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The Sony conundrum

Sony's difficulties have been apparent for some time. In April 2003 the company announced a surprise, sharp decline in the results for the year 2002 – its electronics division actually made a loss. The announcement led to a decline in Sony's share price to a seven-year low, and sent stock prices in Tokyo to their lowest level since 1982. Various measures and policies were subsequently announced with the aim of turning the company around, but these seem to have met with little success.

In January this year there was what has been called the "Sony Shock 2": the company announced that operating profits for the year 2004 would be over 30 per cent lower than had been forecast earlier. Falling consumer electronics prices were blamed. This time, after making a profit in 2003, the electronics division, which still accounts for some sixty per cent of revenues, made a fairly substantial loss. On March 7 Sony's chairman and chief executive Nobuyuku Idei and president Kunitake Ando announced that they would be resigning, along with the other internal members of the board. A restructuring programme, called Transformation 60, had been launched in late 2003. The aim was to achieve an operating profit of ten per cent by March 2007. It had become apparent that this was not going to succeed.

The new chairman and chief executive, to the great surprise of outsiders, is to be Sir Howard Stringer, a Welsh-born US citizen who doesn't even speak Japanese. He has been with the company for eight years, running the Hollywood studios and music business in the US, and has had considerable success in turning around this side of the company. It is difficult to see how he will be able to go about reinvigorating Sony's core consumer electronics business however, though he will have the support in this respect of Sony's new president, Ryoji Chubachi, who had been head of manufacturing operations.

Sony will be sixty years old next year. Its evolution in recent times has been unusual. As we all know, the company started off as a highly innovative consumer electronics business, with many successes to its name such as the Trinitron colour tube and the Walkman audio system. The failure of the technically excellent Betamax VCR format, mainly because of lack of software support, led the company to invest in Hollywood studios – so that it wouldn't be caught in this

The new chairman and chief executive, to the great surprise of outsiders, is to be Sir Howard Stringer, a Welsh-born US citizen who doesn't even speak Japanese.

situation again. It was always difficult to see how a company that combined such different cultures, Japanese manufacturing flair and expertise and US media flamboyance, could work satisfactorily. In fact it does seem to have worked out, probably because the two sides were largely left to their own devices.

The head of the media section is now to take overall control. He is clearly not going to have an easy time. One dreads to think what might have happened to the electronics side without the huge success of the PlayStation games business. There could still be plenty to come from this, with the newly launched portable machine and the more powerful PlayStation 3 in the pipeline, with its multimedia capabilities. But competition is increasing in this field too, and comfortable margins cannot be assumed.

In fact, overall, Sony's problem is that it has been caught by the intense worldwide competition in the consumer electronics field and the erosion of profitability that this has entailed. The company also blames corporate failures – lack of collaboration and so on. This has in turn been attributed to the company's size and its diverse operations. But it is difficult to see how better communications and staff reductions – Sony had planned to reduce the number of its employees by 20,000 worldwide over three years back in October 2003 – can get round the basic problems its core consumer electronics business faces.

Innovation is required, and there are prospects with CE-IT convergence, the wired-up home and so on. What we have seen over the past few years however is that innovation by itself is no longer sufficient to guarantee success. Whatever you achieve, someone else seems to come along and do it more cheaply. Sony still has some good prospects – the Cell chip alone should guarantee that – and is very unlikely to fail. But Sir Howard Stringer is going to have a difficult time exploiting the possibilities.

HDTV strategies

Cable broadcaster NTL has revealed that it started testing high-definition TV services using ADSL2+ technology last February. This can deliver high-speed data, currently at speeds of up to 18Mbits/sec downstream, via standard copper telephone lines. At present the services to most homes that use ADSL operate at 1Mbits/sec.

Meanwhile BT is planning to offer TV services using IPTV (Internet Protocol TV) technology via its telephone lines, and is developing technology that enables broadcasts with close to DVD quality to be delivered at 2Mbits/sec. It has been in discussions with the BBC and ITV on the use of their content on its IPTV services.

Satellite HDTV broadcaster Euro 1080 has announced that it will start using MPEG-4 this summer, when two new channels will be launched and its current channel HD1 will start to be encrypted. MPEG-2 will continue to be used for some transmissions until 2008.

BSkyB has released more information on its plans for HDTV (see page 325 last month). The service is due to be launched next year. The HDTV set-top box will be a personal video recorder, like Sky+, and will be manufactured by Thomson. It was initially thought that the STB would work only with TV sets that have an HDMI (High Definition Multimedia Interface) or DVI (Digital Video Interface) that supports HDCP (High Definition Content Protection). However BSkyB has informed Sony that, initially at least, the HDTV box will also interconnect with displays that have an analogue component-video input. BSkyB says that users with a display of screen size more than 26in. and an HDMI socket will get the full benefit of the service. As a result of this decision, many who bought a flat-display TV without an HDMI or DVI input will be able to receive BSkyB's HDTV service.

Analogue switch-off trials

The first UK analogue switch-off trials started on March 30, when 460 homes in the Welsh villages of Ferryside and Llansteffan, Carmarthenshire, had their analogue TV signals switched off. Residents were provided with a DTT set-top box and PVR, along with technical assistance. It's estimated that the cost was about £350 per household. It has been suggested that, if re-elected, the government plans to make a formal announcement about the analogue switch-off this summer, and will adopt Ofcom's recommendation of a staggered switch-off across the country.

Ofcom is backing a change to the DTT transmission standard, from 2k to 8K OFDM. This relates to the number of carriers used in the orthogonal frequency-division multiplex. The proposal is backed by the manufacturers' organisation Intellect (BREMA), as it would improve the performance and enable a return to 64QAM modulation. But early IDTV sets and ITV Digital STBs would be unable to decode the signals.

Goodmans has launched a personal media center that incorporates a 40GB hard disk, enabling up to 200 hours of TV programmes to be recorded. The unit, Model GPDR40, measures 110 x 80 x 30mm and comes with software, cables, earphones, a carrying bag and an AC adaptor. Price is about £270. Video from a TV set's scart socket is converted to MPEG-4 form for storage, and can then be viewed on the 3·6in. colour LCD screen. JPEG images can also be displayed, and edited. MP3, WMA and WAV music files can be played, and data can be downloaded via the SD/MMC memory card slot or the USB 2.0 port. Battery life is 2·5 hours.

Digital TV households

The latest figures from Ofcom reveal that at the end of last year over 14·75m households in the UK had installed equipment for digital-TV reception – there was an increase of over 910,000 during the last quarter.

BSkyB added some 177,000 subscribers, bringing the total to about 7,262,000, while the number of households with a DTT receiver rose to almost 4,600,000, an increase of 678,000. The total number of cable TV subscribers was about 3,300,000, with over 2,500,000 receiving digital services.

DRM Alliance

Matsushita (Panasonic), Philips, Samsung, Sony and Intertrust Technologies have formed the Marlin Joint Development Association (MJDA), which will provide content management and protection specifications for the consumer electronics industry. These will enable companies to build DRM (Digital Rights Management) modules for use in CE products for the broadcast, internet and mobile markets. DRM systems enable content owners to control how their material is used by the consumer, enabling audio or video to be copied without limit or not at all for example.

The alliance says that convergence of the broadcast, internet and mobile markets has been affected by the often conflicting proprietary DRM technologies in use. The aim of the Marlin JDA specifications is to enable CE manufacturers to use a single 'technology toolkit' to build DRM functions into their equipment. Version 1.0 of the specifications, and a licensing programme, are expected to be launched this summer.

Optical disc technology

TDK's new coating technology for DVD and Blu-ray discs is to be known as Durabis. The company says that it makes discs scratch, dust and grime resistant, and eliminates the need for a protective cartridge with Blu-ray discs. With the coating TDK has become the first company to create bare Blu-ray discs. A single-layer Blu-ray disc can hold up to 25GB of data and, as the technology develops, discs with multiple layers may be able to store up to 100GB.

Recording this amount of data on a disc that's the same size physically as a DVD requires unprecedented recording media stability and precision. Blu-ray recording uses a narrow track pitch and high recording density. The 0·2mm Blu-ray and 0·6mm DVD recording layers are closer to the surface than with a CD, which means that dirt, scratches etc. can cause more serious recording and playback problems. TDK claims that these are virtually eradicated with the use of Durabis. A high discharge effect means that the disc is able to reduce static and prevent dust adhering to the surface.

Apple Computer is the latest company to announce its support for the Blu-ray disc system.

Macrovision has introduced a new DVD anti-copy technology called RipGuard DVD. The company claims that it plugs the 'digital hole' created by PC-based DeCSS ripper software, which has allowed millions of consumers to make unauthorised digital copies of copyright DVDs in minutes. These copies can then be transferred to a recordable DVD or uploaded on to peer-to-peer (P2P) networks. Macrovision says that RipGuard DVD applies a format-based unique digital framework to each protected DVD title, and that this blocks ripping with the most commonly used rippers.

China has announced the Enhanced Video Disc (EVD) format as a national standard. Work on developing the EVD, as an alternative to DVD, started in 1999. It frees Chinese manufacturers of video-disc players from the need to pay the licence fees required for DVD-branded machines.

Durham CRT plant to close

LG Philips is to close its CRT production plant at Durham with the loss of 761 jobs. Production is expected to cease by the end of July. The plant was opened in 1972 and last year produced 2·5m 17, 20 and 21in. CRTs. Production of 21in. 'real-flat' and 'super-slim' tubes will be moved to China or South America. Price erosion – 30 per cent in the last two years – is blamed for the closure.

Sanyo has introduced a new version of its Xacti digital video camera, Model C4. It has a 4 Megapixel image sensor and can store up to an hour of MPEG-4 video on a 1GB SD card. There's a 5·8x optical zoom and a 10x digital zoom, giving a total zoom capability of about 60x. The unit incorporates digital image stabilisation and interference noise reduction to improve the sound quality, and has a 1·8in. LCD screen. It weighs 159g. Recorded video can be saved on a PC or recorded on a DVD or VCR recorder via the AV connection. The Xacti C4 is expected to sell at about £500.

LCD Course

Following the success of their recent plasma technology course, the College of North West London is running a one-day LCD training course on May 13.

For further information phone Fawzi Ibrahim on 07976 350 724.

LCD technology

ViewSonic has announced the world's fastest LCD screens, with an average video response time of 4msec across the entire colour scale. According to ViewSonic the displays currently on the market have an average grey-to-grey (or intermediate level) response time of 30-35msec. The first ViewSonic monitors to use the technology will be Models VX924 (19in.) and VX724 (17in.). ViewSonic says they are ideal for gaming, DVD viewing, TV and even traditional computer usage, such as rapidly-scrolling content within a website or a document.

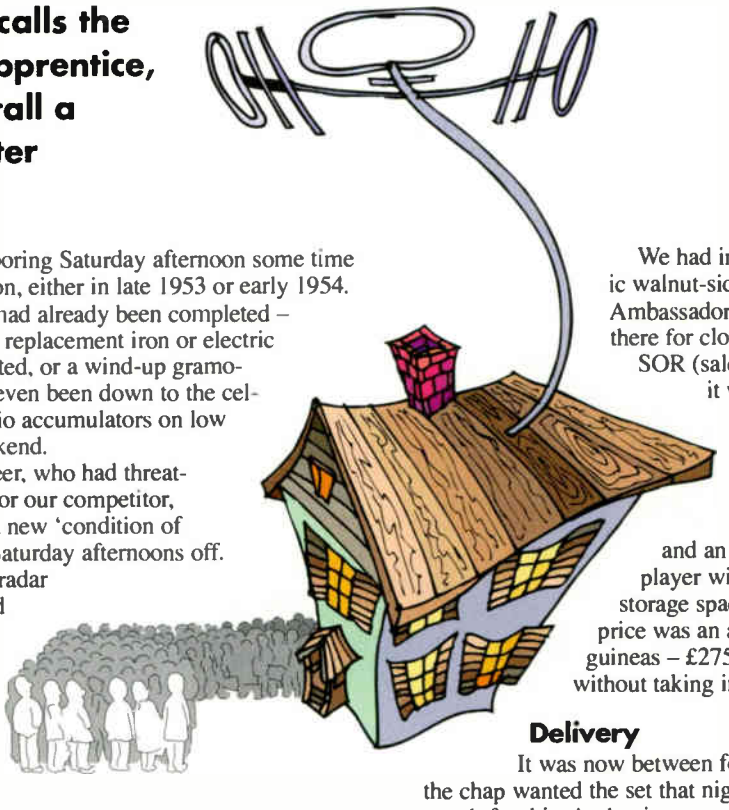
At the recent CeBIT show in Hanover Samsung displayed a massive 82in. LCD display. It uses Samsung's S-PVA (Super Patterned-ITO Vertical Alignment) technology to provide a wide viewing angle, has a response time of about 8msec and, with a low-dispersion colour filter and ultra-high aperture ratio, achieves a contrast ratio of over 1,200:1.

Samsung is to build a second LCD production line at Tanjeong, Korea to produce 1,870 x 2,200 substrates. These will be used for 32, 40 and 46in. TV displays. Production is expected to start during the first half of 2006 at a rate of 45,000 substrates a month. Each substrate will provide twelve 32in., eight 40in. or six 46in. screens.

Sharp has announced the P50 range of "native PAL" LCD TV sets. This means that the 960 x 540 picture resolution matches the PAL transmission standard exactly, with no need for the scaling used by other LCD screens. The disadvantage of scaling is that picture noise is introduced and the image sharpness is compromised. The sets can also handle HDTV, downscaled, and standard NTSC.

A delivery to remember

Alun Rawson-Williams recalls the time when, as a young apprentice, he had to deliver and install a huge TV on a dreary winter Saturday afternoon



I remember it as a boring Saturday afternoon some time after the Coronation, either in late 1953 or early 1954. The week's work had already been completed – there was not even a replacement iron or electric fire element to be fitted, or a wind-up gramophone spring. I had even been down to the cellar to put the 2V radio accumulators on low charge over the weekend.

The Chief Engineer, who had threatened to go to work for our competitor, had just negotiated a new 'condition of work agreement' – Saturday afternoons off. Competent ex-RAF radar mechanics were hard to get at that time, and were at a premium. So he got his way and I was sitting on my own in the workshop, watching an episode of *World at War* or something very similar on a 10in. HMV Model 1807. I would have to wait there until six o'clock, just in case there was a service call that I sincerely hoped wouldn't come.

I hated having to work on Saturdays. At the time I was nineteen, and had just found someone I thought was the girl of my dreams. I was counting every long second until we would meet at the Scala Cinema at 7.45. My friends all finished work on Friday night or at twelve o'clock on Saturday, but I had to work shop hours and my half-day off was on Thursday afternoon, when I finished at one p.m. I had to attend technical college on that day and, to make matters worse, the bus left at 6.15 p.m., returning at 10.45 p.m. Yes, that was the last one. It was a six-mile hike if you missed it. Not much of a half-day off.

The customer and the set

Then into the showroom he came. The scruffiest of individuals, in a much-used trench coat. He had probably that very afternoon bet the whole of his last week's wages and come up with a Yankee Double. Anyway, he was dangling a large bundle of pound notes in front of my boss's nose.

We had in the showroom a titanic walnut-sideboard style 15in. Ambassador TV set. It had been there for close on three months, on SOR (sale or return). I suppose it was what would today be called a combi model. There was a TV section in the middle, a radio and speakers to the left, and an autochange record player with, bellow it, record storage space to the right. The price was an astronomical 245 guineas – £275.25 in today's money, without taking inflation into account.

Delivery

It was now between four and four thirty, and the chap wanted the set that night and was prepared to pay cash for this. At the time my pay was £3.75 per week. The first offer I received to get the set installed was £3. Not on! Then £5 (over a week's wages) was offered. I refused that too, but agreed when the use of one of the firm's two-cylinder Jowett Bradford vans for the night was offered. I would be in time to meet my new girlfriend! There was no passenger seat in the van, just a loose wooden box with an old cushion on it. So not much use for courting.

Installation

The gigantic set was loaded into the van, well padded with cardboard boxes and a box that contained an Antex X Channel 2 aerial, for Holme Moss, and a chimney-lashing kit. At that time installation meant doing the whole job. I shot off to the address, Canal Lock Cottages, about four miles away to get the job done as quickly as possible. The set's new owner followed on his bicycle.

On my arrival I decided to get the worst job, erecting the aerial on the chimney, done first. The owner would take a little time to catch up with me, and I would need him to give me a lift with the titanic Ambassador. Aerial installation took me about three-quarters of an hour, at the

end of which I decided I would need a bath – later, before my date. There must have been a hundred years' soot and grime on that roof.

By now the customer had caught up with me and we struggled in with Titanic, moving towards the front parlour. The next quarter of an hour was spent discussing what would have to be removed to make room for the set. The final decision was that the piano would have to be moved into the kitchen. We accomplished this successfully, after my right-hand knuckles had been jammed between the piano and the door post as the enthusiastic new TV owner and his wife pulled it from the front while I pushed it from the rear.

By now there were spectators outside the house, in the hall and in the parlour. They seemed to have moved en mass from the local rugby ground to see the new television set. Once the owners had finally decided where the set was going to live I proceeded, with difficulty, to hand-drill a hole in the window frame for the aerial lead, then connected the coaxial plug. After that I looked around for a mains socket.

At the time you had to carry about a dozen plug types to fit the different sockets that were in use in various parts of the town. Even double-bayonet bulb adapters with twisted pair cable, dangling from the ceiling, were used as mains plugs. But I hadn't thought to look at the room's light source, which turned out to be a gas mantle. Instead I asked the wife where the nearest mains socket was. "Oh, we haven't any electricity here lad" she said, quite innocently and surprised, "we've only got gas."

I looked at my dishevelled condition, which had not been helped by the soot from the roof and the piano removal from the parlour. Well, I thought, at least I wouldn't have to demonstrate how to use the set. You had to show what all the preset controls did at least three times, and in a week's time you would be called back to put them right again. I managed to get to my date a little early that evening.

Monday morning

Now who was standing in the shop doorway when I drove up in the Jowett on Monday morning? It was Mr Banknotes himself, talking to my boss. The result of this conversation was that he bought a petrol generator, and proposed to supply the other canal-side cottages with power, unofficially, for a charge.

Outcome

My boss made a mint supplying the local residents with Cossor 927 and Bush TV24 TV sets. Within five years he had retired to a cottage in Wales.

The date that night was unfortunately a flop. But I eventually found Miss Right and, after I had qualified and did my National Service in the RAF, we married. We still are.

A declaration: the above story is absolutely true, though I've omitted names and exact locations to save possible embarrassment to any of those involved who may still be alive. I doubt it however, as half a century has past since the events took place.

I wonder however whether I should be claiming industrial compensation damages, because when it's cold and damp I feel a little stiffness and soreness in the knuckle joints of my right hand. Or is it possibly rheumatism setting in?

Test report:

Remote-control extenders

J. Quentin Bullock tries out two entirely different types of extender that provide remote control beyond the range of the normal RC handset

I was prompted to write this report because of several problems that are supposed to be non-existent: the hearing difficulties of a certain Donald Bullock; the reduced speaking clarity of those around him, particularly the long-suffering Greeneyes; and the increasingly woolly quality of the tape inserts in the BBC Radio 4 *Today* programme. While he is unlikely to admit the truth of the first of these problems, I'm sure that Donald, my father, will readily – even eagerly – agree to the accuracy of the others.

Because he is never without a pen in his hand (we seldom notice the whiskey glass in the other) Donald is known at home as The Scribe. He doesn't object to this, possibly because it makes him feel important. Anyway, when his Akai audio system began to develop the same troublesome traits as Greeneyes, he decided that it was time to pass it on to me and invest in the complete Technics separates tower system he'd wanted for years, complete with a graphics equaliser and a Memorex multi-speaker system. The performance of this lot delighted him, but he had to agree with Greeneyes that when its six units were placed beside the existing satellite receiver, VCR and DVD player (see Photo 1), they were all too noticeable in her nice, cosy lounge. After all, each of the Technics units is almost eighteen inches wide and several inches high. And, because he isn't really as spiky as he paints himself, he readily agreed to stack the units in the lesser-used space just the other side of the room-divider.

The problem

But his attempts to send remote-control signals through its spaces and bounce them off the wall failed. So, to save himself the chore of having to think too hard, he asked his *Television* readers what he might do about it. Dozens rushed to his aid, all recommending infra-red extenders of one make or another. Since I can operate computers and he can't, he asked me to surf the net to find him the best one for his needs.

Help from the web

Google immediately directed me to www.satcure.co.uk, a particularly well-constructed website. It offered not only an assortment of remote-control extenders but a vast array of equipment that was accompanied, unusually, by an extensive feast of technical information. I began by studying the Welcome homepage, and was soon drawn in. As with all websites, the homepage is the first one you see, and is therefore the most important. SatCure's website proved to have an easy-to-navigate menu system that lists all its relevant sections, from FAQs (frequently asked questions) to the Online Catalogue and Technical Help section.

The website, again unusually, offers a variety of downloadable E-books, many of which are free. To save the user further time and money, the Online Catalogue is available as a download for those who use a dial-up connection, so that they can browse through it off-line at their leisure. Intrigued with what I had seen so far, I clicked on the 'catalogue menu' button. This brought up a page that stated, surprisingly, that the catalogue is also available in audio format!

It seems that very little has been overlooked at the website. Further on, the catalogue is broken down into sections, with everything categorised and made simple to follow. I found my way to the section I

Photo 1: Donald Bullock's collection of AV boxes created a remote-control problem that was solved by the Marmitek Powermid extender system

wanted quickly and easily, and clicked on the opening link.
The remote-control extender section began by informing me fully about each type on offer and how they work, with additional notes about its best application. In addition, there's mention of any problems to which a given system might be susceptible, a feature that illustrates SatCure's policy of truly fair trading.

System selection

From the information provided, a remote-control extender known as the Powermid XL, Model ST10E, seemed to be interesting. After clicking it to add it to the shopping cart I was taken to a new page that was clearly designed to ease my way around the site. I activated a drop-down list of five delivery options, entered the name and address and proceeded to the method of payment options. It was then a very simple matter to complete the order.

By now I was finding the website absorbing. I returned to its main page and clicked on its 'technical' section. There is a vast array of information. No matter how much knowledge one has, this section adds to it. I perused the e-book list, downloaded two or three titles that are free, then moved to the Forum page, where people are invited to chat amongst themselves, exchanging knowledge on a variety of electronic subjects. From there I moved to an in-depth section that dealt with the FAQs. This, I discovered, is also available in an audio format. All in all I concluded that I had, by accident, stumbled upon a very fertile website indeed!

Transmit-receive extenders

But to return to remote-control extenders. These usually consist of two separate units. One receives the infra-red output from a conventional remote-control unit and retransmits this as an RF signal. The other unit, at the remote location, receives the RF signal and converts it back to an infra-red output. Thus by positioning each unit carefully the infra-red handset will effectively work 'around corners', and even from one room to another one.

On inspection the Powermid XL gave the impression of being a thoughtful design of excellent manufacture. The two receiver/transmitter units are of identical size and are pyramid-shaped (see Photo 2), being just over four inches high and three inches wide. A slender telescopic aerial at the top extends only a matter of inches. The finish is a tasteful matt black.

Testing

On test we found that the IR receiver is highly directional. It needs to face the direction from which the remote-control signal comes quite accurately. The transmitter section converts the IR information to RF at precisely 433·92MHz. This is picked up by the RF receiver, converted back to IR and retransmitted to the equipment to be controlled. The stated range of the transmission is 60 metres. Additional RF receivers can be supplied, enabling a wide range of equipment around the house to be controlled. A novel extra that could be useful is available: a tiny IR transmitter at the end of a long lead that plugs into the RF receiver unit, enabling equipment housed, say, inside a cabinet to be controlled.

We placed the IR receiver on the cabinet shelf that had originally housed the Technics and ancillary equipment and the IR transmitter in the other room, on a shelf facing the equipment in its new position. The system performed very well, though one or two points need to be made.

The stated range of the IR receiver, that is the distance between the Powermid IR receiver and the infra-red remote-control handset, is given as six metres, marginally less than 20ft. At this distance we found that the remote-control signal has to be aimed quite accurately if the Powermid is to pick up the signal first time every time. In addition the Powermid IR transmitter is highly directional and must face the equipment to be controlled accurately.

Both units have to be plugged into a convenient power point. A slight problem with this is that, because the units are lightweight, the weight of the power leads can, when fully extended, pull the units slightly askew, particularly if they are brushed against. An ideal remedy would seem to be to use a lighter and more flexible power lead, or make the units a little heavier. We got round the problem by applying a little dab of Blue-Tac beneath each Powermid base.

The Global tvLINKplus extender

Meanwhile Mike McNeill of Global Communications (UK) Ltd. had sent us a couple of extender systems (see Photo 3) that work on a different principle. They seemed to be the answer to a dream for a chap like me. I often set up the Sky receiver/decoder downstairs then watch TV in bed upstairs: before long I might want to change the channel, but I'm usually too lazy to bestir myself.

The units are called the tvLINK and the tvLINKplus. The former consists of a small tvLINK unit with a cable-connected infra-red remote 'eye'. It has been designed to work with Sky digital receivers, making use of their built-in tvLINK function. These receivers have a second RF output to feed an additional TV set that's usually in a different room. You connect the unit in line with this coaxial feed, at the second-set end. The infra-red remote eye is used to pick up commands from the Sky remote-control

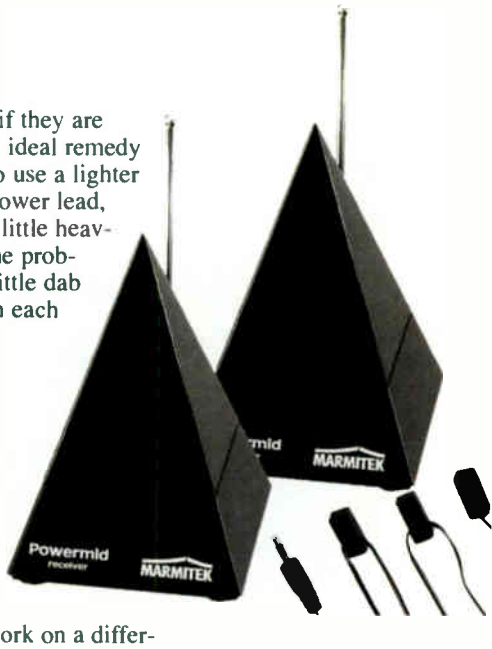


Photo 2: The constituents of the Powermid remote-control extender system.

Photo 3: The Global tvLINK system, top left, and the additional items for the tvLINKplus system. These systems are designed for use with a Sky digibox's second RF output.

Photo 4: The Powermid IR receiver/RF transmitter unit atop Donald Bullock's TV set.

handset, used at the remote end of the link. These commands are sent back down the coaxial cable to the Sky receiver. It's a simple way of changing channel at the receiver from a location that's beyond the range of the Sky remote-control unit.

The tvLINKplus extender kit has been designed for those who may wish to control not only the Sky receiver but additional equipment in another room. It includes the following additional items: a tvLINKplus adaptor, a power pack for this, a set of easy-fit connectors with infra-red emitters, and a coaxial connecting lead. By using this kit in conjunction with the basic one you can control a wide range of extra equipment, such as a DVD player, VCR, etc.

The tvLINKplus's infra-red emitters have reasonably long leads so that they can be placed close to the units to be controlled, facing the IR input area. The remote eye at the second-set location receives commands and feeds them via the cables to the tvLINKplus unit, which directs them to the strategically-placed infra-red emitters.

The system seems to have been very cleverly thought out – but how would it behave on test? Having set it up we found that it worked very well indeed, with no disadvantages that we could detect. It's non-invasive, which pleased my new wife Blue-eyes, and in fact seemed to be tailor-made to suit our particular requirements. We can now fully control our Sky digital receiver, which is installed in the lounge downstairs, from the comfort of our bedroom.

In conclusion

This pair of totally different remote-control extender systems now serves the requirements at our two homes perfectly. Most evenings now The Scribe will be found settled contentedly in his armchair, barely moving a muscle, with a whiskey in one hand and a remote-control unit in the other, deftly sending his commands via the Powermid XL.

At my house I can loll about on the bed and impress Blue-eyes by deftly employing my innate cleverness (from my mother's side, of course) to control our world, with not a digibox in sight. All by courtesy of the Global tvLINKplus.

Availability

The Powermid XL remote-control extender, which is manufactured by Marmitek, was obtained from SatCure Distribution, PO Box 73, Oakengates, Telford. It sells at £34.95 plus VAT. The website is at www.satcure.co.uk

The tvLINKplus is available from Global Communications (UK) Ltd., Winterdale Manor, Southminster Road, Althorne, Essex. It sells at £23.10 plus VAT. Email enquiries can be sent to mikemcneill@globalcom.co.uk The website at www.tvlink.co.uk provides information on the full range and has online ordering.

Test Case 509

Some fault descriptions are just too vague, and it seems to those in the Test Case workshop that the shop and the outside staff do little to help in getting precise fault details from customers. This is especially important when the fault is intermittent. A typical recent example was a Bang and Olufsen VCR: the job card with it simply said "poor playback". When Sage tried it out the playback looked perfectly OK to him, so he made a few ripples on the telephone, initially with the assistant who had accepted it and then with the customer himself. "Line across the picture" was the best he could get, so the machine was taken to the soak-test bench. It ran through a three-hour test tape many times with no sign of any trouble. With a different prerecorded cassette however there was, for a few seconds only, a kind of squeal from the machine and a 'corrugation' of the picture – the vertical picture features became squiggly, so to speak. A sample tape was therefore requested from the customer.

The machine was fitted with the Philips Turbo deck, which is used in many Philips VCRs such as Model VR608. Once the customer's Scotch-make cassette had been inserted it ran trouble-free for many hours with the top off the machine. The symptom finally appeared again, exactly as previously described. Normality had returned to the picture and sound by the time Sage dashed over to the machine, but he had seen this symptom several times during the many years he has been servicing VHS decks. It has always occurred because the rotary sleeve on the entry or exit tape guide had juddered on its shaft. This makes the tape vibrate. Sage couldn't instigate the fault, nor prove his diagnosis, but he obtained agreement from the customer to repair the machine by replacing and aligning both main tape guides. This was done, then the machine was confidently returned to the customer – with quite a high bill.

So there was something of a furore when, two weeks later, the machine bounced back into the workshop with, allegedly, the same fault as before. It was accompanied by a Scotch tape. Sage assumed that the fault effect had been recorded on the tape before the repair, but when it was played back by another machine there was a perfectly good picture throughout the recording. When it was played back by the B&O machine however there was occasionally – very occasionally! – the picture corrugation and audible-squeal symptom. No doubt many readers will identify with this type of bounce-back, obscure-fault problem. Clearly the tape-guide sleeves were not responsible this time!

Whether because of a change in temperature, humidity or whatever in the workshop, or perhaps because of the new phase of the moon or a change in wind direction, the fault was now showing up more frequently – to the point where there was a reasonable chance of tracking down the cause. Sage found that the symptom disappeared when the tape's back-tension was eased off, but doing this was not a solution to the problem of course. The pinch-roller assembly was exonerated by substitution. The stationary tape-guide pins were declared innocent one by one as the tape path was diverted away from them, with the fault persisting. What horrible conclusion was there to this little tale, and what was the final upshot? All is revealed on page 443.

Wireless CCTV

with remote switching

A 2·4GHz AV sender can be used to provide wireless connection to a CCTV camera. Where more than one camera is involved, the 433MHz return path can be used to provide switching between cameras. Ian Rees describes a relay-operated switcher that implements this option for a two-camera system

There are times when it's not possible to connect a CCTV camera at a particular location via cable. A 2·4GHz audio/video sender can sometimes be used to overcome the problem. These devices transmit good AV signals over a distance of 100m line-of-sight or 25m through walls. A combined AV transmitter and receiver originally cost over £200, but can now be bought for less than £40. They are mainly used in domestic TV installations to supply AV signals to other rooms wirelessly, and include a 433MHz return path. This can pick up infra-red signals from an RC handset at the remote location and transmit them at 433MHz to the main TV set location, where they can be used to change channels etc.

A single camera fitted with an AV transmitter works well, but remote switching is required where more than one camera is involved. This article describes a two-camera, relay-operated switcher that's controlled by the 433MHz return path.

System in outline

Fig. 1 shows how the system works. The default camera signal comes from CAM1. A flash from the infra-red remote-control unit at the receiver end is sent via the 433MHz return path to the transmitter, where the original IR signal is reproduced by a plug-in magic-eye unit. The output from this is picked up by the infra-red receiver in the AV switcher, which is positioned about 13cm away. It flips a sixty-second timer that activates a relay to switch from CAM1 to CAM2. When the timer resets, it switches back to CAM1. The operator can reselect CAM2 by using his IR remote-control unit again.

Any type of remote-control unit can be employed, as only the flash it produces is used, not the code it carries.

Switcher circuit

Fig. 2 shows the simple switcher circuit used. Transistors Tr1 and Tr2, connected as a Darlington pair, amplify the signal received by the infra-red photodiode IR. Tr3 is forward biased by R4, with C1 to provide input signal coupling. When an IR flash is received, Tr3 and IC1a produce an output pulse that triggers the timer circuit formed by IC1b and IC1c. This operates the relay via its driver transistor Tr4. Once triggered, the timer will ignore further flashes until it resets. The timing period can be changed by altering the *CR* ratio of R7 and C3. IC1 is a quad two-input NOR gate. Note that it's good practice to disable any unused CMOS gates (IC1d here) by connecting them to the positive or negative supply line: this prevents instability in the IC.

Switching arrangements

Use of a double-pole changeover relay provides a couple of switching options, as shown in Fig. 3. Option (a) switches the power to and the video from the cameras. This is useful where camera 2 is idle for most of the time and power is limited. A short frame-lock delay can occur at switchover however. Where both cameras are powered and video cross-talk is experienced option (b) mutes the unused channel. The switcher's output connections are via pins 17 and 19 of a scart socket.

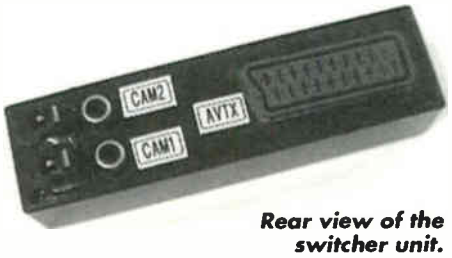
Sound and powering

Two separate microphones can be connected directly to the switcher's scart socket, at pins 1 and 3, to relay sound back to the monitoring location.

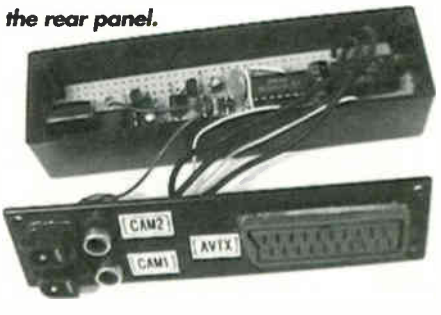
A small DC mains adaptor can supply the power for the cameras and the switcher. The switcher draws a maximum current of 50mA at 12V DC, with the relay energised.

Far right: Internal view of the switcher unit, showing the connections to the rear panel.

Front view of the switcher unit.



Rear view of the switcher unit.



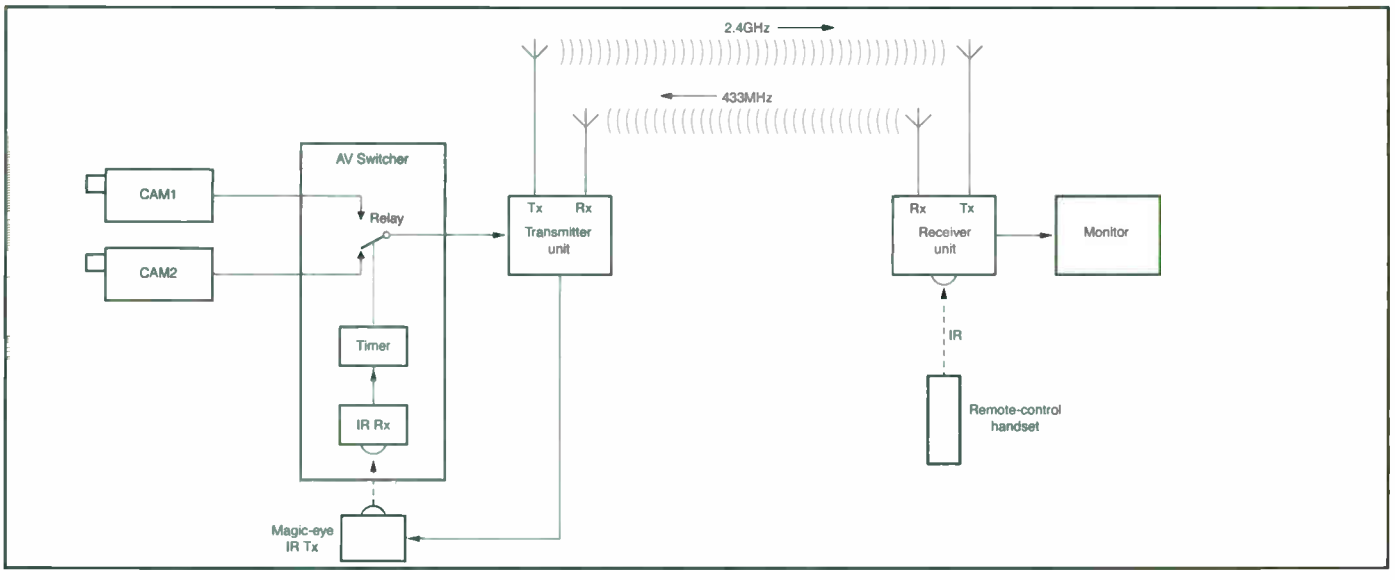


Fig. 1: Block diagram of the AV-sender CCTV system with camera switching.

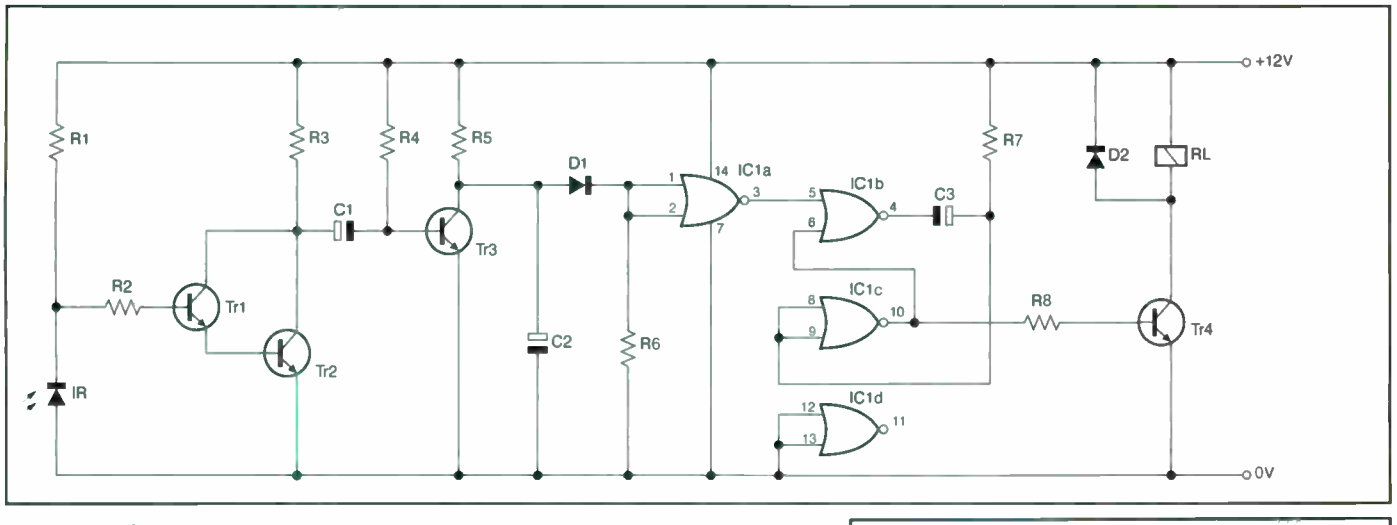
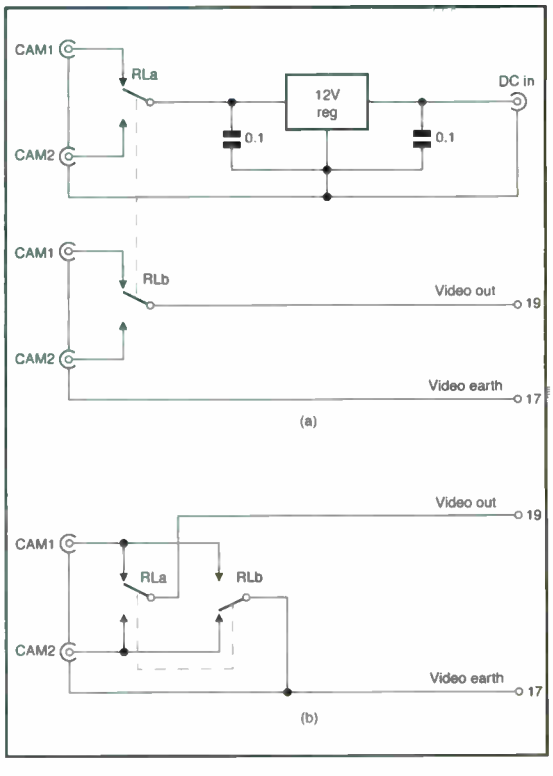


Fig. 2: (above) Circuit diagram of the infra-red signal operated CCTV camera switcher unit.

Fig. 3: (right) Switching arrangements that can be used with a double-pole changeover relay. (a) Power and video switching. (b) Video switching plus channel mute.



Parts list

R1, R4	220kΩ	C1, C2	1µF, 25V	Tr1-4	BC547
R2, R3, R8	10kΩ	C3	100µF, 25V	D1, D2	1N4148
R5	5·6kΩ			IR	2256 IR photodiode
R6	120kΩ			IC1	CD4001/MC14001
R7	820kΩ				

All resistors 5%, 0·25W carbon
Wireless sender units
Miniature relay type 47. 12V, 700W coil, DPDT
Scart signal socket
Phono/BNC signal plugs/sockets
Concentric power plugs/sockets

Vintage push-pull audio output stages

J. LeJeune takes a look at some of the push-pull audio output stage circuitry used in the era of valve equipment, including a transformerless circuit from Philips

During the era of valve radio receivers and radiograms the use of a push-pull audio output stage was the mark of a superior product. Sets that provided higher audio power with low distortion were generally aimed at homes that had spacious drawing-rooms, with possibly an abundance of soft furnishings.

In the period from the Thirties to the Sixties the average output pentode could deliver up to 4W RMS in a Class A single-ended output circuit, but with 10 per cent total harmonic distortion. Valves such as the 6V6, 6L6, KT63, PenA4, EL34, EL81 and KT66 were of beam-tetrode or pentode construction and, when used in a push-pull output circuit, could deliver a hefty output with only small amounts of harmonic distortion. Many of today's audio buffs maintain that a push-pull pair of KT66, EL34 or KT88 valves can provide the finest audio quality. Certainly they make very rugged output stages, but high anode voltages and a weighty output transformer are required.

The inclusion of a push-pull output stage in yesterday's radio receivers was the equivalent of supercharging a car engine. Amongst the many designs there were some memorable ones. We'll take a look at a few of them here, to give an impression of what was involved and different design approaches.

The Ferguson 500RG

The circuit used in the Ferguson Model 500RG, which dates from about 1952, was ingenious in doing without a phase-splitter driver stage. Instead, cathode coupling was used in the output stage, which employed a pair of EL37 pentodes, V7 and V8, with a 350V supply. See Fig. 1.

Prior to the output stage there were three audio amplifier valves, V4-6, all EF40s. The output from the final EF40 was DC coupled to V7 via R61. V8's audio input was fed to its cathode, via C77, the signal being developed across R63 in V7's cathode circuit. Cathode drive has the opposite effect to control-grid drive of course, so the required signal phase reversal was achieved. It was an unusual way of applying push-pull drive. In fact the drive was slightly unbalanced and, to compensate for this, the output transformer's primary winding had

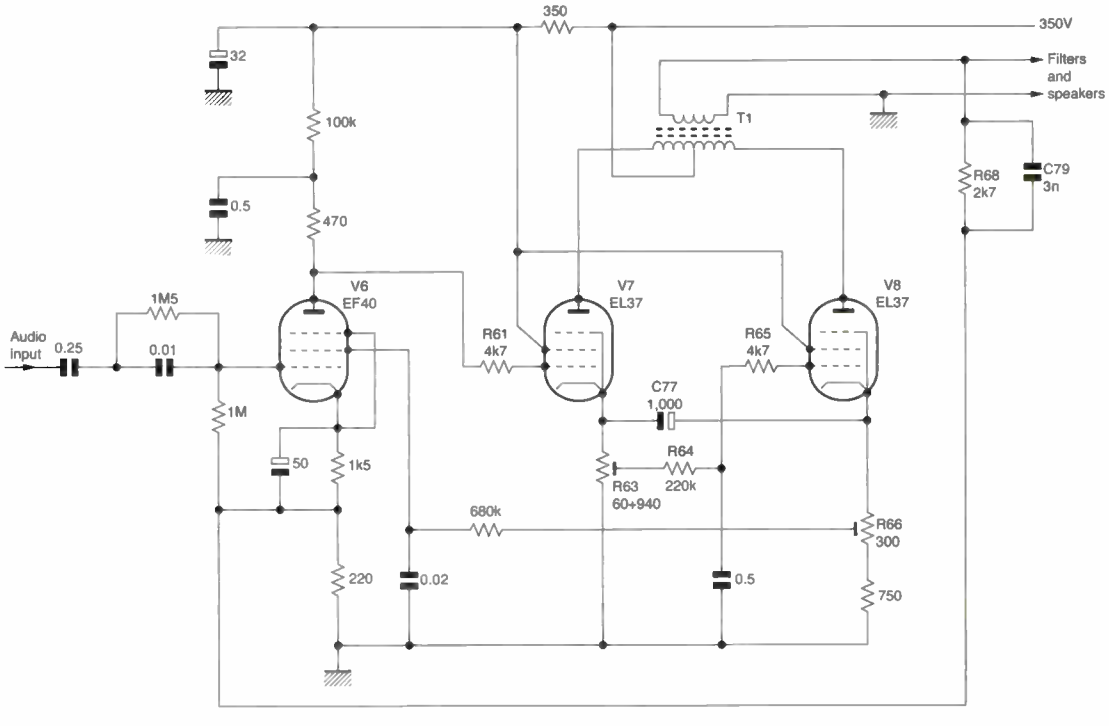


Fig. 1: The push-pull audio output stage in the Ferguson Model 500RG used cathode coupling.

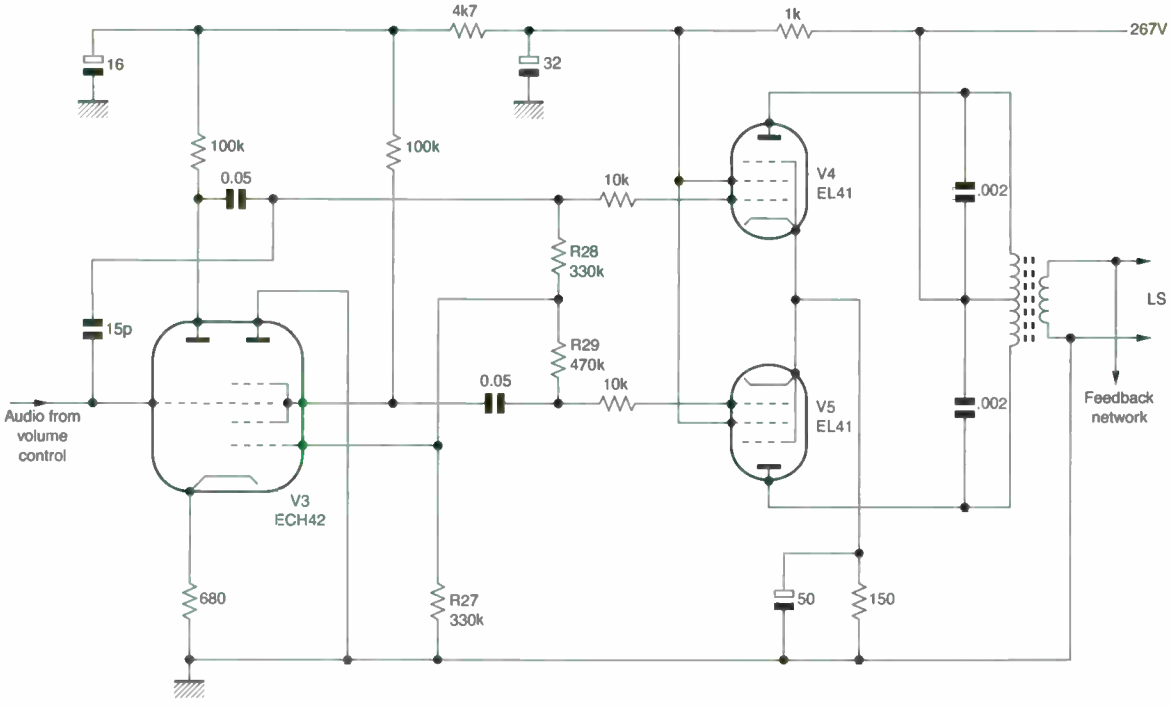


Fig. 2: The Pye Model P76RG used a triode-hexode frequency-changer valve as audio amplifier and phase inverter.

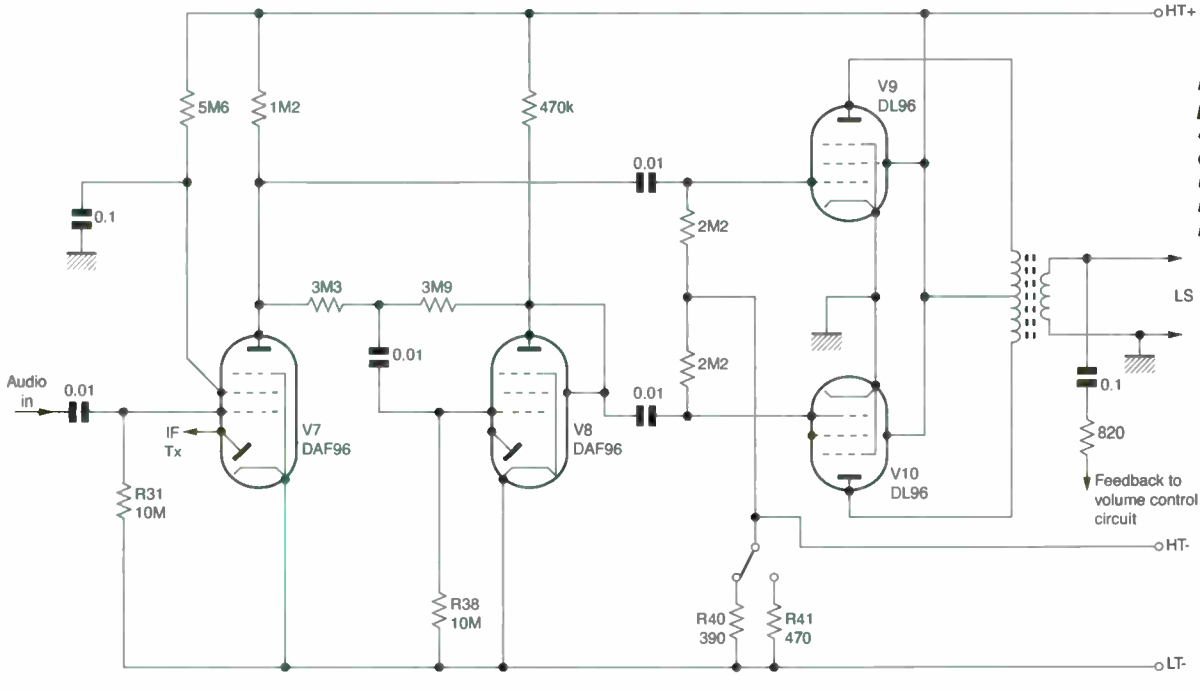


Fig. 3: The push-pull audio output circuitry used in the Ever Ready Sky Monarch.

an asymmetric tap. There was also adjustable feedback to V8's control grid via R64 and R65.

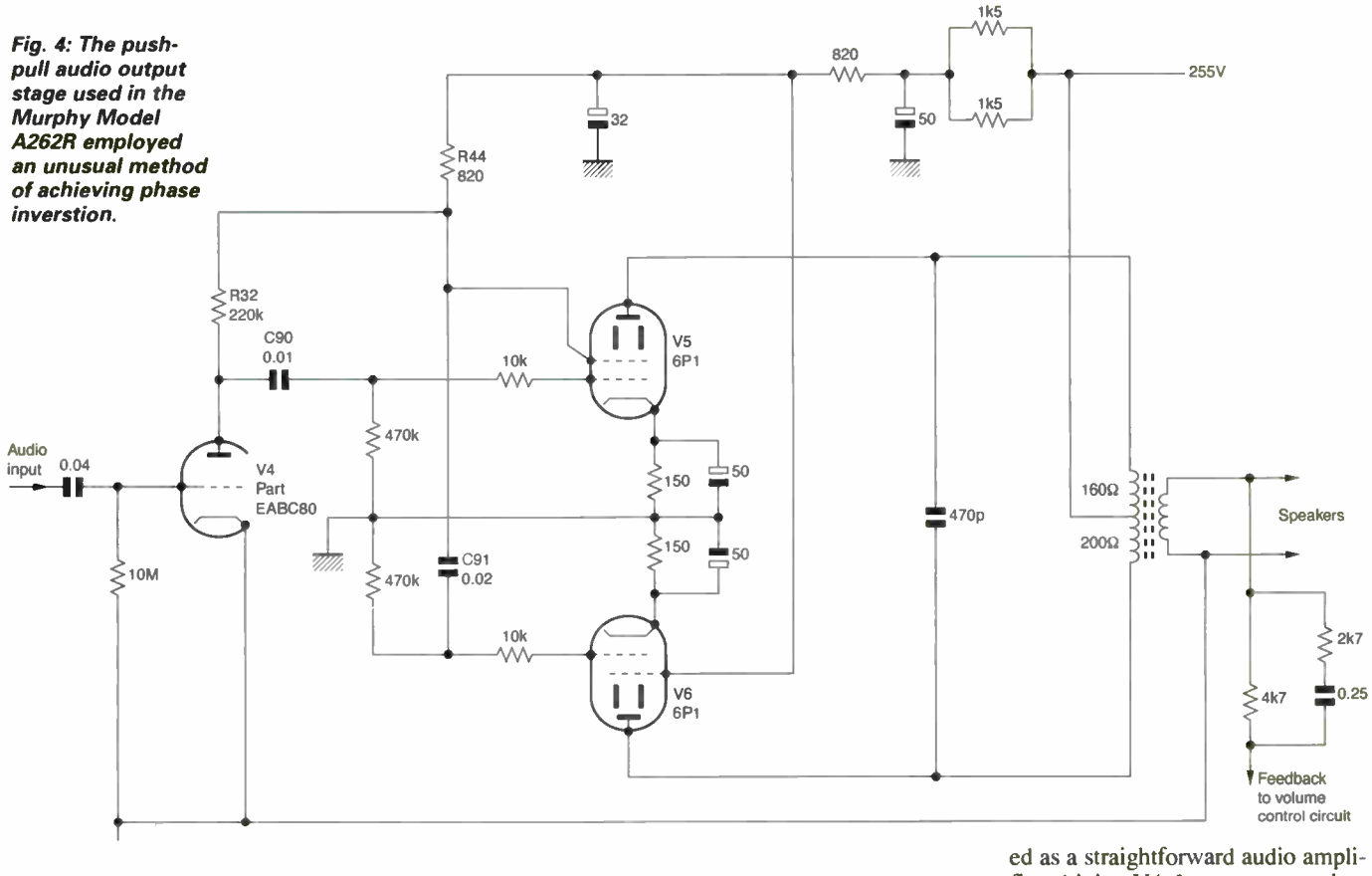
R66 was used to adjust the cathode current in the output pentodes, at 200mA. This was achieved by feedback to V6's screen grid, which was operated at low voltage. Conventional negative feedback was applied to V6's cathode circuit via R68/C79. The circuit delivered 14W RMS maximum before distortion rapidly set in.

The AC/DC version, Model 400URG, was less sophisticated, with fewer audio stages and a pair of UL41 output pentodes in a similar cathode-coupled circuit. The 500RG had a separate chassis for the output stage and power supply. For obvious reasons, the 400URG was built on one 'live' chassis.

Diversity

Philco used a push-pull output stage in its car radio Model CR3696A, with a vibrator power supply. It used a pair of 6AQ5 output tetrodes. The circuit was standard stuff, with a triode used as a 'concertina' phase splitter, i.e. its load was split between the anode and cathode circuits, so that opposite-phase outputs were obtained at the anode and cathode to drive the output valves. The set also boasted two IF amplifier stages, and was made in 6V and 12V versions.

At the luxury end of the car radio market the Radiomobile 200X and 202X tuner units could be used with either a single-ended output unit, type XA, or a push-pull output unit, type XB. The latter had a pair of 6AQ6 output valves and a 6AT6 double-diode triode as the inverter. The output pair consumed 68mA quiescent current at an anode volt-



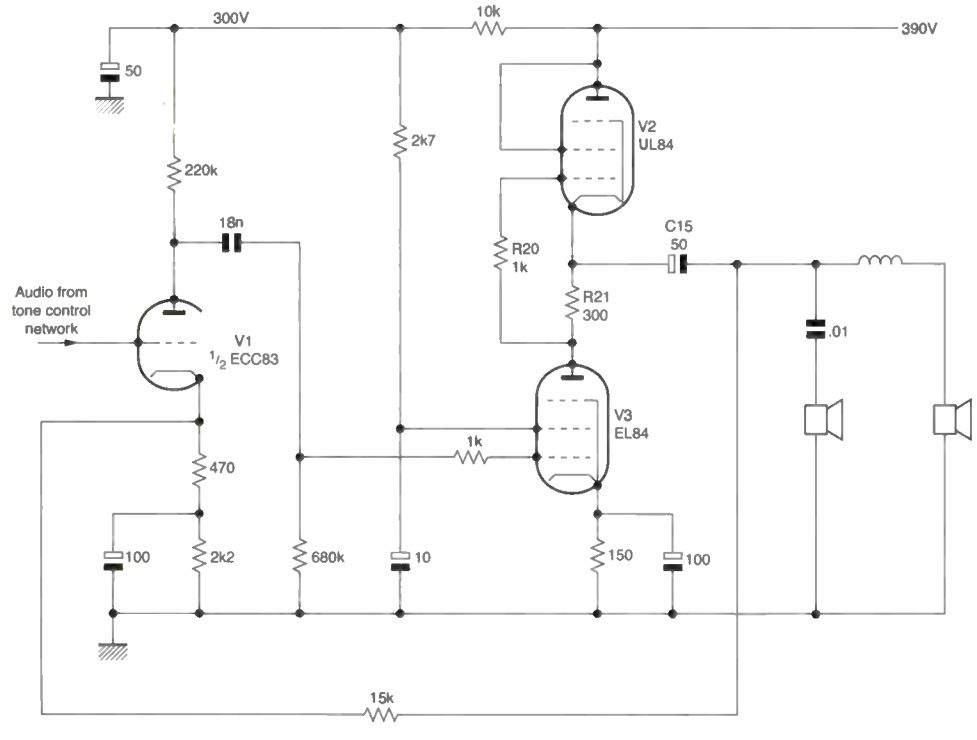


Fig. 5: The transformerless push-pull circuit used in the Philips record player Model AG2126.

age of 260V, which was derived from a vibrator power unit. With a 12V battery the total receiver current drain was 7·9A!

Another memorable receiver was the Pye P76RG, which used a pair of EL41s in a conventional push-pull output stage, see Fig. 2. What was not conventional was the use of an ECH42 triode-hexode frequency-changer valve, V3, as the audio amplifier and phase inverter, nor the way in which it was used. The triode section of this valve was operated as a straightforward audio amplifier, driving V4. Its output was also fed via the potential divider R28/27 to the control grid of the hexode section, which provided an output to drive V5 at its screen grid – its anode was connected to chassis. With this type of circuit the attenuation provided by the potential divider should equal the working gain of the inverter valve.

The Ferranti 435 used an ECL80 triode-pentode for phase inversion, in a more conventional arrangement. More interestingly, the output valves were type PL82. This universal chassis could provide about 12W of audio with an HT voltage of only 215V.

The Ever Ready Sky Monarch ten-valve battery-operated AM/FM receiver was described as a "table radio" rather than a portable. Three of the valves were for FM use only. The push-pull output stage used a pair of DL96 pentodes whose grid bias was varied between AM and FM operation, see Fig. 3. The grid bias resistor was R40 (390Ω) for FM, R41 (470Ω) for AM and gramophone use. The lower value used for FM was because of the higher current drain in this mode – an extra 17-20mA. A pair of DAF96 diode-pentode valves were used as audio amplifier and AM detector (V7) and phase inverter (V8), the latter being operated as a triode. These valves both used grid-current

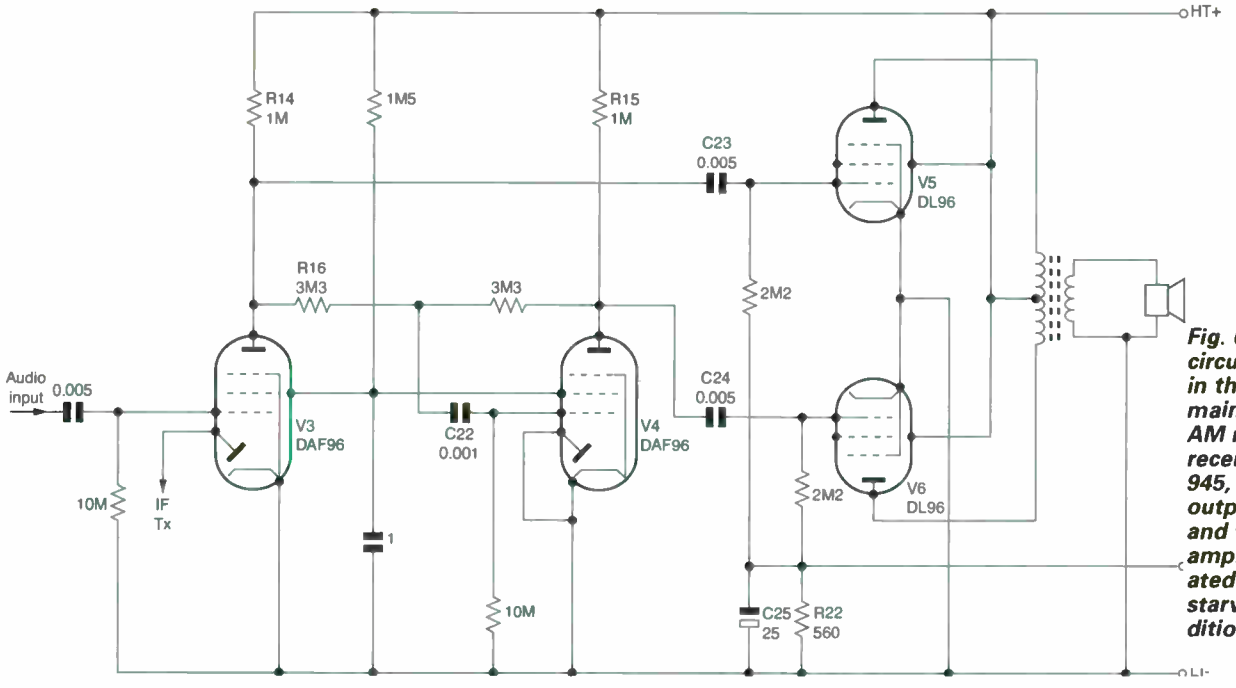


Fig. 6: Audio circuitry used in the Ferranti mains/battery AM radio receiver Model 945, with a QPP output stage and the audio amplifiers operated under starvation conditions.

bias via the 10MΩ resistors R31 and R38. Negative feedback was fed from the secondary side of the output transformer to the volume-control circuit.

More radiograms

The Pye FenMan II could provide headaches for the service engineer. Its push-pull output stage was conventional, with a pair of EL84 output pentodes. The phase inverter was the triode section of an EABC80 triple-diode-triode valve, two of whose diodes were used in the FM detector circuit. Prior to that there was a triode audio amplifier, and further back a preamplifier that was the triode section of a triode-heptode – the heptode section was the AM frequency changer. This involved quite a lot of switching.

Murphy was always an innovative firm. Model A262R, which dates from about 1957, used a very unusual way of providing signal inversion to drive the second beam tetrode valve in the push-pull output stage, see Fig. 4. The output valves V5 and V6 were type 6P1, the triode section of an EABC80 valve being used as the audio amplifier (V4). The input for V6 was obtained from the screen grid of V5, via C91. As with the previously mentioned Ferguson circuit, the primary winding of the output transformer had an asymmetric tap to obtain correct balance. It's interesting that V5's screen grid load resistor R44 also forms part of V4's anode load, providing a form of feedback.

A transformerless circuit

Philips went transformerless with its record player Model AG2126, see Fig. 5. This used a UL84 valve (V2) and an EL84 valve (V3) in the output stage, with output coupling to the loudspeakers via C15. It should be noted that the loudspeakers have an impedance of 800Ω each. Operation of the circuit is not complex. With no audio input, the Class A conditions are the same for V2 and V3 and no current flows into the load. A positive-going input at the control grid of V3 increases its anode current and, as a result, the voltage across R21 increases. The fall in voltage at the anode of V3 is connected to the control grid of V2 via R20, reducing its anode current. This is a form of push-pull operation, with C15 being charged via V2 and discharged via V3. The valve types have to be carefully selected, which explains why they are not exactly the same. The HT supply is 390V, and the output pair draw a quiescent current of 46mA. The impedance between chassis and the cathode of V2 is only 13Ω, which ensures good loudspeaker damping.

A QPP output stage

Finally the Ferranti mains/battery receiver Model 945 used a QPP (Quiescent Push Pull) output stage, see Fig. 6, with the output valves biased to near cut-off, i.e. Class B conditions. As a result there was very low current drain at low volume and with no output. V3 is a DAF96 diode-pentode whose diode section acts as the AM detector. The recovered audio is fed to the control grid of the pentode section. Because of the very value (1MΩ) of its anode load resistor R14 the pentode operates as a starvation amplifier. It provides the input for one of the DL96 output pentodes, V5, and also feeds the phase inverter valve V4, via R16 and C22. This also operates under starvation conditions. Note the grid-current bias for V3 and V4, and the very small value of the coupling capacitors C23 and C24 – because of the high impedance of the circuit.

The output stage is conventional, with negative grid bias provided by R22 (560Ω) and C25 (25μF). With no audio signal, each valve has an anode current of 750μA.

In conclusion

When you look through old radio circuit diagrams you realise that much of the receiver circuitry was very similar from model to model, and from manufacturer to manufacturer, over the years. For the most part the line-up consisted of a frequency changer, an IF amplifier, a detector, an AF amplifier and then the output stage. The interesting bits tended to come with additional 'features'.

Many of these old sets were very reliable, robust and good performers for their time. Servicing was straightforward. The practice of bottle-tapping came later, as falling TV receiver prices brought a need for low-cost servicing. One problem was that earlier valves tended to wear out quite quickly. There was a great improvement in this respect in the late Forties and through the Fifties, mainly the result of improved cathode material. This was a spin-off from war needs and the use of valves in early computers. ■

Servicing the Mitsubishi HS621V

John Coombes provides a fault-finding guide for this VCR, which is fitted with the U deck

The Mitsubishi Model HS621V was first introduced in about 1996. It uses the U deck, which appears to have been the last one from Mitsubishi.

Deck assembly faults

If the cassette jams on insertion, check the cassette housing runners. These can crack or split, preventing normal travel along the guides. In many cases the guides, mounted on the metallic housing, can be reglued or pinned back, using preheated pins through the plastic to add strength and support. If the runners cannot be repaired, the only solution is to replace the complete deck assembly.

The tape may not be accepted because a front-loading arm, supply or take-up, is broken. Check for a cracked shaft or broken teeth on the cogs.

If the tape becomes jammed on ejection, the cause is the front loading door arm that's used to lift the front flap. When the arm breaks or cracks, the front flap will not open. As a result the tape will not eject but goes back into the machine and reloads.

For loading problems check that the loading belt is not stretched or broken: replace if necessary. No or poor loading can be caused by a faulty loading motor assembly.

Be sure to clean the acrylic guides when the VCR is being serviced. Remove any grease, oil or dust with a damp or dry cloth. Do not use alcohol, as this can discolour the guides. Remember that the acrylic guides pass light from the main PCB so that it reaches the various photosensors.

Use oil with dynamic viscosity, e.g. type 948P. This reduces migration and evaporation, enhancing the lubricant's performance.

If all lubrication is OK, check the mechanical operation of the deck. If the take-up or supply spool doesn't rotate, check the idler unit for irregular operation. The cause could be the shift spring or the split washer, which may have become displaced from the spindle that holds the flywheel pulley in place.

If there is incorrect mode operation, or there are strange intermittent operations, check the mode gear and/or cam gear. There may be damaged or stripped teeth.

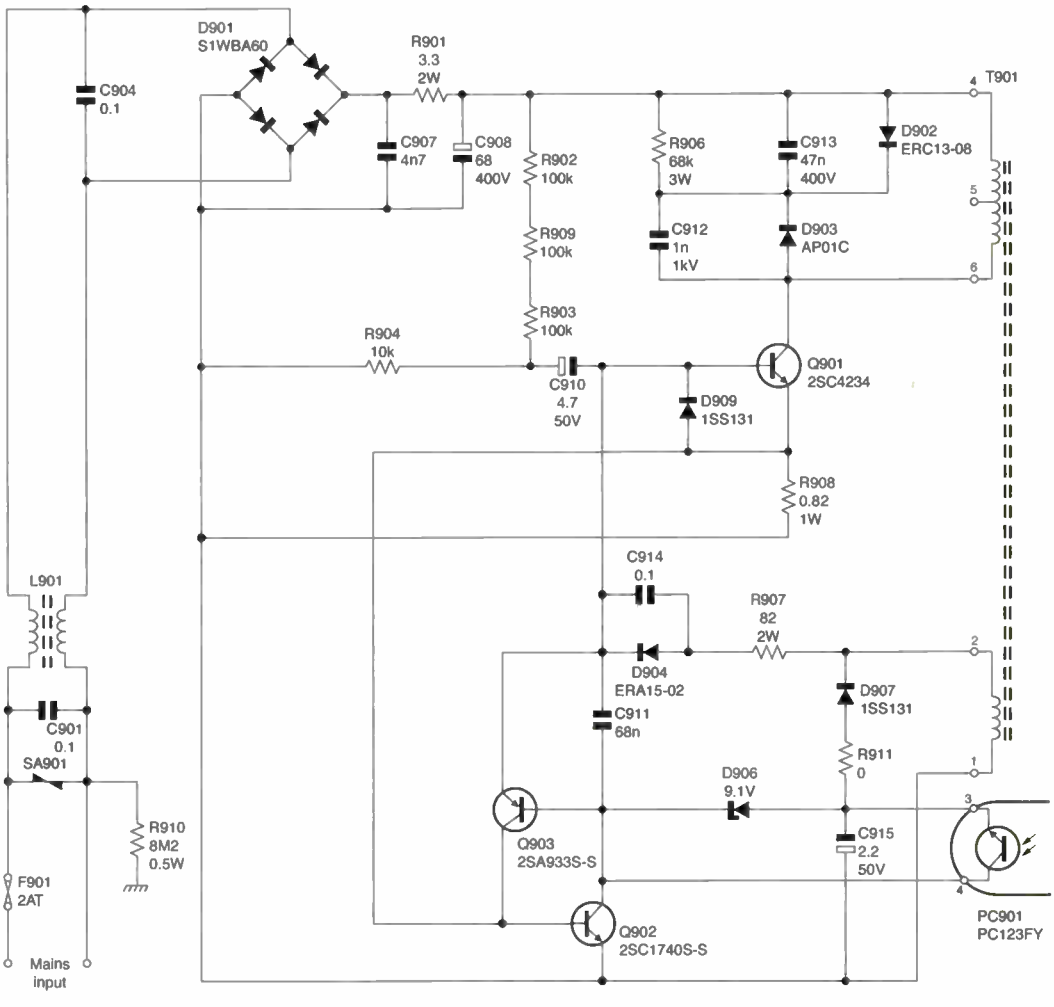


Fig. 1: Circuitry on the primary side of the chopper power supply. A 1nF, 250V AC safety capacitor is connected between the live and isolated chassis

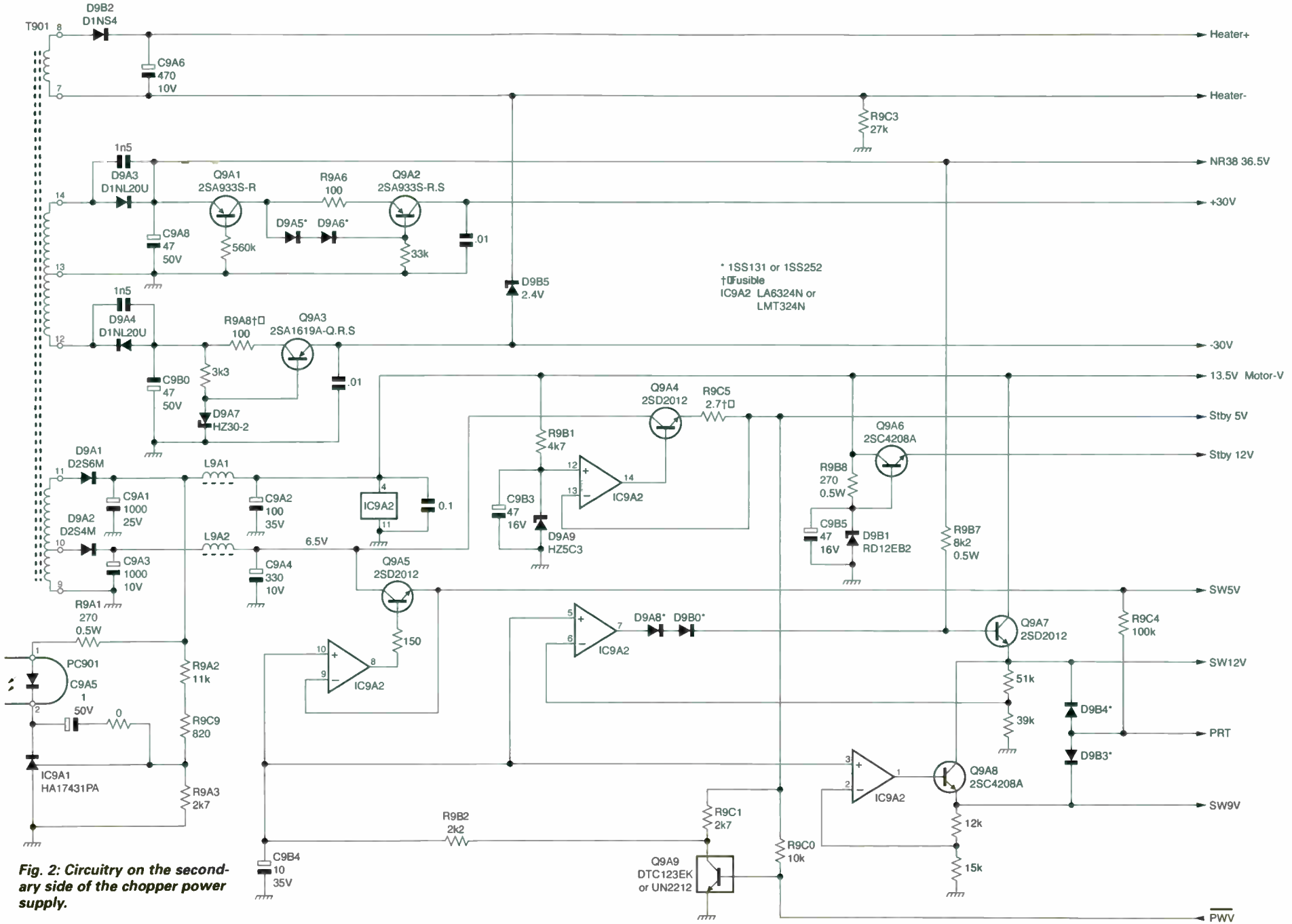


Fig. 2: Circuitry on the secondary side of the chopper power supply.

If there is intermittent supply/take-up operation, check the photo unit. Ensure that grease doesn't prevent light being transmitted from the LED to the reel sensors. Also check that the photo unit isn't cracked or the light tunnel distorted.

The deck actions can be checked during a service without use of sensor signals by shorting test points TP5T and TP5Y on the main PCB with a 1SS252 diode, anode to TP5T, cathode to TP5Y. The actions to check are channel-up button loading, channel-down button unloading, forward button capstan motor forward rotation, rewind button capstan motor reverse rotation.

Mode operation problems can cause various faults. Failure of LEDs D5B4 or D5A4 means no start or end sensor operation. If the VCR goes into play then cuts out after a very short time, check LED D5A9 by replacement. If there is no tape remaining indication, or no auto-play with a cassette with no tape, or no recording on a cassette with no tab, check LED D5C0 by replacement. If the VCR won't eject or accept a tape, check LED D5B5 by replacement. If any of these LEDs have failed, obtain diode kit part number DIODE-LE-KIT. This also provides resistors and new LED holders – the old type have to be cut off, as the plastic lugs have been heated to provide extra secure fixing.

The power supply

Figs. 1 and 2 show the power supply circuitry, on the primary and secondary sides of the chopper transformer T901 respectively. If there are no results with the mains fuse F901 intact, check whether any of the start-up resistors R902, R909 and R903 (all 100kΩ, 0·25W) are open-circuit. Then if necessary check the start-up capacitor C910 (4·7μF, 50V) for the same condition. It can dry up as a result of the heat from the power supply. Alternatively the 2SC4234 chopper transistor Q901 could be short-circuit, with the surge limiter resistor R901 (3·3Ω, 2W) open-circuit. If the 2AT mains fuse F901 is open-circuit or blown however, check the bridge rectifier D901 (type S1WBA60) for shorts.

If the phototransistor within the feedback optocoupler PC901 (type PC123FY) is faulty the biasing of Q901 will be affected and the chopper's self-oscillatory action will stop. Oscillation will not restart until C915 (2·2μF, 50V) is discharged.

Zener diode D906 (9·1V) provides over-voltage protection. When it conducts Q903 and Q902 latch on, removing the drive at the base of the chopper transistor. Excess current is monitored by R908 (0·82Ω, 1W) which operates the latch when the voltage across it rises above 0·6V, with the same result.

The condition of R908 and C915 are thus critical to circuit operation.

Several capacitors on the secondary side of the circuit can cause the no-results condition. Check C9A1 (1,000μF, 25V), C9A2 (100μF, 25V) and C9A3 (1,000μF, 10V) in particular. If necessary check whether the 2·7Ω, 0·25Ω fusible resistor R9C5 is open-circuit.

Video faults

Suspect a dirty or faulty video head if there is a snowy playback picture in the standard and/or long-play mode. There will be poor playback if the head tips are worn or the lower drum is badly worn. In the latter case a complete new drum assembly will be required to restore normal operation. There are other possibilities however. Check for dry-joints at plug and socket MH, and resolder as necessary. If this is all right the LA7411 preamplifier chip IC202 could be faulty. Check that its 5V supply is present at pin 12 before condemning it.

A worn lower drum can cause picture jitter or jumping or incorrect servo speed in the visual search mode.

Audio faults

If there is no playback audio, check the audio/control head. It may be worn or dirty, covered with oxide from a worn cassette tape. If the head is OK, check back to the BA7798FS chip IC3A0. Check for dry-joints or incorrect DC conditions. There should be an 11·8V supply at pin 8 of this IC. If necessary, check it by replacement.

If the previous sound track is left on the tape in the record mode, check the connections to the erase head. It's best to remove the plug/socket and make the connections directly to the erase head. If still in trouble, ensure that the head is clean before fitting a replacement.

Servo faults

Suspect incorrect drum speed if there is variation on picture with noise bars. The cause could be the M56747AFP drum drive IC. It can be replaced as a separate item, or the drum assembly can be replaced. Alternatively suspect IC4A0 (MN67492). Before checking it by replacement, check that the 5V supply at pin 1 is stable.

The capstan motor is suspect for sound variation. Before trying a replacement, check that the capstan spindle is free and clean, and that it is lightly lubricated. If there is lack of lubrication, the spindle can heat up and seize intermittently. Also check that the off-tape CTL pulses are correct and that the audio/control head is clean. The capstan speed output from IC4A0 could be incorrect. Check the DC conditions around this IC and for dry-joints.

Colour faults

Colour faults are rare with modern VCRs. The HS621V is no exception. Here are some checks to make. The 4·43MHz crystal X2A0 could be dry-jointed or faulty (check by replacement). Check for dry-joints at IC2A0 (LA7449M) and the DC conditions at the pins. If these are all OK, check the IC by replacement. Then check IC2A1 (LC89970M) in the same way.

Tuner/IF faults

Flickering or flashing can be caused by a faulty tuner/IF unit (TU01). There may be dry-joints in the unit. These can also be the cause of loss of video and/or sound.

If the tuner drifts on all channels the unit itself is suspect. Before trying a replacement, check the tuning voltage at pin BT. This may vary because the 33V stabiliser IC5A3 (μPC574J) is faulty. Try freezer or check by replacement.

Suspect the IF section of TU01 if there's a blank raster. It's worth looking for dry-joints. If this is unsuccessful, a replacement unit will be required.

Remote control faults

The main cause of trouble with remote-control units is faulty batteries, either exhausted or leaky. If the batteries have leaked the contacts may have become corroded, the result being no or intermittent operation. If there are no battery problems, check the transmitter LED, especially for dry-joints or broken leads. Another possibility is fractured leads or dry-joints at the crystal.

If there's no BBC1 when button one is pressed, clean the contacts and check for contamination. This type of fault can be present with any of the buttons. Check by cleaning or replacing.

The cause of no remote-control operation could be the IR receiver. Check it for dry-joints or high-resistance connections to earth. If these points are OK, replace the IR receiver. ■

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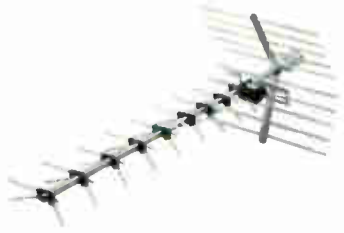

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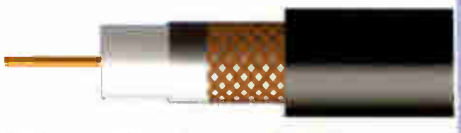

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RTRNF 2023 CEZZ	LOT310	£11.00

SONY

Part No	Code	Price
1-439-332-41	LOT100	£10.00
1-439-332-42	LOT101	£8.50

SONY...continued

Part No	Code	Price
1-439-332-52	LOT100	£10.00
1-439-387-11	LOT311	£14.50
1-439-387-21	LOT311	£14.50
1-439-416-11	LOT255	£11.00
1-439-416-12	LOT255	£11.00
1-439-416-21	LOT255	£11.00
1-439-416-23	LOT255	£11.00
1-439-416-41	LOT255	£11.00
1-439-416-51	LOT255	£11.00
1-453-308-11	LOT2196	£31.50
1-453-308-21	LOT2196	£31.50
1-453-308-31	LOT2196	£31.50
1-453-310-11	LOT2196	£31.50
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1-453-372-11	LOT2196	£31.50
8-598-834-00	LOT2196	£31.50
8-598-834-10	LOT2196	£31.50
8-598-834-20	LOT2196	£31.50
8-598-834-30	LOT2196	£31.50
8-598-834-40	LOT2196	£31.50
8-598-834-50	LOT2196	£31.50

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Part No	Code	Price
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10500980	LOT1505	£19.00
10500980.P1	LOT1505	£19.00
10531460	LOT1505	£19.00
105660 6	LOT1505	£19.00
10566060	LOT1505	£19.00
10566060.P2	LOT1505	£19.00
105660060	LOT1505	£19.00
105880.8	LOT1505	£19.00
10588080	LOT1505	£19.00
10588080.P2	LOT1505	£19.00
151128140	LOT1505	£19.00
151281.4	LOT1505	£19.00
15128140	LOT1505	£19.00
153144 6	LOT1505	£19.00
15314460	LOT1505	£19.00
1531447 A	LOT1505	£19.00
1532873 A	LOT1505	£19.00
3233500	LOT244	£14.50
3233900	LOT244	£14.50
40011200	LOT244	£14.50
40148300	LOT244	£14.50

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Part No	Code	Price
23236098	LOT288	£11.00
23236198	LOT288	£11.00
23236255	LOT289	£12.00
23236425	LOT288	£11.00
23236428	LOT289	£12.00

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Project:

A flock applicator

Martin Pickering describes a unit for the application of flock. It can be built easily and is inexpensive

The hobby-craft market has been in an expansionary phase recently, fired to a large extent by internet auction sites such as eBay. So I thought it was time to resurrect a project that I designed and built some years ago. In fact I made the first unit in 1980, and the second (having lost the first during a house move) in February 1996.

Flock consists of short strands of synthetic fibre such as rayon or nylon – the latter forms a stiffer, more hard-wearing brush-like covering. There's a multitude of uses for a flock applicator, but the average hobbyist will use one to produce a grassy landscape for model railways, 'hair' on a ping-pong ball, a lawn for a dolls' house or decoration on a greetings card. An applicator can also be used to produce flock wall coverings and protective linings for jewellery and watch boxes.

You can buy an electrostatic flock applicator for just over £300. But this is rather expensive for a hobby. I decided that I could save a few pounds by basing my design on a vehicle ignition coil. The original unit used an ignition coil from an Austin Mini but, for the later one, I was able to reduce the size by obtaining a coil from my local motorbike breaker's yard.

Circuit description

The circuit diagram of the flock applicator is shown in Fig. 1 on page 410. For safety, a 240/240V mains isolating transformer (T2) is used. This could be replaced with a 240/350V type to increase the output voltage, but other changes would have to be made to compensate. The isolated mains voltage is full-wave rectified by diodes D1-4 to produce positive-going sinewaves at 100Hz. Each one charges C1 and, as the voltage reaches its peak, thyristor Thy1 switches on, discharging C1 via the primary winding of the ignition coil T1. The rapid current change induces a voltage of about 30kV peak across the secondary winding of the ignition coil. This voltage pulse is connected via thirty diodes, D5-D34, to a metal plate that acts as a capacitor, holding a positive charge with respect to ground. The diodes each have a minimum reverse breakdown voltage of 1kV.

Resistor R1 limits the current that flows via Thy1 when it switches on. The resistor chain R2-R4 sets the point during the sinewave when the thyristor starts to conduct. Ideally, this should be close to the peak, but some allowance must be made for locations where the mains voltage is less than the nominal 230V. The value of R4 can be changed to alter the switching point. If a 350V transformer is used, the value of R4 should be reduced accordingly – so that the thyristor switches on at closer to 340V than 230V.

Note that resistors R1-3 are high-voltage ones, rated at 350V. Use the type specified, as ordinary resistors could break down. C1 is of a type that will withstand the rapid change in voltage (dv/dt): if a type different from that specified is used it may not survive.

C2 and L2 are included to minimise the 'noise' returned to the mains supply. Neither of these items, nor transformer T2, is required for correct operation of the circuit, but they are essential to meet the best safety and emission requirements. Note that they may not be adequate to meet the requirements of CE and other legislation, so do your research carefully if you plan to manufacture equipment based on this prototype.

Switch S1 is a press-on, release-off type for safety. This ensures that you have one hand on the switch while the unit is in operation. The switch has an insulated plastic cover.

Construction

The unit was built into a sturdy plastic 'lunch box' with a recessed lid. For added safety, all screws are plastic. The charge plate was cut from a piece of brass sheet, but almost anything conductive will do (in the days of tinned-steel oil cans I would have used a piece cut from one). Insulate the metal plate by covering it with a piece of black plastic. In the prototype I secured this with four plastic rivets, but you may prefer to use glue or tape. Black plastic is preferable because it usually contains a small amount of carbon, which makes it slightly conductive. A good source of black plastic would be your local builder, who uses rolls of it as damp-course material.

Diodes D5-D34 are soldered end-to-end, all facing the same direction, and threaded into a length of polythene tube – you can buy this from most car accessory shops. In the prototype the cathodes of the diodes face the charge plate, producing a positive charge. Some people maintain that negatively-charged ions are beneficial to health however. For the purpose of charging flock, it really doesn't matter.

The ignition coil came from a scrap motorbike. I had no trouble in buying a couple from a local motorbike repair shop in Crewe. A car ignition coil will work just as well, but will take up a lot more room and be heavier.

The diode tube is held to the coil 'nose', or output lead, by heatsink sleeving.

The smaller components were soldered to a small PCB that had been made for another purpose. Perforated stripboard such as Veroboard can be used. Be careful to leave sufficient gap between high-voltage conductors, otherwise arcing could occur.

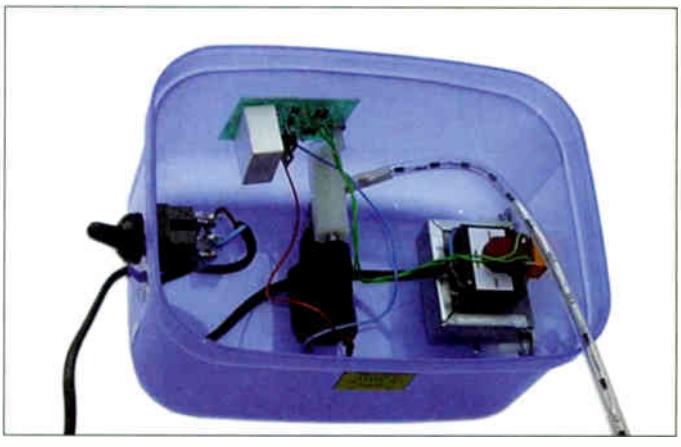
A toggle switch rated at 250V was used as the on/off control. A biased (spring-loaded) switch is used in the prototype, with a waterproof cover added to provide extra insulation.

Dangers

Holes for the switch, screws and mains cord were simply melted into the plastic box, using a previously discarded soldering-iron tip. If you adopt this method, do it outdoors as the fumes may be noxious.

As with all such projects, common sense is required. Remember that soldering irons can burn and mains voltages can kill. The com-

External view of the flock applicator.



Internal view of the flock applicator.

plete project should be finished off so that it's impossible for anyone (especially a child) to come into contact with any part that can carry a high voltage.

If the unit is built as suggested, it will still be possible for someone to draw a small spark from the charged plate and get a nasty shock, albeit indirectly. This presents a similar risk to that from a car-ignition circuit. In other words, the risk of injury or death is extremely low – unless the shock recipient has a heart problem.

Portable version.

Eye protection and a face mask should be worn while using the flock applicator, because tiny fibres can cause bad eye and lung irritation.

Use

The flock applicator is very easy to use, and the results can be amusing, surprising and useful. Apply a suitable glue, paint, varnish or resin to the surface to be treated. The adhesive should preferably be of similar colour to the flock. Sprinkle a little flock on to the lid, hold the object above the flock, and press the switch. Bring the object lower, so that the fibres leap up and embed themselves end-on into the glue. The effect is more powerful if the object is grounded but, in practice, the presence of your hand is usually sufficient.

The flock can be ejected in a powerful spray, so use the applicator in a place where the resultant mess is easy to clean up and won't cause problems. Wear eye protection, a breathing mask and clothing that can be discarded. Flock is not quite as bad to work with as glassfibre, but it can be unpleasant.

If there is high humidity the charge will be quickly lost and results can be very poor. The flock fibres must be completely dry. Store them with a dessicant and, if necessary, heat them up to drive out moisture. For best results sprinkle only a very small amount of flock on the lid, then replenish as necessary.

Sources

The nearby box provides component specifications. The SO802MH thyristor, by Tag Semiconductors Ltd., is available from Mark5 at http://www.mark5.co.uk phone 023 9261 8616, fax 023 9261 8619.

The spring-loaded mains toggle switch S1 is Farnell part no. 422-034 and the cover part no. 151-352.

Farnell Electronic Components is at Canal Road, Leeds, LS12 2TU. Phone 0870 1200 200, fax 0870 1200 201. The website is at http://www.farnell.com

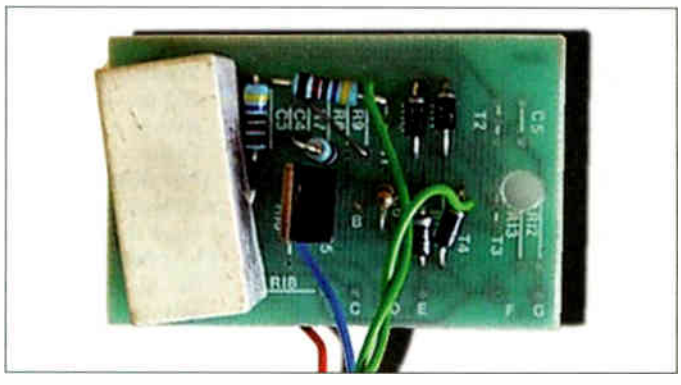
Transformer T2, 240/240V 12VA, is type DB247 from Mike Holmes at http://www.livinginthepast.demon.co.uk/xformer.html

A motorbike ignition coil should be available from any bike repair shop or scrap yard.

Suppression components L2 and C2 can be taken from a scrap satellite receiver or similar unit.

Flock can be obtained from two UK suppliers at present. Because this information takes up a lot of space and is subject to change, I have put full details on a web page at http://www.satcure.co.uk/flock

Constructional articles tend to lead to requests for additional information. I am happy to answer questions by email sent to the SatCure web page above. It will be updated periodically with new information.



Flock applicator PCB layout.

Project:

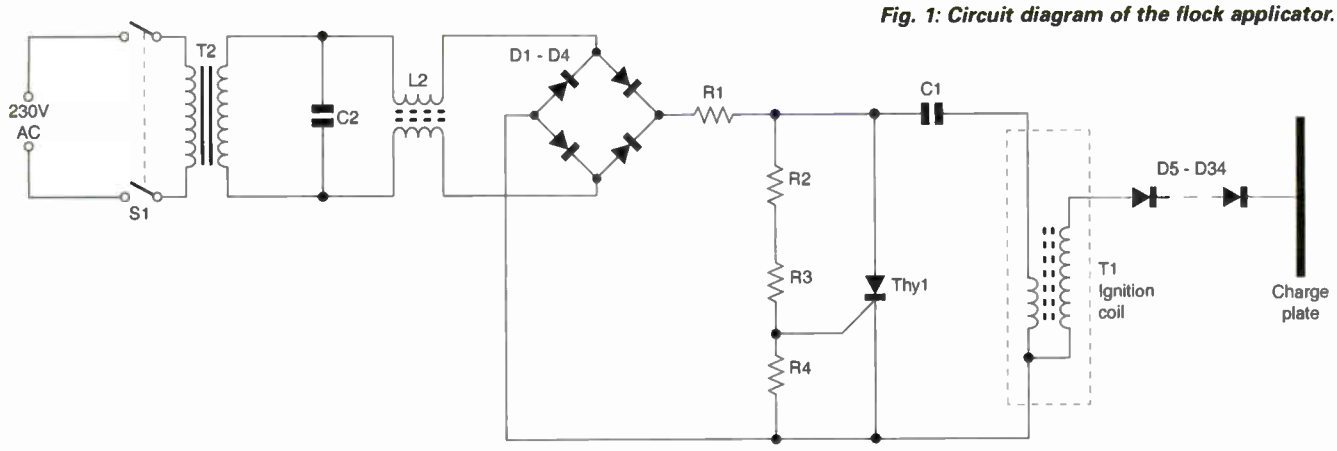


Fig. 1: Circuit diagram of the flock applicator.

Components list

Item	*Specification*	*Farnell part no.*
C1	1µF, 400V DC	548-248
R1-3	47kΩ/0·75W/350V	337-377
R4	1·5kΩ, 0·25W	
D1-D34	1N4007	251-732

See text for other items

Warning

There are potential dangers in the construction and use of this project, as explained under the heading 'dangers'.

Make sure you fully understand what is involved before building or using the flock applicator.

HELP WANTED

Wanted: Transistor type ET453, used in Mitsubishi SVGA monitors. Also a service manual for the Panasonic 9in. colour monitor Model WV-CM1000 and a 4in. monochrome CRT type M13-120W (made by VTM, Italy). Phone James Burch on 020 8402 2488 or email burchey@ntlworld.com

For disposal: Telequipment dual-beam oscilloscope Model D43, a very old valve type, in working order; Philips dual-beam oscilloscope Model PM3207, in working order; 50 Betamax video tapes, some brand new still in packaging. Offers please for any of these items or possibly part exchange. Phone E.J. Williams on 01686 630 637 (Montgomery, Powys).

Wanted: System control PCB assembly for the Pye VCR Model 21VR20, or possibly a scrap machine. It's a late Video 2000 system portable model. Alan Stubbins, 7 Church Road, Saxilby, Lincoln, LN1 2HH. Phone 01522 702 601.

For disposal: Retired TV engineer has the following for collection: a JVC GR45 video camera (for spares); Ferguson FV81LP, JVC HRD170EK, Akai and Sharp VCRs; a fully working 22in. Ferguson 3500 set in a wooden cabinet; a very good A56-120 22in. CRT; lots of reconditioned 3500 panels, 3500 EHT transformers plus a few never-fitted triplers. Offers for three boxed, unused ex-factory Thorn/Ferguson complete TX10 chassis, i.e. power and signal boards. Collect the lot from the South Manchester area. Phone Don on 0161 862 9432.

For disposal: Bush service manuals from the 1950s/60s, from Model TV24 through to the TV66 etc., also Ferguson and ITT manuals and an AVO 8 in good working order. Any offers, please phone Roy Barwell on 01536 725 735 after 6 p.m. (Kettering).

Wanted: Service manual for the Canon 8mm camcorder Model E600E and a source of supply for the CCD as I suspect that it's faulty. Have available at reasonable prices copies of *Television* from 1970 and *Electronics World* from 1995. Phone R. Fullerton on 028 7946 8477 (Castledaw, Co. Londonderry) or email rfulle5318@aol.com

Wanted: Quad 33, 34 or 44 preamplifiers, 405 power amplifiers and FM3 tuners for spares. Also boards and modules for these. Contact Mike on 01758 613 790.

For disposal: *Television* magazines from 1981-2004, some copies missing; 44 Beta tapes that are recorded on; and a box of assorted valves. Phone Mrs J.A. Knight on 01332 552 948 (Allestree, Derby).

Wanted: Does anyone know why an Hitachi Model C28W430N (A7 chassis) doesn't always power up and reverts to standby, with the relay energised and the power supply quietly ticking? If the set is left in this condition it will eventually operate when the mains switch is turned off then on again. Every component in the power supply has been checked and appears to be OK. Is the cause a fault in the auto-check circuit that's initiated at switch on, a faulty CRT, or a software problem? Please phone Brian Battams on 020 8845 5123 (South Ruislip, Middlesex) or email brianbattams@aol.com

For disposal: Free to a collector/enthusiast, a Sobell valve radiogram from the 1950s. In working order though the cabinet needs touching up. Must be collected (Bishop Auckland, Co. Durham). Phone Martin McCluskey on 01388 710 483 or email martin@mccluskey1953.freeserve.co.uk

Wanted: Service manuals or circuit diagrams for the following: NAD tuner/amplifier Model 7225PE, output stages only will suffice; Millbank Ultima 1205 mixer amplifier, output stages again; and the NEC/Granada Sterivision C09 GNI 12V coach-type TV, which was sold by CPC some years ago as a special offer, used. All costs will be reimbursed. Phone Don Aird on 01463 233 441 (Inverness) or email don@airdaudio.freeserve.co.uk

Wanted circuit diagram, maintenance manual for Olivetti photocopier Model 8515, or information on where details can be found. email Tony Rigby at 113670.225@compuserve.com

Service Casebook

Michael Maurice

Sony KVA2942U (AE2A/B chassis)

Sometimes you have to study the operation of a set in a bit more detail than usual. This was such a case – the set would often fail to start up. In the fault condition it appeared to be dead, though the power supply was working with the HT at 62V, about half what it should be. I started by attending to the usual dry-joints, at the field output chip IC501 and the 5V/12V regulator chip IC681. Attention was also paid to components around IC681, as these can also become dry-jointed. But the set still often refused to come on.

Suspecting that the cause of the fault was in the power supply, I removed board D and ran it separately. The HT was 62V and wouldn't budge. A more careful study of the circuit diagram revealed a standby control line from board A. When 5V was applied to the relevant pin the HT rose to 135V. So attention was turned to board A, where the standby 5V supply is derived from a 7805 regulator IC. It was this that was causing the fault. A replacement restored normal operation.

Toshiba 28Z23B

I've had two of these sets in with the same fault, failure to respond to remote-control commands. However in this case the front-panel buttons produced no response either. In both cases the IR remote-control receiver was the cause, replacements providing a complete cure. The cause of no response with the buttons was that panel lock was on. Once remote-control operation had been restored it was a simple task to go into the menu and turn the panel lock off.

Panasonic TXW28R4

The usual cause of reverting to standby a few seconds after switching on, especially intermittently, is dry-joints at the field output chip IC451. This time however the cause was the surface-mounted, 22nF capacitor C454. When I removed it I found that it had split in half.

Hitachi C2976TN (A5 chassis)

The fault symptom with this set was as follows. After a few minutes the screen would go bright, then the set would shut down. A dry-joint at the end of one of the line output stage tuning capacitors was the cause. But, after the resoldering, there was an EW fault. A replacement TDA8350Q field/EW output chip (IC601) cured that.

Panasonic TX21MD4 (EURO-4 chassis) and NVFJ620B VCR

This set wouldn't come on when brought out of standby. The fault had appeared after a thunderstorm. An NVFJ620B VCR was also dead. The TV set's relay didn't operate when it was brought out of standby because the driver transistor Q853 was leaky base-to-emitter. Much to my relief the set worked once a replacement transistor had been fitted, but I wasn't so lucky with the VCR.

This came back to life once the STRM6559 chopper IC had been replaced but, when a tape was inserted, the carriage was lowered then the cassette was ejected. This happened even with the covers on. Further checks in near darkness showed that the end sensors were switching correctly, so it appeared that the microcontroller chip had succumbed. Pity!

Sony KVX2972U (AE2A/B chassis)

Going off and just leaving the channel number was a failing with the old AE1 chassis, but this is the first time I've come across the problem with these chassis. The cause was that most pins of the IF module on board A were dry-jointed.

Panasonic TX32PK2

When the set had been on for a few minutes the picture became darker and darker. The culprit was C360 (27nF, 2kV) which decouples the CRT's first anode supply. A replacement cleared the fault.

Loewe Callida

This 33in. set was dead, and there was no way it was going to go back to the workshop! Fortunately it didn't take long to find the cause of the trouble: the standby power supply transformer was open-circuit. A replacement, part no. 490-22142-001, restored normal operation.

Sony KVM1420U (BE2A chassis)

There were two faults with this set. The first, which had occurred recently, was no picture. This was cured by replacing R812 (1kΩ, 1W) and the rectifier diode D806 (RGP02-17) in the A1/G2 supply. The other fault was that the picture gradually became darker and darker. The cause was eventually traced to C012 (47μF, 16V), which is in the picture-mute circuit. It had become very leaky. But when I replaced it there was no picture! The associated resistor R045 (47kΩ) had also failed, probably because of electrolyte spillage. Replacing these two items finally cured the set of its ills.

Goodmans WS322NS

This set was dead, with its power supply pumping. The cause was failure of the line output transistor, in turn because of a dry-joint at the line flyback tuning capacitor. I replaced both these parts.

LETTERS

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The analogue switch-off

After reading Dick Oliver's letter last month, in which he argues that analogue TV should continue until most of the sets have died, and that BBC3, 4 and 5 and terrestrial commercial radio should be free now via satellite, I was reminded of a recent south-west regional BBC1 TV programme, *Inside Out*, which I saw courtesy of a Sky digital transmission. One item caught my attention. It involved inviting an elderly gentleman, who at present watches analogue TV, to visit a TV showroom with a view to choosing a digital set-up.

He was dismayed to find that he would be expected to pay hundreds of pounds to change to digital, and confessed that it was quite beyond his means. He said that if and when the analogue TV signals were switched off, he would just have to make do with listening to the radio. At the end of the item it was mentioned that in the SW region there are many steep-sided valleys where residents are unable to 'see' the Sky satellites. An expert who was interviewed said that anyone in such a location would not, of course, be able to receive the satellite transmissions. So what are we to make of the government's promise to provide digital receivers for those who have not availed themselves of one by the time that the analogue signals are switched off? A free receiver is not of much use if there are no signals for it to pick up!

The above assumes that the switch-off goes ahead as planned. What if the telecoms companies are unwilling to pay the astronomical sums for the frequencies that they did for the G3 spectrum? Surely the government's main aim in switching off the analogue signals is to top up its coffers with the proceeds of the sell off?

I have read that elsewhere in Europe consideration is being given to whether to delay or even abandon the analogue-signal switch offs, because of the problems that would arise and because the proceeds would hardly make it worthwhile.

David Andrews,
Blackburn, Lancashire.

It was wet and miserable outside, and not much better inside. But at least I was able to warm myself from the dull glow produced by a BUH515 that was working harder than it should inside a Sharp 66GF63H. Then the phone rang. Well, not so much 'rang', more a melodic squawk. It was the lady who belonged to the Sharp set.

"I don't want you to fix my telly" she said, "'cos the man next door says that Tony Blair is switching off all the analogues, making my Sharp obsolete."

"No, no" I replied, trying not to sound patronising, "when analogue is switched off all you will need is a Freeview box to convert it to digital."

"Oh, OK then. But what about my video recorder. Will I be able to record *Dr Who* and watch *Ant and Dec* at the same time?"

"Well no" I explained, "you'll need another box connected to your VCR to do that."

There was a slight pause. "So that's two boxes, right?"

"Two boxes and possibly an aerial upgrade" I continued.

Another pause, then "well, we can just about manage that. But if it's a sunny afernoon we go into the conservatory and watch *Coutdown* on the portable. So will we need another box?"

"Ah yes, 'fraid so."

"So that's three boxes then?"

"Correctamundo" I replied, trying to sound cheerful.

"My son Malcolm still lives with us you know."

"Really" I said, trying to sound interested but suspecting where this was leading.

"He's got one of those new plasmas stuck on his wall, and a DVD recorder. Got them to impress his girlfriend. But they're not digital, even though they are brand new. I bet you're going to tell me we'll need two more boxes."

"Absolutely correct. But your son will get a really good picture on his plasma" I continued, hoping this would placate her.

"So that's five boxes then?"

"Five boxes and maybe a couple of aerials."

By this time the BUH515 had been unable to withstand the dodgy waveform at its base and, with a sort of 'pinking' noise, committed suicide. Must be that little coil in the base drive I thought.

"Are you still there?" interrupted the Sharp lady.

"Your tele will be thirty five quid" I told her, "is that OK?"

"Yes, that's fine. But when we cook the Sunday lunch we like to watch the *'Enders Omnibus* on the portable in the kitchen. Will we need another of those boxes . . ."

Dave Husband,
Hartlepool.

Cable TV, PVRs and DTT

I read with interest the report on VOD services and the concept of a 'cable PVR' (News, March), but feel that NTL's CEO Simon Duffy is misguided if he feels that VOD will remove the need for home recording. Unless every single item is available via VOD at no extra cost, who is to decide what is worth being recorded? In a moment of madness I might want to watch a soap programme. The telephone might ring in the middle of the programme. With a PVR I can set it to record, take my call, then resume viewing. If you are not watching a VOD programme, how could it be paused? It would be totally impractical to have every single programme on a play-out server.

I also note with some amusement the reports of problems with DTT, having worked at a digital cable TV super head-end for over three years and, previously to that, as an analogue head-end engineer. Of the sources that consistently gave us the most problems, DTT topped the bill. It was sometimes possible to follow heavy storms as they passed across the regional acquiring sites, because of the number of bit-error alarms.

Another problem is caused by mobile-phone masts. At my head-end one of the multiplexes was subject to interference, to the point of being unwatchable, but very

intermittently. We tried all sorts of things, and in the end resorted to using a spectrum analyser with a camcorder to film the screen. We then cross-referenced the bit-error alarms with the recording, and discovered that a local phone mast was transmitting a signal which produced the alarms. Ho, hum – another expensive notch-filter project.
Simon Topley,
Folkestone, Kent.

DAB aerials

I've noticed that some new aerial installations on apartment blocks include a multi-element Band III array, presumably for DAB radio. Unlike UHF digital TV however the different DAB multiplex transmissions are generally from different sites – they certainly are in the London area. Use of a directional aerial for DAB radio will result in degraded reception from transmitters that are not in one particular direction.

I understand that a vertical dipole is the normal recommendation for a DAB installation, unless there is a specific requirement, and feel that in most cases the use of a multi-element Yagi array is inappropriate.
Martin Page,
Buckhurst Hill, Essex.

Vintage matters

With reference to Ray Throsell's letter (April) I'm sure he is aware that most popular mass-produced goods are now designed for cheapness of manufacture rather than ease of repair. They are made on automated production lines that involve very little labour. Repairs on the other hand are labour-intensive, and thus their cost is out of all proportion to that of production. This will always be the case while we, the public, demand ever cheaper prices.

Ray mentions early projection sets. I've heard of the White-Ibbotson but never actually met one. We did however in the Fifties sell a number of Philips projection sets. They were probably no less reliable than most other valve sets but were very complex for their time and quite difficult to repair. They employed protection circuitry that cut off the beam current to prevent the 2·5in. MW6-2 CRT from screen burn in the event of timebase failure. This made it impossible to see the fault symptom. Sound familiar? We are used to it now, but it was then the height of technology.

These sets could be very expensive and dangerous to repair as they used two HT lines, ±200V, giving 400V in many areas, and it hurt! They also used a separate EHT generator which had a PL38 driving a transformer with three EY51s in a tripler circuit. The transformer and tripler were enclosed in an oil-filled can. We made various attempts to repair these, but I think we always ended up by getting a replacement. Even when new the EHT regulation was such that you could focus the picture by adjusting the brightness!

When new these sets cost about half a year's wages, or about the cost of a car now. So, though they were expensive to repair it was still much cheaper than buying a new one.

Philip Bearman stirred some memories by mentioning the line cord. Yes, Radiospares did supply it – on drums of, I think, 50 yards. It came in three current ratings, 0·1, 0·15 and 3A, for the various valve line-ups of the time. There seemed to have been quite a few receivers of US origin about at the time. Some of the mains/battery sets used an 117Z4 rectifier valve, which had a 117V heater for connection directly across a 110V mains supply. It was fitting these cords that first exercised my use of Ohm's Law: the resistance per foot was, I believe, marked on the drum, so you had to calculate the total voltage for all the valves and deduct this from the mains voltage, then work out the length needed.

It's not just TV sets that have become more complicated. I could change the head gasket on a Morris Minor in a couple of hours. It has just taken me a week to fit one to my Citroen XM diesel – but of course I do now have an age disadvantage.
Peter Nutkins,
Charmouth, Dorset.

The letters section of the April issue seemed like a trip down memory lane. Topics included radio line cords, AVO meters and the White-Ibbotson rear-projection TV set. Are readers of *Television* setting old?

Ray Throssell recalls an encounter with one of these rear-projection sets, which were a nightmare to service in every respect. They used a Schmidt optical unit with a round 2·5in. CRT. My service manager, Jack Brice, warned me that the EHT supply was lethal, being mains-derived and capable of delivering the 1-2mA required to kill.

One White-Ibbotson set was a many times bouncer, the failure always being the same – the CRT. I had the unenviable task of tube replacement in all sets that required it. This particular set had an intermittent deflection-failure fault. There was a protection circuit, but it didn't seem to protect. The result was a tube with a burn spot at screen centre. Tube replacement also required setting up the optical system. This was not an easy task while you were at the same time saying to the guy holding the mirror (hoping you could get a glimpse of the screen) up-down, left-right while praying that you wouldn't be electrocuted. I was an apprentice at the time, in 1959, and the workshop was above a garage, with narrow, flimsy steps and no rail. The last time we hauled that set up those stairs was when, near the top, Jack said "let it drop", and over the side it went!

I think White-Ibbotson produced only one model, though there were Mk 1 and 2 versions. It was a disaster. In answer to Ray's question, I don't think there was ever a colour version. I hope not!

David North and Alex Dow follow up Eugene Trundle's article on the AVO 8 meter. Does anyone remember the AVO valve voltmeter? It was mains-powered and took a while to warm up, measured about 12 x 8in. and had two controls, set zero and set f.s.d. It was far superior to the AVO 8 but took a while to get used to.

Philip Bearman mentions the line cord used in some early radio sets as an alternative to a barretter. The line cord consisted of resistance wire whose length was adjusted to provide the required voltage drop from 240V down to 110V. Users were advised not to coil up the wire, so that the heat would dissipate freely. This advice was ignored by one owner and also by her cat. As a result the line cord went open-circuit. The apprentice called with his AVO 8 and found that the mains lead was open-circuit. In his ignorance he replaced the lead with ordinary cable, then said to the lady of the house "that should be OK now". Result: bang! I know – I was that apprentice.
Alan Willcox,
Cardiff.

A microwave oven warning

I don't usually report on microwave oven faults, as no one wants to pay for their repair nowadays. But this note, on a Panasonic Model NN-V659C, may help save someone time and trouble. It's one of the models that use a chopper power supply to generate the filament and HV supplies. Spares are not available for the inverter PCB, and a new board costs some £90 plus VAT.

The customer said that there had been a bang, followed by smoke. On inspection I found that one of the EHT voltage-doubler capacitors, C705 (3,600pF, 3kV), had burnt up. It's a bit like the blue disc capacitors used in TV sets, only bigger. So I gave a cheap estimate, which the customer accepted. After fitting the replacement however I found that at start up the other disc capacitor, C704, burnt up. As it had tested OK previously, something else had to be the cause. I then found that the magnetron was faulty, with a low resistance to ground from its filament terminals. These are also feed-through capacitors (approximately 500pF each). Not being replaceable, the mag-

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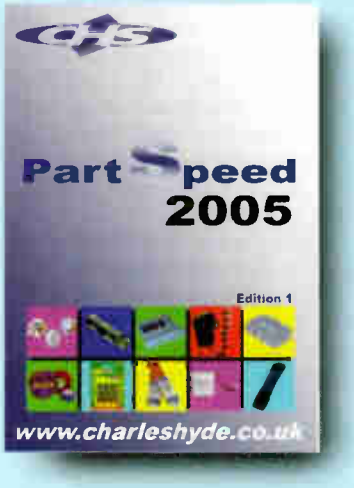

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Akai See Charles Hyde, SEME and Wizard.

Akura See Iain Stewart and Wiltsgrove.

Alba Radio Ltd., 12 Thames Road, Barking, Essex IG11 0HZ. Spares for Alba, Bush, Roadstar and some Goodmans and Hinari models. Some Brother microwave, Dirt Devil and Power Devil spares.
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Fax 020 8787 3010.
See also CPC, SEME, Willow Vale, and Wizard.

Amstrad Spares handled by CPC. See also Willow Vale and SEME.

A.R.D. Electronics Plc., Unit 12B, Metcalf Drive, Altham Business Park, Altham, Accrington, Lancashire BB5 5TU
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Fax 01282 683 010.
email: sales@ardelectronics.com

Beko Plc., Beko House, 36/38 Caxton Way, Watford Business Park, Watford, Herts WD 8QZ.
Tel 0870 774 1059
Fax 0870 774 1090.
email:spares@beko.co.uk
See also SEME.

Beovision/Beocord Bang and Olufsen UK Ltd., Unit 630, Wharfedale Road, E. Triangle, Winnersh, Berks RG415TP.
Tel 0118 969 2288
Fax 0118 969 3388.

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Black Diamond See SEME

Bush See Alba Radio Ltd. Also CPC, SEME and Willow Vale.

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Fax 01772 664 835.
email:accessoriesdirect@cpc.co.uk

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email: enquiry@elftone.com

Etron Brand name used by Nikkai Imports Ltd.

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www.eurosat.co.uk

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42PW33P	5.65
42PW33Q	5.65
42WH18B	5.65
42WH18D	5.65
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42WH38B	5.65
42WH38P	5.65
42WT19B	5.65
42WT29B	5.65
43VJ13P	5.65
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43VJ33P	5.65
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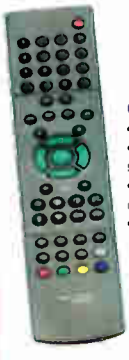

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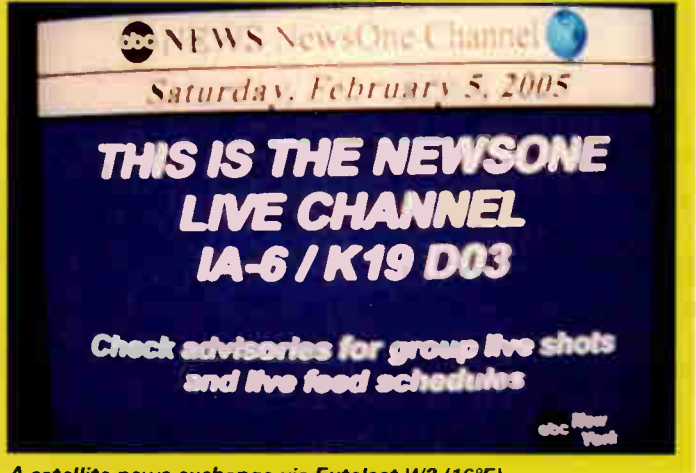


A satellite news exchange via Eutelsat W2 (16°E).

The only significant atmospheric activity during February seems to have been provided by the snow, which blanketed much of the country. Terrestrial DX-TV signal reception was more or less non-existent. Peter Schubert (Rainham, Essex) received a Sporadic E signal on the 5th: it consisted of unidentified programming in ch. E3.

Meanwhile Hugh Cocks, down south in the Algarve, reports TE (Trans-Equatorial Skip) reception on several evenings during the month. He received several ch. A2 transmissions (525 lines, American NTSC standard) – at 55·24MHz clean and fluttery, at 55·25MHz with several signals "rumbling away", and a very weak signal at 55·26MHz. The MUF (maximum usable frequency) never rose to ch. A3. Reception was from the south west, usually at about 2100-2300 GMT. During the same time slot Hugh has received a 6m amateur-band beacon at 50·031MHz. This could either be direct TE or TE back-scatter from Europe. So far, Hugh has been unable to resolve the Morse identification. He also reports African TE reception, which occurs in the late afternoon from due south. The ch. E2 Sierra Leone transmitter is fairly regularly received – the video carrier has moved slightly higher to almost the nominal 48·25MHz channel allocation.

At least there's DXing life somewhere . . .

Satellite sightings

President Bush has been on another walkabout across Europe, seeking support for his policies in the Middle East and S.E. Asia. February 20 and there are live night-time pictures as Air Force 1 touches down at Brussels Airport. This is followed by the usual pictures as he descends the aircraft steps, then handshakes and pictures of the sleek black armoured presidential car as it glides away, headed and backed up with some forty support vehicles – local police, his own security, a medical team, two ambulances and the US communications truck which has two very obvious large, thick vertical aerials. On the morning of the 23rd the President was touching down at Mainz, Germany. The local TV services gave major coverage to an outside broadcast of the arrival, followed by a trip through blinding snow to the riverside meeting hall. In both instances the live pictures were carried by Eutelsat W1 (10°E) at 10·972GHz V (4,167, 5/6). The following day and the President has popped along to Moscow!

The same downlink carried live pictures of Arianespace flight V 164 on the 12th. This was the first flight of the new-type rocket, which successfully launched a 'dummy' and a real satellite as it disappeared into the skies above French Guinea. There were cheers and applause from the operation staff at the launch HQ.

Exactly a week later, on the 19th, there was applause with another OB feed I monitored, at 10·967GHz V. This time it's the Olympic Viewing Committee checking out London as a possible venue for the 2012 Olympics.

In recent weeks I've been looking into the possibility of obtaining a receiver that will display pictures with MPEG 4:2:2 format transmissions. The BBC is now more regularly using Atlantic Bird 1 (12·5°W). It's worth checking at 11-11·120GHz V where BBC regional feeds appear, all in 4:2:2 format. On February 18/19 there was rugby from the Newport ground. BBC Sport-Wales used two downlinks, signing as 'UKI-116 SD16'. Another programme circuit, 'UKI-1091 PI', at 11·098GHz V (4,226, 7/8) totally refused to lock any image. For opera lovers La Traviata was present at 11·154GHz V (6,140, 3/4), signing as 'UKI-498 SD16 1386'. The next day S4C was on site, using similar frequencies for rugby coverage.

On the 16th Roy Carman (Dorking) alerted me to the fact that Hellas Sat 2 (39°E) was carrying HD tests in 4:2:2 format. A quick check revealed 'HDI Test' with more operatic content, followed by a widescreen film. Another channel in the same multiplex was being used by STN, a Slovakian facility company. It was running a repeated promotional video of STN's operation, dishes, equipment, etc. Check at 12·606GHz H (27,500, 3/4).

The last column was sent to the magazine just prior to the Iraqi elections on January 30. There were many news feeds and

reports on the day of the election, mainly concentrating on the reactions of the voters on this historic occasion. Kurdsat SNG was an interesting feed via Eutelsat W2 (16°E) at 11·099GHz H (5,632, 3/4). The NTSC pictures showed an elderly official from the Kurdistan region speaking about the conditions there. There were many news feeds via Eutelsat W1 (10°E) and W3A (7°E), and four more feeds were being transmitted via Intelsat 10-02 (1°W). One of them had the service identification 'SCOPUS-NET-TE', with further detail 'UKI 690 – ABC IRAQ MOBILE' – it was probably a UK hired-in flyaway unit.

The Balkans war is now past history but the trial of the Serb dictator Slobodan Milosevic continues endlessly at the Dutch Haag. Being a lawyer, he's able to hold his own in court. The proceedings are carried occasionally via feeder 'B 92 HAAG'. Check Eutelsat W6 (21·5°E) at 12·705GHz V (4,096, 1/2) or thereabouts during daytime for possible Balkans war crimes trial action.

A final note for Armenian readers. Public TV of Armenia and its companion radio service Public Radio of Armenia have left Sesat (36°E) and moved to Hot Bird (13°E) at 12·577GHz H (27,500, 3/4). At late February the same services are available via Eutelsat W1 (10°E) at 11·167GHz H (2,894, 3/4).

Analogue closedowns

Ofcom has announced its proposals for a phased closedown of analogue TV transmissions in the UK, starting with the Border, West Country and HTV Wales areas in 2008. See the News pages last month for further details. Robert Copeman (Melbourne) reports that there's also to be a phased closedown of analogue TV in Australia. Analogue transmissions will be lost in the main cities in 2008, while transmissions in the rural areas will close down gradually "some years" after that. All Band I, channel 2 transmissions will move to digital channel 12. Digital terrestrial TV will be transmitted in Band III and at UHF. The fact that Band I will be clear of analogue TV transmissions in the main cities could mean a good time for DXers, as analogue TV will continue for some years in the rural areas of Australia and in New Zealand, which has yet to announce any plans for the closedown of analogue TV transmissions.

Broadcast news

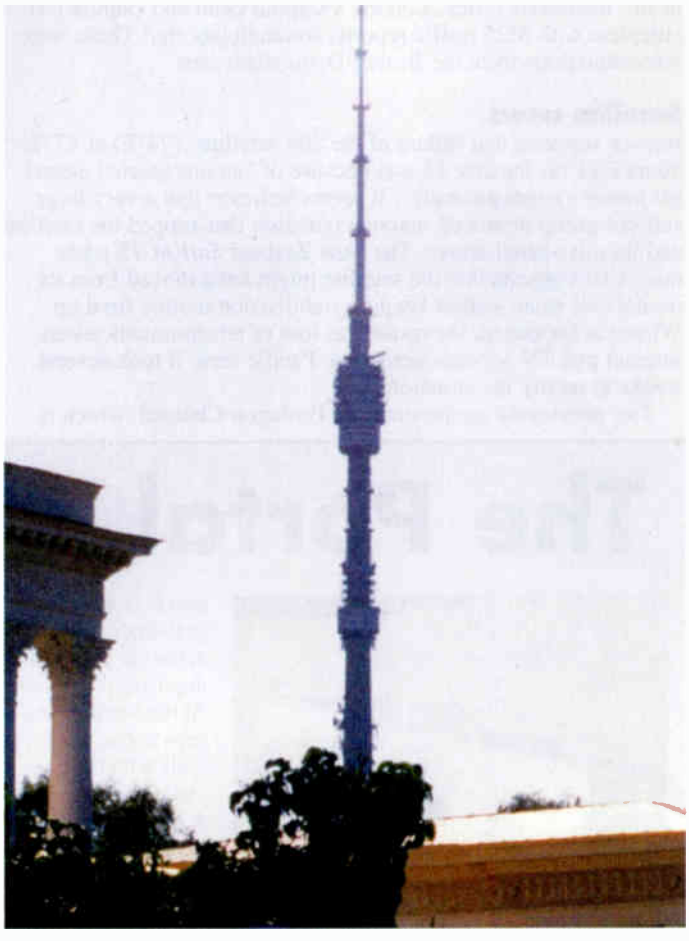
France: A full listing of main UHF TV transmitter radiated power reductions has been received and will be featured next month. The reduced output powers are understood to be a prelude to the commencement of DTT transmissions.

Russia: A new terrestrial TV channel, Zvezda, opened in Moscow in early February. It's funded by the Russian Defence Ministry, showing "patriotic films" etc. to encourage recruitment in the armed forces. There are plans to open further Zvezda transmitters across the country.

Australia: The Australian Broadcasting Corporation (ABC) opened a new terrestrial digital TV channel, ABC-2, in early March. It provides repeat shows and news content, including regional documentaries and news.

BFBS: The British Forces Broadcasting Service is now being distributed to UK military bases, camps and ships at sea in an encrypted digital format. BFBS TV and radio services are uplinked from SSVC Chalfont, received locally and distributed either via cable or local terrestrial transmissions. Pace MicroTechnology has received a contract to supply a digibox, type DS420, that incorporates a Cryptoworks decoder. Encrypted BFBS transmissions can be found at 7°E (Eutelsat W3A).

Malaysia: Gareth Foster has just returned from a visit to the Malaysian region. He reports that five terrestrial TV networks are at present in operation. The RTM TV1 and TV2 networks use Band III, with just a few TV1 transmitters in Band I; the commercial network TV3 transmits at UHF, except for Klang Valley which still uses ch. E11; the two other commercial networks, NTV-7 and 8TV, transmit at UHF. Nicam stereo has largely replaced the Zweiton two-channel system. TV3 continues a limited teletext service called Beritext, but the TV1 and TV2 text services seem to have been discontinued. The MW band is dead during the day, though Band II FM radio is overfull with a lot of co-channel interference.



The Moscow Ostankino TV mast is now fully operational again. Photo from Iain Menzies.

Ryn Muntjewerff's DXing aerials in the Netherlands include vertical and horizontal wideband arrays.

Gareth climbed to the top of Mt Kinabalu (over 13,000ft) and heard, interference-free, London's Capital Gold and Capital FM, complete with M25 traffic reports, commercials etc.! These were retransmissions from the Brunei-Darussalam area.

Satellite news

Intelsat suggests that failure of the 804 satellite (174°E) at 1732 hours EST on January 14 was because of "an unexpected electrical power system anomaly". It seems however that a very large sunspot group produced massive radiation that zapped the satellite and its solar-panel arrays. The New Zealand *SatFACTS* trade magazine suggests that the satellite might have moved from its orbital slot when station-keeping stabilisation motors fired up. Whatever happened, the result was loss of telecommunications, internet and TV services across the Pacific area. It took several weeks to rectify the situation.

I've previously mentioned The Pentagon Channel, which is currently available in encrypted form via Telstar 12 (15°W) – within the Balkans mulitplex that includes Quad UAV, Air Scan surveillance operations etc. and P3/Pentagon. The US Dish network, which is similar to Sky TV in the UK, is now carrying it as a free-to-view public-service channel. It provides military news etc., particularly on activities in Iraq and Afghanistan. P3/Pentagon is obviously an encrypted service for US forces in Europe.

Raymarine Inc. has introduced a new satellite TV receiving system, the 45 STV, for marine use. It's an automatic satellite-tracking system (45cm dome) designed to provide optimum-quality digital TV reception in smaller craft. Dish tilting (DBT – Dynamic Beam Tilting) and wide beamwidth tracking (WRS – Wide Range Search) are used locate and maintain satellite signals. A higher gain, 60cm version (60 STV) is to be introduced later this year. Raymarine equipment is now sold across the US and is expected to be available in Europe by July.

The Portal 1 DAB receiver

In previous issues I've commented on the Roberts Gemini RD-6 mains-operated DAB/FM receiver and the later replacement, Model RD-6R. The latter provides improved performance but I still find that there's intermittent DAB cut-out, requiring a shift to FM then back to DAB to restore digital reception. With its full Band III coverage the RD-6R is well suited to DAB DXing, but can be used only where a mains supply is available. Many enthusiasts like to climb hilltops however, with large aerials and battery receivers, with a view to achieving optimum DX reception conditions. There's good news for them! The Portal 1 DAB-only battery-operated portable receiver is now available from Tesco and Asda at about £50. It has full coverage (174-240MHz) of the European Band III DAB channels. I bought one from the local Asda to assess its performance, and was impressed.

I've yet to come across what to me is a good-looking portable DAB receiver, but this Portal set is amongst the best (see photo) – despite the rather incongruous carrying handle, though this doubles as an effective prop for table use.

The eight-section telescopic whip aerial supplied extends to some 70cm. It can be removed from the F socket mounting – the socket is at the back, in a recessed aperture – enabling a more efficient, higher-gain external aerial to be connected. This vastly improves the signal-reception performance. At my home, using a chimney-mounted discone aerial, the Portal 1 produces full signal scale with the three local multiplexes, including BBC Rowridge at about 26 miles. A fourth more distant multiplex, Now Reading, 40 miles to the north provides a constant-threshold signal or better. Autoscan of the whole Band III spectrum took just 17 seconds, though there are only four multiplexes within the UK segment, providing about 42 stations.

The controls are simple. From left to right there is first a flush-mounted rotary knob, with a finger depression, for station tuning. The adjacent select button can be depressed to capture quickly any station that comes up on the green LCD screen. By prolonged depression this button can also 'lock' a station for reception, called "Autoselect off". The small LCD screen provides two lines of text, the upper one giving the name of the station being received while the lower one relates to the functions of the 'info' button to the right of the screen. These are signal strength; time/date as set by the broadcaster; scrolling information such as current programme content, news flashes, etc.; the type of station, e.g. news, classic pop, etc.; and the multiplex name. The Portal 1 manual suggests that the info button toggles through the above and also 'RDS(FM)', but there's no FM coverage with this receiver.

The auto-tune button above the info one provides a total Band III update scan or a Band III rescan following a system-reset request. The manual-tune function is of particular interest to DXers. It's obtained by depressing the select button. This gives individual DAB channel options, with the frequency displayed to three decimal points.

The Portal 1 can be powered by six U2/HP2/C cells for DXing at the summit of the nearest mountain. A 9V, 500mA plug-top power supply is supplied for home use – a switched socket at the right-hand side of the receiver is provided for connection. Two 3·5mm sockets are provided beneath the grey rubber cover at the left-hand side. These are for headphones and a line output (200mV) to feed a hi-fi system. There's also a DC output socket. According to the Portal 1 booklet this is "to allow connection of future accessories yet to be released".

There's no remote control, nor is there provision for favourite-station storage as with say the Roberts RD-6R, which has five DAB 'memories'. But the cost of the Portal is a third of that of the Roberts set.

As sold by Asda and Tesco the receiver has a two-tone dark and light silver plastic case. The strange-looking dark-plastic handle provides a means of propping the receiver at a user-friendly angle to read the LCD screen, but the aerial input socket will then be on the upper side and the output from the loudspeaker will be smothered.

The control panel is 80mm deep and 243mm wide, the height of the receiver being 180mm. Weight is 1.40kg excluding batteries. The specification in the handbook says that the sensitivity is –97dBm, the output 2W music power, sampling is at 48kHz, 16 bits, and six C batteries provide up to ten hours use – perhaps more with headphone operation.

I am very impressed with the performance and versatility of the receiver. As a DAB DX receiver it's an excellent hands-on unit at an attractive price, and has adequate sensitivity for that mountain top. I would recommend it as a good buy for enthusiasts.

The Portal 1 DAB receiver is distributed by Acoustic Solutions Ltd., Grand Union Buildings, 54 High Street, Weedon Bec, Northampton. NN7 4QD (phone no. 0871 230 7747). Email enquires can be sent to enquiries@acousticsolutions.co.uk or you can check the website at www.acousticsolutions.co.uk

VCR CLINIC

Reports from
Martin McCluskey
Colin McCormick
Dave Kerrod
Gerry Mumford
A. Haq
Peter Exeter
and
Nick Beer

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

Reports can be sent by post to:

Television Magazine Fault Reports,
Highbury Business,
Media House,
Azalea Drive, Swanley, Kent BR8 8HU

or e-mailed to:
t.winford@highburybiz.com

B&O V6000

The complaint with this up-market machine was "picture breaking up and no sound". It uses the Philips Turbo deck and there was no servo lock because the tape was riding up on the capstan spindle. A new pinch-roller assembly cured the problem, but several of the customer's tapes had been ruined by the faulty roller. **M.McC.**

Toshiba V631

There was severe mistracking and no sound. The bottom edge of the tape was crinkling, because a fixed tape-guide pin between the CTL head and the capstan spindle had come away and was loose inside the machine. Everything worked well once this item had been fixed back in place with a spot of superglue. This machine has the fastest rewind I've ever seen! **M.McC.**

Sony SL-C40

The playback picture was marred intermittently by horizontal banding, not dissimilar to the effect caused by C319 in the power supply but not affecting E-E pictures. Annoyingly, if the machine was allowed to warm up the fault could clear for days. The cause was eventually traced to delay line DL001 on the main video PCB.

This fault could also occur with C20 and C30 machines. **C.McC.**

Panasonic NVSJ220 (Z mechanism)

There was no E-E video or sound output from the scart socket or RF output, but the OSD was OK. Video from the tuner was present at pin 50 of IC3001 (type AN3531NFBS) but there was no output at pin 52. Replacement of this 80-pin IC restored the sound and vision. **D.K.**

Panasonic NVVP30

This VCR/DVD combi unit had very slow rewind/fast forward. The first thing to check for this fault is that the gear/clutch mechanism is working correctly. If it's OK, replace the capstan motor. **D.K.**

Panasonic NVHV830

When a cassette was inserted it would be ejected straightaway. I removed the mechanism and noticed that the cam gear wasn't working correctly. The lever under the gear had lost the rivet that runs inside the cam. All was well once the lever, cam gear and retaining clip had been replaced. **D.K.**

Samsung TI-14P14X/XEU (C17A chassis)

This smart silver 14in. TV/VCR combi unit came to us with a cassette trapped inside. The cassette would play back perfectly for a few seconds then stop. It would also rewind or fast-forward for a few seconds then again stop. At no time would it eject. Some time was wasted experimenting with the mode switch and watching the operation of the mechanism for clues. Finally, a scope check revealed that there were no pulses from the supply-reel sensor PTM601. The photodiode half of the opto-slotted switch was open-circuit. A new sensor, part no. 0604-001122, cured the fault. **G.M.**

Panasonic NVHD100

The fault with this VCR was no display: all other functions were OK. I found that Q701 on the timer board was faulty. **A.H.**

Philips Delta 2000 chassis

There's a comprehensive protection circuit in this TV/VCR combi chassis. Any of the following diodes in the circuit can initiate switch-off: D6541, D6542, D6543, D6545 and D6549. Before checking them it might be worthwhile checking D6342 in the 15V supply and D6391 in the 9V supply. I've had both go short-circuit, causing the dead-set symptom. **P.E.**

B&O VX4500

These machines are now quite old, but are still very stylish. Beneath the covers there's an enhanced Hitachi machine. This one had a problem with locking to channel when channel-changing in the E-E mode. The VX4500 and VX5000 have a characteristic that looks like tuner drift when changing channels. They've always done this. This one wouldn't settle however, and also wouldn't stop during a sweep search.

The cause of the problem was in the 15·6kHz oscillator/AFC circuit around 11IC801. A frequency counter connected between TP801 (chassis) and TP802 showed that the oscillator frequency was varying wildly. The main suspect was 11C803 (2·2μF, 63V), which was leaking physically – this was not visible, but you could smell it when the capacitor was unsoldered! 11C801 (0·47μF, 63V electrolytic) was also in trouble, and the 4·7kΩ preset 11RT801 was noisy. Replacements and alignment cured the fault.

The operation of these machines can be confusing to those who are not familiar with them. First, there's no IR sensor, so most functions cannot be controlled without either the B&O TV set connected or a B&O MCL eye connected via the 3·5mm jack at the back of the unit. And secondly to enter the E-E mode in order to change channel you have to type SHIFT 7 on the Beolink remote-control handset or select 'tuner only mode' from the menu. **N.B.**

AUDIO FAULTS

Reports from
Geoff Darby
Chris Bowers
Philip Rosbottom
and
Alan S. Taylor

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Kent BR8 8HU

or e-mailed to:
t.winford@highburybiz.com

Panasonic SA-HD52

Only a good outcome from an eleventh-hour call to Panasonic Technical saved this ageing unit from the skip. The customer had complained that "it plays only half the disc". This wasn't strictly true: it would sometimes play almost to the end of a disc but, immediately after, it might play only the first few seconds of the first track of the same disc. This seemed to rule out mechanical problems. When it was playing correctly, operation was so solid that it was almost impossible to make the unit skip, suggesting that the cause of the problem was not laser related.

After getting involved in a number of time-wasting dead-ends, I was at the point of giving up when I studied the fault symptoms a little more closely – there's a lesson here for us all to learn! When the unit stopped playing, it didn't just stop and return to the total disc contents display. Instead, the display went to all zeros. Then the disc was spun again for a TOC read, which was always successful. This was the clue. The CD player wasn't stopping, it was resetting.

I felt that the cause could well be to do with the power supply. But at this point enough time had been wasted on a unit of its age, so I decided to call Panasonic Technical. It turned out that the problem had been encountered before. It's caused by the 7·5V CD supply occasionally dropping below 7V.

The recommended remedy is to replace Q131 and Q132, both type 2SD2037, and uprate zener diode D135 from 8·2V to 9·1V. These components are on the board at the bottom right of the unit, where the large white flexiprint from the CD PCB is plugged in. There were no further problems once this work had been completed. Thanks Panasonic! **G.D.**

Alpine CDA7843J/TDA5643 car system

This two-piece car audio system consists of a CD/amplifier/tuner and a tape/graphic equaliser unit, both dashboard mounted. The one that came my way belonged to the son of one of my trade customers, so it was yet another of those must-do jobs I seem to have been getting a lot of recently! The complaint was simple enough: the CD unit's display didn't light up for several minutes and, until it did, the CD section wouldn't work. I was able to confirm this quickly and, further, discovered that the lightest touch on either of the two flatpack transistors Q817 and Q819, at the front left of the PCB, restored correct operation.

In common with most modern car units, there's no removable bottom cover to provide access to the underside of the PCB. So the CD deck has to come out first, then the front panel has to be removed. After unsoldering six bend-over tags and twisting them back, the PCB can be withdrawn. There were no obvious signs of any dry-joints in the area when the board was out, but I reflowed them all anyway, along with many through-panel plated holes.

Needless to say it's almost impossible to run the thing when it's apart, so back together it all went. When it was tried again the symptoms were identical, so apart again it came.

This time I turned my attention to the surface-mounted components on the top side of the board. There are four 330Ω resistors here between the two previously-mentioned transistors. When I applied the iron and some fresh solder to one end of the second one it came off the board. Examination with a strong magnifying glass showed that no solder had ever stuck to the other end. So it had been just sitting against the PCB. Resoldering both ends provided a complete cure. Cleaning the laser completed the job. Well, almost.

When I checked the radio it tuned from 76-90MHz. Sometimes radios will default to this foreign FM band and have to be reset to the 88-108MHz band used in the UK. However a quick call to the owner revealed that in this case the system was a Japanese import, and that the FM band it was showing was the only one it had.

There was a final twist. I had only fleetingly considered the metal can plugged into the aerial socket, and had decided that it was a preamplifier. In fact it's a frequency shifter and, according to the owner, it didn't work very well. Apparently he listens only to Radio 1, which the unit receives all right, so he's not bothered about whether it tunes 'normally' or not. At this point I boxed it up and moved on to the next one! **G.D.**

Aiwa MX-Z3300MK

This amplifier, which is part of a three-piece system, seemed to be completely dead. Voltage checks in the power supply showed plenty of activity however – until I got to the negative supply for the VFD. This was very low at only –3V. The usual cause of this is an open-circuit electrolytic capacitor in the voltage-multiplier circuit used to produce the supply. So I looked around for a suitable candidate and quickly arrived at two hot-looking transistors, Q15 and Q16, that were surrounded by small electrolytics. C16 (33μF, 50V) turned out to be open-circuit. A replacement restored the –30V supply to its correct level and enabled the unit to respond to its on/off switch again.

I can only assume that the system microcontroller monitors this supply and, when

it is missing, locks out the 'on' switching. **G.D.**

Naiko N2866SW Sub-woofer

Strictly speaking I suppose this should be classified as a TV fault, as this powered sub-woofer belongs to a TV set. But it had been brought to me in its standalone capacity, as a piece of audio equipment. It was dead with both the internal 3·15AT fuses violently blown. More out of instinct than good fault-finding practice, I checked across the four bridge rectifier diodes with my trusty AVO. Two of them read short-circuit but, when one end of each of them was unsoldered, they proved to be blameless.

Each diode has a 20nF miniature disc ceramic capacitor in parallel, and this is where the trouble lay. Two of them were short-circuit. To be on the safe side I replaced all four, together with the two fuses. Everything then worked correctly. **G.D.**

Sony MZ-NFH800

This Atrac 3 plus Hi MD Walkman made a low-pitched whining sound when a disc was loaded. A check inside revealed that there was no disc rotation. The cure was to replace the spindle motor, ref. M701, part no. 8-835-782-12. **C.B.**

Sony HCD-N455

When the volume control was adjusted there was no increase or decrease in the sound output and no change in the level shown in the display. The rotary encoder switch, ref. S579, on the front display panel was the cause of the fault. The part no. is 1-473-392-11. **C.B.**

Sony HCD-SD1

After about three minutes this unit's CD player would start to skip forwards and backwards. It did this with any disc that was tried. A check on the CD block assembly revealed the cause, which was the two plastic gears P, ref. 258, and M, ref. 257. Replacement of the defective gears restored normal operation. The part numbers are 4-917-564-01 and 4-917-567-01. **C.B.**

Sony MZ-NH1

When this unit's DC mains adaptor was plugged in it would, after a short time, start to whistle. The cause was the DC adaptor, ref. 501, part no. 1-478-395-11. **C.B.**

Technics RS-676

This audio-cassette recorder, see Photo 1, was in production from 1974 to 1977. It was one of the first front-loaders from Technics. At the time Nakamichi was making the similarly over-engineered 700 Tritracer series. The unit weighs about 11kg and has clunky solenoids to operate the record/play slider switches: these solenoids are 3in. long and 1·5in. square. Smaller solenoids provide pause operation and pull the head block to the inserted cassette. There is even one to change from normal tape to chrome tape equalisation.

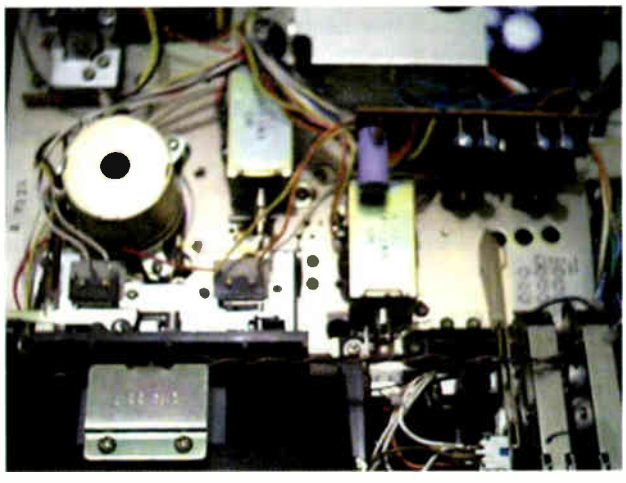


Photo 1: (top) The Technics RS-676 audio-cassette recorder.

Photo 2: (bottom) Internal view of the Technics RS-676 audio-cassette recorder.

The unit is reliable, but time takes its toll on the soldering. There are likely to be problems with this, especially on the main PCB. I've had crystallised joints here being the cause of poor signal playback etc. Another problem area is the microswitch that senses cassette insertion. It's at the left-hand side of the cassette mechanism and is operated by a lever at the back, centre of the cassette. I've not had to replace a belt in these machines – they knew how to make them to last in those days. The heads may not have been kept clean, as the sloping loading arrangement makes this an awkward task. Cleaning could cure simple record/play faults.

The pinch wheel is spring-loaded to follow the head block when play is selected. When the pinch roller is worn there's no clearance between the wheel arm and the head block. The symptom is no tape movement. Bending the arm at the left-hand side of the wheel enables it to press against the capstan as it should.

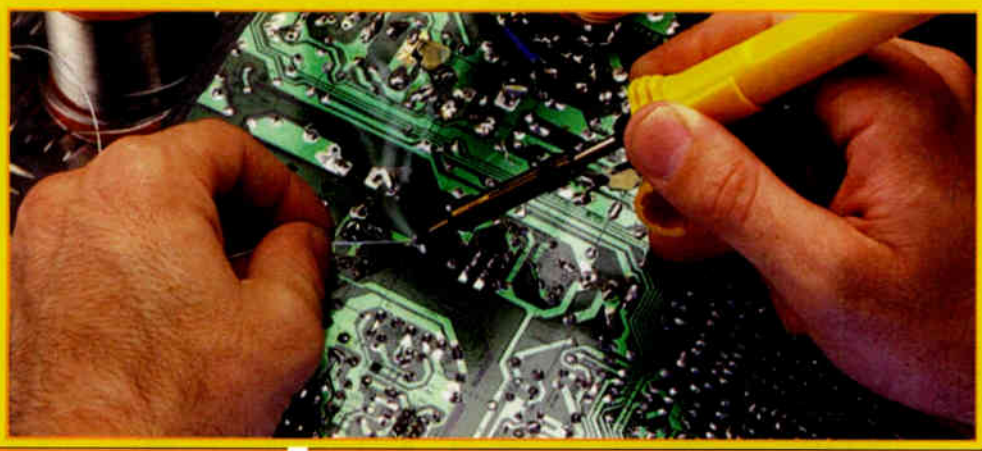
Only the better performance of later models would tempt owners to replace this extremely reliable deck. Technics cassette decks are in general well made. There was a slight change between Model RS-676, which has a variable output control next to the VU meters, and Model RS-676A (Mk 2), which has a microphone-level control in this position.

A separate reel-drive motor is used, so the capstan motor doesn't have to provide drive in the fast-forward/rewind modes. Unlike other makes, the reel motor is reliable in operation. If the deck stops for no apparent reason, the cause could be the auto-stop sensor. This consists of a lamp above a slotted disc at the centre of the top chassis. Alternatively the drive belt could be slipping.

These decks will go on and on, long after those from lesser manufacturers are scrapped. Photo 2 shows an internal view. **P.R.**

Sharp BA-CD2010

There was no audio output from this unit. As I couldn't find anything else amiss, I replaced the STK402-040N and STK402-071N audio output modules. The result, on test, was good audio, but I then noticed that the small fan at the rear of the unit wasn't working. Once I had reflowed some suspect joints in this area the fan sprang to life. Loss of cooling had probably been the cause of the failure of the audio modules. **A.S.T.**



Bench Notes

Adrian Gardiner

explains how your company can increase the services it's able to provide. There is also the domestic saga of a failed cooker

To start with this month, Part 2 of my series on business development. After that there's a little tale about a domestic problem with a cooker.

Do it all!

The boss of the company I work for has an interesting approach to the business: "say yes to everything, and work out the details later". OK, there have to be limits. But, over all, it's not a bad rule to adopt – if you know how to keep control. We are in the business of repairing brown goods. How many types of products are you willing to take on? Our company already handles pretty well any electronic product, yet we are currently thinking about taking on more.

Here's a brief list of the items we deal with: TV sets, CRT, LCD, projection and plasma types; VCRs and DVD players/recorders; camcorders and CCTV equipment; hi-fi systems and separates; in-car entertainment equipment; PA equipment; computer systems, including laptops and Apple items; monitors; satellite receivers; and microwave ovens. Items being investigated include engine management units, alarm-system panels and white goods control boards.

Now modern equipment is often complex, requiring specialised test equipment for each type of product. But this shouldn't deter you from getting involved. There are specialist centres that handle certain types of product, and these are rarely accessible to the general public. They offer fast, reasonably-priced services on a trade basis, making it possible for you to add a sensible mark-up.

The split

The best way to set about this is to decide, first, the area in which you would prefer to specialise. It may be that you already repair many of the products listed above. Or perhaps you are really good at repairing say TV sets but don't really get on with audio equipment, despite having a go. Whatever your field of expertise, make full use of it – and send the rest away. Most customers seem to expect the local electronics shop to be able to repair everything. Live up to this, rather than turning work away.

Ideal products to send elsewhere include satellite receivers, camcorders, laptop computers, in-car entertainment equipment and boards from various other sorts of equipment such as computers. A few companies that offer such services are listed below. I don't mean to endorse them more than others and, if readers would like to recommend other good companies, let me know – via the magazine – and I will endeavour to compile a more comprehensive list.

Specialists

MCES in Manchester is perhaps best known for its tuner repair service. The company's main line is satellite box repairs however. These are carried out on a fixed-fee basis. The telephone number is 0161 746 8037 and the website
www.mces.co.uk

Digifix in Buxton, Derbyshire is another satellite digibox specialist, run by Michael Dranfield. The telephone number is 01298 73 989.

Accent in Worcestershire provides a specialist laptop computer repair service, repairing to component level at very reasonable rates. It also carries out camcorder repairs. The telephone number is 0870 300 5019.

C&G Audio in Norfolk will, among other things, repair the analogue boards in Apple iMac computers and monitors. It offers a fixed-fee service for a fraction of the replacement cost of a new board. The firm also repairs computer power supplies. The telephone number is 01493 850 452 and the website
www.cgaudio.co.uk

Teleplan in Hampshire provides a very specialised service repairing LCD panels – details of some of the work were featured in the February issue. The telephone number is 02392 444 241 and the website
www.teleplan.com

Link-ups

Another good way of expanding the range of products you handle while retaining your hair is to link up with other repairers in your area. You may for example find that while you are particularly good at repairing TV sets another dealer close by is better at handling audio equipment. Arrange a work-swap deal with any such firm. In this way you will both work more efficiently while providing a wider range of services for your customers.

There's another benefit from linking up with separate dealers. As products become more complex and more engineers leave the trade, it's down to the rest of us to share information. Modern products tend to have more and more one-off faults, so shared knowledge can often be valuable in cutting down repair times – and improving your own skills.

Knowledge is power

Those of you who are authorised service centres for various manufacturers will have made use of the relevant websites. Our company has agencies for most of the manufacturers, and these websites have been very useful from time to time.

If you don't have such access, there are a couple of excellent sites you can use. AV Repair, formerly e-repair, is a free technical forum for engineers. It has an easy-to-use tip database, but does need more people to use it and, in particular, record new faults. You will find it at
www.avrepair.co.uk

Although it's a subscription service, Euras is another excellent database for engineers who don't have manufacturers' accounts. There is a free-trial offer, so that you can see if it will be of bene-

fit to you, also a 'chat board'. You will find them at www.euras.co.uk

Well, that's it on business development this time. More next month! Meanwhile, that cooker.

Mr Fixit!

As with any practical skill, electronics engineering can be useful from time to time in your own home. Our skills usually extend beyond that of mending our own TV sets however – from fitting an outside lamp to mending that dripping tap. Indeed I've been known to dismantle a faulty dimmer switch and replace the triac rather than fork out for a replacement! No, I'm not tight: I just don't like adding a readily repairable item to a land-fill site. And let's not forget the children's toys! They seem to require an amazing assortment of batteries these days, and their microcontroller circuits often need attention. As for my teenagers, they constantly seem to require a service pack! Whatever happened to Superglue?

The cooker caper

I arrived home from work the other day to find that the cooker had apparently blown up. My wife explained that it had just gone bang, with a blue flash from the electronic timer. At nearly six years old the ceramic-hob Hotpoint hadn't done badly, considering that it worked for a family of five. Apart from a replacement oven door it had performed admirably. Now however the trim around the ceramic top looked very tired, with several rust spots. Water had obviously managed to seep through, causing damage to the timer unit. In addition the top oven door had now broken away from one of its rubber moulded hinges. As a result it was loose in one corner, which made it difficult to open.

After some consideration we decided to have it repaired. A similar replacement would cost about £600, which we just didn't have to spare. Who does? In order to smarten it up we wanted the trim to be replaced, along with the oven door, and to save money we were prepared to bypass the timer unit if it couldn't be repaired – we never used it anyway.

The call out

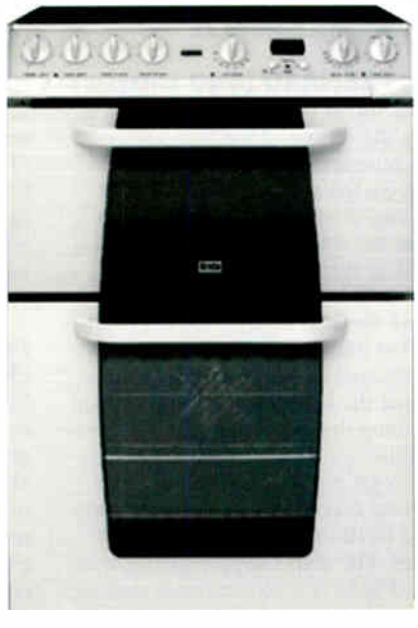
I didn't want the job, as I don't like white goods, and it needed to be repaired quickly so that we could eat! So next day I phoned the local domestic repair centre and requested a call. Knowing them reasonably well, I explained that once it had been removed I would like to repair the timer if possible, and failing that bypass it. All was agreed and an engineer duly called.

On my return I expected my wife to give me the engineer's estimate for a new trim and door, along with the defective timer. Not so. The engineer had not removed the timer, and had said that they can't be repaired anyway. He didn't think the trim was available but would have to check. And to top it all he charged £40 for the call out! Yes, I know, I do as well, but that's not the point!

Aftermath

So at this point I did what I should have done in the first place, and fetched my toolbox. After undoing every screw in sight (twenty) I was finally able to remove the ceramic top. It was immediately obvious that this was a complete unit, supplied minus elements. The trim was an integral part of it, bonded with heatproof sealant all the way round. On extracting the timer, I was forced to agree with the cooker engineer. The black blob in the middle of the PCB had a hole in the centre, and I don't have an IC fabrication unit at my disposal! Bypassing it was easy enough, as it only switched a relay to control the oven.

Next day I eagerly awaited the estimate from the repairers. I nearly fell off my chair when they phoned. £195 plus VAT for the new ceramic top, £60 plus VAT for the door, and there would be a fitting charge of course. Worse, there was no stock at Hotpoint, and the delay would be at least ten days. I hastily reached for the Scotch.



Remembering that SEME also sells spares for white goods, I keyed the model number into their Sali software. Both parts were listed, at a considerably reduced price. But both were to special order, and a call to SEME produced the same "minimum ten days" result.

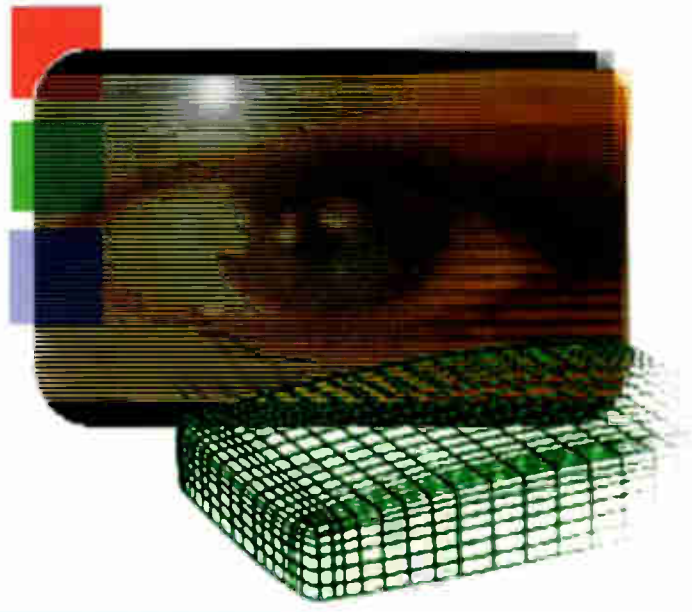
I phoned my wife, and we decided that the best option would be to rent a cooker. We already rent a washing machine from a local company, so adding a cooker would be affordable and hopefully quicker. I gave them a call and found that they had a suitable model, a Creda C362E (made by Hotpoint!). They had it in the colour required, white, so delivery was arranged for two days later. They also agreed to remove the old cooker, which is getting more difficult with the introduction of new waste legislation.

Further problems

Two days later the delivery team arrived, unloaded the new Creda and took away the old cooker. My wife promptly phoned to give me the bad news: a silver one had been delivered by mistake, and they would not be able to replace it for another three days! I phoned the store to complain and, after pleading that we were sick of take-away food and microwave-ready meals, it was agreed that we could use the silver one until it could be replaced. They even arranged for a field engineer to be diverted and pop by to wire it in. Brilliant!

Not so however. He turned up, but decided that to wire it in the cooker would have to be laid on its front. We have a tiled floor, so a blanket was provided to protect it as he did this. It was not what the manufacturer had intended of course – laying the appliance face down resting on its oven handles. As he lifted it back up, the engineer caught one of the doors on its edge and it shattered, accompanied by a loud bang. Ever get the feeling that you are just not meant to have it?

As I write this the company has just delivered a shiny, new, white ceramic-top 60cm cooker. At last! Nothing else can go wrong, can it? Aren't you glad you repair brown goods! ■



TV FAULT FINDING

Reports from
Michael Dranfield
Philip Salkeld
Eugene Trundle
Gerry Mumford
G.M. Smith
Graham Preece
Malcolm Russell
Jerry Fedorak and
Garry Laidler

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Media House,
Azalea Drive, Swanley,
Kent BR8 8HU

or e-mailed to:
t.winford@highburybiz.com

Philips 21PT4457/05 (L01.2E chassis)

This set was stuck on FM radio and was constantly stepping down the channels. A check at pin 80 of the UOC chip produced a reading of 1·45V. This pin is connected to a resistor-ladder network and, with no buttons pressed, should be at the supply voltage (3·3V). Clearly a front button was leaky or stuck down and, as the set was stepping down channels, the fault had to be with the programme-down button. It was slightly leaky and its removal from the PCB cured the fault. **M.D.**

Tatung T28N440 (440 chassis)

There was sound but no picture. When I turned up the setting of the first-anode control a blue screen with flyback lines appeared. So the problem was not field collapse, the usual one with this chassis. Dry-joints are another cause of problems, and a look at the underside of the PCB revealed some heating and cracked soldering around the 56Ω resistor RC1. I resoldered it, but the fault remained. Then, while I was making some voltage checks, I found that the solder at RC1 was molten. So something that was connected to it was short-circuit.

Time to get out the service manual. This showed that RC1 is connected to the STV5112 RGB output chip on the CRT base panel. The chip's supply pin, 2, was then found to have a bidirectional reading of about 10Ω. A replacement chip and resetting the A1 control cured the fault. **M.D.**

Bush 1407

The sound produced by this set was low and distorted. After replacing a few components I discovered that the sound quadrature coil needed resetting. This restored normal sound but, about six months later, the set returned with the same fault and again the coil needed resetting.

I've come across this problem several times before, with various different sets. The one thing they all had in common was that they lived in houses with heavy smokers. I presume that the airborne nicotine has a capacitive effect on the coil and thus detunes it. But why does this affect only the sound coil? **M.D.**

Decca D25N440/25BKA (Tatung 440 chassis)

There was a low-frequency flicker on the picture, most noticeable on bright scenes. Careful adjustment of the first anode preset made things slightly better, but the fault was still present. Eventually the cause was traced to a faulty STV5112 RGB output IC. When I removed the old one I found that there was no heatsink compound at all on it. A replacement IC, with a smear of white zinc oxide, cured the fault. Once the first anode voltage had been set up the set was fine. **M.D.**

Sharp 32LW92H (11AK45B5 chassis)

This set was dead apart from a tripping noise. There were no obvious shorts in the line output stage but, when I checked the forward and reverse resistance of the HT rectifier D808, it read 1kΩ both ways. I isolated the power supply by removing the line output transistor but this strange reading was still present. The next step was to remove the line output transformer (TR600). This corrected the forward/reverse HT rectifier diode readings. A replacement LOPT, part no. V30021290, put matters right. The time has long gone when line output transformers only went short-circuit. **P.S.**

Philips 32PW9308/05 (SEM5.1 chassis)

This three-month old set had suffered from a power supply blow out. I tried to get the set replaced without success. The service manual lists two power supply replacement kits, for the primary and secondary sides, part nos. 3122 78590460 and 3122 78590310. There are over thirty components to replace, so you can imag-

ine the time it takes. Patience was rewarded however, and after the work the set was back to normal operation. **P.S.**

Daewoo GB14H2NS

This combi unit had no picture though the sound was fine. To cut a long story short, there was no line drive. This comes from pin 40 of the TDA8841 jungle chip I501. While I was checking around this IC the set burst into life. My attention turned to the 4·43MHz crystal X502, which was the cause of the fault. I was puzzled about this initially, but 4·43MHz divides down to the line frequency of 15·625kHz. **P.S.**

Toshiba 21S23B2

This nearly new set was fitted with a chassis that didn't look like a Toshiba one. It was dead apart from a slight buzzing noise. As usual in such a situation I went straight to the line output transistor, which was a 2SD2499 (HS402). It was short-circuit and, after fitting a replacement, the set sprang to life.

I carried out an investigation to see whether there was an identifiable cause of the failure of the transistor. While tapping around, the set produced the line-collapse symptom. The cause turned out to be a dry-joint at the line driver transformer T401. **P.S.**

Mitsubishi CT28AV1BDS

This fourteen-year old set brought back memories. It was dead with the S2055N line output transistor Q552 short-circuit, and the TEA2013A EW chip IC551 was cracked. When I removed IC551 and fitted a new line output transistor the set came on with a narrow picture. The next thing to do was to find out why IC551 had been destroyed. A check at pin 5 produced a reading of 35V instead of 12·5V.

I recalled from the past that a coil can cause this increase, and noticed that L505 was getting very hot. A replacement, obtained from a scrap chassis, completed the repair. **P.S.**

Alba CTV4858SIL

This set had come in over the Christmas period as a rush job, which is usual for the time of year. It was dead but tripping. On investigation I found that dry-joints in the line output stage had destroyed the BU808DFI output transistor. I contacted one of our distributors, who promptly sent a replacement. It arrived the next day and, on the assumption that it was just a matter of fitting the new transistor, the job was done. In fact the set did spring to life, but I noticed that after a couple of minutes the transistor was getting extremely hot, though the picture was correct.

As I couldn't find any cause for this overheating I decided to contact the distributor, in case there may have been a faulty batch. During the course of the conversation I mentioned that the replacement had been required for a Bush/Alba set. I was then told that there's a specific BU808DFI transistor for this model. It costs three times as much as the normal one that had been supplied initially, and the code number is ALB1313. **P.S.**

Sharp 32LW92H (11AK45B5 chassis)

This set's picture was too wide. Initial checks in the EW circuit failed to reveal anything amiss, but when I selected the service menu and adjusted the width there was no difference. This suggested that there was in fact a hardware fault. So I started to disconnect and check components in the EW circuit. When I came to D611 (UF5407) I found that it had a forward resistance of 700Ω and a reverse resistance of 6kΩ. A new UF5407 cured the fault. **P.S.**

Hitachi C2846TN

The owner complained about a very intermittent mains buzz that came from within the set. The fault showed up after a long spell of soak testing in the workshop. Its cause was traced to the double choke L902 in the mains filter section of the power supply. **E.T.**

Philips 32PW6506 (L01.1 chassis)

The picture would contract from the left spasmodically. This was most likely to happen at switch-on from cold, and checks with the freezer and hairdryer revealed that the electrolytic capacitor C2455 was responsible. It's in the line drive circuit. **E.T.**

Sony KV-M2150U (BE2A chassis)

In common with other models that use this chassis, these sets sometimes suffer from intermittent colour. The appearance of the symptom can be very erratic. In all the cases we've had so far the cause has been the subcarrier oscillator trimmer CT332. The value is 2-27pF and the part no. 1-141-418-11. **E.T.**

Goodmans W336NS-A

The problem with this set was a very intermittent and elusive loss of the picture. The sound continued to be OK when it occurred. We eventually found that the cause was a dry-joint at capacitor C73 in the line-scan section. **E.T.**

Sony KV-29F1U (BE3D chassis)

Not for the first time this set had come in for repair because of an intermittent problem: no go, and the front-panel LED flashing in sequences of two. It was cured by reworking all the soldered connections to IC500 and to connector CN902 on board A. CN902 is the link to the compact text panel. **E.T.**

Deccacolour D28NEE5 (Tatung E series chassis)

This 28in. set displayed only the lower half of the picture, along with a central, bright horizontal line. As usual, the TDA8350Q combined field/EW output chip IC401 was the cause of the partial field collapse. A replacement restored normal scanning. **G.M.**

Toshiba 21N21B2 (Orion chassis)

This 21in. silver TV set was dead apart from a strange buzz that came from inside it. A quick check revealed that the 2SD2499 line output transistor Q401 was short-circuit. As no other obvious fault could be found, I fitted a replacement. The set then powered up, but there was no EHT. Further checks showed that the line drive was missing. This was because of a virtually invisible dry-joint at the driver transformer T401. It had most likely been the cause of Q401's failure. Resoldering restored a perfect display. **G.M.**

Vibrant VYN0BE0P (Tatung B series chassis)

There was total field collapse with this old-timer. The TDA3654 field output chip IC402 had failed, along with the supply feed resistor R451 (1·2Ω, 0·5W fusible). Replacements produced a surprisingly good display for what must now be considered an old set. **G.M.**

Bush 2574NTX (11AK19 chassis)

This set was dead. Even the standby LED was out, though a faint ticking noise came from the power supply. All the hallmarks of a short-circuit line output transistor I thought. But it was OK, and so was the line output transformer. The cause of the trouble was eventually found to be the TDA6108 RGD output chip on the tube-base panel. It had a heavy leak at its supply pin.

In most versions of the 11AK19 chassis there's a fusible 47Ω resistor in series with the supply to this IC, but this one

just had a wire link. So the HT line was being loaded down via the 200V supply rectifier D609, which is fed from a tap on the line output transformer.

The set sprang to life when a replacement IC had been fitted, but the raster was blank with flyback lines. The cause of this was traced to a leaky diode, D900, which is connected to pin 5 of the TDA6108. It's not shown in the version of the 11AK19 service manual I have. **G.M.S.**

Sharp 66GF-63H (DA100 chassis)

After spending a lot of time looking for a dry-joint around the tuner unit I removed the tuner and connected it via extension leads. This proved that the tuner was not the cause of the intermittent no-signals fault. I finally found that there was a broken wire at one end of coil L204. You should be OK if you repair it carefully. If not, you may find that the AFC has to be reset as laid out in the engineering section of the service manual. **G.P.**

Toshiba 29N23B (11AK37 chassis)

This set was dead. When I inspected the chopper circuit I saw that the top of the MC44608 chip IC800 was missing, because R801 (1kΩ) was short-circuit. In addition D892, D893 (both BA159) and the chopper MOSFET Q801 (NTP6N60F) were all short-circuit. The set ran normally once these components had been replaced. I used a 4·7kΩ safety resistor in position R801 as recommended. **G.P.**

Beko NR284216WNS

This set had probably failed as a result of lightning or a pulse on the mains supply. The 3·15AT mains input fuse had blown and the following items were faulty: the 2SK2545 chopper MOSFET T601; the MC44608-P40 control chip IC601; and three resistors, R606 and R607 (both 0·47Ω, 1W) and R639 (15Ω, 0·5W safety). I fitted replacements then tried to run the set via a variac, with a 40W lamp connected across the HT line in place of the line output transistor.

When the input reached 90V AC the power supply started to pulse. So I checked the control circuitry and found that the optocoupler PH601 (PC130) was leaky and the following items were short-circuit: zener diode ZD603 (BZX55C12V), transistor T603 (SM1FP) and the adjustable shunt regulator chip ZD602 (TL431TLP). TH601 (MCR22-8) seems to have survived. After fitting replacements the set worked correctly with the mains input at 180V AC. I increased the supply to the normal level and ran the set for three days before returning it to the custopmer. **G.P.**

Philips 28PW6515 (A10E chassis)

There was an annoying audio 'plop' every time the channel was changed. It seemed to come from the subwoofer unit, which is mounted inside the back cover. In this model the subwoofer is a self-contained unit with the amplifier and speaker housed within a black box. A five-way lead plugs into the front panel to provide the supply and audio input.

I decided to investigate inside the black box and found that C2010 (330μF, 25V) was faulty. A replacement cured the problem. **M.R.**

Bush 2863NTX/A

There was excessive width with the sides of the picture bowed, though the set would produce a normal picture from time to time. When I inspected the line output stage area I noticed that L602 was dry-jointed. The set produced a normal display once all the legs of this item had been resoldered. A soak test followed to ensure a reliable repair. **J.F.**

Panasonic TX24T1 (Alpha 2W chassis)

This set was dead apart from a squealing sound that came from the power supply area. Cold checks showed that the 2SD1441 line output transistor Q551 was leaky. After fitting a replacement I checked for dry-joints at the line driver transformer, which was OK. At switch on there was an excellent picture. **J.F.**

Sony KVX2172U (AE2A/B chassis)

The problem with this set was intermittent field collapse. Visual inspection revealed dry-joints at the field output chip IC1501. This item is at the rear of the receiver. All pins were resoldered then the set was left on soak test. **J.F.**

Philips 20PV184/05

This combi set was dead with the 1·6A mains fuse blown. Further investigation revealed that D6315 and D6316 (both 1N4007) were short-circuit while the disc capacitor C2328 (470pF, 1kV) had blown in half. Normal operation was resumed once these items had been replaced, **J.F.**

Daewoo GB28G2

This large set was tripping. Cold checks revealed that the 2SD1880 line output transistor Q401 was faulty. I fitted a replacement then switched the set on. It powered up, but smoke started to come from the line output transformer T402. In fact a hole could be seen in it. The part no. is 1352.5008/50H0000181. Be sure to quote this as the number varies with screen size. **J.F.**

Schneider STV2801T

The complaint with this set was sound but no picture. When I switched it on there was no EHT rustle. Cold checks in the line timebase revealed that the driver transistor Q303 was open-circuit – a replacement cured the fault. I've also had this transistor go short-circuit collector-to-emitter. When this happens R306 (4·7Ω) goes open-circuit. A BC879 seems to work well as a replacement for Q303. **G.L.**

Goodmans W321NS

This set had a short-circuit line output transistor. I fitted a replacement and checked the usual suspects – the flyback tuning capacitors, the capacitors in the power supply, etc. The set then worked, but lasted for only fifteen minutes. By luck I had left the back off and saw the tube base arcing over. Fortunately I was able to switch off before the new line output transistor died. A new CRT socket followed by a long soak test proved that all was now well. **G.L.**

Schneider STV2007T (CTS-AA chassis)

The customer's complaint was that this set took longer and longer to come on. When I got it the set was stuck in standby. In view of what the customer had said, I got the freezer and hairdryer out. It didn't take long to establish that C2540 (680μF), C2564 and C2565 (both 220μF) had all fallen in value. Replacements cured the fault. **G.L.**

Bush 1473T (11AK20 chassis)

This set was dead with the chopper MOSFET Q801 (2N60E) short-circuit and R851 (0·33Ω) open-circuit. The culprit was quite obvious – a large blob of glue on resistors R809, R810 (both 150kΩ), R811 (470kΩ) and R812 (330kΩ). R811 was open-circuit and R812 was slightly high in value. I replaced the lot to avoid a recall.

Another of these sets was tripping. It didn't take long, by carrying out cold checks, to find that rectifier diode D811 on the secondary side of the power supply was short-circuit. **G.L.**

DVD

Fault reports from Geoff Darby Gerry Mumford and Chris Bowers

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Sony HCD-S400

The owner's complaint about this home-cinema system was no sound with 'headphones' showing in the front display. When I tested it this proved to be the case. Six channels have to be switched off when headphone operation is required, two front, two rear, a centre and a subwoofer. So this can't be done in the traditional way, by routeing the channels through switch contacts in the headphone socket. Instead, a single switch-contact set acts on the audio-protection circuit, opening all the speaker-protection relays to achieve the same outcome.

The cause of the fault was nothing more complicated than a poorly seated plug on the cable that runs from the headphone-socket sub PCB. As a result the protection circuit saw an open-circuit on the sense line and opened the relays, also telling the system microcontroller chip to display the 'headphones' message.

Everything worked normally when I had cleaned the connection pins and reseated the plug firmly. **G.D.**

Toshiba SD42HKSB

The DVD section of this home-cinema system didn't work, because a section of the power supply had shut down. Connector 901 feeds +32V to the board with the large heatsink, under which there are three surface-mounted audio ICs that don't look man enough for the job – even if you accept that their minuscule pins are able to carry enough current.

There was a short-circuit reading across the 32V rail, while a faint smell of 'IC burn' lingered around the heatsink area. To get to the three screws that secure the heatsink from the underside the entire board has to come out. Once the heatsink had been removed, along with the metal strip across the top of the three STA505 ICs, the offending one could be seen. It was IC710.

Four pins had burnt off the device completely, also one finger of print. The short disappeared when the IC was removed. So I tried repowering the unit, which now came up correctly. To complete the repair I ordered and fitted a replacement IC – it's expensive! **G.D.**

Venturer STS72AAS-10

This Dolby Pro Logic DVD home theatre system produced no sound from any of its five external speakers or its external subwoofer. With the volume setting at maximum only a very soft, slightly distorted 'shuffling' sound could be heard. I also noticed that during DVD playback the picture would momentarily freeze, the result being a jerky display during scenes with rapid motion.

As usual with most DVD players, the main clock crystal (Y1, 27MHz) on the MPEG decoder panel was the cause of the picture fault. These crystals often play up, the result being slow and/or erratic DVD playback. In the worst cases an audio CD may be played back too slowly – it depends on which chipset is used in the player. In this case the audio codec in the Zoran chip was not affected – it would have been with the ESS or MediaTek chips.

The audio fault was much more interesting, the cause being loss of the –7V supply at the BD3814FV IC (audio preamplifier 5.1-channel digital volume control). This supply is derived from the mains transformer via the 630mA wire-ended fuse FS801 and rectifier D809, which produces a –25V output. After that there's a 1kΩ, 0·5Ω feed resistor (R675), a 7V zener diode (DZ602) and a 100μF, 10V smoothing capacitor (C680). The capacitor was short-circuit but, because of the value of R675, the fuse hadn't blown. A replacement capacitor restored full sound from all the external speakers. **G.M.**

Sony DVP-NS330

This unit was dead. A look inside revealed that the power supply had blown up on the primary side of the transformer, with damage to the track print. The solution was to replace the power block, assembly reference 5, part no. 1-468-744-11. **C.B.**

Sony HCD-S500

This unit wouldn't play discs and had diagonal lines across the menu display. Checks inside revealed that C304 (220μF, 4V), a surface-mounted electrolytic capacitor on the DVD board, had gone high (ESR). A replacement restored disc playback and a normal menu display. **C.B.**

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Feb 2000 ▲ 302 pages ▲ Glossary ▲ Index
PB ▲ Published in UK
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NEWNES DICTIONARY OF ELECTRONICS

S W Amos; R S Amos

Aimed at engineers, technicians and students working in the field of electronics, this dictionary provides clear and concise definitions, including TV, radio and computing terms, with illustrations and circuit diagrams.

4th edition ▲ Mar 2002 ▲ 394 pages
100 illustrations ▲ PB ▲ Published in UK
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Eugene Trundle

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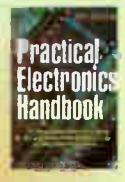

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5th edition ▲ Feb 2000 ▲ 571 pages
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Radio Society of Great Britain

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Mac E Van Valkenburg; Edited by Wendy Middleton

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Lewis & Sinclair

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Jan 1998 ▲ 238 pages ▲ HB
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Revised 2nd edition ▲ Nov 2001 ▲ 336 pages
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Mar 1997 ▲ 240 pages ▲ 200 line drawings
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J Edwards

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Edited by Peter Marlow

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3rd edition ▲ Aug 2003 ▲ 624 pages ▲ Index
PB ▲ Published in UK
Code 0-7506-5694-8 **£29.99**

VCR FAULT-FINDING GUIDE

Edited by Peter Marlow

A distillation of the most-used fault reports from 11 years of *Television* magazine. Arranged by make and model, it features over 2000 reports on over 200 models of VCR, including diagnosis and repair advice.

Mar 2000 ▲ 447 pages ▲ Illustrations ▲ PB
Published in UK
Code 0-7506-4634-9 **£20.99**

VCR IC DATA FILES

J Edwards

This text aims to provide the workshop technician and the field engineer with a convenient method of fault-finding without the need to consult workshop manuals. The most popular ICs used in video recorders are covered. Each device is presented graphically with data given against each pin.

Jul 1998 ▲ 448 pages ▲ 200 line illustrations
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5th edition ▲ Apr 2001 ▲ 323 pages
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References ▲ Glossary ▲ Index ▲ PB
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Published in UK
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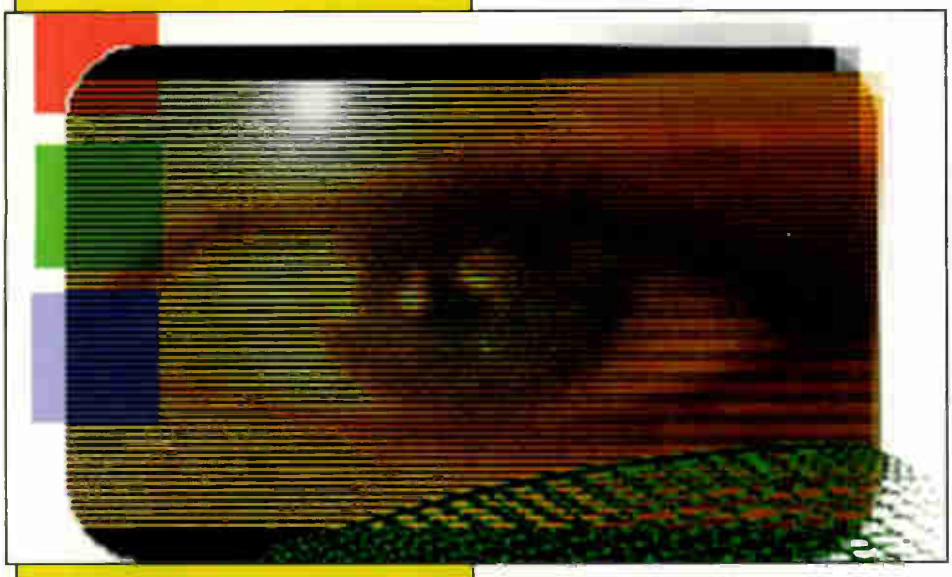

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and Martin McCluskey

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

Reports can be sent by post to:

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Azalea Drive, Swanley,
Kent BR8 8HU

or e-mailed to:
t.winford@highburybiz.com

Fault

Bush ITV6600 Internet TV (Beko chassis)

This set was dead. The mains fuse was intact but there were no outputs on the secondary side of the power supply, and no shorts could be detected. There was 330V across the mains bridge rectifier's reservoir capacitor C613 (220μF, 400V): this voltage decayed when the set was switched off, suggesting that the start-up circuit was OK.

Cold checks revealed that there was no continuity between the drain of the 2SK2545 chopper transistor T601 and C613. When I removed the plastic support from the PCB I expected to see dry-joints on the chopper transformer, but it looked OK. A check on the print side of the PCB showed that there was continuity between T601 and C613. Had I made a mistake the first time? When I checked again at the drain leg of T601 on the component side of the board there was no continuity.

A closer examination of T601's joints revealed that the drain leg hadn't protruded through the solder joint although the joint wasn't dry. Resoldering this joint and making sure that the drain leg of T601 did protrude through the joint restored life to the set.

Interesting that had I removed the plastic support earlier it would have taken me a lot longer to repair the set. The reason why I carried out the initial continuity check on the component side was that the support hid T601's joints. **C.R.**

Sharp 66FW-53H (DA100 chassis)

This set had the usual dry-joint on the line-scan coupling capacitor C613. Now the result of a dry-joint here can be that the capacitor's value falls. But in this case the capacitor's value was spot on. So I refitted it and switched the set on. I was surprised that it worked, as a dry-joint in this position usually causes a trail of destruction.

There was EW distortion however, and this wasn't cured by replacement of the 2SD2391 EW driver transistor Q506. I next carefully measured the inductance of L604 and L603 in the EW-correction circuit, using a digital inductance meter, as they quite often look OK but are low in value because of shorted turns. They proved to be fine. After replacing numerous components I finally found that the cause of the fault was the 47V zener diode D516. It wasn't leaky, and had the correct forward voltage drop. But when I checked it with my zener tester the reverse breakdown voltage was only 5·6V instead of 47V. A replacement cured the fault, then I noticed that there was no sound from the centre speaker.

The centre speaker amplifier is on a small plug-in PCB. A small BA4558 op-amp here, IC1300, had obviously overheated badly. A replacement cured the sound fault, which could have been present for some time and was probably not connected with the line-scan fault. **M.D.**

GEC C2000

This really old set turned out to be fitted with the Decca/Tatung 140 chassis. It was in excellent condition however, and hadn't needed any repairs until now. It had apparently gone 'bang' when switched on.

Its owner had set a modest budget for the repair, so I decided to check the condition of the tube first – using my similarly vintage Leader LCT410A CRT tester. This revealed that the emission of the original Tatung black-stripe tube (made under licence to Toshiba, I believe) was both very good and well balanced. So I decided that it was worth proceeding.

The 3A fuse in the plug was open-circuit and, once a replacement had been fitted, there was a full short-circuit across the live and neutral lines at the mains connector on the PCB. I was surprised, initially, that the internal fuse was intact. Too much time was then spent checking the capacitors, diodes etc. that are connected to the mains input circuit, all to no avail. Then the penny dropped: the on/off switch itself had gone short-circuit. Unusually, the set's internal mains fuse is downstream from the on/off switch. This explained why it hadn't failed.

Like most engineers, I've had my fair share of faulty on/off switches over the years, but I don't recall coming across a short-circuit one before. Once a replacement had been fitted the set burst into life, producing a truly first-class picture. **D.I.S.**

Matsui 28WV2N9 (Grundig C2059 chassis)

Within a few minutes of this set being

switched on lines, rather like the effect of a dry-jointed field output IC, would flash across the screen. The set would then power down to standby. If it was switched on again the process would be repeated.

A highly technical PCB bash would clear the lines etc. Inspection showed that the cause of the problem was not the field output IC, whose connections were OK. But there were many dodgy-looking solder joints in the line output area – so many that, after dealing with them all, I was very surprised to find that the fault was still present.

A more scientific, gentle prod-and-tap approach led me to the EW correction sub-PCB. When I desoldered it there was a blatantly obviously dry-jointed blue box-type capacitor, C64108. Once this and, for good measure, the FET had been resoldered all was well. What puzzles me is why, with this particular capacitor dry-jointed, there were no semiconductor device failures. **B.L.**

Panasonic TX25X1 (Alpha 4 chassis)

When this set was switched on it produced a short squeak then went to standby. The item that was first on my list of suspects was the line output transistor. But a check from its collector to chassis produced an unexpected reading of some 200Ω. Desoldering its collector eliminated it as a suspect, and desoldering pin 10 of the output transformer eliminated this item as well. But the cause had been proved to be in the line output transistor's collector circuitry.

Unplugging the scan coils eliminated this possibility, thankfully, and left a cluster of three beige, ceramic-disc capacitors as the main suspects. One of these, C565 (1,800pF, 3kV), proved to be the culprit. The part number and value listed in the service manual for this capacitor were completely wrong. Thankfully a SEME search under the model number etc. came up with the correct part. Once this had been obtained and fitted the set worked normally. **B.L.**

Toshiba 21N21B2

"It made a funny noise and went bang" the customer explained. The first thing I noticed was a blown-up fusible resistor, R509, in the power supply. Tests then revealed that the chopper FET Q501 and the line output transistor Q401 were both short-circuit. An 18V zener diode, D528, had also failed. The cause of all this mayhem was dry-jointed pins at the line driver transformer T401! Straightforward enough I thought.

I decided to repair the power supply first, then switched on without the line output transistor fitted. A meter was used to monitor the HT supply. This appeared, but the power supply was making a strange, buzzy, squeaking noise and refused to come out of standby. I can only say that, much later, a replacement chopper transformer cured this last problem.

All this because of a dry-jointed line driver transformer. I am being philosophical and have taken the view that this set was a 'loss leader' that will set the pattern for a number of similar blow-ups. **B.L.**

Grundig MW70-2690NIC/TOP (CUC2059 chassis)

The customer had taken this set to another repairer. Apparently the initial complaint was that the width had jumped in and out, then the set had gone dead. Usually the cause of these symptoms is a dry-joint at the scan coils. This kills the line output transistor and the EW section of the field/EW IC. When the set had been returned to the customer (after six months!) there was a picture but with excessive width and severe EW distortion. She had been told there was nothing that could be done about this. Two days later the set failed, with a puff of smoke.

I was a little nervous to start with, but cheered up when I found that sound and EHT were present, though there was no picture of course. The tube's first anode voltage was very low, and I soon found that there's a lead from the CRT base to a small PCB that's referred to in the service manual as 'Panorama View'. Disconnecting this lead restored the badly-distorted picture. When I removed the small PCB I saw that R5021 (1kΩ, fusible) had exploded. It appeared that almost every component on this PCB had been replaced, including D5021 and D5022. These should be type BY203. Instead, low-voltage diodes had been fitted – and had sprung a leak. Once 1·8kV, fast-recovery diodes had been fitted the picture was back. The circuitry on this PCB varies the scanning via an optocoupler and FET, and adjusts the first-anode voltage in sympathy.

The EW fault was cured by replacing the two modulator diodes, the TDA8350Q IC (which acts as EW preamplifier) and the P7N20 EW driver FET T55002. This restored straight sides to the picture.

The relationship between the two faults then dawned on me. The previous repairer had mistaken the Panorama View PCB for the EW correction panel and had replaced every component on it, eventually admitting defeat! **G.D.**

Hitachi DV-PF7E

This DVD/VCR combi unit was dead. After finding the power supply (remove the DVD mechanism first) I disconnected it from the main PCB and discovered that it sprang to life when powered. But it shouldn't be run for long like this – as there's no regulation on the panel, the voltages are 25 per cent higher than usual. The power supply had been tripping because of a heavy leak across the A12V output.

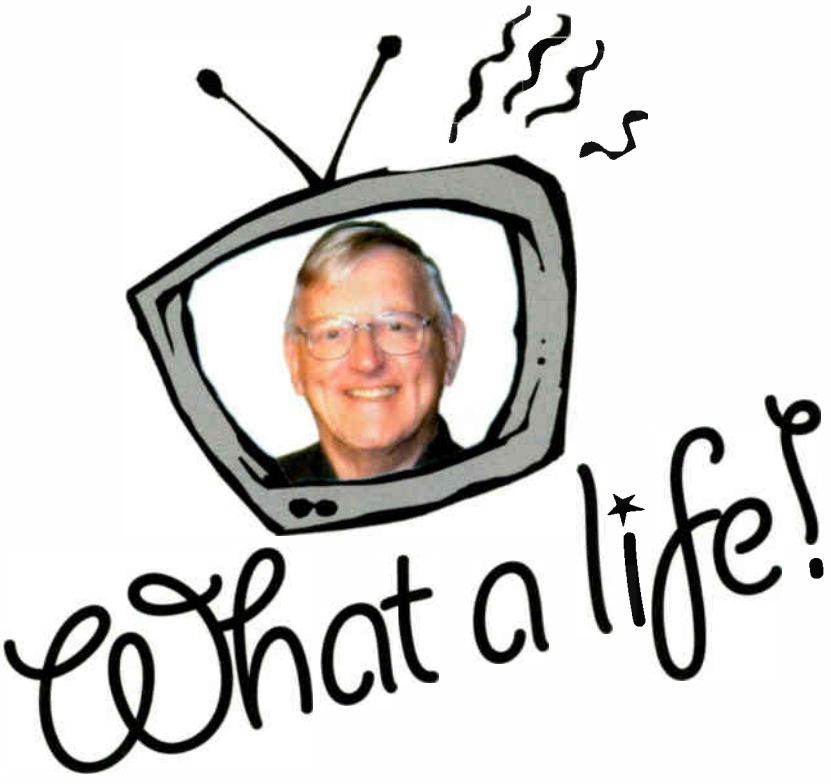
The video deck is very similar to those in the current range of VCRs, and I had a sinking feeling that the capstan motor was leaky. This might not seem to be too serious a fault, but the unit is made by Funai whose policy seems to be "don't fit one part when none will do". There are no expensive plugs and sockets to connect the deck to the PCB: the ribbon cables are glued and soldered directly to the print. The connection and circuitry for the drum and loading motors come via the capstan motor, which needs to be attached prior to reassembly. The new motor's termination has to be removed with a scalpel to reveal the flat conductors, which must be carefully fed through a hole in the PCB. The audio, erase and video head preamplifier ribbon cables also have to be fed through their respective slots. Then they all have to be soldered to the print side of the PCB. Great fun!

Incidentally the white ribbon cable hides a deck-securing screw. Also note that the fluorescent display won't work with the DVD section disconnected. **G.D.**

Bush 11AK19PRO widescreen chassis

The power supply in these models seems to go into a self-destruct mode when the UF5407 HT rectifier diode D816 goes short-circuit. When this happens I check and replace as necessary the following components: the MTP6N60E chopper FET Q802; the MC44604 chopper control chip IC802, which can go short-circuit to chassis from its supply pin 1; the BA159 diodes D807, D826 and D827; R814 (47Ω, 0·25W) in the drive to the gate of Q802; the surge-limiter resistor R817 (2·2Ω, wire-wound); and the mains bridge rectifier diodes D801-4.

One set remained stubbornly dead however after replacing these components. I discovered that the supply voltage at pin 1 of IC802 hovered between 10-12V, while all the outputs on the secondary side of the circuit were very low. To cut a long story short, I found that the tiny coil L801 was open-circuit. It's connected to pin 4 of the chopper transformer TR802 and feeds D805 which, with C848 (100μF, 25V), provides the 12V running supply for IC802. A replacement coil obtained from a scrap chassis restored normal operation. **M.McC.**



Donald Bullock's servicing commentary

- TV set faults
- Rabbi Lionel Blue
- Precautions to take when fitting a new IC in a hazardous position
- More emails

Mr Gumboil was an angry man because of the way in which his 24in. Philips 24PW6006/05 was putting him through the wringer.

"It's making me evil" he announced as he placed it on the counter. "I switches him on and I gets a reddish picture for ten seconds. Fifteen if I'm lucky. Then, just as I gets settled in my chair, he cuts out. Zonk! Just like that!"

I looked suitably grave.

"Well, if I waits a minute or two and switches him back on, I gets a repeat performance. How can a chap watch a programme with a set like that?"

He brought his fist and shoulder back, and I eyed the door.

"For two pins I'd knock him into the middle of next week!" he said.

When he'd departed I tried the set. He was right about the fault, but I noticed something that he hadn't mentioned. When it was there, the picture was a bit bright. Was the beam current too high?

I turned off the colour and carefully adjusted the first anode preset. This cleared the redness of the picture and stopped the set reverting to standby. The problem was solved – and the colour picture was particularly good.

Mrs Beamish

Then Mrs Beamish came in, radiating happiness at RF. I couldn't see why. She's thin but lumpy, and has a mouth like Mick Jagger. As she talked she writhed around.

"Hello Donald Old Bean!" she gushed, It's my giant Matsui television set that brought me to see you."

"Oh, what's up with your car?" I quipped. Since this seemed funny to me, I stopped and had a good laugh. She joined in as though it had been her comment.

The set was a 32in. Matsui Model 32WN03, which is fitted with the Tatung Professional 4400 chassis. "The picture collapsed to a white line across the screen a few times, then came right" she said, "but it's now gone altogether."

The set was stuck in standby when we tried it. We decided to check the S2000AF1 line output transistor TL1, which turned out to be short-circuit. When a replacement had been fitted the set sprang to life, but there was field collapse. We replaced the TDA8350Q field/EW output chip ICF1, then checked its peripheral components. RF10 (33Ω) in the feed to pin 8 (flyback boost supply) was open-circuit, because the associated 22μF, 35V electrolytic capacitor CF6 was short-circuit. The set was perfectly all right once replacements had been fitted.

The Samsung SCT12B chassis

Cocker Cooper plodded in, fresh from his straw-waggon, just as we'd boxed up the Matsui set.

"I feels like about fourteen pints of scrumpy" he commented, "but that ain't why I'm here. I've brought you Old Ferris's telly to mend. I like Old Ferris. He makes real good scrumpy."

Then he plodded out again, extracted a Samsung set from a mountain of pigs and straw, and bundled it in. It was a Model CI5944 (SCT12B chassis).

"He reckons there's no sound nor picture on him" he wheezed.

Steven looked up. "I've had a couple these recently" he commented. "Both apparently dead because there was no line drive. The protection circuit was in operation, in turn because the audio output IC was short-circuit."

It was the same with this one. The offending chip is a TDA7297 (IC601). Once a replacement had been fitted the set was OK in all respects.

Sets from the sticks

It was obviously going to be hayseed day. Our next caller was Martie Maggot, a farmer from out in the sticks.

"Marnin', gentlemen" he said. I put his voice at about 50W. "Why they makes these tellies so big these days I can't think. Our first set wasn't much bigger than a matchbox!"

I looked at him. He seemed to be tough, so I let it pass. The set he'd brought in was a 28in. Goodmans Model 2898, which is fitted with the Daewoo CP775 chassis.

"Dead as a doornail" he boomed, "our first set wasn't never no trouble at all."

"So why did you get rid of it?" I asked.

"'Cos he was too small, of course! Here, someone pinched me wing-mirror off me car the other day. BMW he is. Mirror's a special 'un. Got a heating-thing in 'im, and they wanted a hundred pounds for a new one."

"Did you pay that?" I asked.

"No I never. I pinched one offa someone else's car!"

"Two wrongs don't make a right, Martie" I replied. "If I clouted you for nothing and you went over and clouted that chap outside, that wouldn't make everything right."

"Ah, but it would if he then came in here and clouted you" he said.

"Umm, I see. We'd better look at your set" I conceded.

It was dead all right, and for starters we found that the 2SD1880 line output transistor Q401 had died. We decided to fit an S2055N, which is more reliable. The set then came to life, but with field collapse. So a new TDA8351 field output chip (I301) was fitted. Checks on associated components revealed that D408 (BYV95C) and C413 (47μF, 160V) in the 46V supply to pin 6 were both short-circuit. We snipped them out and fitted replacements. By now Maggot was looking concerned.

We now had field scanning and the set worked merrily – except that the line output transformer was leaking EHT. It often seems to happen with these sets.

Paul broke the news to Maggot. "Your set's working now, as you can see, but the basic cause of all the trouble is the line output transformer, here. You need a new one if the repair is going to last."

"How much will that cost?" asked Maggot.

"About seventy-five quid altogether" Paul replied.

Maggot winced. "What if we leaves that whatever you said in there for now?" he said.

"It'll cost you less, but you'll be back here before long" Paul advised.

Maggot stood thinking.

"Nor much chance of your pinching some other poor fellows components" I commented.

"Nah. You'd better do the lot" said Maggot. Then he did a little dance. "Some you wins, some you looses . . ." he boomed.

Rabbi Lionel Blue

Heaven knows, the BBC isn't what it was. I've often heard it said that it hasn't been since Lord Reith stepped down. But, as a BBC radio listener rather than a television addict, I've often been heard to say thank God for the BBC. I did so the other day whilst listening to the morning Today programme on the Home Service or, as the whiz kids seem to call it nowadays, Radio 4.

My reason was that twice of late, after a long absence, we've been treated to the dry and mischievous voice of Rabbi Lionel Blue, in another of his occasional three-minute spots.

"Good morning John, good morning Sarah, and good morning everyone" he crackled as he was introduced. I stopped to listen to his latest gems of wisdom. He's getting on a bit, and is not too well. He doesn't talk about religion much. More about decent behaviour – even among some of the oddball rogues he reckons he's known. This morning it was about Jules Feiffinger (or somebody), who had called to see him about the awful plight of Old Momma Murphy.

"She needs help from the Synagogue, Rabbi" said Feiffinger. "I've never seen such a poor, unfortunate soul. She's only just hanging together. She has no family, no money for her rent, and she's about to be thrown out on to the streets."

The Rabbi was concerned and fell still. "Of course we'll help her" he said. "That's why we're here. And it's very commendable that you should tell us about her plight. Is she a relative of yours, or a friend?"

"No, Rabbi, just someone I know" answered Feiffinger.

"Then it's even more to your credit that you should be so concerned about her" said the Rabbi. "How did you come to know her?"

"I'm her landlord" said Feiffinger.

More on the Sony PS-LX50

I've had dozens of emails about my trouble with a Sony PS-LX50 record-player deck. As I mentioned last month, Martin Pickering correctly identified the well-cooked motor-speed control IC as a uPC1470, and sent me a couple. Since I still don't have a circuit diagram, the first thing I did was to compile a simple chart of the new IC's resistance readings. I've often done this when faced with the task of fitting an IC in a potentially hazardous position so that I can subsequently, if necessary, check whether the IC has suffered because of an associated fault and is still good or not. The greater the number of pins, the more tedious this operation becomes of course. But I've found that there are times when the time spent is justified. I reckoned that this would be such a case.

Using the diode setting of my digital meter, I connected the black probe to pin 1 of the IC and used the red probe to measure the readings to pins 2, 3 and 4. Then I did the same with pin 2 and so on. This provided me with the chart shown in Table 1.

I then fitted the IC. In operation it became increasingly warm, as the motor's performance deteriorated. So I was able to establish that the motor was the cause of the problem. The IC was still good when checked again.

More emails

Chris Drew of Essex has written about my recent reference to the expensive Grundig TK830 tape recorder our shop manager unwittingly delivered and donated to a fraudster some fifty years ago. At the time the machine was the last word in quality and sophistication, which is why it was sold for about a dozen times the average weekly wage in those days. Chris says he has one, though it isn't the stereo version. He writes:

"An uncle of mine found it at an agricultural market auction. It's a bit scuffed but complete, apart from the famous 'alarm-clock' capacitor microphone. But I don't know if it works, as I haven't tried it yet. As you say, it was very advanced for its time, with a capstan directly driven by a synchronous outer-rotor motor, speed and direction being changed by switching motor poles. The wheels are driven by belts and one-way clutches, with electromagnetic clutches for the reel turntables. There are no brakes or idler wheels. The cabinet contains three speakers. I have some servicing details in Hellyer's red *Tape Recorder Servicing Manual*, which was published in 1965."

Chris thinks this excellent machine would be worthy of renovation, and is prepared to donate it to anyone who would be interested in undertaking the task. If any reader is so inclined, please send me an email, stating your locality. Chris also has several ancient Truvox machines and hopes to renovate them one day. He wonders how many Data Protection laws a *Kelly's Street Directory* would break today.

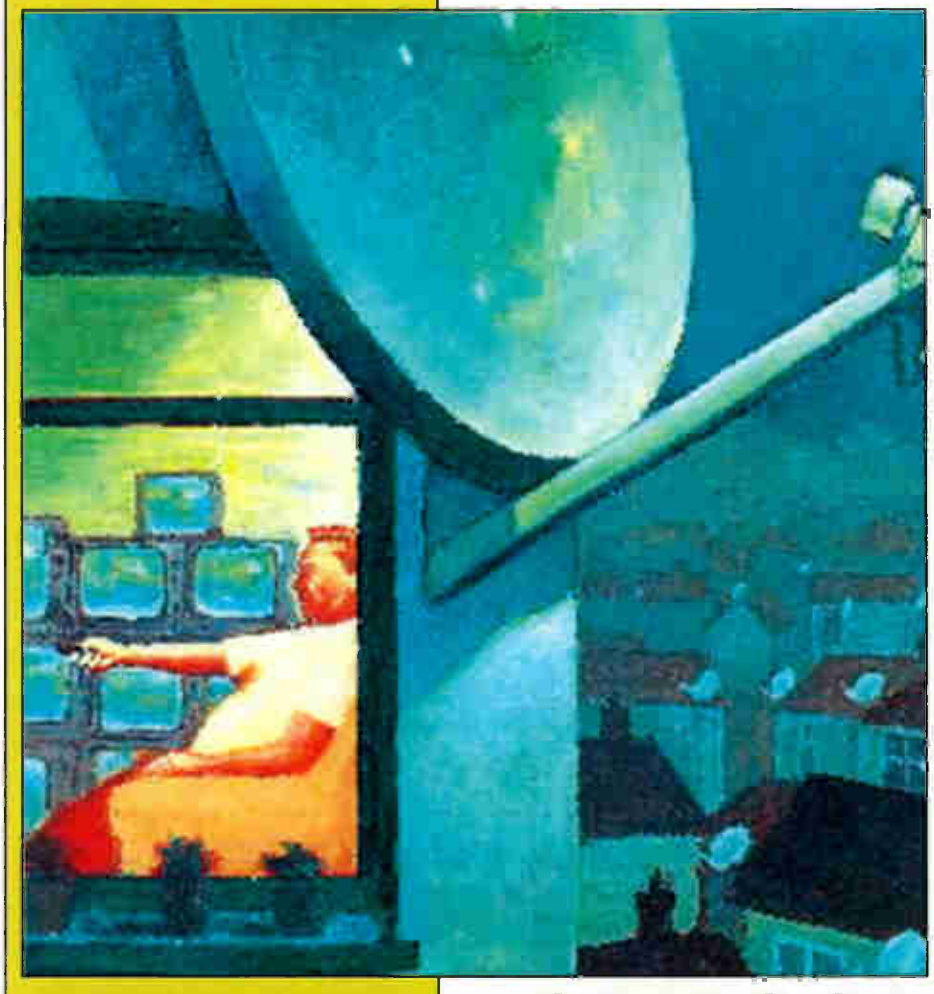
Finally, Peter Wadham, who has traded as Sycamore Services since he left Thorn-EMI, asks why I never refer to Tidman Mail Order Ltd., of whom he thinks very highly. In fact I've often bought line output transformers from the company. He then asks why I have stopped criticising the television broadcasters, especially the BBC, for the thumping and drumming on their programmes and announcements. "Now we have to put up with flashing, out-of-focus pictures as well" he complains.

Why have I stopped? The fact is that there's just so very much wrong with all television broadcasting today. I reckon that only the BBC is worth saving, but this won't come about till they call me in to do the job. Personally I can't see it. But if they do, there will be a very large number of whiz-kids roaming around looking for jobs . . .

Emails are always welcome. You can reach me at donald@wheatleypress.com

Table 1: Resistance measurements for the uPC1470

Black lead to pin 1	Black lead to pin 2
Red lead to pin 2 – 809W	Red lead to pin 1 – 0W
Red lead to pin 3 – 688W	Red lead to pin 3 – 670W
Red lead to pin 4 – 794W	Red lead to pin 4 – 0W
Black lead to pin 3	Black lead to pin 4
Red lead to pin 1 – 0W	Red lead to pin 1 – 0W
Red lead to pin 2 – 1,314W	Red lead to pin 2 – 1,643W
Red lead to pin 4 – 0W	Red lead to pin 3 – 589W



SATELLITE NOTEBOOK

Reports from Christopher Holland and Pete Haylor

Photo 1: RAI Moscow identification via Eutelsat W3A.

Photo 2: RAI Moscow identification via Eutelsat W3A.

Photo 3: Typical Eurovision Geneva caption via Eutelsat W3A.

Photo 4: Typical Eurovision News caption via Eutelsat W3A.

Resistors to the rescue!

Herr Grunwald has some holiday apartments and wanted them to be able to receive the FTA channels from Astra 1 (19·2°E). He had brought most of the equipment required from Germany: five FTA digital satellite receivers and an eight-way magic switch, or Multischalter as the label said. The switch also has a terrestrial aerial input. The loss (Dampfung) at each socket is quoted as 2dB.

We fitted a combined satellite IF F socket and a terrestrial coaxial one in each apartment, to split the diplexed satellite and terrestrial signals from the magic switch. The switch was connected via four cables, for the vertically and horizontally polarised low- and high-band signals, to a suitable LNB that was fitted to the existing prime-focus dish. Each outlet was tested, using a spectrum analyser, and worked well, switching as it should do from low to high band when a 22kHz tone was present.

Imagine my surprise when, after connecting the satellite receivers, I found that there were no high-band signals at any of them. Checks showed that there was no 22kHz switching tone at the LNB socket. But, when the receivers were connected to a conventional single-output LNB, the 22kHz tone was present and high-band switching worked well.

When a satellite receiver is connected to a magic switch virtually no current is drawn from it, as the LNB draws its current from the mains-powered switch. This helps as it reduces the heat generated in the receiver's power supply. For the switch outlet that feeds the receiver to be able to change polarisation and, in the presence of a 22kHz tone, shift from low- to high-band operation, only a very small current is required from the satellite receiver. Strangely, the receivers Herr Grunwald had bought produced no switching tone unless a minimum current level was drawn from their power supply.

Fortunately the tone circuit in the

Photo 5: Typical Eurovision Geneva caption via Eutelsat W3A.

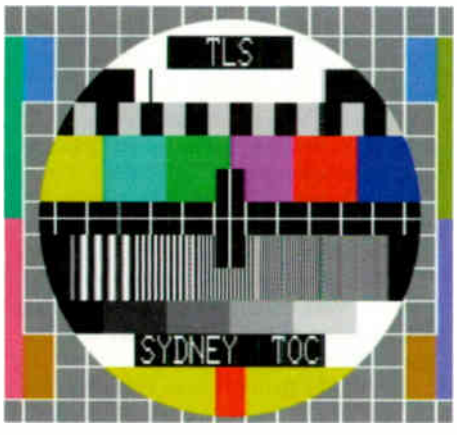


Photo 6: Test card from the Telstra Technical operations centre in Sydney, via Eutelsat W3A.

Photo 7: Jordanian TV test card via Eutelsat W3A.

Photo 8: France 2 Moscow via Eutelsat W3A.

Table 1: Latest digital channel changes at 28·2°E

Channel and EPG no.	*Sat*	*TP*	*Frequency/pol*
Channel S (837)	EB	C7	11·426GHz/V
Kismat Radio (923)	2B	36	12·402GHz/V
Poker TV (265)	EB	D4S	11·527GHz/V
Radio London tests	EB	C6	11·390GHz/V
Sound TV (588)	EB	D9S	11·622GHz/H
UKTV Style Gardens (144)	2A	6	11·817GHz/V

2A = Astra 2A 2B = Astra 2B EB = Eurobird

receivers burst into life with very little current being drawn from their power supply. The solution was to fit a 1·8kΩ, 0·5W resistor from the centre connector of each F socket to chassis inside the magic switch. This provided a complete cure – the presence of the resistor doesn't reduce the RF output from the switch.

It seems that the magic switch draws slightly less current than the designer of the receivers had expected would be the minimum required. It appears to be a design quirk because, if a tone was present at all current levels, the fault condition would never be experienced. **C.H.**

More HD broadcasts

German broadcaster Pro 7 is broadcasting several films in HD format over the next few months via the Astra 1 slot (19·2°E), in parallel with its standard-definition output. The frequency used for the HD transmissions is 11·436GHz, with vertical polarisation, a symbol rate of 22,000 and 5/6 FEC. The EPG identification is Pro 7 HD. A 625-line inlaid picture is often present within the HD raster. **C.H.**

Digital channel update (28·2°E)

The latest channel additions at 28·2°E are listed in Table 1. Where allocated, the EPG number is shown in brackets after the channel name. Sound TV is on-air from 4 p.m. until midnight. At other times the channel is used by the Community Channel. The Radio London tests are connected with an offshore pirate radio ship of the Sixties.

Teachers' TV, which was listed last month, has been moved to 592 in the EPG. The EPG numbers for several UKTV channels that use transponder 6 of Astra 2A have been altered to accommodate the recently launched UKTV Style Gardens channel (EPG no. 144). UKTV Food is now at EPG no. 145, UKTV Food + 1 at EPG no. 146 and UKTV Drama at EPG no. 147.

Motors TV (EPG no. 413, EB transponder D2S, 11·488GHz/V) is now encrypted.

The channels that used Astra 2D transponder 55, including Hallmark, Sky Sports News, The Sci-Fi Channel, Eurosport 2, Discovery, Home and Leisure and Sky Sports Extra have been moved to Astra 2A transponder 23 (12·148GHz/H).

ITV has started to make use of Astra 2D transponder 41 (10·714GHz/H). ITV1 Anglia and Tyne Tees have gone there from transponder 53. **C.H.**

Eutelsat W3A (7°E)

This month we'll take a look at Eutelsat W3A (7°E). I listed the outputs from its predecessor W3 a while back. Some frequencies in use have changed and, with W3A having come into use, it's worth revisiting the slot.

Eutelsat W3A caries all the EBU (European Broadcasting Union) news exchange traffic for Europe. Some of the feeds are now scrambled, but many aren't. But they use MPEG 4:2:2 vision which, at present, is most easily received using a PC-based satellite receiver.

EBU news feed frequencies are as follows: 10·959, 10·968, 10·977, 10·986, 10·995, 11·005, 11·014, 11·023, 11·043, 11·052, 11·061, 11·070, 11·079, 11·088, 11·097 and 11·106GHz. Horizontal and vertical polarisation are both used, the symbol rate is 6,666 and the FEC value is 7/8. There are also wider bandwidth transmissions that use a symbol rate of 13,333 with the same FEC. The frequencies used for these varies, but I've found them at 10·963, 11·065 and 11·083GHz/H and 10·963, 10·982, 11·000, 11·065, 11·082, 11·102 and 11·148GHz/V. A mix of wide and narrow symbol-rate transmissions is usually present at any frequency. In general the wide symbol-rate transmissions are more likely (though not always) to be encrypted.

Photos 1 and 2 show Italian broadcaster RAI's Moscow identification. Photos 3-5 show typical examples of Eurovision Geneva captions.

International test-card identifications can appear unexpectedly. Photo 6 is from the Telstra Technical operations centre at Sydney while Photo 7 is from Jordanian TV (this test card used to be, and possibly still is, aired via the terrestrial TV network when not transmitting programmes). Photo 8 is from France 2 in Moscow while Photo 9 shows a background camera shot of Baghdad with EBU identification.

Various national TV feeds may be

Photo 9: Background camera shot from Baghdad with EBU identification, via Eutelsat W3A.

Photo 10: Italian TV feed via Eutelsat W3A.

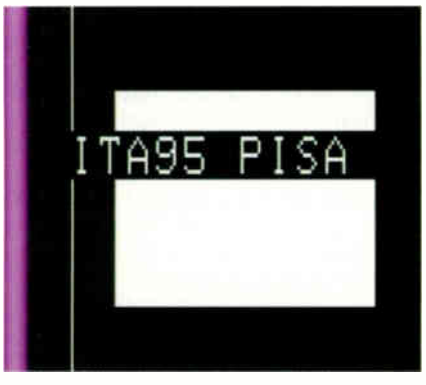


Photo 11: Italian TV feed via Eutelsat W3A.

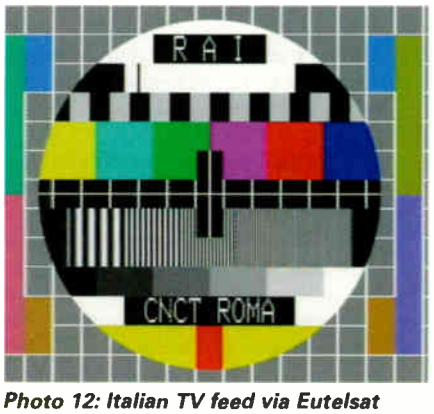


Photo 12: Italian TV feed via Eutelsat W3A.

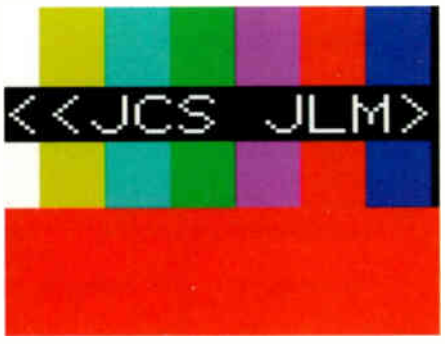


Photo 13: Israeli feed via Eutelsat W3A.

Photo 14: RTP news feed via Eutelsat W3A.

Photo 15: RTP news feed via Eutelsat W3A.

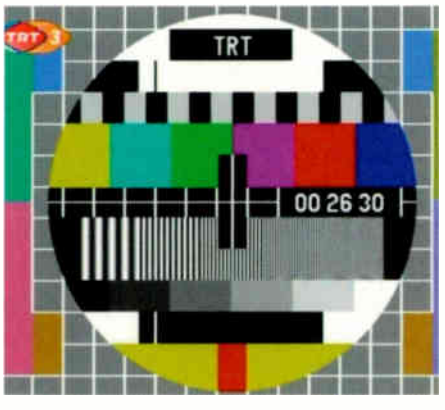


Photo 16: Turkish test card (TRT channel 3) transmitted after midnight local time at 11·492GHz/V via Eutelsat W3A.

found. I've seen TVP (Poland) feeds at 11·126, 11·133 and 11·142GHz/V with SR 5,700 and FEC 3/4. Italian TV feeds appear at 11·125, 11·135, 11·145, 11·155, 11·171, 11·180 and 11·189GHz with SR 5,632 and FEC 3/4. Photos 10-12 show typical examples.

Feeds from Israel are usually present at 11·162GHz, using the same characteristics as the Italian feeds. There are often colour bars captioned JCS Jerusalem, see Photo 13. RTP (Portugal) uses the satellite for national news feeds that can occur at any of the EBU frequencies previously mentioned, using the same SR and FEC. Typical examples are shown in Photo 14 and 15.

The satellite carries other channels. TVP (Poland) is present at 11·175GHz with SR 27,500 and FEC 3/4. TVP1, TVP2 and TVP3 are unfortunately encrypted, the only unencrypted channel in the multiplex being TV Polonia. The French channels TV5 and M6, plus various radio stations, are present at 11·283GHz/V, again using SR 27,500 and FEC 3/4, along with encrypted Eurosport 1 and 2. Various unencrypted Italian channels are present at 11·304GHz/H with the same SR/FEC.

BFBS, for British forces abroad, is at 11·324GHz/V, with SR 27,500 and the low FEC value of 1/2. The TV channel is encrypted but some of the radio stations are in the clear.

South American TV is present at 11·344GHz (SR 27,500, FEC 3/4) – Venevision, TV Chile, TV Colombia, Cubavision and Solo Tango from Argentina.

TRT (Turkey) channels 1, 2 and 3 are present unencrypted at 11·492GHz/V, SR 30,000, FEC 3/4. A different footprint directed more towards Eastern Europe is used however, though there is still a fair signal in the West. Various encrypted Turkish channels use several frequency blocks up to 11·7GHz, with the same SR and FEC. TRT channel 3 closes down after midnight local time (two hours ahead of the UK) then shows a test card, see Photo 16. What a rarity these days! **C.H.**

A helping hand

The customer had been trying to install a motorised dish system himself but had got into difficulties. When I called I found out why – there was a huge tree in front of the dish! Tests showed that the only satellite available was Hotbird, which was fortunate as he was Italian and this was the satellite he wanted. I removed the motor, as it was of no use, and then found that, because of the location of the wall bracket, the dish couldn't be adjusted to the correct elevation. So the whole assembly had to be removed and refitted at the opposite end of the rear wall. At last it worked the way he required. **P.H.**

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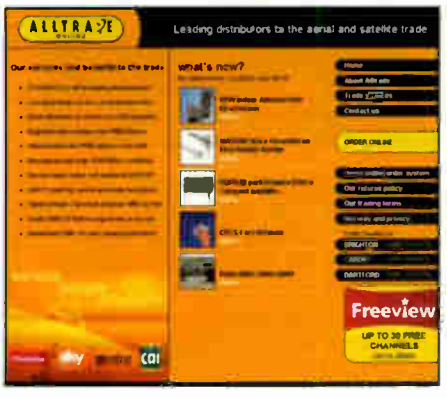

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Horizon is a UK company specialising in the design and manufacture of test equipment for the digital satellite and terrestrial market. the meters are used for the easy alignment of satellite dishes and antenna during installation. At around 1kg they are light and easy to use, packed with features normally found on expensive and heavier spectrum analysers. Manufactured in the UK we have meters used in over 21 countries.

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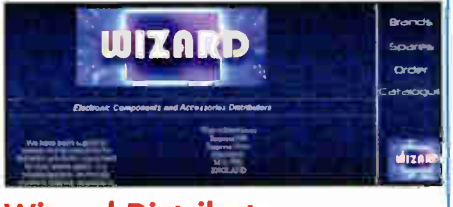

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continued from page 413

netron is useless – along with the rest of the oven. You live and learn.
Michael Dranfield,
Buxton, Derbyshire.

A Thirties workshop

The nearby photograph is a copy of a postcard that recently came my way. It shows the workshop at the Wireless College, Colwyn Bay, North Wales obviously, from the equipment on the bench and the dress of the technicians, taken in the Nineteen Thirties.

Most of the radios at the top of the picture are unknown to me, but the one on the left seems to be familiar. I also think I recognise an FC4 valve (a British 7-pin based frequency changer with gold-coloured metallising) on the shelf above the fireplace in the background. An AVO 7 multimeter on the bench was the first meter I was allowed to use as an apprentice.

I wonder whether readers can identify any of the other equipment?
Alun Rawson-Williams,
Denbigh.

The Bush DAC10

I was very interested to read Malcolm Burrell's article (March) on a Bush Model DAC10 radio receiver restoration. I have one of them in my collection, and had the same problem with the missing Bush emblem. It was solved by a friend who had some Christmas wrapping paper with a similar design on it – silver backing, green bush and a small red pot. I cut this to shape and applied Evostick to the paper. Once dry, I applied the emblem to the cabinet. I think it looks acceptable – as appearances go!

The loudspeaker can be rather a problem when faulty. Unlike a conventional speaker, it does not lend itself to easy repair. You can't fit a conventional substitute, as the original one is of a 'shallow' design. A replacement has to be of the same depth, otherwise you can't get the chassis back in the cabinet. It was one of Bush's quirks in the Fifties. A similar problem is the wavechange switch at the side of Model DAC90A. When this is faulty it's quite a job to get an exact replacement – and to remove the old one. Here are a couple of sources of speakers for the DAC10: the Philips Disc Jockey record player, which has one mounted in the lid; and some car radios used them – that's where I managed to get my replacement.

I recommend replacing all the old waxed capacitors in these valve radio receivers. It seems to me that the original problem with Malcolm's set had been a horrendously leaky coupling capacitor that put a positive voltage on the control grid of the UL41 output pentode. This would have eventually ruined the UL41 and the output transformer (the primary winding going open-circuit). The output transformer had probably been removed for this reason, while a replacement was being sought.

The UL41 is certainly not a cheap valve to buy, and exact replacement audio output transformers are not always easy to find. It's cheaper, though time consuming, to replace these wax capacitors. I would certainly prefer to have the set working properly with replacement capacitors and not the old wax ones that act more like resistors. Even replacement wax capacitors from other sets will eventually cause problems.

With the DAC10 and DAC90A it's also worth ensuring that the windings of the frame aerial are properly on the former. I've known them begin to slide off, possibly because of damp storage conditions, and always apply something like Evostick at various spots across the drum to keep them in place.
Mike Horne,
Leeds, West Yorkshire.

P&P rip-off

I recently needed a replacement pinch wheel for an up-market Panasonic VCR that suffered from tracking errors. It was not the sort of thing I need very often, and certainly not something I would want to hold in stock. So, following a recommendation from another member of the Televideo engineers list, I ordered a pinch wheel from a newish company in the spares trade. I like to support new companies, particularly those trying to make a living in our trade, but won't mention the company here as the following point also relates to many wholesalers.

When the goods eventually arrived I found that the pinch wheel was priced at £4.50 but, in addition, there was an extortionate charge of £3.50 for post and packing, making £8 for a pinch wheel – all prices plus VAT of course. What did I get for £3.50? The pinch wheel was Sellotapped to a sliver of card and then put in an ordinary, non-padded envelope, with a 28p stamp in the corner. The effort couldn't have taken more than a minute.

Yes, I should have checked on the P&P before ordering. But I'm of a generation that expects to be treated fairly – that, surely, is how you build up repeat trade? Such extra costs can only result in our trade declining even faster than it is now.
Robert Philpot,
Horsted Keynes, Sussex.

Answer to Test Case 509

– see page 394 –

Intermittent faults, bounces and demands for money back are all part of the daily lot for most service engineers. With this month's Bang and Olufsen/Philips deck problem the original diagnosis had obviously been wrong, though Sage could hardly be accused of lack of care or diligence. The fact that the fault changed or cleared when the tape's tension around the head drum was slackened was an important clue. It led to the conclusion, the correct one this time, that the basic cause of the problem was wear on the periphery of the lower drum assembly. This increased its friction with the tape and, sometimes, led to judder during the tape's passage. The only cure would have been replacement of the lower drum assembly, at a cost that would have been difficult to justify at this late point in the machine's life span.

We found that every tape that produced the fault symptom was of Scotch manufacture (with a lifetime guarantee!). So the way forward, it was decided, was not to use Scotch tapes any more – they went out of production many years ago anyway – and to continue to use the VCR until further wear led to other troubles. The machine could then be replaced with one of those new-fangled DVD recorders. And that's what happened.

Mention of Scotch reminds me of the late, great Les Lawry-Johns, who had no truck with VCRs or DVDs. Cheers Les, up there . . .

NEXT MONTH IN TELEVISION

Plasma displays for TV

Fawzi Ibrahim starts a new series that will provide an in-depth account of the operation and control of plasma display panels. Part 1 describes the construction and basic operation of a plasma-pixel display panel and the drive requirements and techniques used.

Servicing the B&O 36XX, 316X, 326X and 39XX series chassis

The B&O Unity TV chassis use Flat Square tubes and provide 2 x 40W of hi-fi sound. Models include the L/LX4500, L/LX5500, MX3500/5500 and LS4500/5500. Paul Coles provides a detailed fault-finding guide.

Test report: Peak ESR60

Electrolytic capacitor ESR testing has done a lot to help and speed up CE equipment servicing in recent years. Peak has recently introduced a new tester. Model ESR60, with several interesting features. Eugene Trundle has been trying one out.

Vintage restoration: the Ferguson Model 352U

Malcolm Burrell initially thought that restoration wouldn't be worthwhile, then had second thoughts!
It's an interesting little table model that dates from circa 1955. The circuit diagram will be included.

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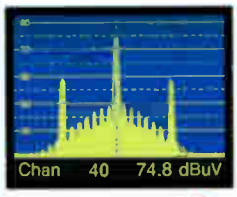

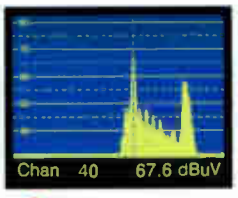

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