB, Belarus TV ch. R1, SVT (Sweden) ch. E4 and a few unidentified signals during this opening, which lasted for almost an hour from 0745 onwards. RAI inserts a series of on-screen corner markings that look like Arabic text. So, if the signal is a weak one, take care over identification.

On January 15th there was an active MS/meteor scatter period and a tropospheric lift, with Band III/UHF reception from Scandinavia. During the tropospheric lift Ryn Muntjewerff (the Netherlands) logged Swedish SVT-2 stations including Sveg ch. E21 and Nassjo ch. E22, several Norwegian NRK TV-2 stations and several Danish

DR1 and DR2 stations. He comments that "the splendid tropo lasted for three hours".

My last F2-layer reception was on December 23rd, but Peter Schubert (Rainham) received weak, smeary ch. E2/R1 signals on January 15th during the early morning period. I had some good news however. On December 14th I received and photographed a ch. E2 signal with a circular logo at the top left-hand corner. It was a typical multiple-image F2-layer signal. On the 19th I received the same logo, but this time in ch. E3 – very strong Arabic F2 signals were swamping ch. E2 at the time. The circular logo signal remained unidentified until the arrival of the January Benelux DX bulletin which showed, on page 46, a Malaysian reader's local off-air photograph of the very same ch. E2 logo. It's used by BEC TV3 Nakhon Ratchasima, Malaysia. I was using just crossed (relay switched) wideband Band I dipoles mounted on the chimney. A very pleasing result.

## Satellite sightings

In contrast with the cold, overcast, wet start to the year in the UK, California provided a colourful welcome in the form of the Rose Parade, an impressive mid-winter carnival. This was carried live via NSS K (21.5°W) at 11.550GHz H (SR 5,632, FEC 3/4). Very large floats, lavishly constructed with lots of colour, moved through the streets of Pasadena to the Rose Bowl Arena. The sun shone and the skies were blue on New Year's day in California. Here, rain fell on the nearby floods as darkness drew in. After the carnival I checked up the

band and found the Globecast multiplex busy with an Ice Hockey match between Vancouver and Nashville, Tennessee. This was at 11.590GHz V and was carried live from Nashville.

While checking the Globecast multiplex on my other digital receiver (RSD ODM302-C1) on January 22nd a caption advising "new channels if you scan" flashed up. So off I scanned and seven new 'channels' appeared. Well, there were carriers that were subsequently identified as GP Dutch, GP French and so on (Finnish, Greek, Italian, Spanish and English) but no video, just the service identification and digital parameters which were the same as the regular Globecast transmissions. A check next day showed that the new channels were off air.

On the same day I discovered that the Serbian RTS-SAT programme downlink channel is now transmitted by the newly-positioned Eutelsat II F4 (28.5°E), at 11.189GHz H (SR 6,111, FEC 3/4). It previously used the Russian Express 3A satellite at 11°W. Stefan Hagendorn reports via the internet that the French Telecom 2B satellite has been moved from 5°W to 11°W, alongside Express 3A. Now that Eutelsat is involved with France Telecom, 11°W, near the 12.5°W Atlantic Gate, could become an active slot.

There's another new Arabic multiplex via Arabsat 3A (26°E), at 11.747GHz V (SR 27,500, FEC 3/4). The memory bank clocked up Dubai EDTV A3A, Dubai Sport, Dubai Business, Palestine, Euronews (English), Euronews (French), Orbit Promo, INN, ANN A3A, Mustakilla and Saudi 2 (in English). A smaller

*Unidentified Arabic ch. E2 SpE signal received by Ryn Muntjewerff. Note logo at top left-hand side. Can anyone help identify the source?*





multiplex has appeared at 12.015GHz V, with Zen-Future, NOS TV, Almanar, Djibouti and Test 1 through 7 (these mainly on colour bars). Arabsat now carries most of the Middle Eastern TV services. Notable exceptions are IRIB (Iran) and Israeli services – which would probably be unacceptable.

On January 27th the Globecast digital package via NSS K carried a caption to advise that the forthcoming PGA (Professional Golf Association) tournaments, from February 1st, would be transmitted using PowerVu encryption. Hopefully the motor racing, such as Daytona and the Indy 500, will remain in the clear.

On January 21st President George W. Bush, newly sworn in, travelled from the White House through the streets of Washington. The security pictures, again apparently from the FBI's or a security group's cameras, appeared from NSS K, via the Reuters' Washington circuit (11.462GHz V, SR 5,32, FEC 3/4). Security was strict, nevertheless the very long procession ended with a medical car and ambulance! With the unpopularity of the new president, the FBI was on special alert – it certainly showed in the pictures. Earlier, on January 6th, a long and very protracted TV broadcast showed the election confirmation-of-vote count routine state by state.

While checking Eutelsat II F3 (21.5°E) in late January I came across strong, sparkie-free analogue programming from the Albanian TVSH channel – at 11.55GHz H with the audio at 6.6MHz. Because of low signal levels and interference from Astra at 19.2°E, I've found it extremely difficult to lock digital news feeds from this inclined-orbit satellite. The dish seems to have a secondary lobe that coincides with Astra.

Intelsat 801 (31.5°W) still provides considerable local UK TV activity at the lower end of Ku band, including various Sky Sports hook-ups, regional TV inserts and football matches, all with vertical polarisation.

During early January Roy Carmen received a long report from Grozny, Chechnya via Eutelsat W2 (16°E) showing the plight of the Russian forces there, with shots of bomb-ravaged streets, the defences around a local military base and messages for the folk back home. This was at 12.507GHz H (SR 5,622, FEC 3/4).

The itinerant NITV (National Iranian Television) channel has now been spotted via Telstar-12 (15°W): check at 12.613GHz H with the unusual parameters SR 3,255 and FEC 1/2. It appears to be an off-shore originated channel, probably based in the USA and definitely anti-Iranian establishment.

New Spanish-language programming is available from Hispasat-1 (30°W). TVE La-2, TVE La Primera and a Retevision slide identification are present at 11.731GHz V (SR 28,120, FEC 5/6). Russian-language students will find TV3 Latvia and TV3 Lithuania in free-to-air form via Sirius (5°E) at 11.881GHz H (SR 27,500, FEC 3/4).

### Broadcast news

**USA:** The FCC has decided to stick with 8VSB modulation for terrestrial digital TV despite the fact that many broadcasters prefer the more widely adopted COFDM modulation system. Recent comparative tests revealed problems, as expected, with 8VSB, while the COFDM equipment supplied for test was apparently faulty. The tests were not terminated but the inconclusive results lead to the FCC's decision. While DTT take-up in the UK is now over one million subscribers, so far only some 70,000 DTT receiver units have been sold in the USA.

**Australia:** Terrestrial digital TV started in the main cities on January 1st, mostly at VHF. There are currently just a few UHF channels, in Sydney, Melbourne, Brisbane, Adelaide and Perth. NTL won the contract to install and operate the ABC digital network until 2016. Interesting that ABC also extended its analogue operation contract with NTL, until 2009.

**China:** The China State Administration has given permission for the BBC World channel to be transmitted in parts of the country. In addition the China International TV Corporation will be distributing BBC World in hotels and other areas frequented by visitors, alongside CNBC and CNN.

**The Netherlands:** Regional TV programming details have recently been released, see Table 1.

**Latvia:** TV3 is to add a fourth channel to its output.

**Russia:** Kosmos TV has added three new channels sourced from the UK group Zonevision. These are Extreme Sports, Reality TV and



the porn channel Private Blue UK: The LBG group (see last month) plans to open an RSL-TV station to serve Chelmsford in early/mid 2002. It would start with analogue transmissions, converting to digital with the analogue switch-off. The transmitter location is at Danbury Heights.

*Tuning caption for a new TV channel, received via Arabsat 3A (26°E).*

## Aerial Techniques

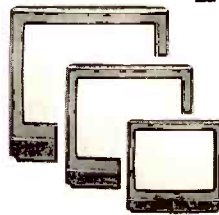
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**FBI TV surveillance of President Bush's first drive through Washington. Note the four G-men at either side of his car – and several others at the roadside. Reception via the NSS K Reuters lease.**

### An inexpensive VHF/UHF TV

A TV set that could be of interest to DX-TV enthusiasts is featured in a catalogue recently sent to me by a reader. The set is a monochrome portable with 5in. screen and coverage of Band I (channels 2-4), Band III (chs. 6-13) and UHF, plus AM/FM radio. It uses a telescopic whip or an external aerial connected via a "jack point". Power is from the mains via a PSU supplied, ten C cells or an external 12V source. A side-mounted knob provides continuously-variable tuning.

The appearance is not all that inspiring. It looks like a white and translucent blue blob and takes after the iMAC's styling. But it has potential for holiday DXing from hill tops or for aligning aerials by observing the screen while moving the aerial for optimum results. The price is very modest at £29.99 plus £2.99 UK post, packing and insurance.

The catalogue is published by Home Services Mail Order Ltd., PO Box 2000, Sunderland SR9 9YY. Phone number for credit card ordering is 0870 600 4477. The set is unlikely to come with technical information, and I haven't seen or tested one.

### Satellite news

The German ARD TV network is using Eutelsat capacity at 13°E to expand its coverage. The ARD Das Erste channel will reach viewers in Turkey, the Middle East (part), North Africa and Eastern Europe. Check at 11.604GHz H (SR 27,500, FEC 3/4).

Intelsat offshoot NSS (New

Skies Satellite) has reported record profits with 61 per cent of its capacity full. NSS 6 is to be launched in the autumn of 2002 to provide coverage of Asia and the Pacific basin.

Insat 3A and 3E will be launched by Arianspace during the next few months to enhance TV, telecoms, internet and rural communications coverage across the Indian sub-continent. There's a move to shift Indian TV from band S (2.5GHz) to the more widely-used Ku band, for which equipment is mass produced and cheap.

Galaxy 7 (91°W) died in late 2000 when its standby control processor failed – the main processor had failed in June 1998. PanAmSat had already positioned Galaxy 11 at 91°W, so there was a seamless changeover.

The two Polsat entertainment channels carried by the Wizja multiplex via Hot Bird were replaced by RTL-7 in late December. Polsat created its own multiplex during January, with both FTA and encrypted channels. The French Sagem group has been awarded a contract to build thousands of Polsat decoders that incorporate an internet access connection.

Contracts have been agreed to launch AsiaSat-4 at 122.5°E in the spring of 2002 and AsiaSat-5 at 105.5°E (co-located with AsiaSat-3S), date to be announced. These satellites will provide both C- and Ku-band capacity.

The WorldSpace AfriStar satellite is now providing CD-quality digital radio across Africa and Europe from its slot at 21.5°E. Transmissions are in band L (1.475-1.485GHz) with LH and RH circular polarisation. AfriStar has about fifty radio channels that range from the BBC's World Service to the more specialist charms of Sun FM Senegal, Kenya Broadcasting and Tamil Oli Radio. Several specialist SW radio suppliers, including Nevada at Portsmouth, can supply the Hitachi KH-WS1 WorldSpace radio at about £99. A higher-gain aerial is available should the detachable, active plastic aerial supplied provide insufficient signal – if the set is used indoors or at the extreme edge of the satellite's footprint for example. For further information consult the Nevada website at <http://www.nevada.co.uk> or phone 02392 313 090.

**Table 1: Dutch regional TV programming**

Region	Transmitter	Channel	ERP
Kanaal 9*	Lopik	E33	–
Omroep Flevoland	Lelystad	E26	50kW
Omroep Fryslan	Irnsrum	E28	150kW
Omroep Gelderland	Arnhem	E58	32kW
	Doetinchem	E40	40kW
	Radio Kootwijk	E32	80kW
	Rossum	E24	50kW
RTV Drenthe.	Smilde	E25	250kW
RTV Oost	Hengelo	E36	50kW
	Zwolle	E22	200kW
RTV Noord	Hoozezand	E36	100kW
RTV Noord Holland	Wormer	E55	100kW

\*DVB-T transmission. Polarisation in all cases horizontal.



# Review: the Velleman-kit K2622 AM-FM aerial amplifier



*The Velleman-kit K2622 aerial amplifier assembled ready for connection and soldering of the screening lids in place.*

My main interest with this amplifier is the band 40-110MHz, so I carried out some spot-gain measurements across this spectrum and upwards to see where the performance fell away. I've no facilities to measure the noise performance, but the amplifier compared favourably with a wideband BFY90 VHF amplifier that has a claimed 3dB noise figure. The BF199 transistor is hardly state-of-the-art, but it works and is cheap.

Velleman's claimed gain performance is with 12-15V applied at 3mA. My measurements, as follows, indicate a slightly higher gain with a rapid fall-off above 150MHz: 40MHz 26dB, 48MHz 24dB, 55MHz 26dB, 70MHz 30dB, 90MHz 28dB, 110MHz 28dB, 150MHz 24dB, 170MHz 10dB, 200MHz 5.5dB.

Once the unit has been built and tested the metal covers can be soldered in place. As a wideband circuit it's perhaps too wide open if

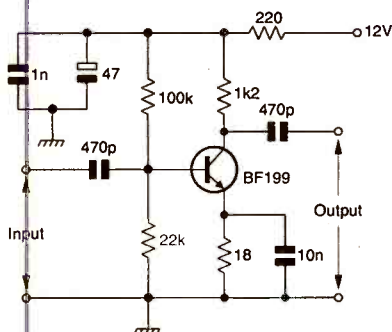
In recent years I've reviewed several amplifiers produced by the Belgian-based DIY electronics group Velleman Kit NV, whose products are now being distributed in the UK by Maplin. The claim for the K2622 amplifier is that it provides a voltage gain of 22dB over the spectrum 10-150MHz, which would make it ideal as a DX amplifier for Bands I and II. So I bought one at the local Maplin branch in Southampton to try it out.

With its prepared PCB, identified components, metal-screened housing and multi-lingual instruction booklet the unit is simple to build. If you can solder and use side-cutters, you can't go wrong! The circuit is shown in Fig. 1. It's a simple wideband design based on a grounded-emitter BF199 transistor. Once it has been built and connected, just switch on and it works.

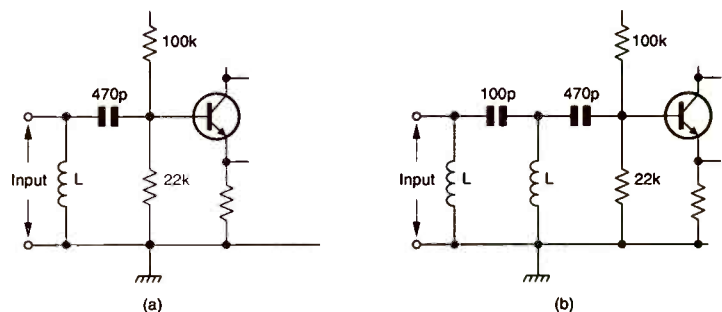
your main interest is Band I or II DXing. A nearby CBER could easily wipe out the upper end of Band I (2 x 27MHz). I would suggest slight modification to minimise HF interference breakthrough, see Fig. 2, with either a VHF choke wired between the input pin and the adjacent chassis screening as shown at (a), or a simple bandpass circuit within the housing as shown at (b).

A shorting link can be inserted to power the amplifier remotely via the coaxial feeder – details are provided. As the amplifier is intended for indoor use (loft etc.) a weatherproof housing is not available.

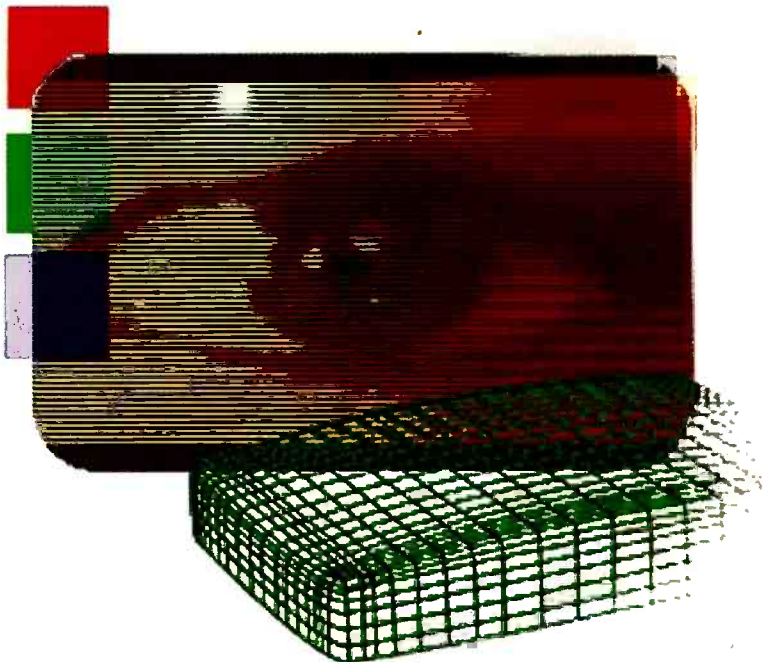
The Velleman K2622 kit is available from Maplin Electronics (catalogue no. VE18U) at £9.99 inclusive of VAT. It's an effective amplifier that is easy to build – and you know it will work. **R.B.**



**Fig. 1:** Circuit diagram of the Velleman-kit K2622 VHF aerial amplifier.



**Fig. 2:** Suggested modifications to the input to minimise HF interference breakthrough, (a) addition of a VHF choke, (b) addition of a simple bandpass filter. In both cases L consists of ten close-spaced turns of 1/8in. diameter 20-22g enamelled-copper wire.



# TV FAULT FINDING

Reports from  
**Michael Dranfield**  
**Steven Leatherbarrow**  
**John Hopkins**  
**Glyn Dickinson**  
 and  
**P. Salkeld**

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

## Sharp DV5937

The picture was OK but there was an LF hum on the sound. The customer complained that his VCR had stopped working at the same time the hum had started. I thought this rather unlikely, but there was no picture via the scart socket when I pressed the VCR's play button. A substitute set confirmed that the TV was indeed the cause of the problem.

When I got back to the workshop I studied the service manual and found that the LA7016 AV switching chip IC406 is fed from the same 12V rail as the Nicam sound PCB. This supply was low at 10.9V. It's derived from pin 5 of the LOPT, with R615 (0.82Ω, 1W) as the surge limiter in the rectifier circuit. This resistor was the cause of the trouble: it had risen in value to 7.3Ω. A replacement cured both faults M.D.

## Samsung CI6230 (UM88MT-1 chassis)

If the TDA3654 field output chip has to be replaced to cure field collapse, carry out the following modification – otherwise the new chip will not last longer than about six months. Trace the track from pin 5 of the TDA3654 chip back until you come to the wire link PJ28. Remove it and fit a 10μH inductor, Samsung part no. 2701-001040. Then fit a 470nF, 100V polyester capacitor (part no. 2305-000407) between pins 4 and

5 of the TDA3654 chip, as close as possible to the IC. M.D.

## Fidelity WSTV7028NF

The symptom with this widescreen supermarket special was serious lack of width, with striations at the left-hand side of the screen. When the back was removed I saw that it uses the Vestel AK19 chassis. This was helpful, as we have the manual for the chassis. The cause of the fault was traced to C630 (430nF, 250V), which was open-circuit. It's in the line output/EW modulator area. M.D.

## Alba CTV3359

This set, which is fitted with a Vestel chassis, came in with sound but no picture. The cause of the problem was loss of line drive, and was traced to the BD679A regulator transistor Q601. Close inspection of the PCB revealed a flashover burn mark between the base of Q601 and the output side of the line scan coil socket.

In my opinion the PCB track to the base of Q601 is far too close to the hot end of the connection to the scan coils. To avoid this failure, remove links J602 and J604 then link these points together on the

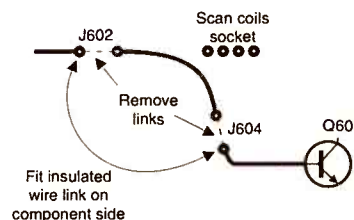


Fig. 1: Suggested modification to avoid flashover between the line scan coil socket and the base of Q601 in the Alba Model CTV3359.

component side of the board, using a short piece of insulated wire. See Fig. 1. M.D.

## JVC AV21F1EK (JX chassis)

If the problem with one of these sets is no on-screen display and no teletext, check for dry-joints at regulator IC522. The fault usually starts off as an intermittent one. M.D.

## Matsui 20TI

The problem with this set, which is fitted with a Grundig chassis, was intermittent grey-scale variations, usually from cold. I've had this problem before, with a worn tube, because the auto grey-scale can't cope. But the fault was still present when I swapped over the CRT.

I eventually removed all three BF423 video output transistors and checked them with my Peak transistor analyser. The hfe



(gain) of one of them varied between 55 and 355 in the hot and cold states. With the other two the variation was not more than 20. A replacement BF423 transistor cured the fault. **M.D.**

### **Samsung TI20C5DF2S/XEV**

At switch on this TV-VCR combi unit remained dead except for the degaussing relay, which operated cyclically – a couple of seconds on then a couple of seconds off. Scope checks around the microcontroller chip revealed that the clock and data lines, at pins 23 and 24, were cycling on and off. This appears to be a start-up procedure however, not a fault: the microcontroller chip loads data on to the bus and, if it gets no response within a couple of seconds, powers down then tries again.

Further checks showed that there was quite a large ripple on the 5V supply to the EEPROM. This comes from the KA7806 regulator IC804. I assumed that it was faulty and that the EEPROM had been corrupted. But the fault remained when these two items had been replaced. There was also still a large ripple on the output from IC804. I came to the conclusion that this was normal and started to check around the TDA8842 jungle chip IC201, which was cycling on and off under the control of the I<sup>2</sup>C bus. A scope check at the line drive output pin 40 revealed that there was no life at this point. I replaced the 4.433619MHz subcarrier crystal, whose output is divided down to produce the line frequency, again with no improvement. Nor did a new jungle chip make any difference.

The only other component I could see that would cause loss of line drive was the charging capacitor C238, which is connected to pin 42. It turned out to be blameless. I eventually discovered the cause of the fault by accident. While double-checking the line drive output I accidentally shorted pin 40 to pin 41, the sandcastle pulse input. I heard the EHT rustle up and a big puff of smoke came from somewhere. Close inspection revealed the source of the trouble. C414 (680pF, 2kV), which couples feedback pulses from the collector of the line output transistor to pin 41 of IC201, had a pinhole burnt around its outer edge. When checked it produced a resistance reading of just 200Ω. A replacement restored the set to life. I was glad to see the back of this one! **M.D.**

### **Hitachi CTP2476 (G6P chassis)**

There was a blank white raster with flyback lines. Disconnecting the luminance input to the CRT panel, at TV3, removed the display. It was then only a short step to Q301 (2SA673C) which was short-circuit. A replacement restored the picture, but it was marred by red flyback lines. In addition there were no on-screen displays. The

penny then dropped – I'd been there before. A new M50450-023P microcontroller chip cured these remaining faults. If you suspect an OSD fault, the inputs to the tube base are via plug KC1/2 and can be easily disconnected as a check. **S.L.**

### **Ferguson B59N (ICC8 chassis)**

There was a blank raster with normal sound, and no graphics displays. The cause of the trouble was traced to DL42 (1N4148) which was slightly leaky. It's in the pulse connection to pin 35 of the TA8659CN colour decoder/timebase generator chip IV01 and is associated with a blanking feed. **S.L.**

### **Mitsubishi CT25B2STX**

When the TDA8178S field output chip IC451 fails it's advisable to replace the associated electrolytic capacitors and, particularly, those on the primary side of the power supply. Note that it is usual for a TDA8171 to be supplied, along with a small modification kit, as the TDA8178 is no longer available. **S.L.**

### **Sharp DV5935H (BCTV-A chassis)**

Stuck in standby seems to be the usual symptom with these sets. This time the cause was a faulty 2SD1546 line output transistor Q600. Failure of the line scan coupling capacitor C619 (560nF, 250V) is a common cause of damage to Q600, and you may find that associated components are stressed, in particular the 39Ω resistors R619 and R632. They are both safety types. **S.L.**

### **Mitsubishi CT2153STX (Euro 4Z chassis)**

Amnesia, channel or level problems should lead to a check on the 30V supply at pin 2 of IC702. You will usually find that the voltage is low, so the EEPROM chip can't function properly. The cure is to replace C962 (100μF, 50V). **S.L.**

### **Sony KVX2942U (AE1C chassis)**

The cause of low sound in one of these sets turned out to be the 13V zener diode D271, which was open-circuit. Another audio problem we had recently was intermittent failure of the surround sound. The cause was faulty speaker sockets on the back panel. A point to note is that the pair are in series, so lose one and you lose both. As the sockets/back panel is no longer available I used the spare main output pair as replacements. **S.L.**

### **JVC C14E1EK (Onwa chassis)**

This set was dead and I was not surprised to find that the HT was high at 118V (should be 112.5V). This was dealt with in the usual

way, by replacing the two 47μF, 50V electrolytics C909 and C911 on the primary side of the power supply (use types rated at 105°C). This restored good regulation but the set was still dead. Further checks revealed that there was no supply at pin 42 of the AN5601K colour decoder/timebase generator chip IC301. It's derived from the HT line via R323 (6.8kΩ, 5W fusible) which was open-circuit. A replacement was all that was required. **S.L.**

### **Akura CX30**

These portables have been around for a few years and have proved to be reliable enough. This one was brought in because there was field collapse. The field output stage consists of a couple of transistors, so fault-finding was simple. There was no supply because R422 (10Ω, 0.5W) was open-circuit. It's connected between pin 5 of the LOPT and rectifier diode D420 (BA133), which was leaky. **J.H.**

### **Fidelity CTV3228NF**

"No picture, sound OK" said the owner of this large-screen set. He wanted a cheap repair because he could get a new set from Argos at under £200. As the sound was OK I said it shouldn't be too bad, thinking of the run of poor scan coil connector joints I've had recently.

I carried out some checks in the line output stage and found that R618 read a few MΩ instead of 100kΩ (1W). When a replacement was fitted C600 (1μF, 250V) went up in smoke. A new capacitor seemed to work happily but there was still no picture. I then found that C620 (0.47μF, 250V) had dropped in value to 16pF. I upgraded the replacement to 400V and was rewarded with a good picture. **J.H.**

### **Toshiba 1752TB**

This 17in. set was less than eighteen months old. It was brought in dead with a smell of burning, and a quick visual inspection revealed that the line output transformer had been overheating. In most cases this would mean going to Argos for a new set at £99.99, so I offered the customer this option – I could hardly tell him that he wouldn't get the same quality as the Toshiba set when it had lasted only eighteen months. The customer opted for repair, so I fitted a König replacement LOPT, which has a much meatier case. A new 2SD1554 line output transistor completed the repair. **J.H.**

### **Panasonic Euro 2 chassis**

Red, white and blue said the patriotic job card. No, not a degaussing fault. There was a grainy picture with smeary red and white. Good teletext however. The picture was still grainy and smeary when a video signal was fed in at the scart socket. Yet another

symptom of failure of the VDP3108-29 digital processing IC. Panasonic now supplies an improved version plus two surface-mounted capacitors (which may already be fitted), an EEPROM and a helpful installation sheet to guide you through the reset procedure. **G.D.**

### Sharp 51AT15H

There was no green in the display. I decided to be smug and not even remove the back. Instead I entered the service mode (V-, P+ and mains on) then scrolled to G gain. Sure enough, zero. Unfortunately increasing it to 30 had no effect and I had to remove the back after all, to sort out the CRT base panel where someone had decided to try out his new soldering iron. Once I'd removed several blobs of solder the green was back. **G.D.**

### Hitachi C2546TN

Intermittent operation then dead is a common problem with these sets. Resoldering IC950, IC951 (under the plastic frame in the centre) and IC952 usually cures the trouble. In one case recently however the set would still revert to standby occasionally. Much time (and solder) was spent in the search for a dry-

joint. I eventually found that IC950 was in need of replacement. **G.D.**

### Hitachi A7 series

These are mainly widescreen sets. The most common problem is the set reverting to standby or tripping off and on again. Many thanks to my TLO who said that the usual cause is dry-joints (often invisible) at the set-HT control VR950. This advice provided an instant cure for two big headaches! **G.D.**

### Philips CP90 chassis

A new line output transformer had been fitted but soon after there was a blank raster and no sound. An input via the scart socket produced normal results, so attention was turned to the IF strip, for which no circuit diagram is provided. I had no luck when I changed the TDA2541 IC, but subsequently found that C2098 (0.47µF or 1µF) was open-circuit. To be on the safe side I replaced the other electrolytic capacitors in this area. **G.D.**

### Goodmans 2875 (F11 chassis)

After repairing a power supply blow-up there was an odd fault: the set powered down when standby was selected, but when it was switched back on it died. In view of the original fault, I decided to replace the small

electrolytic capacitors on the primary side of the power supply. This cured the trouble, but I was rewarded with a picture that had all the appearances of a very leaky tube. Fortunately replacing the three 68kΩ feedback resistors R26, R28 and R29 on the CRT base panel restored a normal grey scale. **G.D.**

### Bush 2866NTX

The complaint with this set was no results. A quick check revealed that the BU2508DF line output transistor Q501 was short-circuit. But the set was still dead when a replacement had been fitted, this time with R604 (3.3Ω, 2W) on the small, upright EW panel burning. Further checks brought me to C596 (0.011µF) which was open-circuit – it was not a dry-joint. The set burst into life with correct scanning once R604 and C596 had been replaced. **P.S.**

### Sony KV32FX60U (AE5 chassis)

This fairly new widescreen set had no sync with teletext, the on-screen displays and menus. It looked like a nasty fault, so I made a quick phone call to Sony. The suggestion was to replace IC2303 (part no. 8-759-438-64) on board B1. Thanks Sony: the replacement did the trick! It's a surface-mounted device. **P.S.**



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# HELP WANTED

**The help wanted column is intended to assist readers who require a part, circuit etc. that's not generally available. Requests are published at the discretion of the editor. Send them to the editorial department - do not write to or phone the advertisement department about this feature.**

**Wanted:** Unmarked case front for the Thorn 14in Model P1465R (Tatung 190 chassis) and handset. Service data and long flap that covers buttons for the Salora 04074 VCR or original maker's equivalent. Valve tester at reasonable price. Phone Roddy Ballardie on 0161 962 8826.

**Wanted:** Capstan motor, in good condition, for the JVC HR7700/Ferguson 3V23 etc. 'breeze-block' VCR. Happy to cover any reasonable price and postage. Contact Chris at RadioVision, Exeter on 01932 275 535 or e-mail [chris.avis@cwcom.net](mailto:chris.avis@cwcom.net)

**Wanted:** Viewfinder (WV-VF65) and gen-lock (WV-AD36E) for the Panasonic WVP-F10 camera. Service manual for the WVP-A2E/B camera. Line output transformer for the Ekco Model TMB272 (circa 1954). B. Senior, 1 Bedale Close, Coalville, Leicester LE67 3BE. 01530 810 962.

**Wanted:** Quad FM3 tuner for spares or repair. Quad 405 power amplifier. Tube base for the Sony Model KVM21TU (AE1 chassis). Phone Mike on 01758 613 790.

**For disposal:** New tube for Panasonic Model TX1785, free to caller. Various TV/video service manuals, e-mail for list. Phone Simon Ellis on 01784 449 209 (Stains, Middx) or e-mail [simon@ellitel.com](mailto:simon@ellitel.com)

**Wanted:** Circuit diagram and dial-cord drive diagrams for the Grundig Sattelit 210 (Transistor 6001) radio. Also drive-cord diagrams for the B&O Beolit Model 611 radio. Eric Kempshall, 109A Portland Road, Hove, East Sussex BN3 5DP. Phone 01273 382 001.

**Wanted:** I have two Matsui 20in. Model 209R TV sets with similar control faults. In both cases touching power control pin 16 of the TVPO2066 4A2 microcontroller chip IC401 to chassis brings the set on but there is no control whatsoever. The chip is expensive: before I consign the sets to the tip, is there something I've possibly missed? The voltages around the chip appear to be OK, and remote-control code signals go into it. Could anyone who can help phone Laurie on 01288 341 254?

**Wanted:** Working remote-control unit for the Ferguson Model FV62HV VCR. Will collect or pay postage depending on location. If anyone has this item please phone Mark Cliffe on 01733 576 493 (Peterborough) after 5 p.m. during the week or any time at weekends.

**Wanted:** Video heads for the JVC Models HRD880EK and HRS4700EK, or machines with good heads. Allan Crathorne, 2 Harden Close, Walsall WS3 1BU. Phone 01922 492 088 after 8 p.m.

**Wanted:** Any information, handbooks, circuit diagrams etc. for two satellite receivers, Models CDR960 and D9232, that came from Dubai and are believed to have been made in Korea. Also a handbook/servicing information for the Pace D2-MAC decoder Model D100. Photocopies OK. Phone Bob McLachlan on 00 351 281 971 669 (Portugal).

**Wanted:** Converter transformer T102 for the Sony VCR Model C7 or complete board SR-08-2. Instructions (photocopy OK) and a remote control unit for the Matsui OP10 stereo satellite receiver. N. Brown, 37 Newland Street, Rugby, Warks CV22 7BJ.

**Wanted:** Any U-View circuit diagram books and a TV test pattern generator. G. Richardson, 1 Doe Park, Clifton Moor, York YO30 4UQ. Phone 01904 692 978.

**Wanted:** Philips hybrid colour TV receiver in any condition, e.g. K4, G6, K70, K80 etc. Can collect from anywhere in the UK. Phone Mike Bennett on 01395 279 732 or e-mail [mdb@oldtechnology.net](mailto:mdb@oldtechnology.net)

**Wanted:** Line output transformer in reasonable condition for the Memorex Model 1400R. Phone Stephen Rowe on mobile 01483 762 780.

**Wanted:** Service manual with circuit diagrams for the Sony VCR Model SL-F25UB, photocopies OK. Also test tapes for this VCR. Wayne Brill, 31 Parnell Road, Ipswich, Suffolk IP1 6SP. Phone 01473 742 568.

**Wanted:** Remote control unit for the Salora M chassis, original or copy RM2001. Also head and drum assembly and a colour/chroma PCB for the Hitachi multisystem Model VCR598EM. Steve Thomson, 51 Churchill Way, Manor

Estate, Stafford, Staffs ST17 9PB.

**Wanted:** July 2000 issue of *Television*. D. M. Henry, Tongland Hall, Kirkcudbright, Scotland DG6 4NA. Phone 01557 330 462.

**Wanted:** Instruction manuals for the Matsui VX730 and Orion D1100 VCRs, photocopies OK. D. Lee, 16 Devonshire Place, Claughton, Birkenhead, Cheshire CH43 1TU.

**Wanted:** Replacement UPD75516GF/3B9/230 system control IC for the Hitachi VTF770E VCR, or complete board or a non-working machine with a good chip. Phone Martyn Locke on 01570 434 318 (Ceredigion).

**Wanted:** A turntable motor, part no. 4322-010-59171, for the Philips Model 22GA212 (it's about 25 years old). Contact Rod Tyler at Tyler TV, 26 Littlecote, Petworth, West Sussex GU28 0EF. Phone/fax 01798 342 210 or e-mail [rod@ryler60.fsnet.co.uk](mailto:rod@ryler60.fsnet.co.uk)

**Wanted:** Vertical output amplifier assembly A5 for the Hewlett-Packard Model 1715A oscilloscope, or has anyone used/designed an alternative for the output module U2? Also require a scrap Pson Series 5 with a good LCD and flex. Phone Vince Buffin on 01752 215 536 (Plymouth) or e-mail [vinceboo@niffub.freereserve.co.uk](mailto:vinceboo@niffub.freereserve.co.uk)

**Wanted:** A VDR, circuit reference number Z3, for the Ferguson 1500A monochrome chassis. Phone Wilf Milton on 01823 667 575.

**Wanted:** A 14DN379 IC for the Amstrad TV3 combi unit. A circuit diagram or service manual for the JVC K99 audio amplifier and triple tape record/play unit. Also a circuit diagram or service manual for the Sony MDS S35 CD player/recorder. E.R. Rogers, 86 The Avenue, Linthorpe, Middlesbrough, Teeside TS5 6SB. Phone 01642 815 871 or e-mail [bill.cother@ntlworld.com](mailto:bill.cother@ntlworld.com)

**Wanted:** Circuit diagram for the Opus monitor Model BIH7260/053 with composite video input (I have the TTL input version but want to convert the monitor for use with a monochrome camera). All expenses paid. Mike Belford, Danganella, Cooraclare, Co. Clare, Ireland.



# MONITORS

Fault reports from  
**Ian Field**  
**Geoff Butcher**  
 and  
**Gerry Mumford**

We welcome fault reports from readers – payment for each fault is made shortly after publication.

Reports can be sent by post to:

Television, Fault Reports,  
 Reed Business Information,  
 Room L514, Quadrant House,  
 The Quadrant, Sutton,  
 Surrey SM2 5AS

faxed to: 020 8652 8111

or e-mailed to:  
 tessa2@btinternet.com

## Hewlett-Packard Ergo Ultra D2608B

These VGA monitors appear to be difficult to dismantle, but once you get the hang of it they are easy. Under the cabinet there are four screws with the heads facing downwards. The back cover is secured by two of them and by two latches at the top. The remaining two screws secure the bottom cover and swivel base. Once these items have been removed most of the print side of the PCB is accessible through the apertures. If greater access is needed, the main PCB slides out rearwards fairly easily.

As there was no job card to tell me what was wrong, I wondered whether the slightly dim picture was the problem. The heater supply voltage was slightly low, so I upgraded the heater rectifier D114 to a Schottky-barrier type. The chopper power supply flyback voltage is well below 40V, so there's no need for a snubber circuit. Although the upgraded rectifier improved the picture, it wasn't all that bad to start with! So I was beginning to suspect that there was some intermittent fault I should be looking for. When I started to dismantle the screening on the CRT base PCB Q431R fell out, heatsink and all. The soldering here was certainly in need of attention. Several of the CRT connector lugs were close to breaking free. **I.F.**

## Elonex MN034P

There was a purity fault with this monitor, which is fitted with a Philips chassis. The white 96702 Philips-type degaussing posistor can be easily opened to inspect the pellets, which proved to be OK. The way the relay clunked sounded about right, there were no obvious cracks in the PCB, and the degaussing coil wasn't open-circuit.

As I was refitting the degaussing plug to connector M102 I noticed that this was wobbly. The connector had not been fully inserted in the PCB during assembly, and both solder pads had parted neatly from the tracks to the posistor. A couple of stout wire links provided a cure.

With this chassis it always pays to apply fresh solder to the 'four-poster' transformers/inductors and all TO220 and similar-style semiconductor devices – especially the two clipped to the rear metal bracket. In this one the front panel rotary controls also had frail-looking solder joints. **I.F.**

## Smile CA1516SL

The complaint was of "uncontrollable brightness". At switch on this description didn't seem to be accurate: there appeared to be some control, but the brightness couldn't be reduced to a usable level. It soon became clear that the fault was get-

ting worse as I watched! When the A1/G2 preset had been adjusted to produce a sensible brightness level the push-button brightness control, with its menu entry 0-255 bar graph, showed a slight change at about 1-4. The display continued to brighten when the monitor was left running.

Having gone over the soldering I decided to have a quick prod at the electrolytics before switching on the DMM and doing the job properly! Finger pressure on C543 (1µF, 50V) produced wild fluctuations in the B+ voltage and also varied the brightness. Suspecting that the can was not isolated and that my finger was providing a leakage path, I gave it a prod with a plastic trimming tool. The effect was the same, so out it came. A replacement failed to cure the fault, so I began using the Stienel checker.

When this was applied across C126 (0.47µF, 250V electrolytic) both LEDs glowed, indicating that an AC voltage was present. A replacement corrected this situation but not the fault. Further checks revealed that there was still AC at the tube's control grid. In desperation I decoupled the supply with a suitably rated 10µF capacitor. The voltage was then DC, but only a couple of volts negative. Tracing the source of the supply on the main PCB I came to R152 (220kΩ) which was open-circuit.

A word of warning. The main cable between the CRT base and the main PCB is not a ribbon cable and is not wired 'straight', as a ribbon cable would be, e.g. the control grid feed is the second pin from the end on the CRT PCB and the third pin from the end on the main PCB. **I.F.**

## IBM 6314-002

The display was only two-three inches wide but the cause was quite simple: most of the solder fillet at the collector pin of the EW driver transistor Q705 stood proud of the solder pad. Resoldering cured the basic fault.

A full check on the soldering should always be undertaken. In particular check P701 on the capacitor-switching MOSFET subpanel: an arcing dry-joint here can be very destructive. Check all TO220-style devices, especially the rectifiers on the secondary side of the power supply. And don't forget the less-than-obvious front panel button store procedure – press 'mode' as well as 'store' to save changed user settings. This remains the most common cause of returns!

The width control system is not the best I've come across but at least has adequate adjustment range – the width can be reduced via the front buttons to almost as



narrow as the fault condition with this particular monitor. Unfortunately there's severe EW distortion before the horizontal scanning fills the screen. Most customers find this unacceptable. The solution is to add extra capacitance across C718. With this monitor a 1,200pF capacitor had to be added. The value usually required is about 680pF – start with about 270pF and double the value until the monitor is just able to overscan horizontally without the raster becoming hexagonal!

A second one of these monitors off the pile had the frequently-encountered dry-joint at P701, with visible signs of arcing. After resoldering this and the other usual troublespots all that was required was to adjust the value of C718. In this case a 1,500pF capacitor was added. **I.F.**

### **IBM G50 (6543-302)**

When it was powered this monitor showed no sign of being faulty. The customer had written only his phone number on the label, so I had to enquire. "Intermittent" he said, but couldn't recall what was intermittent.

The metal tray has to be unclipped before the PCB can be unscrewed from it – this presents a risk to the membrane keypad's ribbon, as the chassis plate tends to come loose suddenly!

When the PCB was removed I found that the soldering was possibly the best I've ever seen in an IBM monitor. The two end pins of the scan plug (line output hot pin and HT interlock link) were dry-jointed, and the solder on the degaussing resistor was a bit thin. But none of the components were threatening to fall off the PCB! The CRT base PCB soldering wasn't bad either, so I just reflowed the DIL chip's pins and those on the CRT connector and left it at that. **I.F.**

### **Compaq 171FS (Model 491)**

This chassis has two chopper power supplies. Neither will start if R902 (30k $\Omega$ , 3W) is open-circuit. **I.F.**

### **AST RM07F1B**

This monitor was dead apart from a slight pulse of current when it was first switched on. The power supply didn't start because R13 was open-circuit. There are two start-up resistors in series, R13 and R14, both 270k $\Omega$ . To be on the safe side I replaced them both. **G.B.**

### **Axion CL1766**

There was a yellowish smearing effect because of poor LF response in the blue channel. An oscilloscope connected to the blue cathode with a test-pattern display showed the distortion clearly. The wave-

form at the base of Q513 in the blue amplifier pair was good. It was bad at the collector of Q506. Resoldering didn't help, so I removed and tested both transistors. They proved to be OK and, when refitted, the fault had cleared. To be on the safe side I decided to replace them. **G.B.**

### **Compaq 481**

This 20in. monitor is similar to the Philips C2082. It powered up correctly, but the screen was completely dark. The customer mentioned that it had been taking longer and longer for a display to appear. I found that the first anode voltage was very low, because of leakage in the CRT base socket. In fact the whole base socket had become slightly conductive. Fortunately a complete replacement CRT PCB (Philips part no. 4822-212-30173) is available at a reasonable price. **G.B.**

### **Philips 4CM4270**

After replacing a short-circuit line output transistor and resoldering a number of poor joints in the line output stage I found that there was still no display, with the symptoms of an overload in the line output department. In the past I've found that the cause can be shorted-turns in the 11mH choke L5601. This time however the culprits were the 4.2mH choke L5604 and the 10mH choke L5613, both of which had shorted turns.

When they were replaced there was a display with excessive width, and the width control had no effect. The cause turned out to be the MUR460 diode D6624, which was short-circuit. Note that it's a special high-speed diode (switching speed less than 50ns). **G.B.**

### **Sony PVM1444QM**

There was just a faint horizontal line on the screen of this professional TV monitor. Checks showed that there was only some 3V at the output from the LM7812 12V regulator IC505. Once a replacement had been fitted there was a 12V supply and a display on the screen. **G.B.**

### **Philips 4CM4270**

This was a "fault from hell": several groups of fine vertical striations were spaced across the screen. While probing around in the line output stage I found that they disappeared when a scope probe was touched on the line output transistor's collector connection. But they would always come back after a while, and no amount of PCB tapping had any effect. Adjustment of the contrast control varied the intensity of the striations.

I spent some time fruitlessly testing components in the line output stage before I

decided to attack the problem from the other end, i.e. the RGB circuit, to see where the spurious signal was actually getting in. The fault disappeared when I connected an earthing lead to the earth link 9309 (near the green input connector). I repeated this several times and, although the soldered connections to the link looked good, I found that resoldering it provided a permanent cure. **G.B.**

### **Daytek (Daewoo) DTC1564**

This monitor had power but no display. On inspection I found a small burn mark where the B+ feed choke L502 had become dry-jointed and arced over. Fortunately the choke had not been harmed and the damage to the print was minimal. But as a result the BU2520AF line output transistor Q702 had gone short-circuit and the fusible feed resistor R825 (2.2 $\Omega$ , 0.25W) had gone open-circuit. Replacement of these items cured the fault. **G.M.**

### **Medion MD1772ie (Acer chassis)**

A dealer brought in a number of these 17in. monitors. For a totally dead one, check D702 (UF4006) on the secondary side of the power supply – it tends to become leaky or go short-circuit. Sometimes you find, incorrectly, a 1N4005 in this position.

If the LED comes on then goes off, with no display, check the 4A wire-ended fuse FR707, which is also on the secondary side of the power supply. Its failure usually means that there's a short-circuit in the line output stage. The item that most often fails is the double-diode D305 in the EW modulator circuit. It tends to become leaky. As a result the monitor will work all right for a short time once FR707 has been replaced, but D305 will overheat. The type is FMP2FU (use the equivalent DMV32B).

If D305 goes short-circuit rather than leaky (the screw that holds it to the heatsink seems to work loose, so that it overheats then dies), FR338 (1 $\Omega$ , 0.25W fusible) in the neighbouring EW-correction control circuit will probably have gone open-circuit. The symptoms are a narrow display with the width and pincushion correction controls inoperative. The line output transistor seems to be very reliable.

For no blue in the display, check for dry-joints at R108. It's the feed resistor in the blue drive, under the can in the centre of the PCB. For poor blue suspect that the EEPROM (IC802) has become corrupted. Although there must be a correct way to reprogram it, it's simpler to copy a known good one from another working monitor, replace it, then go through the menus and alter settings as required. **G.M.**



## VCR CLINIC

Reports from  
**Geoff Butcher**  
**Ian Bowden**  
**Eugene Trundle**  
and  
**Michael Dranfield**

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

### **Mitsubishi HSB27**

The E-E and playback sound were fine but there was no recorded sound. Various checks on the signals around the record/playback audio amplifier chip IC310 were carried out but failed to reveal anything amiss. So another test recording was made.

Annoyingly, the sound had returned! It seemed to be slightly distorted however. I decided, without much enthusiasm, to check the electrolytic capacitors in this area with my ever-useful ESR meter. My reward came when I found that C327 (33 $\mu$ F, 16V) was almost open-circuit. It decouples the supply to the bias oscillator. After fitting a replacement there were no further sound problems. **G.B.**

### **Goodmans TVC1400**

There was a problem with the VCR section of this unit. Recording was OK, but when any tape was played back the capstan and drum both ran much too fast. I obtained a service manual, then decided to replace the control chip IC601. To my dismay the fault was still present. To my even greater dismay and embarrassment I eventually found that the front panel PAL/NTSC switch was in the NTSC position! This had apparently happened by accident, as the customer doesn't have any NTSC tapes.

I've since had exactly the same problem with a different machine that can also be switched between PAL and NTSC playback. I wasn't caught out the second time! **G.B.**

### **Hitachi VTM740**

The customer complained that playback was marred by flashing colours. When a check was carried out with a prerecorded tape everything was OK, but the problem was obvious when one of the machine's own recordings was played back. So too was the clean edit back to a previous recording under the new one, i.e. full erase wasn't in operation. The cause of the problem was the 2SA952 switching transistor Q1542 that supplies the erase oscillator in the record mode. **I.B.**

### **Panasonic NVJ40**

The customer's complaint was poor playback colour. When I tuned the VCR to a monitor I noticed that there was a lot of flashing on E-E vision. The results were the same on playback with, as reported, the colour dropping in and out. When recording was tried the tape was erased but nothing was recorded.

A check at the connections to the video head preamplifier unit revealed that the E.Record 5V (i.e. playback 5V) supply was low at 3V. When scoped, HF oscillations were seen on it. Back in the power supply

section the voltage at pin 6 of P1001 (regulated 5V) was found to be high at 6.2V, occasionally dropping back to the correct level. The cause of the trouble was the regulator chip IC1103, part no. VEFH24A. There was normal operation once a replacement had been fitted. **I.B.**

### **Sharp VCH92HM**

There was no rewind: the machine would go into the review or rewind mode but cut out after a few seconds. The cause of the problem was a faulty reel rotation optosensor, on the supply side. The optotransistor's collector voltage varied between 5V and 2.7V instead of 5V and 0V.

I also found that when the machine was powered up from cold there was severe line noise across the E-E picture. After about twenty minutes this was barely noticeable. Use of a spot of freezer inside the combined RF/detector can revealed two suspect miniature capacitors, CQ601 (0.47 $\mu$ F, 50V, 105°C) and CQ602 (2.2 $\mu$ F, 50V, 85°C). Once these had been replaced the unit was fine, even from cold. **I.B.**

### **Sony SLVE200**

This machine was supposed to be dead. When I connected it to the mains supply the drum didn't spin for a second or so, as normally happens, and the tape inserted symbol was displayed though the machine was in the eject mode.

Checks in the power supply revealed that Q5101 (2SC4483) was open-circuit base-to-emitter. When the VCR is in the on state Q5101's base should be at 5.8V. There was only 1.2V at its emitter. A new 2SC4483 restored normal operation. **I.B.**

### **Aiwa HVFX2500**

Poor playback colour was the complaint with this machine. When I first tried it there was no colour at all then, after a few minutes, areas of chroma patterning rolled through the playback picture with normal colour between them.

Thermal tests in the power supply area led me to C618 (10 $\mu$ F, 50V), which is connected to pin 7 of IC601. When this capacitor was cold there was a normal 500mV of 100Hz ripple across it and, in addition, HF ripple. A replacement capacitor removed this HF component and restored normal playback colour. **I.B.**

### **JVC HRJ610EK**

The complaint with this machine was 'intermittent picture': most of the time there was a blank screen in the E-E mode, with just occasionally a burst of picture. These symptoms have been reported before in VCR Clinic, for a similar machine. In



the previous fault report (May 1996) the output from the IF/detector was being muted by the system control micro because of lack of sync detection.

I found that the signal at pin 3 of transformer T901 was at about 4V peak-to-peak, which pointed to a problem in the IF/detector unit. When this was fitted on the other side of the PCB I soon found that the problem was thermal – heating the unit cleared the fault. A few squirts of freezer revealed that C206 (0.1µF, 50V) was the cause of the trouble. When a replacement had been fitted there was a 6.5V peak-to-peak signal at pin 3 of T901 with no muting. **I.B.**

### Sony KV21FV1U

This was a brand new TV-VCR combi unit. At random intervals the deck stopped, regardless of which mode it was in. After much dismantling I discovered that one of the leadouts from the take-up spool's rotation-detector optocoupler (PH452) was dry-jointed. **E.T.**

### Sony SLVE710

The symptom with this machine was very intermittent refusal to accept a cassette,

because it thought one had already been inserted – indicated by the cassette symbol on the front panel being alight. The cure was a 'blanket' job: I replaced the centre (cassette) LED, both end-sensor photodiodes, the record-safety tabswitch (which also acts as tape-in indicator), and the two 39kΩ surface-mounted resistors R264/5. The latter is recommended in a Sony service bulletin. **E.T.**

### Daewoo DVF932P

This machine behaved itself most of the time. Occasionally however it would eject a cassette immediately after taking it in and down, while the fluorescent display was incomplete and there were no E-E signals. The cause was trouble with the 6V supply. The 470µF, 10V reservoir capacitor C23 produced a high reading when checked with an ESR meter. **E.T.**

### Sony SLV825UB

When this machine was connected to the mains supply it alternated between the standby and on modes, with its indicator flashing from red to green. After a while it would settle at standby, but any attempt to switch it on produced only a momentary

green light before reversion to standby. The cause of the trouble was C207 (2,200µF, 16V) in the power supply – there's no power supply circuit in the service manual! **E.T.**

### Alba VCR7340T

Manual control worked, but this machine didn't respond to commands from the remote-control unit. When I checked the unit with my tester it sounded all right. I then scoped the output from the IR receiver, and found that there was a serial data train at approximately 5V peak-to-peak. So the receiver appeared to be OK, but I replaced it nevertheless – to no avail.

As remote control data entered the microcontroller chip at pin 14, it seemed that either the micro or the EEPROM chip was faulty. A new EEPROM made no difference. While I was thinking about fitting a new OEC7035A microcontroller chip another dealer came into the shop. He suggested opening the remote control unit and reflowing all the pins of the IC.

I did this and pointed the unit at my tester. The sound it produced was no different, but it now worked the VCR with no trouble. **M.D.**

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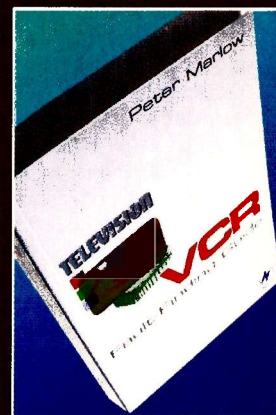
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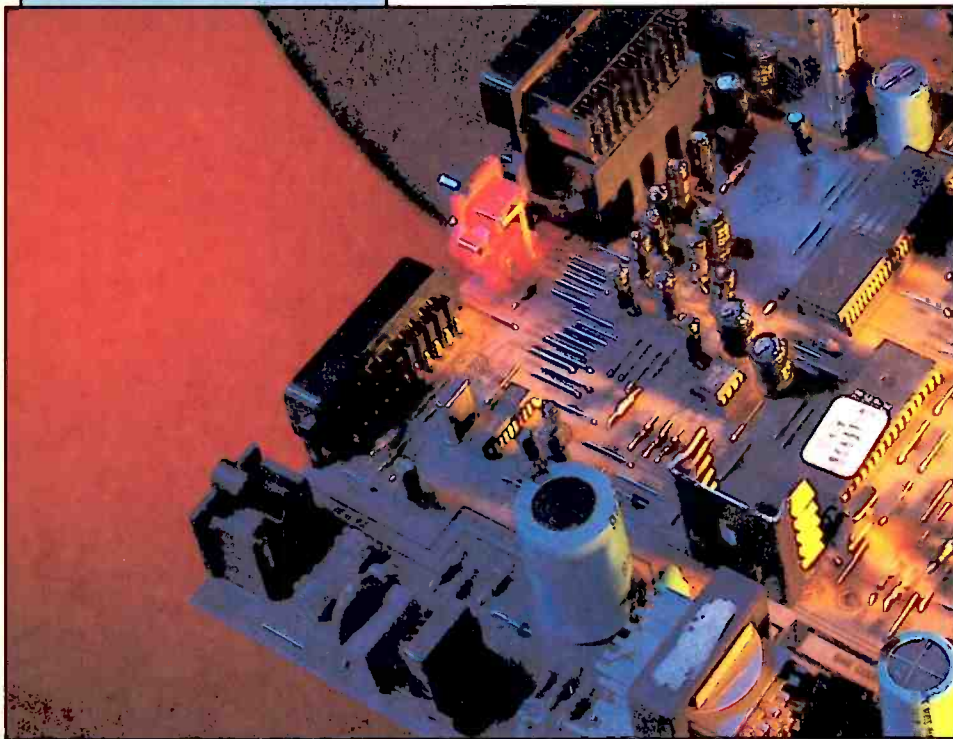
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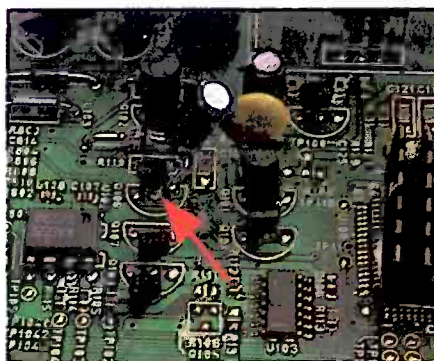
February is the month when the credit card statements arrive with the Christmas spending listed in full. My customers stay away in droves! Analogue satellite receiver repairs are now minimal, though I still get the occasional call to "look at a D2MAC decoder", which usually turns out to be a converted French cable TV box. I decline the offer of a tenner for what usually amounts to three hours' work followed by three months of complaints about pirate cards not working. I won't have anything to do with these, but my customers seem to think that I ought to. Anyway, like so many in the repair trade, I'm looking for other ways to make an honest living. So expect to see fewer satellite repairs and more computer repairs in this column.

## Amstrad DRX100

I've become a little bit bored with having to replace faulty tuners in this type of digibox. So it made an interesting change to find a similar symptom with a different cause. The receiver was a very early one with a revision 4.7 motherboard. The symptom was 'no satellite signal', but the signal-strength indication went up when the LNB was connected and down when it was disconnected.

Being suspicious about this, I checked

the 22kHz switching signal. It was 'on' in the menu, but the LNB voltage didn't vary by the 0.5V it usually does (measured with my digital voltmeter) when I selected 22kHz 'off' then 'store changes'. I then found that a 'factory-bodge' electrolytic capacitor had been soldered to Q106 near the NE555 oscillator chip. It had a solder spike that shorted out Q106's wires. The tone came on when I wiggled this capacitor. The cure was simply to remove the excess solder. See accompanying picture.



The arrow points to Q106, near the NE555 timer chip, in the Amstrad DRX100 digibox; the added electrolytic capacitor soldered to Q106 was shorting out its wires.

## A Pace MSS300

Against my better judgement I agreed to look at an MSS300 that had the classic symptoms of EEPROM failure. At switch-on it displayed "restore" briefly in the front panel window. You could switch it out of standby and it would respond to the remote-control unit, but the screen remained free of pictures and there was no sound.

The fault seemed to involve the I<sup>2</sup>C bus, but I couldn't find it. I replaced all the ICs that are connected to the bus – the microcontroller, the MSP3400, the Nicky chip, the EEPROM and the logic chip next to the micro. This had no effect, so I compared the board with another one and found that a 220Ω resistor below the logic chip was a zero-Ohm link on the other board. Fitting the resistor might have been a factory production error, so I tried shorting it out. The receiver then worked, but it produced a strange 'hunting for frequency' symptom, as if it was changing back and forth between its lowest and highest frequency. I was able to reduce this effect slightly by increasing the supply from 5.2V to 5.6V. As this is excessive I settled for about 5.35V.

Everything pointed to a fault on the I<sup>2</sup>C data line, but I couldn't find one. It may be that something else was interfering with the data speed or synchronisation, but my knowledge of the system's operation was not sufficient for me to be able to deduce what was happening. Pace was unable to suggest anything apart from replacing the 8-pin chip in the RF modulator. As this didn't appear to be related to the fault, I didn't try it. I wondered whether the M50555 character generator might have been the culprit, but it's connected to a different data bus and appeared to work correctly. Another possibility is a reduced 30V tuning supply or instability here, causing the circuit to 'hunt'.

At this point I decided that I had spent long enough on the problem. I was able to sell the customer another, used MSS300 which I had refurbished. He was quite happy about this.

Back in the days when analogue receivers were worth repairing I would have been prepared to spend more time on the fault, in the interests of adding to my knowledge. Unfortunately there's now little point, as BSkyB will cease analogue transmissions later this year. So I concentrate on repairs that will bring me cash immediately.

## ProTV

Last month I reviewed the ProTV card which was designed by Formac to provide the Apple Mac computer with a radio, TV and AV input facility. The 'final' software, version 2.6.0, is now available for downloading from the Formac web site (see last month). It solves most of the problems, but stereo audio continues to be available

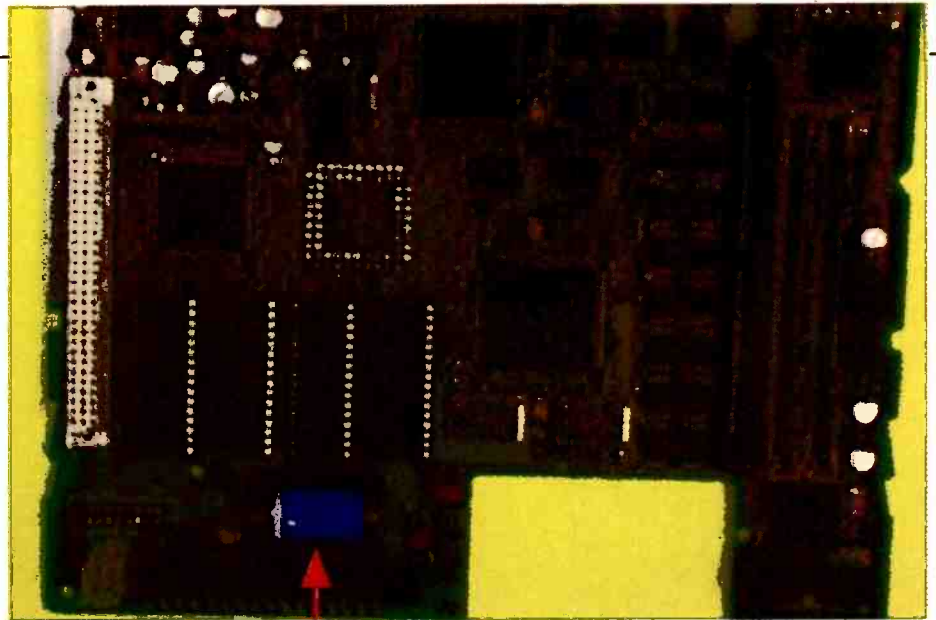


only direct from the card socket, not via the Macintosh itself.

### The Apple Mac

Most 'PC experts' tend to be suspicious about the Apple Mac when it comes to repairs and upgrades. Its reliability is well known, which gives rise to the view that there's little need for repair work. There's also the view that "you can't upgrade a Mac", and further that "nobody uses a Mac - there's no software and only a dozen were ever sold". In fact millions of Apple Mac computers have been sold worldwide. In the UK, there are still more Apple Mac computers than SkyDigital receivers.

Although the build and component quality is usually excellent, Apple Macs can go wrong. You really should accept them for repair! In general Macs cost more to buy than the equivalent PC system, though the price gap has narrowed considerably in recent times. The average Mac owner will be prepared to pay you to carry out a repair - unlike the average PC owner who merely wants to stand over you and offer advice while you sort out a problem that "I could have done by myself", only he was too busy/couldn't be bothered. A Mac owner will be so conditioned to being turned down that when you say "yes, we repair Macs" he'll probably walk off muttering "oh well, thanks anyway" and you'll have to grab him



by the wallet and drag him back!

The most common and easiest to rectify fault is failure of the internal battery, which is often a 1/2AA size lithium cell in a clip. Depending on the Mac model, demise of the battery is heralded by incorrect date/time settings or complete failure to boot up. The battery maintains the PRAM settings which, if lost or corrupted, can cause the computer to act very strangely. Resetting the parameters to standard is simply a matter of holding down the option, command/Apple, P and R keys while the computer starts up. Continue to hold them down and the

*The arrow indicates the battery position in an Apple Mac LCII.*

computer will restart a second time as the parameters are reset. Make sure that the caps-lock (shift) key is off when you do this. The time, date, monitor resolution and other settings can then be altered via the control panels if necessary. You find the control panels by clicking the mouse cursor on the Apple symbol at the top left of the menu bar.

**More on Apple Macs next month.**

## Test Case 460

"Me TV picture's gone snowy and me video recorder don't work" the caller said. It was one of our rental customers, Michael Johnson. Pam fished out his card and put it on Doc Colin's pile for a house call next day. Colin's workload was a heavy one that day. When he called he checked the mains plug then swapped Mr Johnson's Sony VCR for a loan machine. After that he took the faulty VCR back to base for attention. The job was urgent because Mr Johnson didn't like the loan machine: it differed from his, and he didn't show any interest in getting to know it. The snowy TV picture had, of course, been caused by the video machine's failure.

On Doc's return to the workshop the Sony SLV-E210UX was taken straight to Resident Workshop Sage's bench. He went into it first thing next morning, confidently expecting to find a blown mains fuse or that fusible resistor PR512 had gone high in value - it's a common cause of power problems in the models in this range. When he took the cover off, Sage was amazed to find that the mains fuse was intact and that the machine didn't have resistor PR512. Although it's of Sanyo origin, the design differs from that of Models SLV-E280, SLV-E520 etc.

A few quick checks established that the mains bridge rectifier and its reservoir capacitor were OK, and that there was 320V at the collector of the chopper FET Q5001. Sage's next check was at the cathode of the rectifier for the 5.8V supply, D5101, on the secondary side of the power supply. Although quite smooth, the voltage was low at about 2V. It was obvious that this was not going to be a five-minute job. The whole caboose

would have to be parted from its cabinet for further testing. Its centre-deck, one-board construction makes this difficult. If only such machines had better accessibility on the underside!

Out it all had to come, then be reassembled with the deck: many VCR designs refuse to play ball if the deck is not present to chat to the control system at the outset. With everything connected and the whole lot sitting upside down on the bench, Sage checked the waveform at the collector of the chopper transistor. This showed that the FET was conducting in bursts instead of producing a continuous pulse train, suggesting an overload condition.

Sage moved back to the secondary side of the circuit, where he checked the rectifier diodes for leakage. All five declared their innocence. The associated reservoir capacitors were neither leaky nor short-circuit, and didn't give faulty readings when checked with an ESR meter. Sage then had a chat with a good friend at the Sony technical advice centre. He was advised to check zener diode D5111 which, he was told, could develop leakage. Sage, thankful of the advice, found and fitted a new 6.2V zener diode. But the fault was still present - and the old diode measured OK! Where next?

Careful checks on the voltages derived from the chopper transformer, on the secondary side, revealed that they were all about 30 per cent low. This seemed to rule out the possibility that an overload protection system had come into operation. So attention was turned back to the primary side of the circuit, where the 2.2µF capacitor C5011 was replaced without any beneficial effect.

It took Sage some time to find the root cause of the trouble in this power supply. It was in an area where there's rarely trouble of this kind. Can you guess what had failed? For the solution, turn to page 376.





## SATELLITE NOTEBOOK

Reports from  
**Michael Dranfield**  
**Hugh Cocks and**  
**Christopher Holland**

### Pace B SkyB 2200 digibox

The owner of this digibox complained that the audio was broken up and the picture would freeze. The fault was cyclic. A picture would appear for a split second, then break up into blocks. A check around the SDRAM chips U321 and U322 with a logic probe showed that the data and address lines were all active. So it seemed that either the 27MHz clock was wrong or the STI3520L video/audio MPEG decoder chip U320 was faulty. As the 27MHz PIX line, pins 87 and 100, was running at the correct frequency I decided to replace U320.

None of my usual suppliers had this item

listed. So I phoned Pace direct, expecting to be told that digibox spares are available only to authorised dealers or account holders. I was pleasantly surprised when a very nice lady answered and, after quoting the part number (909-3520300) from the manual, told me that they could supply direct at a cost of £37 something, which included postage and VAT.

At this point I couldn't be 100 per cent sure that U320 was faulty, and it was a lot of money to spend out if the replacement chip failed to cure the problem. We had a scrap digibox in the workshop however, one that had been struck by lightning via the modem socket. I had nothing to lose by removing the STI3520L chip from this box and fitting it in the other one. 160 pins later it had been fitted and the fault had been cured. **M.D.**

*Editorial note:* Here's a correction to Fig. 3 (c), page 145, December 2000 issue. The memory box immediately above the MPEG decoder box should have been labelled SDRAM, not SRAM.

### Panasonic TV-DSB30

This digibox displayed the message "no signal is being received". The basic problem was loss of the LNB supply, caused by water running down the cable. There was little sign of damage to the tuner, which I cleaned up, but there was no LNB voltage at pin 2. While tracing back to source I came across an open-circuit plated-through PCB hole that I was able to repair by pushing through it a piece of the finest wire I could find then soldering the wire on both sides. Unlike the Amstrad tuner, this one is soldered on only the bottom side of the PCB. It's very easy to remove. **M.D.**

### Dutch TV problem

The Netherlands was one of the first countries to start a digital satellite TV service, back in 1996 via Astra at 19.2°E. The Irdeto scrambling system was originally used. This is being phased out, the Mediaguard system used by Canal Plus now being the norm. Irdeto is still used in parallel on some channels however, to provide reception with older receivers.

Once a viewer has chosen a channel package option these channels appear normally. Other channels not included in the package produce a rather unhelpful blank screen, with nothing to say that they aren't available as part of the subscription. This was the problem that Mr Van Der Noort was experiencing when he phoned us. He was very confused by the fact that certain channels provided no reception, and had come to the conclusion that the equipment or maybe the dish was faulty. In fact all the channels he required were available once he'd upgraded to the full package. His previous Irdeto receiver had produced an on-screen message when a channel wasn't part of the viewing package, which was a help.

The Canal Plus STB will receive digital free-to-air signals, but a viewing card has to be inserted in the slot. The receiver can be forced to do a complete scan across the Astra channels. This takes quite a long time. It normally finds many channel names that produce just a blank screen! **H.C.**

### SkyDigital update

Astra 2D took over from 1D at the end of January. It has a single footprint, optimised for reception in the UK and Ireland – 2A and 2B have a large footprint that covers most of Europe via north and south beams. 1D has returned to 19.2°E.

Table 1 shows recently added channels, with the transponder number in brackets after the frequency and the EPG number in brackets after the channel name.

In addition to being the digibox default frequency, 11.778GHz V (transponder 4) is being used to transmit a widescreen Philips test pattern which can be added to the Extra Channels menu. At present this is not encrypted and can thus be received by any MPEG-2 decoder. See photo at right.

Sky One UK (EPG 106) has left transponder 20 (12.090GHz V): the Sky



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One cable feed, which was on transponder 7 (11.836GHz H), has taken over as Sky One UK (106) on transponder 20. Sky One Eire is not affected by this and continues on transponder 19 as before, for reception via Irish digiboxes.

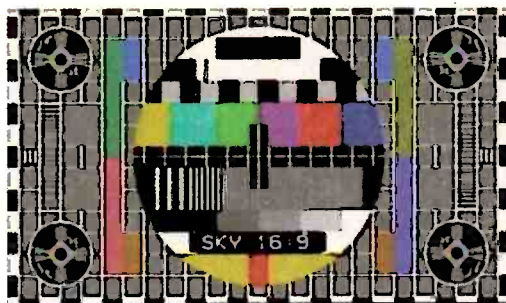
Channel 4 has left transponder 3 and is now only on transponder 24 (12.168GHz V). There are occasional Channel 5 widescreen tests at the old Channel 4 position (transponder 3, 11.758GHz H).

Transponder 56 (10.877GHz V) aboard Astra 2D has been activated for use by Open shopping.

Music Choice (transponder 25, 12.188GHz H) is currently transmitting a caption which says "loading, please wait" (see accompanying photo). This can be added to the Extra Channels menu and has the identification "Meta 1".

The Medical channel (EPG 902) is no longer being transmitted. The Money channel (EPG 516) has moved from transponder 19 (12.070GHz H) to transponder 32 (12.324GHz V). Rapture TV has moved from EPG ch. 187 to ch. 458.

Serbian TV is now being transmitted by Eutelsat II F4, which is located at the adjacent orbital slot to Astra 2. The frequency is 11.189GHz, with horizontal polarisation. Unfortunately a digibox will not accept the low symbol rate of 6,111 (with FEC 3/4). A digital satellite receiver such as the Nokia 9600 or 9800 will receive the signal. **C.H.**



The widescreen Philips test pattern transmitted by Astra 2A, transponder 4.



Caption currently being transmitted by Music Choice (transponder 25).

Table 1: New SkyDigital channels.

Frequency (GHz)	Satellite/beam	Polarisation	Channel
10.921 (55)	2D	H	Star Plus (672)
12.110 (21)	2B/S	H	LBH radio (TBA)
12.129 (22)	2A/N	V	Einstein TV (576)
12.168 (24)	2A/S	V	E4 (205)
12.324 (32)	2B/N	V	The Storm (952), Trans World Radio (953)
12.363 (34)	2B/S	H	Star News (671)
12.402 (36)	2B/N	V	Anjuman TV (694), Family Radio (TBA)

N = north beam, S = south beam, TBA = to be announced.

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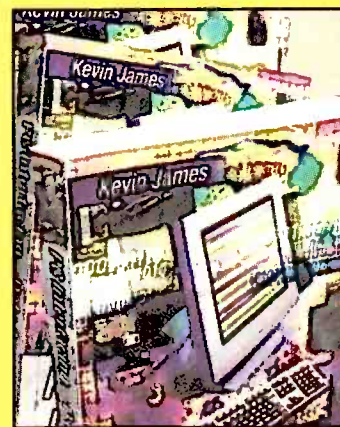
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<http://www.ardelectronics.com>

A.R.D.'s Website details all the information you need to know about this new and exciting electronic



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## Baird 30 Line Recordings

<http://www.dfm.dircon.co.uk>

For history buffs and the curious here's a fascinating site containing early TV recordings and their background.

## BBC

<http://www.bbc.co.uk/info/reception>

<http://www.bbc.co.uk/enginfo>

If you need any help with your reception go to this site – both of the addresses point here. There's special advice for people with loft installations, and caravanners and boating enthusiasts.

## Doknet Service manuals

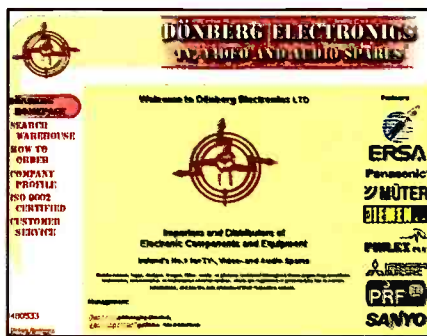
<http://www.doknet.com>

This Dutch site says it has 350,000 service manuals and 1 million service parts.

You interrogate the data base by filling out an order form, with the "request" box ticked, and then wait for an email to arrive back on your computer. However, an on-line index would be useful and maybe on-line downloading of the manuals.

## Dönberg Electronics

<http://www.donberg.ie>

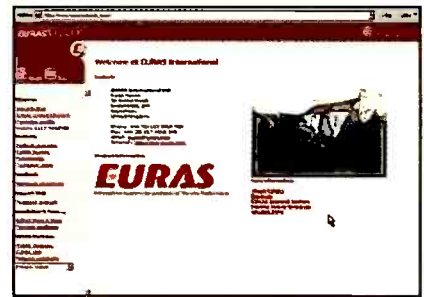


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## Goot Products

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## MB21

<http://www.mb21.co.uk/index.html>

Another enjoyable site with a "telenostalgia" section about the technical aspects of television. There's also a section on transmitter sites, teletext "then and now", and a "rough guide" to widescreen television

## Matrix Multimedia Ltd

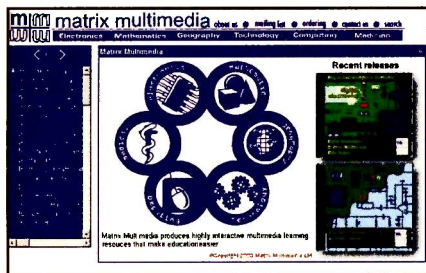
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filter design, and PICmicro(R) microcontroller programming (C and assembly).

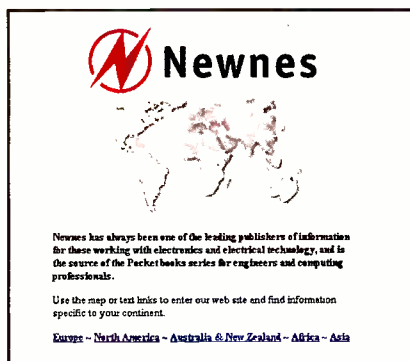
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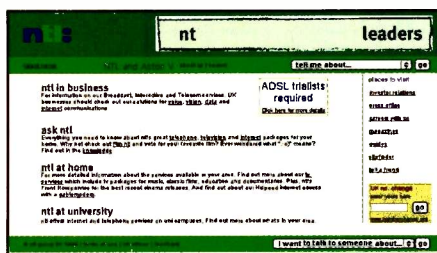


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area by area. There's also a useful transmitter site map and database, giving locations and information. The site also contains useful documents, which describe digital TV, interactive TV and digital Radio. There's also a useful contacts list.

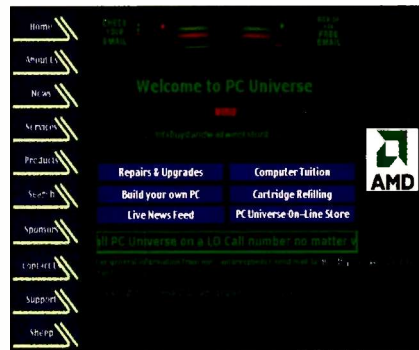
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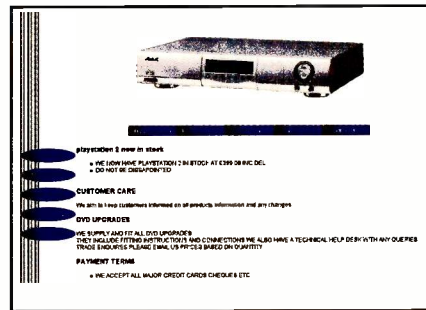
<http://www.horizonsatellites.co.uk>

The Horizon site gives details of our range of products and services including Sky Digital Receiver Repairs.

**Servicing Advice**

[http://www.repairfaq.org/REPAIR/F\\_Repair.html](http://www.repairfaq.org/REPAIR/F_Repair.html)

Here are some frequently asked questions about servicing consumer electronic equipment, with a US bias. But there's some good material on monitors and CD players and CD-ROM drives. (thanks to David Edwards for this information)



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**Timecast**

<http://realguide.real.com/stations/>

This site contains listings of TV and Radio stations available on the Internet. There are also some fixed cameras positioning in locations ranging from game park, high streets and people's houses - not exactly captive viewing! But an interesting thought - are PCs and TVs going to eventually "get married"?

**Televés**

<http://www.televés.com/ingles/ingles.htm>

Televés website was launched as an easier way to keep in contact with our World-wide Network of Subsidiaries and Clients. This site is constantly updated with useful information/news plus you can download info on our range: TV Aerials & accessories, Domestic and Distribution amplifiers, Systems Equipment for DTT and Analogue TV, Meters and much more.



## The Service Engineers Forum

<http://www.E-repair.co.uk>

A brand new site dedicated to the needs of service engineers containing detailed servicing articles, circuits & repair tips. The site also includes for sale, wanted & special offer sections, industry news & much more. An impressive site well worth visiting.

For customers without net access, servicing product details are also available by ringing Mike on 0151 522 0053

## UK Electrical Direct

<http://www.uked.com>

For a comprehensive on-line directory, buyers guide and resource locator for the UK Electrical Industry look at this site. Many of the companies listed have links to their own web sites, making this a one-stop shop for a huge amount of information.

## UK Mailing List Group

<http://www.egroups.com/list/uktrrepair>

Following on from the newsgroup discussion last month there is a UK Email group for TV technicians where you can

send an Email to everyone in the group. There's just over 30 people in the group at present. For more details and how to register look at the egroup home page. Just a general comment though - you do have to be careful who you give your Email address to so that you can avoid "spamming" - that is getting lots of unwanted Email about dubious Russian site (amongst others).

## PSA

<http://www.psaparts.com>

This web site gives details of various specialist parts for repairers, from rare semiconductors to compute batteries and printer parts. The vast majority of items are in stock, and can be purchased on-line via this site's shopping facility.

## Reed Connect

<http://www.reedconnect.net/>

Another free internet access site, this time from Reed Business Information. However the site possesses a useful UK People and Business Finder, with an e-mail search. There's also business news and local information, and some good links to directory sites.

## Repairworld

<http://www.repairworld.com>

Repairworld is a US based fault report database which is updated bi-weekly. It operates on a subscription basis and describes itself as an "affordable solution for all technicians". There is apparently no minimum number of months for which you have to subscribe. You can see some samples of the material for free, monitors, VCR, DVD and Camcorders being of particular relevance to UK users. The site provides a "chat room" where you can talk via your keyboard to others "in the room".

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# AUDIO FAULTS

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

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

## Memorex CD5400

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

## Revox B226 CD player

There were two faults with this machine, no display and no sound. The cause of the sound fault was loss of the -15V supply to the DA converter chip. The -15V regulator IC5 on the decoder board had failed. I also had to replace the BC337-25 standby switching transistor Q7. The display itself

was the cause of the other fault. It's a backlit LCD type whose lighting power is supplied by a separate transformer, T1. This is driven by its own oscillator, which is part of IC12 (74HC00), and amplifier IC2 (L272). T1, IC12 and IC2 are on the micro-processor and control board.

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

## Technics SU-CH900

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

## Fostex B16/D8 multi-track tape decks

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

## Omnitronic DD-2250 pro turntable

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

## HH MA150 pro mixer amp

Power but no sound output was the complaint. The output power amplifier was indeed working, but the preamplifier sec-

tion wasn't. In this event check the +15V and -15V rails. Either a 15V zener diode or its load resistor will be open-circuit, occasionally both. Change the lot for a reliable repair. **R.J.F.**

## McGreggor GS500 pro mixer amp

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

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

## Carlsboro Marlin pro mixer amp

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

## Nakamichi 481/581 cassette deck

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

## Cambridge Audio DACMagic 2

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

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



# LETTERS

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Please send ONLY text intended for the letters page. Correspondence relating to subscriptions and other matters must be sent to the office address given above.

## Dangers

Colin Guy's comment in TV Fault Finding that "the parentage of the designers of several recent chassis has been under discussion in the workshop recently" got me thinking. Take for example the 'live-side' micro in the Sharp CS chassis (same issue), with live tact switches just waiting for the next squirt of furniture polish. In the monitor field, there has been a trend to reduce the specification of the B+ chopper inductor to the point where, should the MOSFET fail, the power supply drives sufficient current through the inductor to burn out its windings.

There also seems to have been a sharp rise in the incidence of LOPT failure recently. And, to make matters more interesting, there appears to be a new breed of LOPTs that have long drawn-out death throes. The equipment comes in with a short-circuit line output transistor. A replacement restores apparently normal operation, and the most thorough check for likely causes of the transistor's failure rarely brings to light anything other than a strong suspicion that the 'superior wetting qualities' of lead-free solder have somehow been responsible for disruption of the line drive. The repair will then be OK for any period of time short of the warranty given! The more recent the chassis, the less likely it is that HR will have a pattern replacement in production. So you either have to convince the customer to fork out for a genuine LOPT to make good a warranty repair or give a refund.

On the subject of sets that catch fire, there are a few monitors I refuse to even look at because they are a fire risk. Astonishingly, they are often models that have the greatest array of standards agency symbols emblazoned on the back. I'm seriously concerned about the implications of this. It's getting to the point where certification has become meaningless: the chances are that it's safer to buy equipment with the minimum legal requirement of safety symbols on the back and hope that the manufacturer has set out to maintain a reputation for safety and reliability.

My opinion of the clamour to introduce a registration body for this trade is based on similar apprehensions. Would it simply be extra bureaucracy that would cripple smaller companies?

Ian Field,  
Letchworth, Herts.

## Training and transferable skills

I can appreciate the feelings of the writer of the letter headed 'A last repair?' (February issue). The TV repair trade has gone from being a good career to one with many problems, and if I was starting out again I would probably choose another career route. There are however many jobs

in electronics that need the skills gained from TV studies and experience, i.e. these skills are transferable. Examples are PC repair and maintenance and technician work in industrial electronics.

I am a lecturer at the Stockton and Billingham College of further education and would like to point out that some colleges still do offer courses in TV servicing. We offer City & Guilds 2240 Electronics Servicing at levels 1 to 3, including TV and video servicing. We used to offer the satellite option, but now offer TROC Digital Television for Technicians instead. We also now offer the new City & Guilds Progression Award in Electrical and Electronic Servicing, which has a Radio and Television Systems Technology unit. Other units in the scheme are analogue, digital, AC and DC technology, commercial electronics and PC technology, so a wide range of skills, including TV servicing, can be learnt.

We find that small businesses use our courses to train and update the skills of their staff, and we get adults who want to retrain in new technology and school leavers who wish to prepare themselves for jobs that involve electronics technology. But we have very few students from the large retail/rental companies that used to send several apprentices to the college each year.

City & Guilds and the EEB (Electronics Examination Board) should be able to provide potential students with details of the nearest college where suitable training is available. Our own college has students from the North Yorkshire, Teesside, Co. Durham and Tyne and Wear areas. It can be reached on 01642 865 400.

Brian Ostle,  
Stockton on Tees.

## PC settings

In an attempt to make up for some of the fall off in TV repairwork I've recently taken to mending and upgrading computers. I know enough about the BIOS to be able to set up a new hard drive, but most of the rest of what's in it baffles me.

I've heard that by tweaking the BIOS you can gain significant improvements in performance, and sometimes make the machine more stable. But I've also heard that unless you know what you are doing it's a lot easier to do the reverse.

Turning on the option to cache ROM is supposed to make the computer run faster by taking firmware from EPROM and placing it in DRAM, which can be accessed much more quickly. But if caching memory makes the machine faster, why would you want to be able to disable this? It can only be because turning it on can cause problems. So what are the problems?

How can I find out what can be tweaked? There doesn't seem to be much



at all on the internet, and motherboard manuals are worse than useless. For example, here's an extract from the manual of a US-made motherboard that costs over £400: "SERR#: Set this option to Enabled to enable the SERR# signal on the bus. The settings are Enabled or Disabled." But why one might want to enable or disable this signal is a mystery.

Stan Clifford,  
via e-mail.

**Editorial note:** We would be interested in any information on this subject and will pass it on to Stan Clifford. If replying by e-mail, please address to tessa2@btinternet.com

### Dell monitor

In Monitor faults, February, the power supply IC in the Dell Model VC10EN should have been given as type SG3842M or UC3842 (not SG3824M). It's also worth checking C117 (22µF, 100V) for high ESR.

Jim Horsley  
via e-mail.

**Editorial note:** Our apologies for the editorial transposition in the IC type.

### ProTV card

Updated software (2.6.0) is now available, via the Formac web site, for the ProTV Stereo PCI card (see Jack's Workshop last month). It seems to solve most of the problems I mentioned. The sibilance on audio can be cured by reducing the gain setting in the 'tuner setup' audio menu. Stereo audio is still available (radio, not TV) only from the ProTV card's audio output socket. The UHF channel numbers are now correct.

Jack Armstrong,  
Middlesbrough, Teeside.

### Correspondents required

When my copy of *Television* arrives each month I can't wait to turn to my favourite column, TV Fault Finding. I love building projects and servicing TV sets, VCRs and audio equipment. Fortunately this is my profession. I would like to correspond with others who share these interests around the world, to exchange ideas, manuals etc. Joseph Anie, P.O. Box 383, Tema, Ghana, W. Africa. [Zodanie@netscape.net](mailto:Zodanie@netscape.net)

### Optimism

There are still predictions of doom and gloom for the servicing trade in *Television*. Those of you who met me at last year's RETRA servicing conference will know my views on the subject. Here however is a little snippet I came across recently:

"At a recent meeting of the Society of Electronic and Radio Technicians it

was claimed that many well-qualified service engineers are leaving the trade to go into industry. Their reason was not lack of pay or slave-driving conditions but a dislike of the design and construction quality of some of the current TV models." Sounds familiar? This was reported in *Practical Wireless*, May 1965!

By the way, at the moment I am having to be selective about the jobs I take in, because of pressure of work. Colin J. Guy,  
Boston, Lincs.

### Digital TV reception

Having been heavily involved in digital TV reception from the start, I would like to make the following comments in connection with K.F. Ibrahim's article in the December issue of *Television*.

(1) Unless it is specifically designed for DTT measurement a spectrum analyser will, because of inadequate bandwidth, provide readings that are typically 15dB lower than the digital signal level. Some meters are so bad they may be 30dB out. The carrier-to-noise ratio will be incorrect by typically 7-10dB, not ten per cent. To use a typical low-cost analyser to measure C/N and/or signal level will at best give poor readings and often be so incorrect that the readings are useless.

(2) A signal level of 40dBµV is not adequate for good-quality DTT reception. The minimum recommended level is 45dBµV. At between 40-45dBµV the viewer will sometimes experience picture break-up. In fact break-up can be experienced at above 45dBµV, depending on location etc. At below 40dBµV the system will not work, and amplifying such a signal is a waste of time.

(3) With DTT reception the C/N ratio must not drop below 26dB. A margin of at least 6dB is required to allow for signal variations, impulse noise etc. At 22dB the system will not work - this is considered a fail level. For digital satellite reception the C/N ratio with a domestic system should be above 9dB. Accurate dish alignment is important to prevent cross-polarisation problems.

(4) As far as I know, the signal-quality measurement in a standard STB is based on the BER. This has proved to be unreliable for DTT reception because of impulse noise. As a result, the STB gives the impression that everything is fine when in fact a margin of only 2dB exists, so the viewer will be faced with picture break-up and poor quality. To use this measurement is very dangerous.

(5) To use a spectrum analyser for digital satellite dish alignment is inappropriate as it's impossible to obtain correct cross-polarisation with this method. The only way is to use a meter with numbers, not a spectrum.

(6) The maximum digital signal level that can be fed into a STB in the UK without attenuation is about 60-65dBµV, depending on the area. Otherwise the analogue signal present overloads the unit, creating picture break-up.

(7) Because of the protection provided by COFDM modulation, kinks in the cable will not by themselves corrupt the signal with DTT reception. The important factor is the flatness of the multiplex. At 45dBµV the flatness has to be within 1dB, whereas at 55dBµV the flatness can vary by 6dB. This is because of the need for margins: if the variation at 45dBµV is 6dB, it's obvious that some parts of the multiplex will be too low for correct decoding, hence picture break-up. Squeezing the cable creates a wave that affects the flatness.

(8) Impulse noise is probably the single most likely cause of picture break-up. Martin Turner,  
Chairman, Technical Committee,  
The Confederation of Aerial Industries Ltd.,  
Wembley Park, Middx.

### The Decca SRG700

In his interesting letter (March issue) Bruce Adams mentions the Decca SRG700. I still have one from new, liking the cabinet and its eight speakers, but have added a stereo decoder and a preamplifier for a m/c pick-up. Here's a word of warning about this chassis. In some, if not all, these radiograms the biasing resistors for the ECL82 output valves are only half the value required. This works, but the output transformers are unhappy and eventually go open-circuit.

The pentode section of an ECL82 has an anode current of 28mA, screen grid current of 5.7mA and the grid bias is -22.5V, so the bias resistor should be 667Ω. But the ones fitted are 270Ω. Between two of these and chassis there is a common 46Ω 2W resistor that generates 3V, so 560Ω for the individual bias resistors would be about right. Maybe the original idea was to use 270Ω per pair, but because of increased third harmonic distortion this was changed to individual biasing and someone forgot to double the resistor values. Incidentally the chassis is at mains neutral potential. ■  
G. Cox,  
Bexhill-on-sea, East Sussex.

## Answer to Test Case 460

- page 367 -

Ace repairman Sage spent a lot of time in that power supply. He was handicapped because he didn't know for sure whether the cause of the trouble was in the power supply or was the result of a problem elsewhere in the machine. Oh for the days when, in both Sanyo and Sony VCRs, the power supply was a separate module at the rear, and thus amenable to a simple substitution test!

Sage confirmed that the mains bridge rectifier's reservoir capacitor C5010 was up to scratch, and that the core of the chopper transformer T5001 was intact. Deficiencies in either of these two components can cause strange effects. He went on to test the semiconductor devices on the primary side of the circuit. They proved to be OK - until he came to the bunch of zener diodes across the chopper transformer's primary winding. Three of them, D5020, D5021 and D5023, were dead short-circuit. This left only zener diode D5022 and the conventional diode D5010 across the winding, and was the cause of the trouble. It was surprising that the chopper FET and fuse-link F5030 had held out: had the latter gone open-circuit it would have provided a quicker route to the diagnosis.

Why had the zener diodes failed? It's not the season for lightning, and other possible causes seem remote. The replacements have held out, touch wood - or Mr Johnson would surely have phoned!

## NEXT MONTH IN TELEVISION

### Servicing the Philips Anubis A chassis

The first sets fitted with the initial Philips Anubis series chassis were launched in 1991. Large numbers were sold, and have proved to be extremely reliable. Some are now coming back in part exchange, as customers upgrade to more modern widescreen sets. They are well worth reconditioning for sale as second sets or to those who simply need a cheap TV. Pete Murchison describes the basic operation of the chassis and tells you what to look for when things go wrong.

### Microphone preamplifier project

Keith Cummins found that no modern audio tape recorder provided a microphone input, which can be useful for many reasons. The preamplifier described in this article was designed to meet the need. It includes a pan-pot for moving the voice position within the stereo field, and a mixer stage to provide voice over other programme material.

### Car electrical safety and wiring

Well, we're all looking for more things to do to maintain our work load, so how about automobile electrics/electronics? Provided you don't mind getting your hands dirty for a while, such jobs can be very lucrative. Tom Baker on how to get started: this first article in a new series deals with basic car wiring safety requirements.

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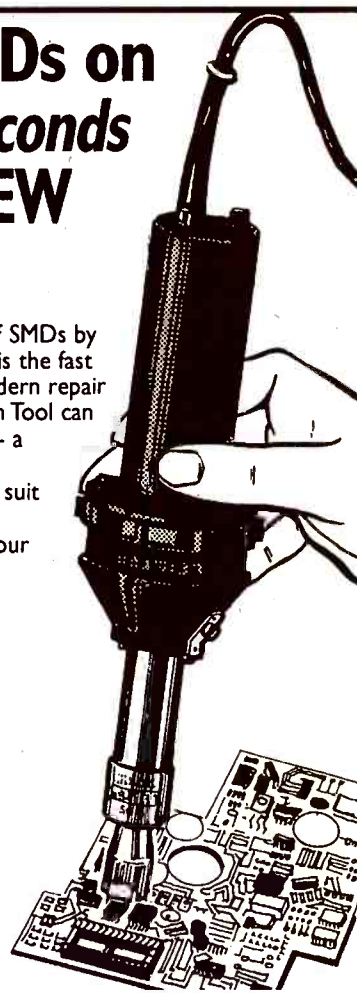
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Reference	8130 8131 8132	
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Gain out 2 (dB)	- 15 7.5	
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Reference	4381 4382 4383	
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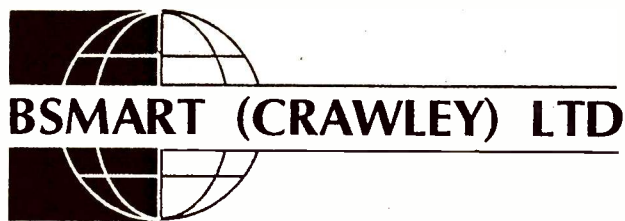
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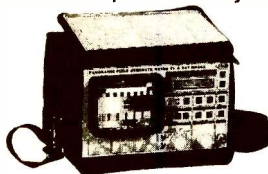
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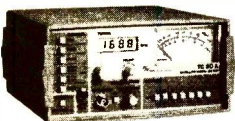


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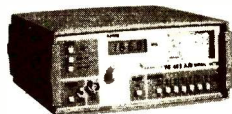
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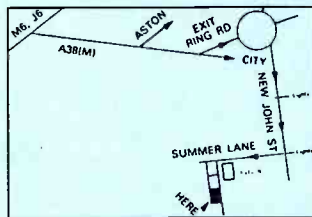
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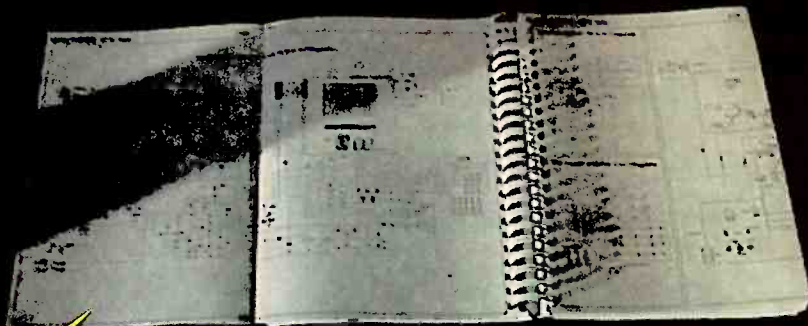
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2433952, 2434141, 2434393	
2434451, 2434492	
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2435064, 2435085, 2435121	
2435372, 2435701, 2436773	
2436792, 2436795, 2436797, 3216001	
243666, 243663	
3220029, 3714016, 47003481	
AT207678, AT207688, AT207825	
AT207781	
D5T81N243/47293-00	
D5T85B235/47328700 & /40153200	
D5T88N234/400086AD, & /478052001	
D5T88N234/47320041, & /47317590	
D5T1862434/473058-00	
TFB3035D, TFB3069D, TFB4023AD	
TFB4039AD, TFB4066AD	

<b>FERGUSON</b>	
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TX10	
TX85, TX86	
TX89, TX98, TX99	
Y260781	
FSY260482	
LOPT RED SPOT	
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TLF1457B, TLF701/6	
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TFB 4038AD, TFB 4110AD	
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