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NEXUS
MEDIA COMMUNICATIONS

Goodbye again

For the last five years, just a little over in fact, Tessa Winford and I have been editing and laying out each issue of *Television* on a free-lance basis, after leaving the publisher Reed Business Information. In the following year Reed sold the magazine, along with a group of others including *Electronics and Wireless World*, to Cumulus Business Media, a division of Highbury House Communications PLC. Cumulus was subsequently integrated into Highbury Business and, earlier this year, Highbury's business publishing division was sold off, becoming Nexus Media Communications. Quite a lot of changes! The new owners of *Television* have now decided that they want the editorial work on the magazine done in-house, and have appointed a new editor, Boris Sedacca, who will be taking over from the next (December) issue. Boris has worked on a number of trade and technical journals and understands their requirements. He moves to *Television* from being editor of *Electrical Times*. We extend to Boris our best wishes on taking over responsibility for *Television*. He tells us that no major changes will be made to the magazine's policy and features in the immediate future.

It is with sadness that Tessa and I leave the magazine. I've been involved with it continuously since 1967, while Tessa has worked with me for over seventeen years. During this lengthy period we have got to know many of our contributors well. They have given us a great deal of help and encouragement, for which we are truly grateful.

Our departure coincides with continued uncertainties in the trade and the industry. Difficulties are being experienced by everyone, whether on the repair/servicing side, the retailing side or the manufacturing side. Dixons and Kesa Electricals (Comet) have recently reported lower profits and mentioned tough trading conditions. They are more fortunate than some other electrical retailers in being international operations nowadays. In the UK, they and others are suffering from a change of shopping habits: people buy increasingly from the supermarkets and via the internet. This contributes to the persistent price/profit erosion. Businesses suffer in two ways, from lower prices and from higher rates and rents – for some reason rents seem to defy the current economic conditions, for the present anyway.

Manufacturers are suffering as a result of the vast flow of low-cost consumer-electronics products coming from China and elsewhere in the Far East. Even the Japanese and Koreans, who have dominated the industry in recent decades, are suffering. Last year the price of LCD TV sets fell by about 35 per cent worldwide. In the UK, the price fell by as much as 50 per cent for entry-level models. The situation is so bad that Samsung Electronics, the world's second largest LCD screen manufacturer, is considering a significant scaling back of its huge planned investment in the technology should profitability continue to deteriorate.

Sony has announced a major restructuring to strengthen its profitability and competitiveness. It is to focus on three core sectors: electronics, games and entertainment. Sony's electronics group is being reorganised, with decision-making assigned to an overall CEO. There is to be rigorous horizontal coordination of product planning, technology, procurement, manufacturing, and sales and marketing. The number of products is to be reduced and manufacturing sites are to be consolidated. There will be some 10,000 job losses worldwide. Sony will review its real estate, stock holdings and non-core assets with a view to making disposals. Sanyo has also announced a major restructuring and will leave certain product areas altogether, including DVD players and recorders and VCRs. It is to close two IC plants in Japan and reduce its low-margin white goods business, concentrating on top-of-the-market products.

There should, in the UK, be a boom in CE sales over the next few years as a result of the switch to digital TV. This is likely to bring with it a mass clear out of older TV/video equipment. Most people will probably buy new equipment, digital with a flat-screen display. But the WEEE directive and other regulations will make disposal of old equipment increasingly expensive. So there could be a move to make the most of existing equipment, hopefully increasing the requirement for repair work. There's also the fact that the cheap new products being bought do not have the reliability we had come to expect when the Japanese, with their renowned quality control, dominated the CE industry. So repair work, possibly quite a lot, will continue to be required. It will be a matter of getting used to all the new technology involved. But who will man the benches? The fact that young people have not, for many years, chosen to enter the trade means that those who remain in it could be very busy.

On that note, it's goodbye again from us. But we'll be around to help out with the magazine should the need arise.

John and Tessa.

The analogue TV switch-off

Culture Secretary Tessa Jowell has announced the latest plan for the switchover to digital TV in the UK. It will take place over the period 2008-2012, in the following order by ITV regions:

2008 Border
2009 West Country, HTV Wales, Granada
2010 HTV West, Grampian, Scottish Television
2011 Yorkshire, Anglia, Central
2012 Meridian, Carlton/LWT (London), Tyne Tees, Ulster

A new trial is planned for Bolton, to see how the over-75s and infirm cope with system set-up and DTV menus. It will also survey the deaf, blind, partially sighted and people with learning difficulties. Evidence from the previous Ferryside and Llansteffan trial suggests that many people will require several help visits.

The current plan is to change the channel frequencies of the present six digital multiplexes to frequencies made available by the analogue switch-off. Extra frequencies made available could be used for two or three new multiplexes or for other purposes.

The government says it wants all UK households to have the benefit of digital TV, and that the key to this is to ensure that everyone has a choice of digital TV options that they can afford. To this end a support scheme is being set up to ensure that no one is 'left behind'. It will provide help with equipment, installation and follow-up support for people aged 75 and over and those with significant disabilities. The scheme will be funded by the BBC through the licence fee.

The scope of the support scheme consists of help for all households with one person aged 75 or over; help for all households with one person who has a significant disability (receiving attendance allowance, disability living allowance); help available free-of-charge to households with one person aged 75 or over/disabled households receiving pension credit, income support or jobseekers allowance (other households will pay a modest fee); specific support for households where one person is blind.

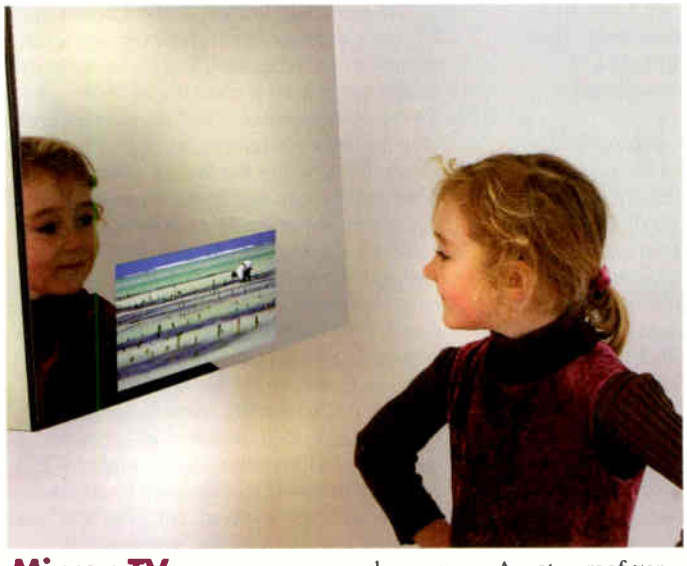
Assistance will consist of providing equipment to convert one TV set and help with its installation and use. Equivalent arrangements will be made to provide assistance where a different method of receiving digital signals is opted for. Further details of how the scheme will operate have to be worked out by the BBC and the government.

Digital UK, previously Switchco, has been given the task of implementing the switchover. It has announced a national information campaign and will write to every household in each region twice during the switchover period. There is an information telephone line (0845 650 5050) and a consumer website (www.digitaluk.co.uk).

While help with equipment and installation will be available free for elderly and disabled people who receive certain allowances, the rest of us will have to put our hands in our pockets. According to figures prepared for the Department for Culture, Media and Sport households will have to pay anywhere between £80 and £570 to receive digital TV. Households already receiving digital TV may face steep costs for converting other sets, replacing VCRs and in some cases installing new aerials. These estimates have been described as "very conservative".

Currys is currently supplying entry-level Freeview set-top boxes at £28. But viewers may have to replace their set-top aerials with outdoor ones or change the outdoor aerial to one of a different group.

ITV and the BBC are to launch a free satellite TV service called Freesat, intended mainly for the 25 per cent of the country unable to receive Freeview.



Mirror TV

VisionMirror is, as the name suggests, a TV set built into a mirror. When the set is switched off all you see is your reflection. When the on button is pressed, a crystal-clear TV display appears. A waterproof version is available for bathroom use, and there are battery-operated versions for use in a boat or caravan. For further details go to www.visionmirror.com

BBC's internet trial

The BBC has launched an internet video recorder trial. Some 5,000 people have been given software called iMP (internet media player) to try. It will enable them to download to a PC, a choice of programmes from a listings guide covering the previous seven days' broadcasts. Once a programme has been downloaded it can be watched an unlimited number of times until seven days after the broadcast time. It will then be automatically deleted. For copyright reasons Hollywood films will not be included.

If the trial is successful, the free system could be made available to every internet user in Britain next year. It will not be available outside the UK. Downloaded programmes will be digitally protected so that they cannot be emailed to friends or shared on the internet illegally. To reduce the demand on its servers however the BBC has developed software that allows those taking part in the trial to share programmes with each other.

NHJ declares bankruptcy

Japanese manufacturer NHJ, which had been planning to launch a series of innovative portable CE products in the UK including a TV watch (see page 581, August), has filed for semi-voluntary bankruptcy in Tokyo. NHJ was set up in 1999 and had been opening distribution offices around the world. The London office was its eighth.

HD-DVD support and developments

Microsoft and Intel have decided to support the HD-DVD blue-laser disc format rather than the Blu-ray format backed by the majority of consumer electronics companies. According to Microsoft the decision was taken because of the features that HD-DVD offers. These include:

Managed copy. This gives consumers the freedom to make copies of their discs on a hard drive or home server. HD-DVD discs will also allow copies of a movie to be played using a portable device.

Future-proof compatibility. With HD-DVD 'hybrid disc' technology a single disc can store both HD and SD versions of a film, enabling viewers to play SD movies on a current DVD machine while the HD version can be played using an HD-DVD one.

Proven low-cost, high-volume manufacture. HD-DVD discs can be made using essentially the same manufacturing equipment as current DVDs. Thus production of HD-DVD discs can be ramped up easily at lower cost.

Superior capacity. Dual-layer 30GB HD-DVD-ROM discs will be available at launch. BD-ROM discs will be limited to 25GB initially.

Superior interactivity. HD-DVD discs offer greater interactivity, using iHD technology. This provides enhanced content, navigation and value-added functionality for HD films – for example advanced picture-in-picture capability.

Superiority for notebook PC use. The compatibility of HD-DVD with standard DVD facilitates and simplifies development of slim-disc drives for use in notebook PCs, one of the fastest-growing segments of the PC market.

Microsoft's next-generation Windows operating system, Vista, will provide native support for HD-DVD but not for Blu-ray, though third parties may offer such support.

Toshiba has developed the world's first notebook PC with an integrated slim-type HD-DVD-ROM drive and plans to launch it early next year, in Japan initially. The drive is just 12·7mm high and uses a single optical-lens pickup head that can read HD-DVD discs and read/write standard DVD and CD discs.

Toshiba has also announced the development of a 30GB dual-layer HD-DVD-R (recordable) disc, which was approved as version 1.9 at the September meeting of the DVD Forum's steering committee. The disc is based on the same structure as current DVD, HD-DVD-ROM and HD-DVD-RW (rewritable) discs – back-to-back bonding of two 0·6mm thick substrates. It uses an organic dye as the data storage medium. Toshiba expects the DVD Forum to finalise the HD-DVD specification book within a year.

Mobile TV

Sky is to start a service "within months" providing live TV via mobile phones. It would be paid for by a monthly subscription. The company is in talks with third-generation mobile phone operators on the provision of the service.

According to a new report from Juniper Research the number of phone users subscribing to streamed or broadcast TV services is expected to reach 65m worldwide by the end of 2010. While streamed services are expected to account for the majority of customers at that stage, the rollout of mobile broadcast TV services should see broadcast subscriptions and revenues overtake streaming TV by 2012. Orange has already launched a mobile TV service in the UK, and O2 and Nokia are currently conducting trials in the Oxford area using the DVB-H transmission system.

Sanyo's pocket MP3/DAB unit

Sanyo has launched Model DAB150M, an MP3 player that incorporates a DAB radio tuner, an FM tuner and a 128M flash memory, all for about £150. It has eight station presets, a six-mode sound equaliser and stereo headphones, and comes with a USB cable. Power is from two AA batteries. For further details check at www.sanyo.co.uk

Philips' LCD advance

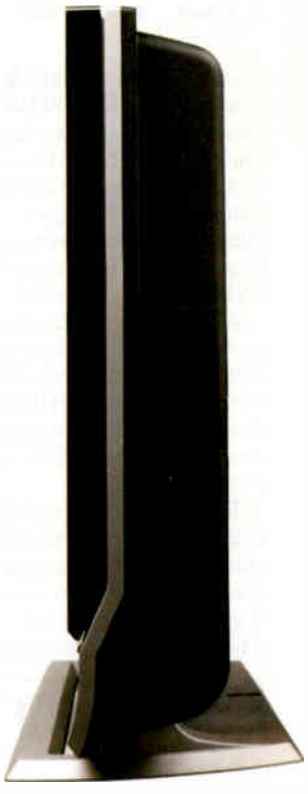
Philips has developed a technique that's claimed to reduce dramatically the smearing experienced with LCD screens. It involves rapidly switching the fluorescent backlight on and off. The cause of the problem is the time taken for pixels to switch from on to off. It's more noticeable with fast-moving objects, but also causes distortion of slower-moving images. The technology will initially be used in top-of-the-range Philips LCD models to be launched next year.

New Blu-ray protection system

The Blu-ray Disc Association has adopted a new content-management system that includes three main elements, AACS (Advanced Access Content System), BD+ and ROM Mark. AACS, which is also used with HD-DVD discs, is claimed to be many times more powerful than the system used with DVDs. It can provide content protection over networks, including the internet. BD+ enables rights-management schemes built into players to be updated. ROM Mark is a new technology designed to guard against mass-production piracy or the mass duplication and sale of unauthorised prerecorded Blu-ray discs such as movies, music and games. While invisible to consumers, ROM Mark can be mastered only with equipment that's available to licensed BD-ROM manufacturers, preventing unauthorised disc copying.

HomeChoice via ADSL2+

Video Networks, the company behind the HomeChoice service that provides digital TV, internet and telephony to homes via ADSL telephone lines, has announced plans to move to ADSL2+ technology. This will increase the bandwidth available to its customers. HomeChoice has completed initial tests, with its service delivered successfully using ADSL2+ via an unbundled line. These are being followed by a technical pilot. ADSL2+ enabled services are due to be launched commercially later this year. The new service could provide internet speeds of up to 24Mbits/sec.



The Humax LGB32TPVR

Here's a TV set that was designed with the future in view. It has a 32in. LCD screen, is HDTV ready and has a built-in personal video recorder. Roger Thomas bought one and reports on his experiences with it

The Humax Model LGB32TPVR widescreen LCD TV set has a black border and a contemporary, silver fascia, so it should look good in most domestic settings. The loudspeakers are behind the silver fascia, while buttons to control functions such as channel up/down, volume, menu, standby etc. are to the right. Screen size is 32in., measured diagonally. Overall the set measures 83 x 60 x 12cm (w x h x d, the height including the stand). According to the manual the weight is 32kg with the stand fitted. The set can be wall-mounted after buying a suitable VESA bracket. As the model number indicates, it incorporates a personal video recorder (PVR).

To say that the set has a lot of connections is an understatement. There are three scart sockets, an S-video input, component video input, a DVI (Digital Video Interface), a 15-pin D socket for PC RGB, PC audio in, headphone output, optical S/PDIF output, a smart-card interface slot, a 9-pin RS-232C connector and a USB 2.0 port. Access to the phono-type connectors is via a recess on the left-hand side of the set, where the viewing card interface slot for encrypted services is also located. The socket-type connectors (scart, USB etc.) are along a recess at the back of the set, so the connectors have to be inserted vertically from below. This prevents the cables protruding. The set can thus lie flat against the wall for the wall-mounting option. A scart and a PC video cable are supplied, but not a PC serial cable.

Fig. 1: The HD ready logo. It's a trade mark of the European Industry Association for Information Systems, Communications Technologies and Consumer Electronics.

You can upgrade the Humax software by downloading from the Humax website and transferring the new software via the PC serial interface or, automatically, via OAD (Over Air Download) using the engineering channel in the BBC multiplexes. The USB port is for connecting an external hard disk so that MPEG video stored on the PVR hard drive can be copied to an external drive.

I bought the set to replace an elderly 30in. Toshiba model. One of the reasons for buying it was the impending arrival of high-definition TV.

Satellite HDTV

Sky has announced that it will start an HDTV service in 2006. So far there has been no commitment to an actual start date, but it is likely to be before June as this is when the 2006 World Cup begins – on past occasions Sky has used sports coverage to gain new subscribers. An HD digibox will be required from Sky to receive these transmissions. The new boxes will be similar to the Sky+ one and will incorporate a PVR.

HD ready

An HD ready logo, see Fig. 1, has been introduced by the industry to identify TV sets that are capable of displaying HDTV transmissions. To qualify for this the screen must be capable of displaying at least 1,280 pixels and 720 lines scanned progressively at 50 frames/sec. This is commonly referred to as 720p. Standard-definition PAL has 576 actives lines each with 720 pixels. Thus 720p provides an improved resolution of some 45 per cent and, unlike PAL, does not suffer from interlace flicker.

The display must also be able to handle the higher resolution of 1,920 pixels and 1,080 lines, scanned at 25 frames/sec with interlacing. This is commonly referred to as 1,080i. The 720p and 1,080i modes are both widescreen (16:9 aspect ratio). To be 'HD ready' the set has only to be able to display 720p material, but can scale down 1,080i material to fit. Few sets at present are capable of displaying 1,920 x 1,080 material. This Humax set has a resolution capability of 1,366 pixels and 768 lines.

Films may benefit by being transmitted with the higher 1,080i resolution, but 720p is preferred for the majority of broadcasts, including sports coverage. With 1,080i, a fast-moving object can move many vertical lines between each frame (two 540-line fields), which is undesirable for sports coverage, while with 720p the resolution is always 720 lines.

To be HD ready the set must also have a DVI or HDMI (High Definition Multimedia Interface) connection and operate with HDCP (High-bandwidth Digital Content Protection). In addition the display must accept an analogue Y/Pb/Pr input for compatibility with DVD players.

DIV, HDMI and HDCP

DVI is a wide-bandwidth, 24-bit digital RGB interface. It was created by the Digital Display Working Group in 1999, and was originally developed by the computer industry for high-resolution monitors – 1,600 x 1,200 (UXGA). It's therefore suitable for HDTV use. DVI provides an uncompressed digital-to-digital connection (no digital-to-analogue or analogue-to-digital conversions, which can degrade video quality).

HDMI is a newer video-connection standard. The cables are a smaller version of DIV ones, and the connection is backwards-compatible with DVI. HDMI also carries eight channels of 16-bit digital audio as well as the 24-bit video.

To protect HDTV broadcasts – particularly movies – from piracy, Intel and Silicon Image developed the HDCP video-encryption system. It involves a protected link between the video source and the display, using 64-bit encryption, to prevent non-HDCP devices receiving the video content. The encryption key is established during the initial authentication protocol that establishes whether a receiver is HDCP capable. This protection has nothing to do with any encryption used for broadcasting: HDCP prevents video from an HD digibox entering a non-HDCP device that could copy the video.

Sky originally announced that it would provide only an HDCP output from the HD Sky+ box, but has recently hinted that there might also be an analogue output for connection to TV sets that are able to display HDTV but lack HDCP. It is unlikely however that premium services such as movies and sports will be made available regularly via such an unencrypted output.

Terrestrial HDTV

A full terrestrial HDTV service is unlikely until the analogue transmissions are switched off, when the channels used for DTT (Digital Terrestrial TV) can be better allocated. Unlike the satellite service, which has virtually unlimited bandwidth, the terrestrial allocation is much smaller and already used for analogue/digital TV broadcasting.

The current schedule is that analogue transmitters broadcasting Border will be switched off in 2008. The process will continue until 2012, when the last mainland analogue transmitters to be switched off will be Meridian, Carlton/LWT, Tyne Tees and Ulster. During this process the output of some DTT transmitters in neighbouring regions could be increased, as some are on low power to prevent interference with analogue TV services. It may be possible for some experimental HDTV transmissions to take place in regions that no longer have analogue TV. And, yes, when HDTV comes we will need to buy new set-top boxes, PVRs etc. Many TV programmes, particularly drama and sports coverage, are already recorded in HDTV form.

Model LGB32TPVR

The set comes with two different remote-control units but only one set of batteries. You may think that one is for the TV with the other for the PVR, but this is not the case. The main remote-control unit (see Fig. 2) has all the controls and is rather long (24cm). A cover that slides back reveals a further 24 buttons (see Fig. 3). The hidden buttons include the analogue TV teletext functions. These buttons are not relevant for DTT and, when viewing digital TV, are assigned to the PVR.

The other, smaller remote-control unit (see Fig. 4) is 5·5cm long and includes only the most common functions. Technophobes will appreciate the choice.

Tuners

Although the set looks towards the future of digital broadcasting, it also has a single PAL analogue tuner with teletext. Once the auto-tune has finished finding stations, the weaker/duplicate ones need to be deleted from the list and the list then sorted. Being able to switch to analogue (while it is still there) may provide a useful backup if the local DTT transmitter fails or where the local news is not available via digital TV.

To switch between analogue and digital TV the TV/AV button has to be pressed and the required service selected from a drop-down menu, but this is not made clear in the manual. Fig. 5 shows the choice of video sources.

A DTT scan (see Fig. 6) takes about two-three

Top – Fig. 2: The set's multi-functional main remote-control unit.

Left – Fig. 3: Sliding back the cover reveals yet more buttons.

Fig. 4: The Humax specification claims that this remote-control unit is for the "elderly and children".

minutes, and the set distinguishes between radio, TV, data and encrypted services. The main remote-control unit has separate buttons to select either radio or TV. There are dual DTT tuners, which makes picture-in-picture (PIP) and the simultaneous display of two different DTT stations (twin mode) possible. In the twin mode it's possible to display a picture from the analogue and a picture from one of the digital tuners and see the time delay of the digital broadcast compared to the analogue one. The cause of this time delay is the buffering required for MPEG video compression.

The manual

The 74-page, A4 manual supplied is reasonably comprehensive, but there are several typographical errors and some sentences that make no sense in English. It lacks background information on DTT however. There is no description of a DTT multiplex, or information on how many stations a scan should find, or advice on aerials. Unfortunately good analogue reception does not necessarily mean perfect DTT reception, as some analogue relay transmitters do not provide full DTT coverage. An aerial installed for reception of local analogue TV may be of the wrong group for DTT reception. A household making the technological leap from analogue to digital TV may struggle for lack of practical information.

If you are not sure from which transmitter you are receiving analogue TV, go to ITV teletext page 100 and press reveal. The transmitter's name will then be displayed, in abbreviated form.

Page 65 of the manual has information on the 'DTV setup' menu and select status, and there is a 'signal detection' option. This displays the current channel, multiplex mode and two graphs, one for signal strength and the other for signal quality. Those familiar with DTT will know that this information is needed for aerial alignment. To help newcomers to the joys of DTT, it should be more prominent in the manual.

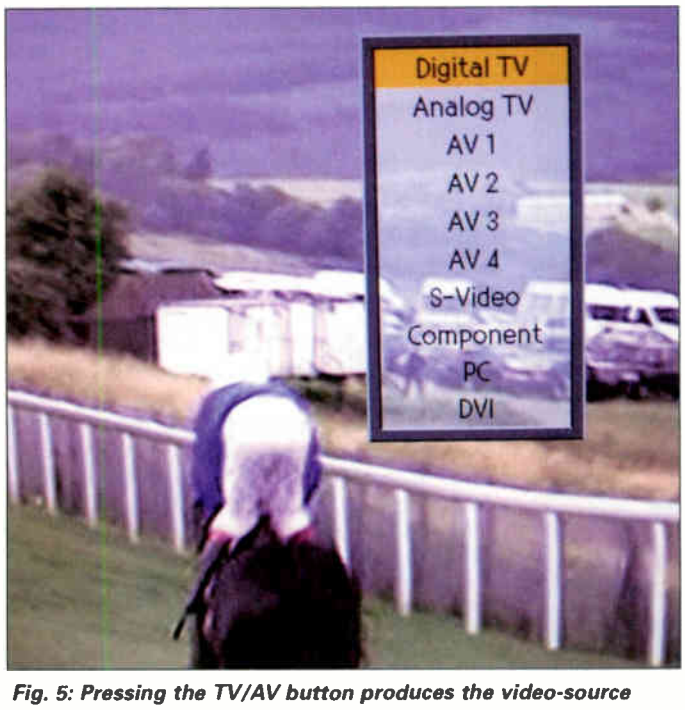


Fig. 5: Pressing the TV/AV button produces the video-source menu.

The PVR

Model LGB32TPVR has an integrated 40GB personal video recorder that can store about 20 hours of TV programming. There are three settings, HQ (High Quality), SP (Standard Play) and LP (Long Play), but an explanation of the relative merits of these is not provided in the manual. Despite the two digital tuners, only one programme can be recorded at any one time, a limitation that's not evident with other PVRs that have dual tuners.

The programme to be recorded can be selected from the EPG directly, or details can be fed in manually. When selected from the EPG, an icon is placed next to the programme name to indicate that it is scheduled to be recorded. If the times are then edited, for example an extra minute is added at the start to ensure that all the programme is recorded, the record icon is removed from the EPG as the two times no longer coincide. The EPG software lacks flexibility: provided the start time is before the official EPG start time, the record icon should still be displayed.

The set uses the Freeview 7-day EPG. Pressing 'info' while watching a programme will display the now/next information.

There is no indication that the PVR is actually recording but, just before it starts a scheduled recording, a message appears giving the option to cancel the recording (default is no), a 'REC' icon appearing at the top right for a few seconds. A programme can be played back while it is being recorded and, surprisingly, the PVR can record programmes from the analogue tuner – for this option the times/dates have to be entered manually.

Instant single-button recording is available. Each press of the button selects the next part, starting with 30 minutes then 60, 90, 120, 240 and 24 hours maximum. I would have preferred the first option to be related to the remaining time of the programme being watched.

The set can buffer up to 30 minutes of video. Humax calls this function 'time-shifted recording' (TSR). And the video can be paused. The status bar, see Fig. 8, gives the start/stop times and the video buffer can be played in forward or reverse mode at half, quarter, eighth, sixteenth, twenty fourth or twice, four times, eight times, sixteen times or 24 times speed. There is also a 10 sec instant replay button.

In operation the set behaves as if one digital tuner is allocated to the PVR, the other to TV viewing. The time-shift functions are not available when the PVR is recording, as the hard disk is also used as the buffer – pressing any of these buttons produces either a "Will not accept" or "Recording" message. It's difficult to know whether this is because of an inherent design limitation or the current software version (version 1.24, May 16 2005), but most other dual-tuner PVRs don't have this restriction.

There is a serious software bug with the PVR. If you are recording a programme, it's not possible to put the set in standby. Pressing the standby button produces the small message shown in Fig. 9. Humax customer support says that this is because of an "oversight with the software" that will be corrected in a future software release.

Summary

I've provided only a brief outline of what the set can do – there are other menus, and various options, that I have not mentioned. The family is happy with the purchase, picture quality is good, and various parameters (brightness, contrast, sharpness, colour) can be altered (see Fig. 10). Watching standard-definition TV in widescreen mode can show up some of the artefacts inherent with MPEG video compression.

The set is as future-proof as one can reasonably expect, and the number of scart sockets and other connections should enable additional devices to be added easily. The LGB32TPVR looks good – it is not a set you would want to hide away in a cabinet.

Fig. 6: The set carrying out a DTT scan.

Fig. 7: EPG with 'Top Gear' selected for recording.

The various on-screen menus are easy to read, and the opacity of the background can be altered so that whatever is being displayed behind the menu doesn't distract from its legibility. Response time to menu selection is adequate.

I do have reservations about the limited functionality of the PVR, especially in view of the premium one is paying for an integrated TV/PVR set.

The set was bought on line at www.scan.co.uk (Scan International) for a total cost of £1,361 including VAT and delivery. It could be argued that an integrated TV is not the best value for money, and that better value would be provided by a high-resolution monitor and an external set-top box or PVR. There is far less clutter from trailing wires with an integrated set however.

The LGB32TPVR is reasonable value in comparison with other similar HR ready LCD TV sets as it includes dual tuners and a PVR, but it is still on the expensive side. Clearly the cost of LCD TV sets will fall as flat-panel production is ramped up to meet the increasing demand for digital TV receivers.

Hard-disk problem

A fault occurred just after I had finished writing the above review: the PVR's 2·5in. hard-disk drive appeared to die. We had had the set for just over a week. The symptoms were failure to record programmes and none of the time-shift functions working, as the hard disk is used for video caching. When any of the menu options associated with the PVR were selected, the menu would disappear. All that was left was a 'waiting' message at the bottom of the screen. The TV part of the set worked fine, so we could continue to watch television.

I checked the Humax website and phoned the UK Customer Helpline. After trying various suggestions, including restore default settings, it was agreed that the set was faulty and that we should contact the retailer for a replacement. Although there is a two-year, on-site warranty, it seems that if the set is under thirty days old Humax prefer to have the unit returned to the retailer rather than send out an engineer.

When contacted via the web returns page and phone, Scan International eventually agreed to arrange for collection. When the LGB32TPVR is placed in its polystyrene packaging the outer cardboard box is just under 1m in length and required two people to move it. This is not a product that can be taken to the nearest post office and posted!

Scan International subsequently verified that the set was faulty, and a replacement was received some two weeks after the initial contact. ■

Further information can be obtained from
www.humaxdigital.com/uk (Humax UK homepage)
www.dtg.org.uk/retailer/download_schedule.pl
(OAD software schedule)
http:/hd.sky.com/
(provisional information on Sky's HDTV service)

Fig. 8: Display with TSR (Time Shift Recording) function active.

Fig. 9: When a programme is being recorded the set cannot be switched to standby.

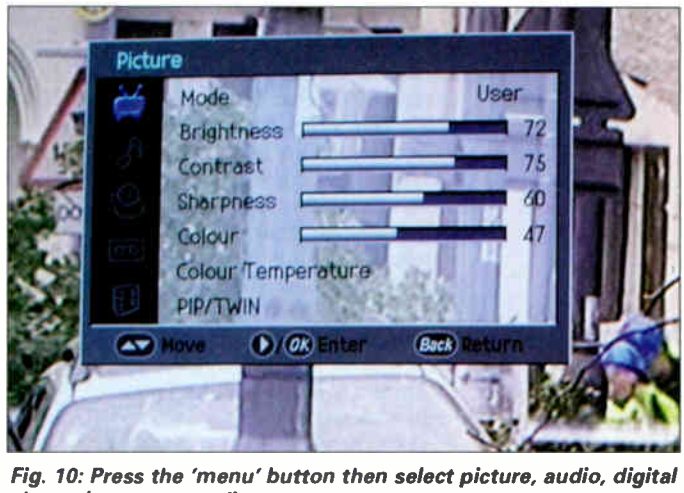


Fig. 10: Press the 'menu' button then select picture, audio, digital channel setup, recording or system.

IFA 2005 show report

George Cole reports on the highlights of the Internationale Funkausstellung (IFA), the world's largest consumer electronics show. Features this year included various types of flat-screen display, optical disc systems and equipment, mobile TV and internet-enabled devices

The Internationale Funkausstellung (IFA) consumer electronics show is held every two years in Berlin. It's the world's largest consumer electronics fair, and is open to both the trade and the public. With an exhibition area this time of some 160,000 square meters, spread over many halls, there was much to be seen from the 1,189 exhibitors. Companies from over forty countries were present.

Television

No prizes for guessing the TV developments that dominated this year's IFA: high-definition TV, flat-screen technology and also mobile TV (see later). Most manufacturers seem to have divided their ranges to include two main types of set: standard-definition 4:3 models, most of which use CRT technology, and HD ready 16:9 models that have high-resolution flat-panel displays and an HDMI (High Definition Multimedia Interface input socket).

Over the years Samsung and LG have vied with one another to see who could come up with the largest flat-screen display, almost always a prototype. This year's 'winner' was Samsung, which had on show a massive 102in. plasma set along with 82in. LCD and 71in. DLP (Digital Light Processing) models – DLP is a form of projection TV. LG's largest offering was a 71in. plasma TV set that was decorated with 24-carat gold – owners can add an optional home-theatre system and a digital terrestrial receiver with the same finish! Unlike many giant flat-panel sets however this one is being mass-produced. The LG stand also featured a 60in. full-HD plasma TV set.

Philips highlighted two TV technologies, PixelPlus 2 HD and Ambilight 2. PixelPlus HD uses video processing to enhance HD signals, improving the sharpness and colour by altering the pixels at the signal-input stage so that they match the surrounding ones. Ambilight analyses the incoming picture signal and produces background lighting to match the on-screen display: Ambilight 2 goes a stage further by adapting the background lighting independently to the colours at the left and right of the screen. The two technologies are used by three models in the Philips Cineos LCD TV range. These are the 42PF9830, 37PF9830 and 32PF9830 (the first two digits indicate the screen size in inches). There was a series of side-by-side comparisons with LCD sets that don't use these technologies: the results were impressive, providing pictures with subjectively greater resolution and sharper colours. Philips believes that HDTV will revive the TV market, and that major sports events like next year's World Cup will drive sales of HDTV sets. So much so that, in Germany, Philips has formed a joint HDTV sports channel with broadcaster Premiere called Premiere/Philips HD Sports.

The sets shown by Sharp included two interesting technologies, PALoptimal and dual-view. PALoptimal has been specifically designed for sets sold in countries that use the PAL and SECAM TV systems, the aim being to improve the picture quality with 625-line transmissions. Normally when a PAL display is generated by an HD ready set the video drive, as LCD

screens mostly use VGA or WXGA resolution, is changed to match this resolution. The change is achieved by the use of appropriate processing algorithms. This process tends to cause artifacts such as picture noise however. PALoptimal overcomes this problem by matching the resolution of the LCD screen with that of the 625-line signal. This, says Sharp, avoids the effects produced by artificial signal processing.

Sharp also showed its dual-display LCD TV, which shows two different pictures simultaneously on the screen. If you view the LCD screen from the left you see one picture: if you move to the right you see the other one! I saw this with my own two eyes, and it works, though sitting in the centre, which is normally the best position from which to view an LCD display, gives you a strange mix of the two images. Sharp began mass production of dual-view LCD TV sets in July but, try as I can, I can't see a sound practical use for the technique. One suggestion is that a child could play video games at one end of the settee, using headphones, while the parents watched another programme sitting at the other end. But how realistic is this? It's possibly more relevant in Japan, where living accommodation tends to be more restricted. Another suggestion is that the system could be used for in-car entertainment equipment, with two passengers watching different programmes on the same screen. But again I question the usefulness of this.

There's no doubt however that well-heeled customers will like Sharp's 65in. Aquos LCD Model LC65GD1E, which produces superb pictures. Sharp also showed a prototype 57in. LCD TV set and smaller LCD TV models with 26 and 32in. screens.

Hitachi's TV offerings included the 42 and 37in. plasma Models 42PD6600 and 37PD6600. Pride of place on the Panasonic stand was given to the 65in. plasma Model TH-65PV500, which includes an SD/PC card slot for viewing JPEG images on screen. Model TX-32LXD55 is a 32in. LCD set with both analogue and digital terrestrial TV tuners. There were some interesting products on the Hisense, a Hungarian company, stand. These included a 37in. LCD set, Model TLM3777W, that uses a wireless transmission link between the tuner box and the screen. Pioneer had 'sixth-generation' 50 and 43in. plasma sets on display.

Toshiba's HiVision Network TV set includes two Ethernet ports, a USB port and an iLink connector. It can be connected to a PC, enabling viewers to read emails on the TV screen – an alarm tells you when new emails have arrived. Email attachments can be saved on an SD Memory card. It's even possible to program the timer of a DVD recorder via email.

Toshiba was placing even more emphasis on the new TV display technology, called Surface-conduction Electron Emitter (SED), it has developed in conjunction with Canon. Toshiba says that SED combines CRT-type picture quality (high resolution, excellent colour saturation, a fast response time and a wide viewing angle) with the advantages of a flat display panel, and claims that its power consumption is a third of that of a comparable plasma display and, because it doesn't use a backlight, two thirds that of an LCD screen. With a conventional CRT an electron gun system fires electrons at a phosphor-coated screen. SED uses an array of ultra-thin electron emitters to create the same effect – see my Japan CEATEC show report last December, pages 72-3, for further information on it.

On paper SED looks impressive, with a dark room contrast ratio of 100,000:1 (yes, that figure is correct). But the bright room contrast ratio is a disappointing 85:1, though Toshiba says it is working hard to improve on this. The figure would explain why SED was being displayed in a back room away from the bright exhibition hall, and its operation was demonstrated only in a darkened environment. The 36in. prototype had a power consumption of 160W: screen size with the first full-production version will be 50in. Mass production is due to start in 2007. SED could change the face of TV technology, but other alternatives to LCD and plasma displays have emerged over the years only to be abandoned.

This year's 'winner' was Samsung, which had on show a massive 102in. plasma set along with 82in. LCD and 71in. DLP (Digital Light Processing) models.

Hisense and Samsung also showed short-neck CRT sets that are two-thirds the depth of a set with a conventional CRT. Their performance was impressive but, with the price of FDP sets falling so much, it's hard to see that they will make much impact on the TV market.

Thomson showed many flat-display sets but for me the star product was Model DTI0601, the world's first mobile set-top box with an integrated aerial and LCD screen. It's designed for reception of digital terrestrial TV channels in various environments, including around the home. It can be used as a standard set-top box connected to either the main TV set or another set in the home without the need for any external aerial connections. And it enables live DTT programmes to be viewed whilst on the move. Measurements are 17 x 9cm and weight just 425g. It can be connected to a large-screen set using composite video or a scart connection, and can be connected to a PC for software downloads via the included USB 2.0 cable. A remote-control handset and head-

LG's largest offering was a 71in. plasma TV set that was decorated with 24-carat gold – owners can add an optional home-theatre system and a digital terrestrial receiver with the same finish!

A Toshiba prototype HD-DVD player.

phones are also included. Power is from a rechargeable battery that provides up to 2·5 hours' viewing time. In addition a 12V car adaptor is available as an optional extra. The DTI0601 will be launched in the UK, Australia, France, Germany and Italy early next year.

Philips showed protoype 3D displays, and LG had a number of sets with OLED (Organic LED) displays on its stand.

Blu-ray

The Blu-ray optical disc (BD) had a very high profile at the IFA. The format, which is supported by a wide range of computer and electronics companies including Sony, Philips, Pioneer, Samsung and Panasonic, uses blue-laser technology to store up to 25GB of data on a single-layer disc and 50GB of data on a dual-layer version – by way of comparison, the maximum storage capacity of a DVD disc is 18GB, though most typically hold half this amount of data.

The Blu-ray Disc Association held a major press event to bring us all up-to-date with the format's current status. The disc has certainly been gaining support – there are now 54 members of the Association and 79 contributors. Blu-ray disc hardware is already designed to be backwards compatible with CD and DVD discs, and a single optical pickup has been developed for reading all three types of disc. There are now plans for hybrid Blu-ray discs that can also be read by CD and DVD players: they will have a Blu-ray disc layer and a CD or DVD layer. I have to confess that I'm not too sure who would want to use such a disc however.

The Blu-ray disc camp envisages the format being used for recording HDTV broadcasts, playing prerecorded HD content such as films, as a PC storage device, and in the video games market (Sony plans to use Blu-ray disc technology with its next-generation PlayStation 3 console). The format will include 8 and 12cm discs with single or dual layers. The smaller disc size could be used for camcorders and portable video players. Blu-ray disc supporters feel that the format has the edge when it comes to storage capacity, pointing out that a single-layer 25GB Blue-ray disc has 67 per cent more capacity than that provided by a single-layer disc of the rival HD-DVD type while a 50GB dual-layer disc has 40 per cent more capacity than a dual-layer HD-DVD disc. This, it's claimed, means that the format is better suited to providing high picture quality and additional features. But the film industry seems to be split between support for the two formats. Some, such as Fox and Sony Pictures, support Blu-ray while others, including Warner Bros and Universal, have opted for HD-DVD.

One of the guest speakers at the Blu-ray disc event was Andrew Setos, president of engineering at Fox Entertainment. He said that Fox had compared both formats before opting for the Blu-ray disc. The reasons he gave for the decision were that Blu-ray offers a better consumer experience, more robust copy protection, competitive manufacturing costs, advanced interactivity through the use of Java, and that it has broader industry support. Setos was particularly impressed with Blu-ray disc's copy protection, which consists of three elements: AACS (Advanced Access Content System), BD+ and ROM-mark. These systems check a Blu-ray disc player to see if it has been compromised. The hardware also checks a disc to see if it is genuine or a prated one. In addition the system is dynamic: in other words if the copy-protection system is hacked, as happened with the CSS encryption system used for DVD, it can be modified with new encryption and decryption keys issued.

During a Q&A session the Blu-ray disc Association confirmed that authoring books for all Blu-ray disc formats will be released at the end of the year, with the format officially launched in "early 2006". Talks have been taking place over the past year between one of the main drivers behind the Blu-ray disc, Sony, and the leading HD-DVD company, Toshiba. These seem to have come to nothing probably because, unlike the earlier example of the Philips/Sony Multimedia CD and the Toshiba/Time Warner Super Density (SD) disc, there is little room for compromise. Blu-ray and HD-DVD discs have different physical specifications and file formats, though they both use blue-laser technology. In other words for a single format to emerge one side would have to adopt the other format. Unless there is a dramatic turn of events soon, it seems that Blu-ray and HD-DVD discs will both be launched on the market and a format war will then take place.

Interestingly, the Hollywood film studios are still undecided as to whether Blu-ray discs will use the Regional Coding system currently used by DVD-Video discs or

This prototype HD-DVD recorder was shown behind a glass display case on the Toshiba stand.

will adopt an open system as with the CD. I feel that the studios will retain the option of using some form of Regional Coding. Andrew Setos hinted however that Blu-ray might offer a more flexible form of copy protection using Digital Rights Management. This would, for example, allow users to put their Blu-ray disc content on to a home network system. The industry is currently considering three DRM proposals.

There was a large Blue-ray Disc Association stand at the IFA, and many products were displayed on individual company stands. Panasonic showed a prototype BD-ROM player that can read 50GB discs and was designed to play what are described as HD movie titles. Philips also showed a prototype BD-ROM player. The Samsung BD-HR1000 is a Blu-ray disc recorder that includes a 400GB hard drive. It can store up to 47 hours of high-definition quality video and has integrated wired and wireless networking (Ethernet and IEEE 802.11b/g), enabling it to be connected to a PC for downloading music and video files. Hitachi and Panasonic also had Blu-ray disc recorders on show.

HD-DVD

The HD-DVD format had a much lower profile than Blu-ray at the IFA. I spotted only a prototype recorder, behind a glass display case on the Toshiba stand, and an NEC laptop with a built-in HD-DVD drive. Toshiba, Sanyo and NEC are the main HD-DVD supporters. Toshiba held a press conference to give us the latest news but in fact there was not a lot to say. Apparently 89 HD-DVD titles are in the pipeline from Warner Bros, Paramount and Universal, but Toshiba couldn't give any firm dates for the launch of the format – despite reports earlier this year that HD-DVD would be in stores in Japan and the US before Christmas 2005.

There are plans to increase the capacity of all HD-DVD disc formats. The current 30GB capacity of a dual-layer ROM disc could be increased to 90GB using a double-sided, triple-layer configuration. This would be able to store up to 24 hours of high-definition content. There are also plans to increase the capacity of recordable discs from the current 15GB to 30GB – Toshiba stated that a 60GB version was possible. Toshiba says that rewritable disc capacity could be increased from its current 20GB to 40GB. But many of these larger-capacity discs rely on dual- and triple-layer configurations, which could be expensive. The company also claimed that manufacture of HD-DVD discs costs one tenth that of a Blu-ray disc.

LG's DVD recorder Model RHS7700 works with DVD±R, DVD±RW and DVD-RAM discs and has a 160GB hard drive that can record 220 hours of analogue broadcast programmes.

DVD

One of the biggest trends in this field is the increased number of multi-format machines that can read and record on almost any type of recordable and rewritable DVD disc. In effect the consumer electronics companies are following the PC manufacturers, which now tend to offer multi-format drives in their machines. Thus users don't have to worry about what type of recordable or rewritable DVD disc they buy.

Another trend is for DVD recorders to come with an integrated hard drive that provides increased recording times and the ability to transfer recordings between the hard drive and a DVD disc. The Panasonic DMR-EH80V is an integrated VHS/DVD recorder with a 200GB hard-disk drive. It offers six-way dubbing between the hard disk, DVD discs and VHS tapes. An SD card slot enables images from a fourth source to be added. It can record on DVD-RAM, DVD-R DVD+R and DVD-RW discs and play back DVD-RAM, DVD-R DVD+R, DVD-RW, DVD+RW, DVD-Audio, DVD-Video, SVCD, Video CD, audio CD (CD-DA), CD-R/RW and MP3/JPEG formatted discs. The hard drive holds up to 355 hours of recordings.

LG's DVD recorder Model RHS7700 works with DVD±R, DVD±RW and DVD-RAM discs and has a 160GB hard drive that can record 220 hours of analogue broadcast programmes. It can also record on double-layer DVD+R discs, enabling eleven hours of video to be stored on one disc, and supports DivX.

Pioneer showed a number of DVD recorders with integrated hard drives that have storage capacities of 160, 250 and 400GB, providing video recording times of 445, 711 and around 1,000 hours respectively. Hitachi goes further with Model DV-DH1000W, which is described as the world's first terabyte (1,000GB) hard disk/DVD recorder. It can store up to 128 hours of high-definition or 1,700 hours of standard-definition video. Hitachi also showed multi-format DVD recorders.

The Sharp Models DV-RW260S and DV-RW270S are combined DVD/VHS recorders that are designed to make it easy to transfer personal VHS recordings on to DVD. It's also possible to record

The Thomson Model DTI0601, the world's first mobile set-top box with an integrated aerial and LCD screen.

The KISS DP600 is a compact black box that can be connected to a PC or a broadband link to stream video channels around the home.

using both formats, and play back with one format while recording with the other. It will be interesting to see if any VHS recorders, combined or otherwise, are at IFA 2007. Samsung's Model TR-520 is a twin-tray DVD recorder for digital-to-digital copying, while DVD recorder Model SR-420 has a built-in digital terrestrial TV tuner.

Mobile TV

One of the most interested developments that was highlighted at IFA 2005 was mobile TV. Systems using a variety of devices including mobile phones, hand-held media viewers and laptop PCs were on show.

Two mobile TV formats were featured, DMB and DVB-H. Digital Multimedia Broadcasting (DMB) is based on the DAB standard. In fact the data is transmitted in the same way as with DAB, using the Eureka 147 Coded Orthogonal Frequency Division Multiplex standard with some extra error correction to make the TV signal more robust. The signals are so robust that TV broadcasts can be received in a fast-moving car or train. Theoretically DMB could be broadcast via the existing network of DAB transmitters, though the UK's DAB frequency spectrum is too crowded to allow this.

DMB uses MPEG-4 video compression and, to reduce power consumption, a similar time-slicing technique to DAB. This transmits the TV data in short bursts of about 1-2Mbits/sec rather than as a continuous stream. Furthermore data is received only on the channel that's being watched at the time. In theory time-slicing can reduce power consumption by up to 95 per cent. Some European mobile TV trials using DMB technology are being conducted, though most of the momentum for DMB TV is coming from Korea, which has adopted the standard. No surprise then that LG and Samsung both showed an array of DMB products.

Philips was demonstrating the alternative DVB-H (Digital Video Broadcasting – Handheld) technology on its stand. The standard was only finalised in November 2004. It's based on the DVB standard for digital terrestrial TV and also uses time-slicing technology to reduce power consumption. It will require a new network of DVB-H transmitters and a frequency-spectrum allocation. Current trials of the technology involve network operators building special transmitters within designated areas. Philips' DVB-H product was a prototype unit.

There is a lot of interest in mobile TV in a number of quarters, including advertisers and mobile phone companies. We are likely to see a roll-out of new services over the next few years.

Convergence

Ever since consumer electronics started to move from analogue to digital technology there has been much talk about the convergence of computer, consumer electronics and communications products. After a few false starts we finally seem to be getting there.

Philips says that by the end of the year almost a third of Western European homes will have a broadband internet connection, with the figure reaching 50 per cent by 2009. Developments such as faster ADSL technology (ADSL 2+) could provide data rates of up to 20Mbits/sec, sufficient for HDTV signals to be sent via a broadband line. Philips believes that more and more consumers will be accessing music, video, games, images and TV programmes via the internet.

For this reason Philips is launching the MCP9350I Media Center, which is designed to sit beneath the TV set in the living room. It looks like a large DVD recorder and is in fact a combined DVD and hard-disk recorder, the latter having a storage capacity of 250GB. It can connect to a PC, a broadband connection and home AV system via IEEE 802.11a/g wireless networking. Although the MCP9350I is operated with a remote-control handset, it is really a Windows XP PC with an Intel 4 3GHz processor and pre-installed Microsoft Media Centre software edition 2005. It has a multi-format flash memory card slot that can read SD, MMC, Memory Stick and CompactFlash cards. Other connections include USB and FireWire/IEEE 1394.

The idea of storing all your digital content on the MCP9350I is appealing, but there is concern that users could end up downloading viruses or Trojan Horses if the product is without protection – Philips provides just three months of anti-virus protection – and also whether consumers will know what to do if the unit crashes.

The KISS DP600 is a compact black box that can be connected to a PC or a broadband link to stream video channels around the home. It also plays CDs and operates with a wide range of media formats including Windows Media 9, Nero Digital, DivX, MPEG-1/2/4, MP3 and JPEG. An Ethernet port and IEEE 802.11a/g wireless networking are included

Hisense showed an LCD TV set than can be connected to the internet.

Bluecom showed an interactive TV system on the Astra stand. It uses a mobile phone to display programme information and offers interactive features such as voting, shopping and betting. The handset uses Bluetooth technology to communicate with a digital set-top box and then the mobile phone network as the return path to the broadcaster. In the Netherlands Philips has teamed up with telecomms operator KPN to provide a WiFi wireless videophone that uses voice-over-IP (VOIP) technology. ■

The Philips MCP9350I Media Center, which is designed to sit beneath the TV set in the living room. It looks like a large DVD recorder and is in fact a combined DVD and hard-disk recorder.

Vintage radio repair

All sorts of things can come your way when you repair vintage equipment. Pete Roberts describes the problems with two recent arrivals on his bench, a Philips Thirties replica and a Pye Minor car radio

Philips vintage replica

Photo 1: External view of the Philips vintage replica radio receiver, a Sixties model made to look like a valve set from the Thirties.

Photo 2: Rear view of the Philips vintage replica receiver after removal of the back.

This mains-only Philips receiver (see Photo 1), a replica of a Thirties valve radio but dating from the late Sixties, was made in Japan. Unusual to say the least! It came to me with the complaint "completely dead". When I plugged it in I found that this was an accurate description of the fault.

Removal of the authentic, heavy cardboard back from the quite substantial wooden cabinet revealed a typical Philips loudspeaker driven by a small Japanese LW/MW/FM transistor radio that was obviously derived from a portable model, see Photo 2. This is powered by a small mains transformer. The vintage-style tuning scale is pulley driven by the tuning knob's shaft, with a spigot-type coupling to the shaft of the tuning capacitor, see Photo 3. A toggle that protrudes through the back operates the wavechange switch. The radio circuitry uses silicon transistors throughout.

A quick check revealed that mains voltage was present at the input side of the on/off switch but not at the other side. Failure of the mains switch in a control of this type is sometimes caused by old grease that gums up the switch toggle, but in this case a shot of switch cleaner did no good. Fortunately the control was a standard carbon type with a 3/8in. control shaft. The only problem was its value, 20kΩ. As this is no longer a standard value, a 47kΩ log. potentiometer was fitted. The volume control is fed from the detector via a capacitor and doesn't serve as a DC load, so the higher value wouldn't cause any problems. One of the switch terminals was a little too close to the mains transformer's frame for comfort, so I made sure that this was connected to mains neutral and, for good measure, fitted a neoprene binding sleeve over the joint.

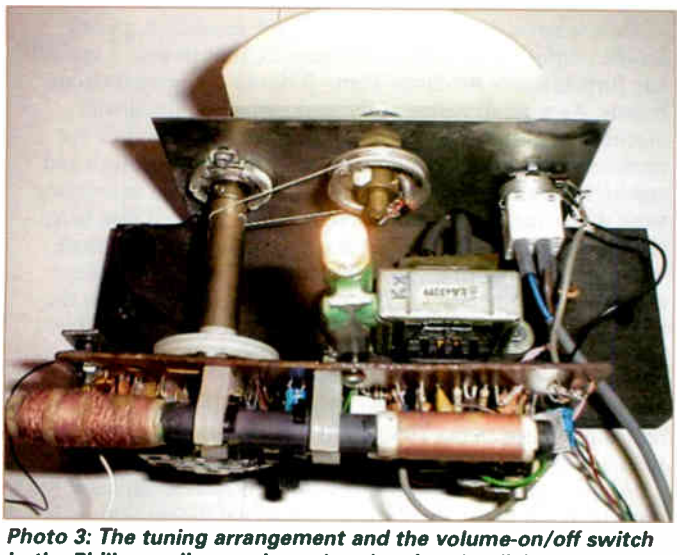


Photo 3: The tuning arrangement and the volume-on/off switch in the Philips replica receiver, also showing the dial lamp, the mains transformer and the ferrite-rod aerial.

Restoration work

When I switched the set on it sprang to life with reception on all three bands. The wavechange switch was noisy, but a spot of contact-treatment oil cured that. In view of the age of the set, and the fact that it had been out of use for a while, I thought it best to replace all the electrolytics. They cost only pennies, and replacement would make a bounce unlikely. In fact reception was noticeably improved afterwards, so at least some of the originals must have been a bit tired. I used modern blue BC Components radial-lead types to replace the higher-value capacitors and tantalum-bead types to replaces those below 10μF in value. Finally, before boxing up and soak testing, I replaced the 13A fuse in the plug with a 1A type.

A quick buffing up with a beeswax-based wood polish finished the job. The set was of great sentimental value to its owner, and the look of delight on his face when I handed it back to him made the job worthwhile.

Pye Minor car radio

This small car radio, dating from 1968, was original equipment in a LandRover of similar vintage. Photo 4 shows the front view. The vehicle had belonged to the owner's father and was of great sentimental value to him, so he wanted its radio restored to full operation. The Pye Minor is for 12V operation only with dual polarity provision. It shares the all germanium-transistor circuitry with the Major, the only difference being the audio output stage: while the Major has a single AD149 transistor in a class A circuit, the Minor has an AD161/162 complementary-symmetry pair in the familiar transformerless totem-pole push-pull arrangement. A Mullard module incorporates the AF115 mixer and the two AF117 IF amplifier transistors, see Photo 5. As with most car radios of the period permeability tuning is used, with both continuous tuning and mechanical presets, one for long wave. Photo 6 is an internal view before new parts were fitted, showing the tuning-selector mechanism.

Photo 4: Front view of the Pye Minor car radio.

Photo 5: Inside the Mullard IF module.

The dead condition

The reported fault was "dead", and it certainly was. In fact it drew so much current that my 13·8V, 3A bench power supply went into current limit. Yes, I know, I should have had a 1A fuse in line, but we all forget such minor details at times!

As expected, the audio output transistors were almost dead short-circuit. After unsoldering the faulty AD161/162 pair they were removed carefully, in order to avoid damage to the mica washers – these particular transistors are an odd size, and new washers are not readily obtainable. The old heatsink compound was cleaned off before smearing on a small amount of fresh material. A new AD161/162 pair was then fitted. From experience I would always recommend replacing these devices as a pair, even if only one of them has failed. The still functional one will have been damaged and will fail sooner rather than later. Photo 7 is a rear view with the new AD161/162 pair fitted – the dead ones are also shown.

The old, blue Philips electrolytics looked rather tired, with white gunge showing around the seals. So these were replaced before applying power. I used similar-looking BC Components capacitors. Photo 8 shows a top view with the new electrolytics fitted. At least the radio now drew only 100mA or so, mainly because of the dial light, and the audio output stage was live.

But there was still no reception.

Restoring reception

Thinking the obvious, I removed the Mullard IF module. Fortunately it's a very simple procedure with these receivers. Once I had opened it up I checked the AF11X transistors and found that they were all OK, with none of the usual collector-to-case shorts. There were traces of water contamination on the PCB however, and there were some dodgy joints. After a blanket resoldering operation I replaced the single 10μF electrolytic with a modern solid-aluminium type and then, before reassembling the module, I treated the PCB to a couple of coats of tropicalising varnish.

After allowing time for the varnish to dry I reassembled the module and fitted it back in place. The crossing of fingers and muttering of incantations must have worked because, at switch on, there was really good reception. I must admit that I have never understood the reason for the stern admonishment "under no circumstances should repair of this module be attempted", as troubleshooting and repair is easy. Am I being cynical in thinking that there was more profit in selling a whole new module than just the parts needed to fix a faulty one? Nowadays of course there is no alternative.

Before boxing up and soak testing the receiver I applied acrylic conformal varnish to the main PCB to protect it against any further attack by damp. Photo 9 shows the printed circuit boards. As with all radios of the period that are fitted with mechanical push-button presets it's a good idea to check for hardening or absence of lubricant and, if necessary, clean and sparingly relubricate the mechanism. In addition to preventing wear this makes the action feel light and smooth. It also helps ensure consistent tuning without mechanically-induced drift.

Before you return a classic car radio to its owner, always check the earth polarity of the vehicle – it's possible that the radio may be set incorrectly. Polarity selection may involve simple rotation of a widget or, as with this receiver, swapping over two plug-in leads on the PCB. In some sets it involves unsoldering and repositioning wire links. Note that all car radios produced in the 1950-1960s era were designed for use with a single 3 or 4Ω loudspeaker rated at about 5W.

Always impress upon the owner that a fuse of between 1-3A must be fitted in the supply lead. Those unfamiliar with older equipment may wrongly assume that, as with modern car audio equipment, an internal fuse is fitted. Without a fuse a shorted output stage or other major fault could result in a fire.

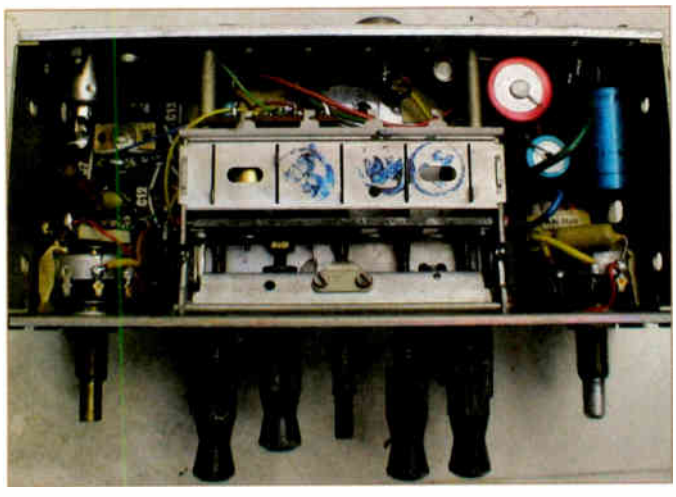


Photo 6: Top view inside before new parts were fitted, showing the tuning selector mechanism.

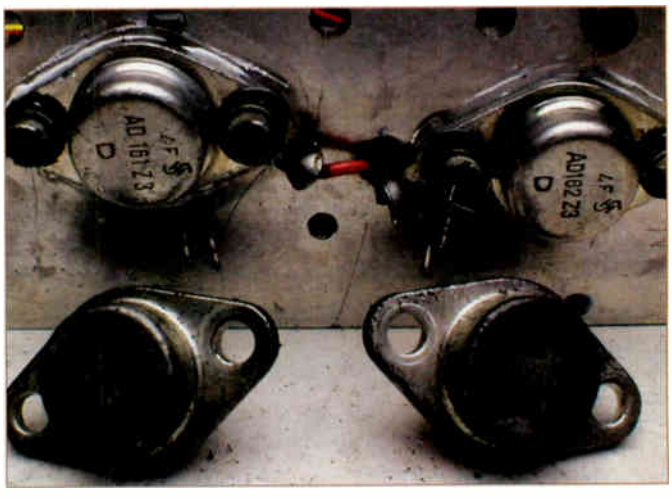


Photo 7: Rear view with the new AD161/162 pair fitted. The dead transistors are also shown.

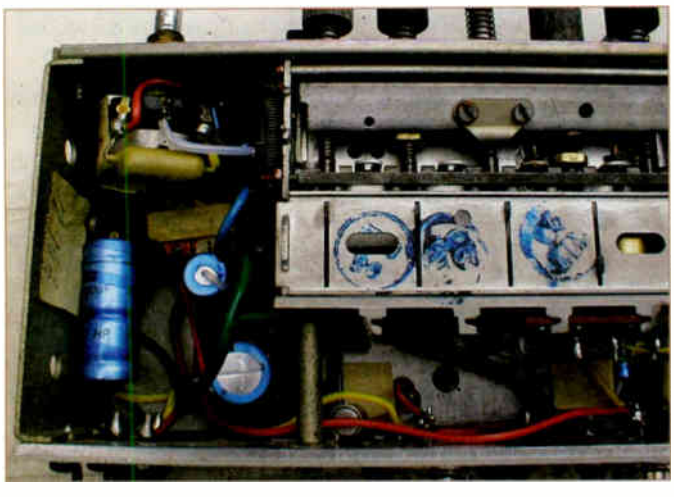


Photo 8: Top view with the new electrolytics fitted.

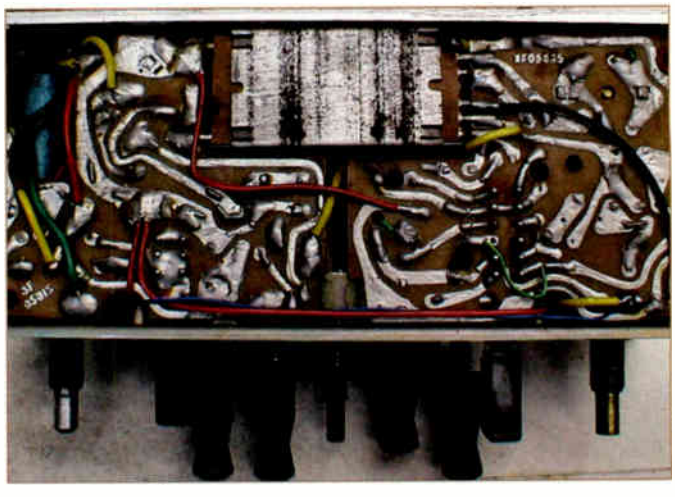


Photo 9: Bottom view, showing the printed circuit boards.

A NiMH battery charger repair

Ian Field describes a fault that occurred with a NiMH battery charger – the constant-current source transistor used appears to be under-rated. The unit was not difficult to repair once the circuit had been traced out

The fault occurred with a GP Powerbank GPKB01BS NiMH battery charger that came as part of a package with a digital camera. As it was only a few weeks old, I should have returned it under warranty. The purchase had been made at a Lidl store however. These have batches of stock week by week rather than continuous stock lines, which means that the store would have been unable to exchange the product. I didn't want to be without the camera while the package was returned to the manufacturer just for the sake of a faulty charger, so I decided to attempt repair.

As repairs go, the charger is not a high-profit margin item. At the time of writing Argos has a similar item on special offer at about £25. These chargers do seem to have rather fragile series-regulator transistors in the current-limiting circuit however. Once you have the circuit diagram in front of you, fault diagnosis and repair can be carried out in minutes.

Circuit details

It was easy to trace out the circuit, see Fig. 1. Identification of the transistor types was rather more difficult. Q1 and Q4 are marked 'A6', Q2 and Q5 'M6', and Q3 and Q6 'HF'. According to the ECA data manual the A6 could be either a 1S2838 or BAS16 diode. The M6 could be any of five different devices, four of them bipolar transistors and the other a FET. The HF could be one of two different VHF tuner local-oscillator transistors. Not very helpful! I removed one of each type of transistor in turn and carried out standard checks on them. This revealed that they were all bipolar transistors, two npn ones and a pnp type. From this point the information in the ECA book was disregarded.

Fault diagnosis

The fault symptom presented was that one of the two charge-indicator LEDs was dim and flickering – and of course one of the two pairs of cells wasn't being charged. Fault diagnosis is very easy in this situation, as there are two identical circuits side-by-side. So voltage-comparison checks are a simple matter.

I found that the voltage between the base and emitter of the current-source transistor Q1 was 2·5V. Yet it was still not being biased into conduction adequately. This was a little surprising, as Q1 was one of the transistors removed for identification. The junctions had given normal readings with a DMM diode check. But it was obviously defective.

Finding a replacement

Finding a suitable replacement for Q1 presented a slight problem as I had not been able to identify the original. It was obviously no ordinary transistor, as the unit provides a charge current of 100mA for AA NiMH cells. This is controlled by the very tiny surface-mounted current-source transistors. The ECA book had identified the encapsulation as TO236. There seemed little chance of finding a suitable replacement in the same package size – and the original transistors run unhealthily hot!

My solution was to form the leads of a conventional transistor to match the surface-mount pads. The device I selected was the Toshiba 2SC2236Y, which comes in a jumbo TO92 package. Although it also runs quite warm, it runs very much cooler than the original surface-mounted transistors. By repeating the voltage comparison checks I found that the performance of this transistor was close enough.

The charger has seen considerable use since the repair and there has been no sign of any problems.

The case

Finally, a note on the three screws that hold the charger's case together. They seem to be some form of anti-tamper screw that requires a three-sided Allen key. The Spear and Jackson screwdriver that came taped to the front of an issue of *Television* a few years ago turns these screw-heads very nicely. For those who missed out on the freebie screwdriver, it's identical to the well-known Steadfast electrician's screwdriver that was available from RS Components for a while.

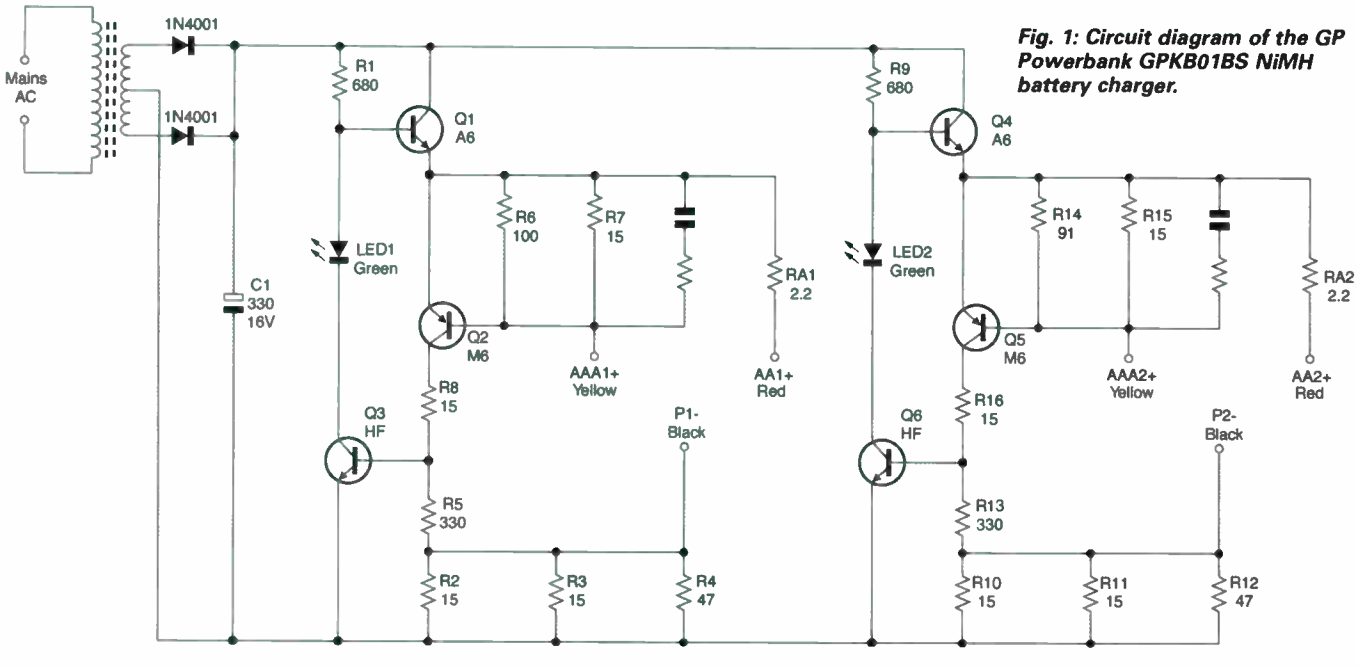


Fig. 1: Circuit diagram of the GP Powerbank GPKB01BS NiMH battery charger.

Adrian Gardiner starts a new series on PC maintenance. To start off, virus protection is covered. Also some reader feedback

Bench Notes

As promised last month, I am beginning a new series of articles on getting your PC in tiptop running order and keeping it that way. Love them or hate them, PCs are a part of everyday life. The guidelines provided in this series should reduce your computer frustrations, while the basic knowledge will enable you to keep your PC in optimum condition. Furthermore PCs can be an excellent source of additional servicing income. Most of the common problems you are likely to encounter will be dealt with over the next few months. Throughout, I will welcome any questions and problems you have. You can contact me through the magazine at the address given on the leader page or by email (use TVeditor@nexusmedia.com).

Before I begin, it's necessary to make a few assumptions. I am assuming that you can operate a mouse and know how to select menus. Unless otherwise stated, the information given will be based on a Windows XP PC. However most of the information given will work with all versions of Windows from 98 onwards. Finally I assume that you have internet access.

Virus protection

We'll start off by looking at virus protection. Most people know that they need anti-virus software, though a surprising number don't have it. With so many nasty virus programs around, software to protect against them is vital, especially when you are connected to the internet. All modern protection software checks for virus activity in real time, as well as having the ability to scan the entire machine for infection. Good programs also check email and online messaging services, both of which are common ways for viruses to attack.

Many anti-virus products are available and all have advantages and disadvantages. Many come as complete 'security suites', with built-in firewalls and spyware protection (these issues will be dealt with in later articles). Two of the best-known products are Norton and McAfee. Both are good, but many other excellent programs are available. Norton and McAfee both have one major drawback: they slow your PC down. This can become a real problem with older systems. One of the most common complaints I get is "very slow". Whenever I find Norton or McAfee installed I now recommend its replacement.

After months of research and nearly a year of successful installations I personally recommend AVG Antivirus, written by Grisoft. This program is excellent and has removed viruses that other products have failed to remove. Best of all, it is totally free to domestic users. It is regularly updated, and does not slow the PC down. What's more it is totally automatic: once it has been installed you can simply forget about it.

Downloading and installing

Before downloading and installing it, remove any existing anti-virus software. Most programs have their own uninstall option. If not, navigate to the Windows control panel and click on 'Add/Remove Programs'. You should then see a list of the programs installed on your PC. From here you can click on the anti-virus package and then click the Add/Remove button to uninstall it.

Personal/home users can download the free edition of AVG from
http://free.grisoft.com/doc/1
From here you should click on 'Get AVG Free'. This will take you to the page where you can download it.

Business users can buy the professional version of AVG from
http://www.grisoft.com
Begin by selecting 'United Kingdom' from the drop-down menu in the top, right corner of the site. On the page that appears subsequently, click on 'Buy Now' to be taken through the steps to purchase. The current cost is just £23 for a one-year subscription.

Once you have clicked on the appropriate download link you will be prompted with a box that asks you to save it. Click 'Save' and navigate to a suitable place to save it to. The Windows desktop is ideal for this. Once the program has finished being downloaded, click on its icon to start the install process. When this has been completed AVG will take you through a few simple steps to complete the set-up process. These include registration and the creation of a rescue disc that can help you restore your machine in the event of a major infection. Finally, the program will carry out an update to ensure that you have the latest protection. And that's it.

You are now protected and can pretty much forget about viruses. If a new virus is discovered, AVG will halt the machine and present you with an option box asking you how to proceed. Under normal circumstances you should choose to delete the infected file.

Next month I will continue with spyware protection.

Matters arising

Allan Lloyd contacted me by email to say that he is having problems downloading the EEPROM software I recommended in the September issue (page 679). He says that payment appears to be required. Having double-checked the information, I can confirm that the PonyProg software is still free. It would appear that the cost Allan refers to is for a complete hardware/software package. If you are building your own programmer, you need only the software. To download it, go to
http://www.lancos.com/prog.html
and click on the download link about half way down the page.

Allan also suggests that people might be interested in
http://www.leksound.net/dlweb/
This site contains a wealth of service information and discussion forums. Personally I found it difficult to navigate, as much of the site is not in English. You can never have enough service sites however, so add it to your bookmarks!

Roy Bailey writes asking about my previous articles on small monochrome portables. He wants to know if I have more information on the ICs used in these sets. I regret that I don't have any further information or pin-out data. The ICs appear to be of Chinese origin, made specifically for the purpose. They rarely fail, so check everything else first. Given the low value of these sets, the only cost-effective way of replacing an IC is to take one from a scrap unit.

Please keep your letters and emails coming, particularly during the current series on PCs. I welcome your PC problems, and will endeavour to deal with as many as possible in this column.

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Television Repair / Modkits

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1402	PSU	ONWAKIT
1455T	PSU	ONWAKIT
1456T	PSU	ONWAKIT
1458T	PSU	ONWAKIT
1459T	PSU	ONWAKIT
1499Y	STANDBY	MODKIT37
14SLTX	STANDBY	MODKIT37
1799Y	STANDBY	MODKIT37
2002	PSU	ONWAKIT
2009B	PSU	ONWAKIT
2052T	PSU	ONWAKIT
2152T	PSU	ONWAKIT
2099TX	STANDBY	MODKIT37
BTV17	STANDBY	MODKIT37
CTV501	PSU	ONWAKIT
CTV701	PSU	ONWAKIT
CTV840	PSU	ONWAKIT
CTV841	PSU	ONWAKIT
CTV485	PSU	ONWAKIT
11AK19 4:3	PSU & EW KIT	MODKIT52
11AK19 16:9	PSU & EW KIT	MODKIT52A
AKAI		
CT1417	PSU	ONWAKIT
CT2159U	PSU	ONWAKIT
CT2162UNT	PSU	ONWAKIT
CT2863UNT	PSU	ONWAKIT
AMSTRAD		
11AK19 4:3	PSU & EW KIT	MODKIT52
11AK1916:9	PSU & EW KIT	MODKIT52A
BLACK DIAMOND		
11AK37	PSU	MODKIT51
BUSH		
2871NTX	PSU & EW KIT	MODKIT52
WS6673	PSU & EW KIT	MODKIT52
WS6674	PSU	MODKIT51
11AK37	PSU	MODKIT51
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CF25C22C	FRAME	MODKIT35
CF28A50F	FRAME	MODKIT36
CF28C22F	FRAME	MODKIT35
CF28C28F	FRAME	MODKIT36
CF29C42F	FRAME	MODKIT35
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1430RS	PSU	ONWAKIT
1430RW	PSU	ONWAKIT
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2029T	PSU	ONWAKIT
2029TA	PSU	ONWAKIT
COMPACT 11	PSU	MODKIT47

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F16 CHASSIS	LINE	GOODKIT1
F16	PSU	GOODKIT1
F16	VIDEO	GOODKIT1
11AK37 CHASSIS	PSU	MODKIT51
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CUC 2050	PSU	MODKIT48
CUC 2051	PSU	MODKIT48
CUC 2058	PSU	MODKIT48
CUC 2059	PSU	MODKIT48
CUC 2080	PSU	MODKIT48
CUC 7350		GRUNDIGKIT1
CUC 7301/3 (BUZ90)	PSU	GRUNDIGKIT2
CUC 7301/3 (MJF18004)	PSU	GRUNDIGKIT3
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AV29SX1EN1	FIELD O/P	JVCKIT1
AV29SX1PF	FIELD O/P	JVCKIT1
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C14E1EK	PSU	ONWAKIT
C14T1EK	PSU	ONWAKIT
C21ET1EK	PSU	ONWAKIT
CS21M3EK	PSU	ONWAKIT
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1496R/T (H3N90)	PSU	MODKIT43
1496R/T (BUZ90)	PSU	MODKIT44
1498	PSU	ONWAKIT
2086	PSU	ONWAKIT
2096R/T (H3N90)	PSU	MODKIT43
2096R/T (BUZ90)	PSU	MODKIT44
2098	PSU	ONWAKIT
21V1N (BUZ90)	PSU	GRUNDIGKIT2
21V1T(MJF18004)	PSU	GRUNDIGKIT3
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TVR185T	STANDBY	MODKIT39
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CT1M5B	PSU	MITSKIT3
CT21M5BT	PSU	MITSKIT3
CT25M5BT	PSU	MITSKIT3
CT21A2STX	TDA 8178S	MITSKIT1
CT21AX1B	PSU	MITSKIT3
CT21A3STX	TDA 8178S	MITSKIT1
CT21AV1BS	PSU	MITSKIT3
CT25A2STX	TDA 8178S	MITSKIT1
CT25A3STX	TDA 8178S	MITSKIT1
CT25A4STX	TDA 8178S	MITSKIT1
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CT25AV1BD	PSU	MITSKIT3

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CT29B6	TDA 8178S	MITSKIT2
CT33B3	TDA 8178S	MITSKIT2
M5 SERIES	PSU	MITSKIT3
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C289FTXN	PSU	NIKKAIKIT1
C28F41FXN	PSU	NIKKAIKIT1
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TX25XD60	VERT OUTPUT	PANKIT2
TC28XD60	VERT OUTPUT	PANKIT2
TX28XD70	VERT OUTPUT	PANKIT2
TX29XD70	VERT OUTPUT	PANKIT2
TX-W26D3	VERT OUTPUT	PANKIT2
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28PW5407/05	PSU	MODKIT50
28PW6006/05	PSU	MODKIT50
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310.20491		PHILKIT2
310.20496		PHILKIT10
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310.32252		PHILKIT5
310.32253		PHILKIT4
310.32254		PHILKIT9
310.32255		PHILKIT7
310.32262		PHILKIT8
310.62264		PHILKIT1
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CP110 CHASSIS	SOPS	PHILKIT8
G90A CHASSIS	SOPS	PHILKIT10
G90B CHASSIS	SOPS	PHILKIT10
G110 CHASSIS	SOPS	PHILKIT3
GR2.1 CHASSIS	SOPS	PHILKIT1
GR2.2 CHASSIS	SOPS	PHILKIT1
D-16 CHASSIS	SOPS	PHILKIT6
HSM VIDEO	SOPS	PHILKIT5
JSM VIDEO	SOPS	PHILKIT4
KSM VIDEO	SOPS	PHILKIT9
LSM VIDEO	SOPS	PHILKIT7
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CI5944	FRAME	SAMKIT2
CI6844	FRAME	SAMKIT2
VIK310	PSU	SAMSUNGKIT
VIK320	PSU	SAMSUNGKIT
VIK350	PSU	SAMSUNGKIT
VI375	PSU	SAMSUNGKIT
VI395	PSU	SAMSUNGKIT
WINNER 1	PSU	SAMSUNGKIT
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51CS05H	PSU	SHARPKIT1

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59CS05H	PSU	SHARPKIT2
59CSD8H	PSU	SHARPKIT2
59DS03H	PSU	SHARPKIT3
59FW53H	PSU & EW	MODKIT49
28HW53H	PSU + EW	MODKIT53
56FW53H	PSU + EW	MODKIT53
66CS03H	PSU	SHARPKIT2
66CS05H	PSU	SHARPKIT2
66CSD8H	PSU	SHARPKIT2
66EW53H	PSU + EW	MODKIT53
66FW53H	PSU + EW	MODKIT53
66FW53H	PSU & DOLBY	MODKIT45
66FW53H	PSU & EW	MODKIT49
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66FW54H	PSU & EW	MODKIT49
66FW63H	PSU + EW	MODKIT53
76FW53H	PSU & DOLBY	MODKIT45
76FW53H	PSU & EW	MODKIT49
76FW54H	PSU & DOLBY	MODKIT45
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ICC8 CHASSIS	TDA 8178FS	THOMKIT1
ICC8 CHASSIS	FRAME	THOMKIT3
ICC9 CHASSIS	EAST/WEST	THOMKIT4
ICC17 CHASSIS	PSU	MODKIT41
ISS20 (TV-DVD)	PSU	MODKIT46
R3000	PSU	THOMKIT2
R4000	PSU	THOMKIT2
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BD2851S	PSU	MODKIT51
BD2951S	PSU	MODKIT51
BD3251S	PSU	MODKIT51
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GRUNDIGKIT3	£10.50
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MODKIT30	£10.00
MODKIT35	£9.50
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MODKIT37	£6.50
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MODKIT44	£7.00
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MODKIT46	£12.00
MODKIT47	£15.50
MODKIT48	£8.00
MODKIT49	£13.00
MODKIT50	£18.00
MODKIT51	£10.00
MODKIT52	£15.00
MODKIT52A	£15.00

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PANKIT2	£9.00
PHILKIT1	£10.00
PHILKIT2	£2.50
PHILKIT3	£4.00
PHILKIT4	£4.25
PHILKIT5	£5.75
PHILKIT6	£5.50
PHILKIT7	£7.60

ORDER CODE	PRICE
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PHILKIT9	£7.50
PHILKIT10	£8.50
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SAMSUNGKIT	£16.00
SHARPKIT1	£11.00
SHARPKIT2	£11.00
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1.50mm	3.0m	WICKM2	£ 1.20 + vat
2.00mm	3.0m	WICKM3	£ 1.30 + vat
2.50mm	3.0m	WICKM4	£ 1.40 + vat
2.50mm	15m	WICKL4	£ 6.00 + vat
3.00mm	15m	WICKL5	£ 7.00 + vat
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2.00mm	30m	WICKL3	£ 10.00 + vat

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3 1/2 digits LCD Display
Low Battery indication
Transistor Testing Socket
Audible continuity

Technical Specifications:

DC Voltage: 200mV, 2V, 20V, 200V, 1000V
AC Voltage: 200mV, 2V, 20V, 200V, 750V
DC Current:20uA,200uA,2mA,20mA,200mA,2A,10A
AC Current: 200uA, 2mA, 20mA, 200mA, 2A, 10A
Resistance: 200R, 2K, 20K, 200K, 2M, 20M, 200M

Order Code : METER01
Price : £ 11.00 + vat
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3 1/2 digits LCD Display
Low Battery indication
Transistor Testing Socket
Audible continuity

Technical Specifications:

DC Voltage: 200mV, 2V, 20V, 200V, 1000V
AC Voltage: 200mV, 2V, 20V, 200V, 750V
DC Current:20uA,200uA,2mA,20mA,200mA,2A,10A
AC Current: 200uA, 2mA, 20mA, 200mA, 2A, 10A
Resistance: 200R, 2K, 20K, 200K, 2M, 20M, 200M
Capacitance: 2nF, 20nF, 200nF, 2uF, 20uF

Order Code : METER02
Price : £ 14.00 + vat
Carriage charged at £ 3.00 + vat

3 1/2 digits LCD Display
Low Battery indication
Transistor Testing Socket
Audible continuity

Technical Specifications:

DC Voltage: 200mV, 2V, 20V, 200V, 1000V
AC Voltage: 200mV, 2V, 20V, 200V, 750V
DC Current:20uA,200uA,2mA,20mA,200mA,2A,10A
AC Current: 200uA, 2mA, 20mA, 200mA, 2A, 10A
Resistance: 200R, 2K, 20K, 200K, 2M, 20M, 200M
Capacitance: 2nF, 20nF, 200nF, 2uF, 20uF
Frequency: 2kHz, 20kHz

Order Code : METER03
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Order Code : 27831RPrice : £ 4.50 + vat

2 way UHF TV Masthead Amplifier - 10dB Gain
Order Code : 27837RPrice : £ 9.00 + vat

4 way UHF TV Masthead Amplfier - 10dB Gain
Order Code : 27838RPrice : £ 9.50 + vat

4 way UHF TV & FM Masthead Amp - 10dB Gain
Order Code : 27839RPrice : £ 10.00 + vat

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Description	Gain	Order Code	Price
2 way	18dB	SLX2	£ 8.00 + vat
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4 way	12dB	SLX4	£ 13.00 + vat
4 way with Bypass	6dB	SLX4B	£ 14.00 + vat
6 way	12dB	SLX6	£ 18.00 + vat
6 way with Bypass	6dB	SLX6B	£ 19.00 + vat
8 way	12dB	SLX8	£ 18.50 + vat
8 way with Bypass	6dB	SLX8B	£ 20.00 + vat

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Universal Single LNB

Signal/noise ratio of 0.6dB.
Feedhorn: 40 mm
Input Frequency 10.7 - 12.75 GHz
Order Code : LNBSINGLE
Price : £ 5.00 + vat

Universal Twin LNB

Signal/noise ratio of 0.7dB.
Feedhorn: 40 mm
Input Frequency 10.7 - 12.75 GHz
Order Code : LNBTWIN
Price : £ 14.00 + vat

Universal Quad LNB

Signal/noise ratio of 0.7dB.
Feedhorn: 40 mm
Input Frequency 10.7 - 12.75 GHz
Order Code : LNBQUAD
Price : £ 25.00 + vat

Universal Quattro LNB

For use with Multiswitches
Signal/noise ratio of 0.7dB.
Feedhorn: 40 mm
Input Frequency 10.7 - 12.75 GHz
Order Code : LNBQUATTRO
Price : £ 15.00 + vat

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Audible signal strength reading
Adjustable level control
Adjustable sensitivity adjustment
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Order Code : 27860R
Price : £ 10.00 + vat

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Order Code : PLG51
Bag of 10
Price : £ 1.25 + vat
Bag of 100
Price : £ 9.00 + vat

Screw Type Coax Plugs

Order Code : PLG62
Bag of 10
Price : £ 1.60 + vat
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Price : £ 1.00 + vat
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Aerial Installation Accessories

Wireless technologies in CE products

In the fifth instalment in this series Graham Maynard concentrates on ZigBee technology, including product development, testing and certification

This month we will continue with our description of one of the newer wireless technologies, the Personal Area Network called ZigBee. This article has a different approach to the others in the series in showing what's involved today in a typical wireless design: the process is similar whether it be ZigBee, Bluetooth, WLAN etc. A product development cycle involves more than just designing hardware and writing some software code to drive it. Some insight is provided into the approvals processes involved, and what is available to support design-ins and testing, certification etc. for a typical wireless product.

ZigBee product design

ZigBee wireless technology takes advantage of the inherent robustness of the IEEE radio specification 802.15.4. On the basis of this it builds a mesh network that can self-form and self-heal; route messages quickly and accurately; and provide interoperability mechanisms and testing capabilities to ensure that like devices can talk to each other and that they can all take advantage of a ZigBee network.

There are three types of device 'class': co-ordinator, router and end device. The co-ordinator, of which there is only one per network, sets up the initial address space and network configuration.

ZigBee specifies how a device, for example a light switch, should behave in a given environment – rather like the Bluetooth profiles. These behaviour modes are specified in documents published by the ZigBee Alliance – they are available on the web at www.zigbee.org

Functionality is divided up according to intended market. For example, the home set-up or 'space' differs from the industrial-control space, as installing a domestic control or sensor network usually requires a different competence level to that required with an industrial installation. Domestic set-ups need to be consumer-friendly, which means that manufacturers should not expect consumers to know about (or even care about) networking, radios, device functionality etc. It must be simple to set up ZigBee device networks successfully, with the right characteristics. This should all be described in a straightforward manner, so that consumers won't take devices back to the shop after a poor 'out-of-the box' experience.

The ZigBee website provides the documentation required to develop

a ZigBee application. The HCL (Home Control Lighting) profile document for example specifies the overall HCL environment, types of devices, and cluster IDs used to transmit information. The HCL SRC (Switch Remote Control) document specifies the required ZigBee-specific physical device inputs/outputs. These two documents, which are available to the general public, specify what a device needs to be able to do in order to be classified as a ZigBee product.

True ZigBee range and economy

ZigBee devices, which are typically battery-powered, can transmit information much farther than their standard quoted range of 20m, because each device within listening distance passes the message along to any other device within range. Only the intended recipient acts upon the message however.

Provided there are enough devices spread around the house, ZigBee's multi-hop mesh-networking approach can use extra pathways to make sure that a message gets through even when one of the devices is out of order. If, for example, you flipped a portable switch to preheat the hot tub in the back yard, the message might normally pass through a node in the kitchen. Suppose the battery in the ZigBee unit in the kitchen has died. The message could still get through in a wireless version of an 'end-around play'. The portable switch, by simultaneously transmitting the message to your den, could bypass the kitchen transmitter and still get the 'on' message to the tub.

But because of another major ZigBee innovation, power efficiency, the battery in the kitchen is not likely to die in the first place. By instructing nodes to wake up for only those split-second intervals when they are needed, ZigBee is so economical with power that batteries can be expected to last for years.

Design example

As a very simple design example we will consider a battery-operated, remote-control light pad for domestic use, with one push button. The device uses the 'simple binding' process, which is similar to the Bluetooth 'pairing' process. In the SRC (see above) document on the ZigBee website you will see that the OnOffSRC 'cluster' has an attribute called OnOff, with three possible data values: 0x00 (hex) specifies off, 0xFF specifies on, and 0xF0 means toggle (if it was on turn it off, and vice versa). For the simple light switch we use only the toggle value, because all we have is a momentary-type switch on a faceplate. The software code would issue a ZigBee packet that specifies the cluster ID, 0x13, and a data value of 0xF0 every time the button is pushed.

'Simple binding' is described as follows in paragraph 1.4.2.2 End Device Bind Overview of the specification: 'Provides the ability for an application to support "simple binding" where user intervention is employed to identify command/control device pairs. Typical usage would be where a user is asked to push buttons on two devices for installation purposes'.

This is a basic, intuitive method of binding, one that's used in many applications. With the light-switch product mentioned above the method could be written as a user instruction as follows: hold down the button on the remote light switch for five seconds, then push the bind button on the master home controller within sixty seconds.

There could be other physical implementations for the same function, but the method is basically the same with all such products. The binding comes from the user's physical input at both the device that issues the command (the switch) and the device that responds to the command (the load control that switches the light). This binding information will then be stored in the ZigBee network's co-ordinator, and may also be stored as backup in the 'end devices', i.e. the load switches/lights.

To keep the task as simple as possible, you could start with someone else's ZigBee-compliant platform (chips plus software) that meets the Alliance's specification. At April 2005 four manufacturers offered a compliant platform.

Fig. 1: Typical Zigbee development kit from Freescale Semiconductor.

Using the development tools provided by the IC supplier and/or a third party, you can write the ZigBee-specific parts of the application code and maintain an overall look and feel that differentiates your product from others on the market. Spend most of your time on how the product will interact with the user.

Most ZigBee products have been and will continue to be developed on the basis of these 'compliant platforms'. A typical development kit, from Freescale Semiconductor, is shown in Fig. 1. See the description later in this article. Freescale Semiconductor is a leader in ZigBee technology – it was formerly part of Motorola Semiconductor.

Fig. 2: MaxStream Xbee modules provide an easy ZigBee solution for manufacturers.

Fig. 3: ZigBee implementation using a Freescale MC13191/92 IC and a microcontroller chip with an HCS08 core.

Interoperability testing and certification

Before a product is released on the

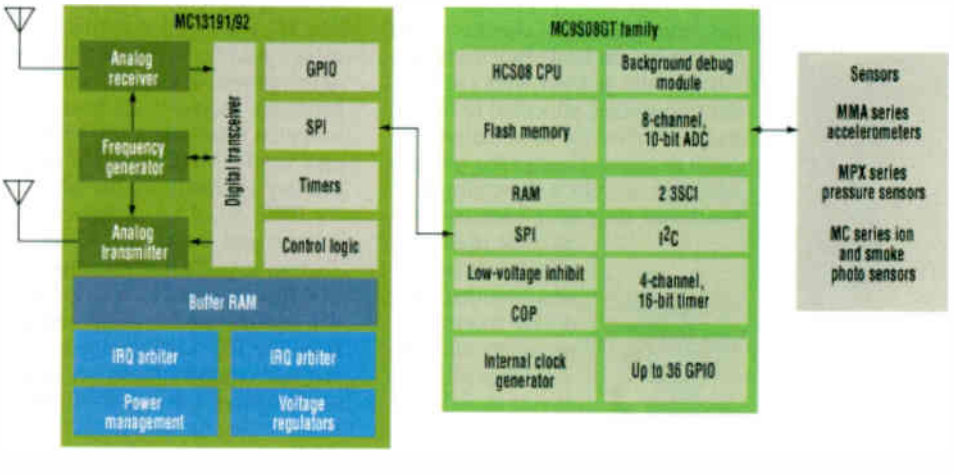

Fig. 4: Freescale MC13191/92 chips.

market its manufacturer has to check that it inter-operates with other ZigBee devices, first at IEEE 802.15.4 level, then at ZigBee network level, and finally at the device profile and description level. The Alliance organises quarterly interoperability events called ZigFests, where developers can perform interoperability and functional testing in a secure environment.

Once a product has reached the 'engineering sample' stage it will be taken to a ZigBee Alliance certified test house to check that it meets the requirements of the chosen profile. This is a crucial stage, because customers need to know that the product is compatible with other ZigBee-certified products in their environment, and the Alliance wants to ensure that products with the ZigBee logo have been tested for compliance with the same documents used for similar devices. The process is similar in many ways to the Bluetooth certification process, though not quite as complex.

Certification benefits both the developer and the consumer. For a simple battery-operated light switch, certification checking at a test house takes probably less than a day. But a lot of testing is carried out in those six-eight hours. There are some quick spot checks like RF frequency and basic functionality – whether the product works at all the frequencies allocated in the band, whether the modulation is clean enough, whether the range is adequate etc. Once these simple functional tests have been completed most of the effort goes into ensuring that the device meets the requirements of the ZigBee profile and device description documents. Testing is completed with a written report. If successful, the developer and the Alliance are told that a light switch has successfully passed. On receiving notification of this, the developer can request permission to use the ZigBee logo for the product. Its part number has to be quoted.

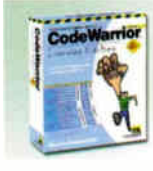

Fig. 5: The Metrowerks CodeWarrier pack.

As with any wireless device, the developer must ensure that the radio regulatory rules in countries in which it will be sold are met. Testing for this generally takes longer than the ZigBee certification testing, but not much more for a simple device. This testing is of course mandatory for all wireless devices sold, whether ZigBee or not.

Compliant platforms and development kits

In addition to Freescale Semiconductor, Zigbee-compliant platforms are currently available from Chipcon, CompXs and Ember Corporation. For a good example of the kind of product available and what can be done with it, see the following link
www.chipcon.com/files/CC2420DBK_ZigBee_Light_Switch_Demo_1_1.pdf

Some complete Zigbee modules are also available. These will simplify the design process for manufacturers who don't want to 'reinvent the wheel'. An example is the MaxStream XbeePro, see Fig. 2. Check at
http://www.maxsteam.net/
These modules have a very good specification: up to 300ft (100m) RF line-of-sight range at 250kbits/sec; up to 100ft (30m) range at 250kbits/sec in indoor/urban environments; 1mW power output; –92dBm receiver sensitivity; power-down current reaches below 10μA.

The 13193-EVK is Freescale Semiconductor's latest hardware for a ZigBee-compliant platform. The kit, see Fig. 1, has full ZigBee capabilities for demonstration and development. It contains all the hardware and software necessary, based on Freescale's MC13191 IC and Simple MAC software for proprietary applications, the MC13192 for IEEE 802.15.4 compliant applications, and the MC13193 for Zigbee-compliant applications. The development kit can be used to demonstrate and develop wireless solutions for simple point-to-point, star and complex mesh networks. It contains five 2·4GHz wireless nodes based on the Freescale ZigBee-compliant platform, and an 802.15.4 packet sniffer to enable the protocol between the wireless nodes to be monitored and for troubleshooting with software and application profile problems.

The kit also provides reference designs from IC to aerial. An on-board BDM (Background Debug Mode) port is provided for microcontroller chip flash reprogramming and in-circuit hardware debugging, and an RS-232 port for monitoring and flash programming. There are LEDs and switches for demonstration, monitoring and control, and connections for a 9V battery or external power supply (included in the kit). The kit is SMAC, 802.15.4 and ZigBee compatible, and includes Metrowerks CodeWarrier Development Studio for HCS08 (a Freescale 8-bit microcontroller). SMAC is a utility for MAC address modification. A ZigBee protocol stack is included, with sample applications and utilities to try out and use.

Fig. 3 shows a typical ZigBee implementation. The front-end (radio transmitter/receiver, data buffer RAM, interrupt request arbiters, GPIO, control logic, timers etc.) consists of an MC13191/92/93 chip (see Fig. 4) that's linked by serial protocol (SPI) to a microcontroller IC with say the Freescale HCS08 core. This runs the ZigBee stack, allows for background debugging and peripheral attachment and AD conversion from the sensor – detector, switch, potentiometer etc. The ZigBee protocol stack code is in the on-board flash memory. There's a RAM for temporary storage, boot-up sequence transfers etc.

CodeWarrier by Metrowerks, see Fig. 5, is a high-quality software development environment that can be used to program a microcontroller in C code. It also allows for easy trial runs and debugging of the code, and product integration and test etc. For further information on CodeWarrier see
http://www.metrowerks.com/mw/default.htm

Testing ZigBee products

A number of companies produce 'protocol sniffers' that enable engineers to fault-find with their ZigBee product designs and also sort out complex problems between compliant ZigBee devices that don't communicate as they should – arguments can arise between rival companies about whose product is causing the problem. The sniffers enable packets of complex instructions and data sent between devices

on a network to be examined and checked.

Frontline produces one such device, type FTS4ZB, a ZigBee and 802.15.4 protocol analyser and packet sniffer. It simplifies the understanding of a ZigBee network by simultaneously capturing, decoding, displaying, filtering and detecting errors, all live and in real time. The FTS4ZB air-sniffs data, using the finger-sized ZigBee ComProbe (see Fig. 6). Software is provided to enable frame decoding and other results to be displayed on a PC monitor. Fig. 7 shows a typical display obtained from a ComProbe sniffer and the software supplied with it.

The FTS4ZB displays each packet in a variety of formats, from raw binary to hex through detailed, fully decoded, field-by-field descriptions of the captured data. Decoding begins at the IEEE 802.15.4 MAC level and goes all the way up the ZigBee stack to the profile level. Packets that contain protocol violations are flagged in red for easy detection of bad messages.

ZigBee-based products

Apart from the compliant platforms, software stacks and protocol analysers described above there are no qualified ZigBee products for sale on the market so far. But it's only a matter of time before products are qualified and become available.

While the technology could well become a wireless automation standard for transmitting status messages in sensor networks in manufacturing, health care, shipping, defence and so on, the ZigBee Alliance is initially keeping its focus range narrow. The Alliance would love to have ZigBee in every widget in the world. But the challenge, which Bluetooth also had to face, is to draw attention to ZigBee amongst the multitude of wireless standards available and at a time when manufacturers and consumers have come to distrust any technology that's presented as a panacea.

ZigBee's initial applications will almost certainly be in professional installation kits for lighting controls, heating, ventilation, air conditioning and security. Huge cost savings can be achieved with both new construction and in redesigning commercial and domestic spaces. The cost of laying cable ranges from $20-$200 a foot, and you have to move a lot of conduits in order to get the light controls and other mechanisms into the right places. The advantages of a wireless, peel-and-stick light switch are very strong.

Competition

Similar technologies are available, such as Zensys's Z-Wave mesh network, Smarthome's Insteon and, at the high end, the Intel-backed TinyOS operating system that's popular for sensor networks used in academic research. Even Bluetooth has been presented as a home-automation solution, though it lacks the simplicity, affordability, power saving and mesh-networking capabilities of ZigBee. Builders seem to be attracted to ZigBee because of its frugal use of battery power, its use of open standards and the support of home-automation giants such as Honeywell and Philips.

Once it has become accepted by the construction industry, ZigBee is likely to be featured in home-networking kits for consumers – perhaps in 2006. In addition to being used to pair switches with lights, it can be used to configure HVAC (Heating Ventilation Air Conditioning) systems into zones to match office space layouts, to pair smoke alarms with fire-door release mechanisms, for emergency lighting, sprinklers and so on. There are applications in industrial automation, another major target for ZigBee technology. Fig. 8 shows a prototype ZigBee light-switch system developed by Cambridge Consultants. This company is very strong in the protocol areas, and particularly in pairing procedures for devices used in home ZigBee networks etc. For more information, check at the following link http://www.cambridgeconsultants.com/

For information about Z-Wave, a serious competitor to ZigBee, see http://www.zen-sys.com/index.php

In conclusion

This concludes our look at the new world of ZigBee technology, which we will find being increasingly used over the next one-five years. If you are really interested in gaining more knowledge about ZigBee and 802.15.4, there's a good course at http://www.compxs.com/indepth.html

You can of course refer to the ZigBee Alliance site (www.zigbee.org) and the excellent wireless site at www.palowireless.com

Next month

This series will continue with an in-depth look at mobile phone communication technologies. What is meant by 2G, 2.5G, 2.75G, EDGE, E-GPRS, UMTS and 3G? All will be explained, in the context of an ever-evolving and improving digital mobile communications network that links the whole world.

Fig. 6: The finger-sized ComProbe for ZigBee sniffing.

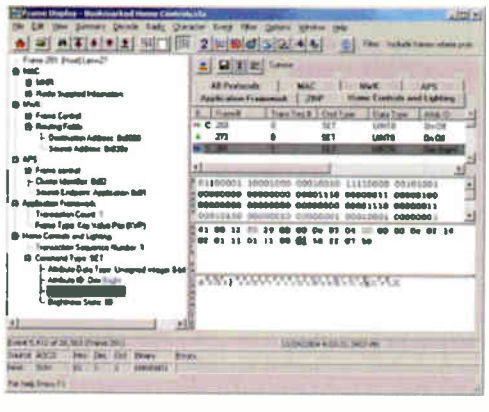

Fig. 7: PC monitor display of a typical output from a Frontline FTS4ZB protocol analyser and packet sniffer.

Fig 8: A prototype ZigBee light-switch system in action.

The AVO 8 story

Stan H. Falmouth recounts the evolution of the famed meter and describes the various versions that were produced

I expect that many older readers enjoyed Eugene Trundle's article earlier this year (see February issue, pages 204-5) on the advantages of the AVO 8 multimeter. I can add some background to clarify the origins of this renowned meter: it didn't just happen – it evolved.

The introduction in the user's manual supplied with the first two versions of the Model 8 states modestly that "since its inception in 1923 the Avometer has maintained a distinct lead on all its competitors". AVO was referring to its portable test instruments in general, not just the Model 8 itself. There was no Model 8 in 1923.

Beginnings

At some time during the Twenties the Automatic Coil Winder and Electrical Equipment Co. Ltd. started to make multirange moving-coil test meters as part of its wide range of products. At that time self-contained, portable instruments that covered a wide range of Amperages, Voltages and Ohms (AVO) were novel. Radio broadcasting was then at an early stage – the British Broadcasting Company (not Corporation at that stage) had been created in October 1922 – so the test-equipment market was largely for laboratory use and general electrical engineering.

The radio industry expanded rapidly during the late Twenties and Thirties, so AVO aimed its products at the blossoming radio and electronics industry. The meters ranged from the relatively inexpensive DC Avominor and Universal Avominor to the more ambitious Model 40 Universal Avometer. Model 40 established the shape and presentation associated with subsequent AVO meters right up to the current AVO 8 Mark 7. It had a 3·0mA movement, which set its DC voltage sensitivity at 333Ω/volt, but the range of measurements provided by the meter approximated to those of later instruments.

The industry develops

The radio and electronics industry flourished in the early Thirties, based on equipment that used thermionic valves, and there was a requirement for appropriate high-impedance test gear. The popular demand was for 1,000Ω/volt. To satisfy this, the Model 40 was followed by the substantially similar Model 7, with a 1·0mA movement.

At that time ownership of a Model 7 was the ambition of every budding radio

service engineer. There were much cheaper instruments, mostly of the moving-iron type, but they were insensitive, inaccurate and lacked the range of the AVO. During World War II the AVO Model 7 became the electrical test instrument workhorse of the snowballing radio and radar industry. Indeed it rendered such sterling service to King and Country that its performance has guaranteed it a place in the history of metrology. It certainly set the seal on the AVO reputation for accuracy and reliability in adverse conditions.

Higher sensitivity

The demand for higher sensitivity continued. To meet it, the High Resistance Avometers 1 and 2 appeared. They were superficially similar to the Model 7 but used a 50μA movement, providing a sensitivity of 20,000Ω/V. The improved linearity of the new moving-coil assembly enabled AVO to adopt a printed scale instead of the hand-calibrated scales used in earlier instruments. These two AVO meters had no AC current ranges, an omission that was rectified with the introduction of the associated Model 8 Mark 1. The very similar Mark 2 followed.

Up to this point the AVO meters had been made in London but, at about the time when the Model 8 Mark 3 appeared, the firm moved to Dover. The Mark 4 was introduced shortly after that move.

Construction

The Mark 1 to 4 AVO 8s were a delight to a retired cave-dweller like myself. Many of the components inside were good old-fashioned wire-wound devices on slabs of Paxolin board. The wiring consisted of proper bits of insulated wire between workmanlike solder lugs. It was said that any handy plumber with an electrical primer could service them using a light hammer and a strong soldering iron. Then along came the Model 8 Mark 5.

This was a complete redesign, though there was a marked general external similarity to the earlier AVO 8s. It incorporated all sorts of modern magic, like flexible printed interconnecting wiring and switches with fixed contacts that were no more than heavy silver plating on PCB copper. The Victor Meldrew in me questions this 'progress', but the new techniques must have considerably reduced the man-hours involved in assembly.

Competition

The AVO Model 8 never met much real competition. Some Taylor instruments offered higher sensitivity, but they were generally regarded as second-class citizens. Some people thought that the Selectest Super 50, made by Salford Electrical Instruments, was a better piece of engineering than the contemporary AVO, but the Super 50 lacked the mystique of the AVO and failed to become as popular as it perhaps deserved.

Different versions

Special versions of virtually all the Avometers were produced for the Services and for organisations such as the Post Office. They were substantially similar to the commercial models.

There were also versions that carried the suffix X after the AVO type number. These were intended for use in exceptionally severe conditions. There were also some 'specials' that looked very like standard AVOs but had their own individual ranges.

Today

Time has moved on. Complex semiconductor-based instruments such as digital multirange meters have become cheaper and cheaper. Meanwhile the costs of Model 8 production have gone up and up, so that on a 'cost per measurement' basis the Model 8 is now somewhat overpriced. It still has its advantages however, as Eugene Trundle pointed out, and if I want to hold a big circuit diagram down when there's a good breeze I still prefer my Model 8 Mark 2!

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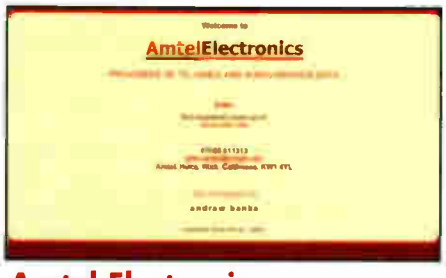

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Problems with the phone

Elaine Everest on the many difficulties that phone equipment of various types can cause

Do your customers have problems with modern technology? I don't mean TVs and videos. We all know that most people can't control the beasts – it's what we are here for! No, what I mean is machines for communication.

The mobile

My pet hate is mobile phones. Once someone has your phone number there's no escape. Bleep, bleep, bleep. There's another message! Just because they want to talk to you it doesn't mean you want to speak to them! As for the spelling used for texting, no wunda kids terday carnt spel.

Another problem with mobile phones is that you don't know whether the person using it to book a service call is genuine or not. After a few wasted journeys we decided to ask for a landline number as well. We would also ring back before leaving the workshop to check that the callout was still required. This was fine until a couple of years ago, but now many people use only a mobile phone, doing away with the expensive BT service. I'd be interested to know how other engineers have got around this problem.

Our regular customers are no problem. They ring up and we pop round. Many customers have been with us for years – we now service their children's and grandchildren's sets. We also receive calls from their friends asking for advice: they then become regular clients.

Answerphone difficulties

A problem occurs when our answerphone is switched on. Because we recognise their voices, regular customers sometimes assume that the answerphone can do the same!

"Hello Mick. It's George here. Pop round and look at the box. It goes all peculiar when *Coronation Street's* on."

Unless we can recognise the voice we are in trouble and have no option but to wait for their next call. Sod's law, the answerphone will be on again. With the advent of the 1471 service we can track down George's phone number. But this isn't always the solution.

When we finally get the call – I say we, but it's normally me – George or whoever may still not provide any clues as to who he is or where he lives. Fine if it's himself who is taking the call. After all he has sat in their homes, drinking their tea. To me they are just faceless voices.

"It's George here. Mick knows me. He does all the tellies up our road."

It's embarrassing if I have to say I don't know who he is, and he's likely to be offended when I say so. I've learnt to chat and try to glean some more information.

"How's the wife?" is a dodgy ploy. He may have just buried her, or she may have run off with the milkman!

But you can normally crack it after twenty minutes of idle chit-chat, during which the potatoes have boiled dry and the dog has chewed through the leg of the dining table!

Holidays

Holidays are a particular problem. You can guarantee that we have just departed when the first message arrives. Now little old ladies are never confident with gadgetry, answerphones included. They expect the machine to know who is speaking. So the first call will be simply: "Can Mick come and fix the television. I'm in all day."

A second call will follow: "I forgot to give you my phone number . . ."

A couple of hours will pass, then: "Are you coming?"

Next day: "Why didn't you come? I'm home after two."

By the time you return from your holiday the tape will be full of one very irate, elderly lady's phone calls. It will be in only the last message that you get the full information: "This is Miss Smith of 24 Acacia Avenue, telephone number blah, blah, blah, and I am very annoyed that you have not come to repair my television!"

She will go on to threaten the trading standards, the race relations board and Age Concern.

One phone call in reply, "hello love, what's the problem", and she's a pussycat again!

At this point I hear you all shouting: "For heaven's sake, just leave a message on your machine!" What, tell the world and his neighbour that you are away and the workshop is available for all and sundry to burgle. Not on your Nellie!

Of course you will also come home to a shed load of customers complaining that they couldn't get through on the phone because it was always engaged. You can't win!

Cornwall

Talking about holidays, we take most of ours in this country, mainly because of the dogs and also because we like to. Chuck them in the car, along with the suitcases and wellies, and off to Cornwall. We've found a lovely farm, where we stay in a self-contained cottage. We are free to roam the farm, and help if need be.

In times passed we've popped off and done a few dog shows down that end of the country as well. I mentioned before that we show the dogs, didn't I? The farmer and his family are very interested in our wins, being great show people themselves. They've won many prizes at the Cornwall show, not only for livestock but also for organic food and ice cream.

That's another thing we've helped with. When the Roskillys were first venturing into ice cream production their visitors in the three cottages were very keen guinea pigs. The rum and raisin was particularly welcome, with a full bottle of rum in every batch. I won't even mention the chocolate brandy version! These days everything is high-tech and correct, but twenty years ago the boys in Brussels would have had a field day.

Another item that's always packed into the car is himself's toolcase. Many a telly has been fixed on the farm, let alone grandfather clocks and other interesting items. Talk about a busman's holiday!

On the move

The most ridiculous item we took to the West Country was a portable satellite dish. This was before all and sundry owned dishes. It was about five feet in diameter, and we strapped it to the roof rack.

We set it up in our cottage, and all the farm staff came to view the "foreign stations". The picture was like something out of the early Fifties. Not surprising, as the sets in the cottages dated from about then.

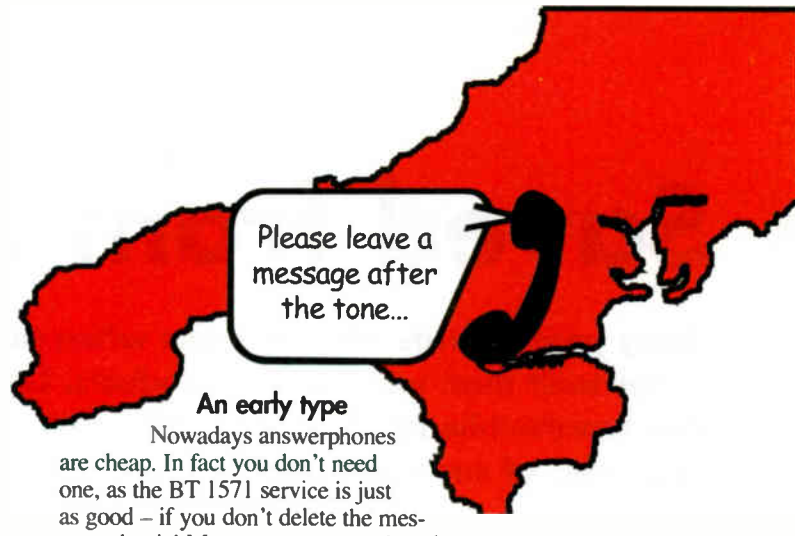
Talking of roof racks, we've travelled home with a wide range of items on the roof of the car, for example a rather nice chest of drawers found in the barn of a farm up for auction. We didn't buy the farm, though I was tempted! Then there was a fantastic antique table. No, I'm wrong about that. The shop delivered it "up to London" and it got there ahead of us. We found it parked in the front garden when we arrived back. That was before the cheque had even been cleared. Trusting folk, the Cornish.

You've probably gathered from my ramblings that I have a soft spot for Cornwall, and you wouldn't be wrong. Once I'm a famous novelist I plan to move down to a cottage on the Lizard Peninsular, with an acre or two for the dogs. Himself will probably stay behind of course, out of loyalty to the job – regardless of no pay rise and his hours being cut at the whim of the chap for whom he subcontracts. That's men, will they ever learn?!

Funny messages

Going back to answerphones, do you remember the funny messages you could put on the machines? A favourite of mine was a Prince Charles sound alike who couldn't come to the telephone because "one was talking to one's plants"!

A particularly funny message nearly got us into trouble. We had been using an American message in which a police officer with a loudhailer informed callers that "the house is surrounded and no one can get in or out, so please leave a message!" One of our slightly deaf, elderly customers panicked and phoned the local police station – he was worried that his telly might be damaged in a police raid. Fortunately the British Bobby has a sense of humour.



An early type

Nowadays answerphones are cheap. In fact you don't need one, as the BT 1571 service is just as good – if you don't delete the message, that is! Many moons ago, when the answerphone had just about been invented, we rented one from the GPO (remember it?). It was a very large machine that needed its own table to sit on. What I liked about it was the button I could press to record any conversations – handy for heavy breathers and the odd pervert call.

We were tied to a five-year lease for an exorbitant amount of money that was deducted from the business bank account via a direct debit. I'm not keen on banks, as you might have gathered from my previous comments. But in those far-off days I was more trusting. Imagine our horror when we discovered that the GPO had been deducting five lots of money each year. It couldn't understand that there are not five quarters in a year and, for a time, refused to return our money.

We got our own back however when the machine perished in our house fire. The only problem was that we also lost half the house and the workshop as well. But that, as they say, is another story...

Saved from the skip!

Many people write off older sets when they go wrong, though they are often better built than more recent products. Large numbers of sets can be given a further worthwhile lease of life with a little effort. Michael Maurice describes some examples of successful repair/restoration

Isn't it nice when people don't automatically assume that just because something is old it should be taken to the tip and be replaced with a new one when a fault develops? Unfortunately however many people, especially of the younger generation, now go for the replacement option without giving it a second thought. They seem to be programmed to dispose of their electronic equipment, including items that are only two-three years old and may have just a minor fault.

More and more my job, and therefore my business, depends on my skill at persuading customers not to go for a replacement but have a repair carried out. Here are some recent examples.

Goodmans 2875

I had sold this set to a customer second-hand a few years ago. She was about to bin it and buy a cheap set from the local supermarket, but I managed to persuade her not to. The problem was that the set was dead with a purring noise that came from the power supply. As there were no shorts in either the power supply or the line output stage I had to carry out some live voltage checks. I soon found that there was only 225V instead of the usual 330V across the mains bridge rectifier's reservoir capacitor, which was open-circuit. A nice new 150μF, 400V electrolytic restored normal operation. Not long to do, not expensive to carry out.

Philips 14CE1201 (CP90 chassis)

I wondered whether the customer would go for a repair this time. After all, 14in. TV sets sell for under £50 in some stores. But he required only a little persuasion to agree to a repair.

The set was dead and it took only a few minutes to discover why. The chopper transistor's collector connection was dry-jointed! I also found that the voltage across the Nicad back-up battery was 1·2V instead of 2·4V.

After attending to these two points I retuned the receiver and set up the brightness, colour and contrast. This restored the excellent pictures these sets can provide. I'll bet it will last longer than anything you buy today!

Panasonic TX28X1 (Alpha 4 chassis)

Another set the customer was thinking of throwing out. His kids were trying to persuade him to buy a plasma set! The set was dead with its mains fuse open-circuit. As no shorts could be found I looked at the posistor in the degaussing circuit. When I removed the top this item was found to be in order as well. The fuse had probably just failed because it was old. A replacement restored normal operation, and I told the customer I would have another look into the cause should it fail again after a short while. Again, the set produced excellent pictures and sound.

JVC AV29SX2EK

"I don't know whether it's worth repairing this TV" the customer said when he phoned me at about 8 o'clock in the morning. When he told me the make, model number and the fault I replied "most definitely yes". The fault symptoms were intermittent lines on the picture followed by no picture. The cure was to remove, clean and re-tin all the pins of the field output chip IC401. After resoldering it an excellent picture was obtained.

B&O MX2000

This set is about 18 years old. It had been got at by a third party and was now dead, but the owner wanted it fixed! The set is based on either the Thomson ICC3 or ICC5 chassis. First, the power supply had to be removed, which is no mean feat. It's part of the mains transformer and, to get at it, you have to remove the speaker grille, then a couple of screws and after that tilt the whole assembly forward before lifting it out. The original mains bridge rectifier consisted of four 1N4004 diodes. I replaced them with type 1N5062, which has higher voltage and current ratings. I then replaced the mains fuse and the missing posistor in the degaussing circuit. As a precaution I tested the power supply outside the set. As it was working I refitted it, connected the set to the mains supply and switched on.

I was rewarded with sound and a picture. But the picture was pale with low brightness and, no matter what I did, I couldn't improve it. A check showed that the CRT itself was in good order. Sometimes the picture did become good, but not for long. To make matters worse, when you pressed down on the function keys at the top of the set the picture reverted to normal!

To cut a very long story short, the cause of the problem was faulty CRT earthing. The reason why pressing down on the function keys restored a good picture was that the module or, more importantly, the IR remote-control receiver was earthed. Pressing it down brought it into contact with the CRTs' Aquadag coating. Further investigation revealed that the earth lead from the main chassis wasn't making a connection on the CRT base board. It wasn't dry-jointed. This is a B&O rather than a Thomson board, and the print lands for the earthing wires are connected to the main print land by four small strips of copper. These had cracked. Remaking the connections using stout wire provided a complete and

permanent cure.

Yet another set rescued from the dump!

JVC C140EKY (BX11 chassis)

This set was a really old brute, but was very well built for its day. The customer wanted it to be repaired for sentimental reasons – it had been an eighteenth birthday present. It was dead except for a whining noise. I found a short-circuit zener diode across the 15V rail in the power supply – this is the source of the supply to the line driver stage.

The cause of the trouble was intermittent failure of the STR54041S chopper chip. Replacement of these two items brought the set back to life.

Grundig MW70-2699

I nearly lost this job as the customer didn't want to wait a day or so for me to come out. So she called the local cowboy, who told her "it would be a big job" and couldn't even give her a rough estimate. As usual the customer didn't think it was worth spending much on the set. Some work had obviously been done in the power supply. Why I don't know, as both fuses were intact and the set was ticking away merrily. The cause of the failure was the BU2508AF line output transistor. There appeared to be no particular cause of its demise.

I fitted a replacement and replaced/uprated the 68kΩ and 270kW resistors in the power supply, fitting 150kΩ and 180kΩ resistors rated at 2W, 500V. In addition I replaced the two small electrolytic capacitors in the power supply, because the other 'repairer' had fitted unsuitable, poor-quality types.

The work was carried out in front of the customer at her home and took about an hour and a half.

Philips 21PT4494

When the customer phoned me and told me this set was dead I was sure that it would need a power-supply repair kit. But no, the power supply was working. The culprit was T7505 in the 5V supply. A replacement restored normal operation.

A few hours later the customer was on the phone. No, nothing wrong – he wanted to thank me for quick and efficient service.

Hitachi C2156TN

This set was dead apart from the fact that the standby light was on. It had been worked on previously, but I double-checked the work and removed the old solder before resoldering the connections to the regulators IC951 and IC952 and the earth-plane links. The set then worked – until I refitted the back!

To cut a long story short, I persuaded the customer to let me have the set for a couple of days rather than buy a new set. The cause of the problem turned out to be the HT preset RV950. It wasn't dry-jointed, but was failing intermittently. A new potentiometer restored reliable operation

Toshiba 3357DB (C5SS chassis)

I'm a little wary about these sets because the huge Philips ESF-type tube can fail. This set was dead with the standby light on and the HT fuse open-circuit. This is quite common, the usual cause being a faulty line output transformer. Before giving the customer an estimate I asked her whether there were any picture faults. She told me that the picture would sometimes go red, but always settled down.

I told here that the CRT was also likely to be faulty, that this wouldn't be cured by fitting a new transformer, that the condition was likely worsen and that the CRT is no longer available. She still decided to have the repair done. After fitting a new transformer and fuse I found that the picture did indeed have a red cast. But she couldn't say I didn't warn her.

Sony KVE2922U (AE1C chassis)

The customer was thinking about looking at a new set but decided to call me because I had serviced this one occasionally over the past few years. The problem, as the customer described it, was that the picture "exploded" or went huge. In fact it was like the centre of the picture magnified a couple of times. A quick check on the HT supply showed that it was present and correct at 135V. When I took my screwdriver and tapped board J1 at the back of the set the picture changed size momentarily.

I removed the chassis from the set and resoldered board J1's edge connector and the corresponding one on main board D. The picture size was then back to normal. Another one saved from the tip!

Schneider STV2502T

A very loud buzzing noise came from this set when it was switched on. The buzz drowned out the audio, and was caused by the scan coils. These are normally available only with the CRT, replacement of which would have made the set uneconomic to repair. But a quick call to Express confirmed that the scan coils do go noisy and that they could supply a set of coils at a very reasonable price. They arrived next day and, when fitted, produced a good picture with no buzzing.

Sony KVX2562U (AE2 chassis)

It was touch and go whether this set was repaired or not. It was dead apart from flashing LEDs that gave the number 13, indicating a deflection fault. A new STV9379 field output chip (IC1501) was fitted, but the results remained the same. So I disconnected the protection pin and found that there was field collapse. As I didn't have an oscilloscope or a service manual with me I took the set to the workshop.

Checks showed that the supplies to IC1501 were present and correct, also that good field pulses were present at the input to the chip. But there was no output. I popped in another STV9379 and was rewarded with a full picture.

Conversations with other engineers suggest that there are a lot of duff components out there, and that the problem is not confined to the smaller component suppliers. I don't know who supplied me with this duff IC, as I obtain my spares from several suppliers. Even if I could pin the supplier down, would they be prepared to pay me for the time and inconvenience caused? I think not!

So there we are then. 13 to me and zero for the dump! And that was just over a couple of months.

DX and Satellite Reception

Terrestrial DX and satellite TV reception reports. Broadcast and satellite TV news. A new Band I notch filter from HS Publications. Roger Bunney reports

An Israeli tuning card received via Eutelsat W2 (16°E).

Sporadic E TV reception declined during August, which is normal as the season draws to an end. As a result, the log is somewhat diminished – though there was an excellent opening over the 24/25th.

5/8/05	TV Luna (Mount Faito, Italy) ch. E2– (47·72MHz); TVE (Spain) chs. E2, 3; RAI (Italy) ch. IA.
8/8/05	MTV (Hungary) R1; HRT (Croatia) E4; RAI IA; TVE E2, 3; Syria E2.
10/8/05	TVE E2, 3.
13/8/05	HRT E4.
15/8/05	BT (Belarus) R1; RAI IA.
24/8/05	RAI IA, B; Tele-A (Italy) and TV Luna E2–; TVE E4; HRT E4; Scandinavia E2-4.
25/8/05	ETV (Estonia) R2; SVT (Sweden) E2-4; RAI IA, B; TVE E3; TV Luna E2–; UTV (Ukraine) R1; Syria E3; unidentified Arabic signal in ch. E2.

There was auroral activity during the morning and at lunchtime on the 24th in Europe and North America, with signal propagation in the 50 and 144MHz amateur bands, though no TV reception was reported. A solar flare and storm occurred during this period. Check the N. American channels A2 and A3 during late-night auroral activity for possible transatlantic reception – the website at www.DXFM.com provides updates on solar and SpE activity.

The tropospheric ducting that occurred on 16 July in the afternoon/early evening (see last month's column) created a 144MHz amateur-band beacon-signal path between the Azores (CU8DUB) and Portugal, Germany, the Balearic Is and the Canaries.

Satellite sightings

This year's summer in the UK provided heat-wave conditions punctuated with torrential downpours and electric storms. There have been difficult weather conditions in central Europe as well. Live news reports from Germany on 23 August showed the results of heavy rainstorms in the south German mountains. Bayerischer Rundfunk 1 transmitted two reports via Eutelsat W1 (10°E) from 1900 hours. One, at 10·989GHz V from the Dutch DSNG HOL 78 satellite truck, showed soaked reporters standing on a flooded road against a background of brooding mountains swathed in low cloud; the other, at 10·980GHz V from Telemobil DSNG farther down the valley, showed a flooded town with the river just fringing its banks and a church sandbagged to keep the waters out. In both cases he symbol rate was 6,109, with 3/4 FEC.

While Germany was suffering from excessive rainfall and floods, the problems in Portugal and Spain were searing heat (+40°C) and lack of rain. On the same day an ENEX (European News Exchange) feed via Eutelsat W2 (16°E) carried a live report for Sky News showing forest fires approaching a village, with a helicopter dropping water bombs in an attempt to reduce the flames. This was at 12·525GHz H (5,632, 3/4). ENEX can usually be found via W2 at 12·511GHz H.

From early August the Israeli authorities were moving settlers out of the Gaza strip. On the 16th there were many pictures of one-way traffic leaving Gaza with the military in attendance. Several news feeds were present, via Atlantic Bird 1 (12·5°W) for the BBC, Intelsat 10–02 (1°W) for ABC News NY, Eutelsat W1 (10°E) for APTN and Eutelsat W2 (16°E) for Sky and CBS. Whereas most reports were on-site in Gaza, others were via facility studios in Tel Aviv and Jerusalem. The BBC has been making extensive use of the satellite uplink company Bezeq Sat, with feeds from Gaza for BBC News/BBC World via the usual Atlantic Bird 1 regional/national slots at 11·050/11·150GHz V. I noticed that the satellite uplink truck registration numbers are rising: on the 17th UKI 1266 BBC Hull appeared at 11·072GHz V (4.226, 5/6), the highest UKI number seen to date.

Atlantic Bird 1 continues to provide test patterns, e.g. GlobeCast NY and GlobeCast LA via the GlobeCast multiplex at 11·014GHz H (20,145, 3/4). This is a very strong signal and is easily received with an 80cm dish. The multiplex has eight channels and on most days sporting action is present via one of the three main ones. Most receivers are unable to resolve the trio GP eng/italie/spanis, which usually duplicate one of the three main channels. On the 13th the two main channels carried ABC World of Sport horse racing from Arlington Park, with a second feed to Arlington Park from the Saratoga racecourse. This transmission carried the rehearsals, two-way chat between the two venues and general banter. Most major US horseracing events have three commentators in the reporting position and mobile reporters across the site. Horseracing made a pleasant change from the PGA golfing events usually carried by GlobeCast.

The remarkable crash of the Air France Airbus 340 at Toronto Pearson airport was just too late for inclusion in the last column. It was remarkable in that all the passengers and crew escaped. The aircraft went off the runway on landing during a thunderstorm, possibly struck by lightning, fell into a ravine then caught fire and burnt out. The crash was alongside the main Highway 401 during the rush hour and was caught by a nearby road-surveillance camera. The APTN European distributor UP4 (10·972GHz V, 4,167, 5/6) carried live pictures from Toronto then took a live CBC programme that featured developments as they unfolded. These included a dramatic handheld video camera sequence from a car, showing the tail section surrounded by flames. The traffic camera even showed escaping passengers clambering on to the motorway – several hailed a taxi! Unfortunately the UP4 feeder increasingly uses encryption. I hope this is not permanent, as with the Reuters WNS and CNNewsforce services.

Edmund Spicer (Littlehampton) is now using a Manahattan Plaza ST550 receiver, which has a 120GB HDD and blind search. It runs well with his 80cm dish, hunting feeds and identifying unusual symbol rates etc., but can run hot and needs good ventilation. He mentions that Dave Lee Travis appears on Spectrum FM Saturday at 0900-1200 via Hispasat (30°W), intended for British expatriates on the Costa Brava. This is at 12·149GHz V (27,500, 3/4), which has BBC World Service news at other times.

Alan Richards (Skegness) saw rugby from Cape Town via PAS 12 (45°E) in mid-August. This was a GlobeCast Africa transmission at 11·513GHz V (6,111, 3/4). It started with a picture of Table Mountain against a blue sky, zoomed back to the Cape Town suburbs then to the stadium for the All Blacks v. Springboks Tri Nations Rugby match.

There was drama at sea on the 5-7th when a miniature Russian submarine became entangled in a seabed 'cable antenna mooring'. A UK rescue team used its Scorpio undersea probe to cut the cables and release the sub. CBS NY sent various reports back from Moscow via Eutelsat W2 at 12·564GHz H (5,632, 3/4, NTSC), including some remarkable 'home video' (VHS quality) of the submarine on the surface and extracts from Russian news broadcasts.

Broadcast news

France: The second phase of French DTT transmitters to come on air, in September, has been announced. The three that could provide regular cross-Channel reception in the UK are Caen, Cherbourg and Le Havre. The channels allocated to these transmitters are Caen D31, D30, D32, D33, D58 and D50; Cherbourg D63, D34, D49, D53, D32 and D57; and Le Havre D48, D42, D57, D63, D58 and D54. In each case the first five channels will transmit multiplexes 1, 2, 3, 4 and 6 respectively. The sixth channel is for multiplex 5, which has no programmes at present.

Multiplex 1 is used for France 2, France 3, France 4, France 5, ARTE, La Chaine and Parliamentaire; multiplex 2 for Direct 8 and TMC; multiplex 3 for Canal+; multiplex 4 for M6, W9 and NT-1; and multiplex 6 for TF1 and NRJ 12.

Live picture from the Air France plane crash at Toronto airport, received via Eutelsat W1 (10°E).

Forces TV: *Media-Network News* reports that the AFN-TV services in Germany and Belgium will close down at the end of 2009, except for Kaiserslautern which will close at the end of 2010. FTA AFN-TV in Italy will close down at the end of this year. Reasons given are the cost of maintaining the services and the transition to digital TV in Europe.

Incidentally the Russian government has approved the financing for a state-backed Armed Forces radio and TV network.

RSL-TV: Reader Howard B. Hughes (Doncaster) reports that TV York has been on air since earlier this year. Channel 54 is used with horizontal polarisation. The transmitter is sited at Askham Bryan and has an ERP of 5kW.

Spain: The Spanish government has confirmed that the DTT services will continue to be run by RTVE, which is to become a public limited company and will receive government financing subject to provision of prescribed public services. TVE will have nine channels; Antena 3, Sogecable and Telecino four channels each; Net TV and Veo-TV two channels each.

Russia: A new educational TV channel, World of Knowledge TV, will open in the middle of next year with programming similar to Discovery and BBC World. The US network ABC has been banned from operations in Russia following its airing of an interview with a "most-wanted" Chechen rebel.

Vietnam: The eight Vietnam Television (VTV) channels are to increase transmissions to nearly 170 hours daily over the next four years. Locally-made programmes are also to be increased, and there will be a move to DTT.

China: The government has stopped any more non-Chinese media companies opening new TV channels. The authorities are to impose regulation on broadcast content. Overseas media companies with interests in China include Time Warner/CNN, News Corporation, Phoenix Satellite TV, Viacom and the BBC.

Satellite TV

All Ku-band output from Eutelsat W1 (10°W) was lost between about 1415 and 2200 hours on 10 August. APTN, a major user of the satellite, immediately transferred its Global video feed to W6 (21·5°E) at 12·546GHz V and subsequently maintained dual transmission for a time as a precaution. The official explanation

Recording of the Russian miniature submarine before it became stranded on the seabed, received via Eutelsat W2.

for the problem was 'de-pointing' because of a power subsystem anomaly.

Intelsat is to take over PanAmSat, forming the world's largest satellite operator with 53 satellites in orbit. The two companies had focused on different types of business, with Intelsat concentrating on telecommunications while PanAmSat provides extensive video services. The move is seen as part of an industry consolidation following excessive investment in the 1990s. Most satellites have excess capacity at present.

PAS-2 was shifted to 160°E earlier this year to make good lost services there for SE Asia. A replacement is to be launched late next year, and will provide increased Ku-band capacity for Australasia and the SW Pacific region. In the short term PAS-2's Ku-band feeds will directed at Australia.

As noted above, AFN-TV is to close down its terrestrial transmitters. Forces personnel will then have to rely on an encrypted satellite service for US programming and news. Scientific Atlanta is to introduce a new decoder for the service at a much-reduced price. These decoders will not be available to the public.

Analogue satellite TV isn't dead yet! Euronews has opened an analogue downlink via Hot Bird (13°E) at 11·363GHz V.

The NZ magazine *SatFACTS* reports on a unique US channel, UonTV, that downlinks from Intelsat Americas 5 (97°W) at 12·177GHz V (2,300, 2/3). Content is provided by the public. For US$20 to US$170 depending on the time of day you can hire a 30-minute slot to air your own pictures, video content etc. That

The Shuttle flies once more. ABC announcement received via Eutelsat W1.

30 minutes includes a five-minute period for UonTV promotion. UonTV also provides basic instruction and encouragement for editing, using professional systems. The FTA Ku-band coverage includes N. America, Alaska and Hawaii. Apparently sales of small Ku-band satellite systems have soared since the service started.

Correction

Under the heading Historical Matters in the September column (page 672) I mentioned glowing testimonials in the February 1951 issue of *Practical Television* for the Telerection Maximus aerial, in particular from a Cornish viewer whom I had assumed was "receiving ch. B5 from Wenvoe". Hugh Cocks points out that the Wenvoe transmitter opened on 15 August 1952. Up till then the only BBC transmitters on air were Alexandra Palace, Sutton Coldfield and Holme Moss. It's likely that the Cornish viewer was receiving Sutton Coldfield over the Severn sea path!

Band I notch filter from HSP

TV-DXers will be aware of the interference problems that affect reception of chs. E2 (48·25MHz vision) and R1 (49·75MHz vision). Interference comes from a multitude of low-power items, including kids walkie-talkies, pagers, a few cordless phones and baby-alarm monitors, that operate in the 49·8200-49·9875MHz band; from pagers that operate in the 48·99375-49·49375MHz band; and from the dedicated 49·4250-49·4750MHz hospital band. This once-clear spectrum, in the days of 405-line TV, has since become a sort of RF dustbin.

Apparatus operating at 49MHz within a radius of about 200 yards is a particular problem when you are trying to receive a weak ch. R1 signal. In a modern residential estate most houses will be occupied by families with small children and will have at least one baby monitor. Most of these are never switched off! My own estate must have a thousand such monitors that run 24-hours a day, as the whole band is jammed day and night. I'm sure this isn't unique.

I've tried rotating aerials, which can help, and noise phase-cancelling systems, which are not too effective with multiple interfering signals. HS Publications, Derby, has now come up with the C70 Band I notch filter. The claim is that it "can make a dramatic difference, with chs. E2 and R1 DXable again". So I sent off for one.

The filter is housed in a small (5 x 3·6 x 3cm) alloy diecast box. On top there are two adjacent Belling-Lee sockets, a small protruding blue plastic boss and a small hole. See nearby photo. Printed instructions say that the filter can be tuned across 45-65MHz. The preset controls should be adjusted carefully, to avoid damage, if possible using a standard copper-bladed trimming tool. The filter itself consists of a coil wound on a ferrite core, with a second coil overwound centrally, a 2pF padding capacitor, a miniature carbon preset for notch depth adjustment and a sub-miniature trimmer capacitor for tuning. They are mounted on a flat square laminate that's bolted to the lid of the box. Though the filter covers the entire Band I, the prime interest is in minimising ch. R1 interference.

A quick check on ch. R1 revealed a screen blanked-out by interference from baby monitors. A quick trim with a copper-bladed tool and, yes, a hole appeared in the noise. Using a scanner, I notched out the highest-frequency local 49MHz monitor, which was operating just inside the top of the low-power band. During the next SpE opening I fitted the notch filter in series with the DX aerial feed cable and real ch. R1 pictures appeared!

So the filter does work. The question is how well? To check I fed the output from a stable, modulated signal generator set to 49·5MHz via the notch filter to a commercial VHF/UHF signal-strength meter. The trimmer (blue boss) was used to peak the filter frequency and the carbon preset (small hole) to set the notch depth. The adjustments were repeated for optimum performance. I found that the maximum notch depth occurred at one end of the preset's travel and would have preferred it to occur at about mid-

travel. The notch depth was –45dB at 49·5MHz.

It's equally important that the notch has very steep sides, to minimise signal loss at adjacent frequencies – we are trying to receive a signal at 49·75MHz while notching out interference within a few 100kHz. Attenuation was measured at 500kHz and 1MHz spots. The results were as follows: –39dB at 50MHz; –14dB at 50·5MHz; –10dB at 51MHz; –8dB at 52MHz; –5dB at 53MHz; and –2·5dB at 54MHz. The insertion loss beyond this is –2dB.

The notch depth is very impressive at –45dB. The slope is fairly wide however, without the ideal extreme sharpness required for close working with ch. R1 and the multiplicity of low-power 49MHz devices. The wanted 49·75MHz is well down the slope and will suffer from perhaps excessive attenuation. Ch. E2 at 48·25MHz is 1·5MHz away with a loss of –14dB, which is much more tolerable. My own compromise was to insert the filter after the aerial amplifier, before the low-gain distribution/splitter amplifier. This works well and provides ch. R1 reception with stronger signals, whereas picture reception had previously been impossible.

I have also used a remotely-tuned varicap Band I notch filter from HS Publications. Both filters are very well made, with strong diecast boxes and a high standard of construction. I feel that it's essential to tune the filter to the highest interference experienced in the 49MHz band.

In conclusion I would have preferred a notch with a steeper slope, but this would be expecting rather a lot from a single-stage filter of modest cost. The C70 filter costs £15.95 plus £2 post and packing. It does make possible reception of a previously 'lost' and important DXTV channel, and for this reason represents good value for money. It's available from HS Publications, 7 Epping Close, Derby DE22 4FS. Phone 01322 381 699 or email garrysmith@dx-tv.fsnet.co.uk

External view of the HS Publications Band I notch filter type CF70.

Internal view of the HS Publications Band I notch filter type CF70.

If writing, enclose a stamped addressed envelope.

HS Publications also produces and supplies the well-known D100 series DX tuner, which has variable IF bandwidth – use of a narrow IF bandwidth can lift a weak signal above the noise level.

Test Case 515

Well-made test equipment lasts a long time, and much of what's in use in dealers' workshops is getting on a bit! That's certainly true of Sage's oscilloscope, a 60MHz dual-trace job bought in the days when analogue video camcorders were being repaired. For some time it had had a niggling intermittent fault that Sage had learnt to live with. When the fault was present there were little ramp-shaped spikes about six millimetres high on both traces. They were obviously mains-derived, because they were at 20msec intervals and when the trigger-source control was set to line, i.e. mains frequency, they stood still. The duration of each 'blip' was 1msec or so. Strangely perhaps, they didn't alter at all with the settings of the Y gain controls. And they would often disappear completely. Their coming and going seemed to be completely at random, unrelated to temperature or mechanical vibration – for mechanical vibration read Sage beating the instrument with his fist and belabouring it with the handle of a big screwdriver.

Because the fault did not affect normal use of the scope too much, there was little urgent need to repair it. But there came a day when nothing else was awaiting repair. So Sage swapped the instrument for an older one and he and Cathode Ray set about removing the case of the offending oscilloscope. They had no service manual or circuit diagram of course, but hoped that a repair might be possible without them. It was obviously some sort of power supply smoothing/decoupling problem, wasn't it?

Close examination of the power supply section, round the back, revealed several electrolytic capacitors that looked tired and weary. So they were carefully replaced, along with any others that gave a high ESR reading when checked with the meter. After that the fault appeared to have been cured, and much flexing, tapping and general abuse of the PCBs failed to bring it back.

Sage and Cathode Ray congratulated themselves, but decided to run the unit on test for a few days before reassembling it. They took it off the repair bench and connected it to a raw mains supply. The fault immediately reappeared! They rushed it back to the operating table, fed from a mains-isolating transformer, but now the fault refused to show up. They put it back on the test bench, powered straight from the ring mains supply – only to find that it now behaved normally there as well! It remained there for the next ten days.

When the little ramps finally reappeared on the two traces they were exactly as before. Not caused by tired electrolytic capacitors then! If only they had some service data they could perhaps have carried out some logical testing. But by now Cathode Ray had noticed that, regardless of whether a raw or isolated mains supply was being used, the normal slight buzz from the instrument's mains transformer became somewhat louder when the fault was present. This, in conjunction with the other symptoms, gave Sage an idea. He got Ray to connect a second oscilloscope to certain points, after noting the temperature of a couple of power-supply components with and without the fault being present. They finally got their diagnosis and were able, without much expenditure and certainly without having to obtain any special parts from the scope's manufacturer, to achieve a sure repair. What was it? For the solution, turn to page 59.

LETTERS

Send letters to "Television", Nexus Media Communications, Media House, Azalea Drive, Swanley, Kent, BR8 8HU or email TVeditor@nexusmedia.com using subject heading 'Television Letters'.

Lead-free solder

As we should all know by now, new EC legislation requires us to carry out repairs to domestic electronic products using lead-free solder. Eugene Trundle and Adrian Gardiner have written on the subject in recent issues, while Geoff Darby questioned the need for it in a recent letter.

From what I hear, products have become less reliable as a result of the use of lead-free solder. Soldered joints are now failing in sections of sets where we never had this trouble before. A good example of this is the flash memory chip on the text module in some Toshiba TV sets.

Some manufacturers now require their service agents to use lead-free solder or risk losing the agency. But others in the trade, like myself and many another independent engineer and repair shop, will not be under any such threats.

Lead-free solder does produce unreliable joints. That is why its use is prohibited in the production and servicing of equipment in the medical and aviation fields. More relevantly, who is going to police the use of leaded/lead-free solder? I suspect that only authorised service agents and the big repair companies will be forced to use it.

As a friend commented, he's ordered several reels of leaded solder that should last him till he leaves the trade!

Michael Maurice,
Wembley, Middx.

Baird's studios

Lack of space precluded mention of Baird's studios at Alexandra Palace in our article on 405-line TV last month (the Baird system used 240 lines). Their operation is of interest however – it was part of the reason for the abandonment of the Baird TV system. Baird was provided with two studios at Alexandra Palace, whereas EMI was allocated only one.

Two separate methods of producing TV programmes were available in Baird's main studio, which was 70ft long, 30ft wide and 23ft high. These were the intermediate-film process and the Baird Electron camera system. The intermediate-film process used 17·5mm film taken in the studio. It was passed continuously through, in turn, a developing tank, a washing tank, a fixing tank and a second washing tank, the complete process taking 65 seconds. While it was still wet the negative film was scanned by a disc that rotated at 6,000 r.p.m., with illumination provided by a 30A arc lamp. The light from the scanning disc passed to a photocell that incorporated an electron multiplier, the vision current from this device being passed to a valve amplifier after which it was sent to the Baird control room. The recorded sound was taken off the film by a pickup head and was passed straight to the control room. All in all a somewhat clumsy and restrictive arrangement! The intermediate-film equipment was housed in a room adjacent to the main studio. It had a glass window through which the camera filmed the action.

The second system at Baird's disposal was the Electron camera, which was located in a special sub-control room and could be used for programmes such as lectures or the broadcasting of cartoon films. The set-up used the spot-light system, in which the studio was kept mainly in darkness except for a scanning beam of light that was projected on to the subject/artiste. Photocells detected the reflected light. In the adjoining projection room a large disc, rotating at 6,000 r.p.m. with illumination from a 150A arc, generated the scanning beam, which was admitted into the small studio via a window. The studio was equipped with four photocells that used multipliers, from which the signals generated passed via a chain of amplifiers to the control room.

Sound was picked up by a single microphone. Engineers in the control room could fade between signals produced by the intermediate-film and Electron-camera systems. It seems that performers hated the prospect of appearing in front of Baird's scanning system and found all sorts of excuses to put off turning up at the studio until the following week, when the EMI 405-line system would be in use.

Keith Hamer and Garry Smith,
Derby.

WEEE and all that

Since my letter (July issue) on the effect of the WEEE directive there has been a further postponement of its implementation and other interesting facts have come to light. According to an article in the *Daily Telegraph* (11 August) it will be possible for big businesses in effect to buy their way out of any obligation to recycle redundant equipment. This isn't going to help the smaller trader of course. Have readers in this position buried their heads in the sand, hoping that it won't happen? It probably won't elsewhere in Europe, but this is Britain and we play cricket!

On the lead-free solder directive, how is this to be forced on the main manufacturers of the products we deal with, as most of them are outside the EU? I can't see the Chinese going along with it. Perhaps, as retailers, we will be expected to police the rules – watch this space.

I for one have no intention of compromising the safety and reliability of my repairs by using doubtful techniques with lead-free solder. As I see it, 60-40 solder will be around in new and existing products for a long time to come, while my stocks of the stuff will last me to retirement and beyond. Will I be alone? Let's hear some other views. And by the way, what are the consequences of using lead-free solder to repair 60-40 soldered joints and vice versa?

I have today (1 September) received an invitation to apply for my 'help pack' from a government agency called Envirowise – the first official notification that any of this is to happen. Any remaining confidence I had finally departed when I saw, according to the envelope, that the agency is based in somewhere called Dicot (sic) in Oxfordshire.

Trevor Warner, B.Sc (Eng.),
Porthmadog, Gwynedd.

Wartime civilian receivers

I well remember these sets, as a neighbour obtained one without the necessary licence during the war. Only last year I found that he had won it in a 6d raffle! I forget the usual price, but it was something like £3 17s 6d. The sets were for medium-wave reception only.

In those days it was common to find that a radio receiver was plugged into the lighting circuit, as there were two tariffs – one for lighting and a dearer one for power.

I never saw another of these receivers, but I believe there was also a battery model with the usual 2V accumulator and HT battery supplies.

Philip H. Bearman,
New Barnet, Herts.

Editorial comment: The idea of a wartime 'Utility Set' was first suggested by the BBC in June 1942. Subsequently the Equipment Technical Committee of the Radio Manufacturers' Association, in consultation with the BBC, drew up specifications for a mains-operated and a battery model. The aim

was to use valves and components that were being produced for the services and to make minimum demand on materials that were in short supply. Manufacture of the sets finally started in July 1944. As 'Utility' products, they were exempt from purchase tax.

Authorisation was given for 175,000 mains sets and 75,000 battery sets to be produced. They were made by a number of manufacturers and, to minimise hold-ups caused by shortages, the specifications left room for slight variations in the design. It was often possible to identify the manufacturer by the code on the chassis and the use of particular components, for example Murphy IF transformers.

Days of 405

I was very interested to read (October page 719) about trying to record some 405-line TV material during the final days of the transmissions from Sutton Coldfield, having had a very similar experience in London at about the same time. I too had decided to capture some 405-line material on VHS for posterity, which was possible because the frame rate was the same as with 625 lines. So I fired up an old KB valve portable (VC11 chassis) and extracted the video. The set was fed from an isolating transformer as it has a live chassis. I have to admit that I cheated with the sound, using a normal UHF transmission.

Channel 1 (BBC1) produced a good picture and sound, but on channel 9 (ITV) there was sound but no picture. The screen brightness was varying in accordance with the picture content (comparing it with the 625-line transmission), but there appeared to be no proper vision modulation. I phoned the IBA Engineering Information number, explained what I was trying to do, and was told that someone would phone me back. I must confess that I wasn't very optimistic about this, and was astonished when less than ten minutes later someone phoned me directly from the Croydon transmitter!

He was very interested in what I was trying to do and explained that the problem was almost certainly being caused by the 625-405 standards converter, not the transmitter itself. These converters were installed at transmitter sites because everything had long been distributed at 625. Unfortunately they were full of obsolete germanium transistors, which were getting very hard to find. As the transistors died, the picture gradually deteriorated. By then there was no off-air monitoring of the 405-line signals from Croydon, so the engineers had been unaware of the problem. Not very surprisingly, no one had complained! But there was a second standards converter, which the engineer thought might work better. He went away, threw a switch somewhere, and a picture appeared before my very eyes! It was a bit streaky and smeary, but usable. I felt quite proud that this transmission was "just for me", and got my recording of both BBC and ITV material. I wonder for how long that transmitter had been radiating a signal with no picture. It could have been for many months, with no one noticing. What a waste of electricity!

I fear that shutdown of the analogue TV transmissions with no one noticing will be far less likely, no matter how long they leave it. It will be all very well to say that the level of 'digital homes' needed to justify the switch-off has been reached, but this ignores the fact that the majority of these 'digital homes' will have digital TV only via the main living-room set. When people realise that to maintain the same flexibility they now enjoy they will need a clumsy, separate digital adapter for every TV set and VCR in the house, and that they will have to set up two separate timers if they want to make unattended recordings on different channels, there will be a lot of very angry faces.

Dave Hawley,
London.

AUDIO FAULTS

Reports from
Geoff Darby
Philip Rosbottom
Charles Coultas
Peter Graves
and
Chris Bowers

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

or e-mailed to:
TVeditor@nexusmedia.com

Goodmans 2728

The complaint with this all-function budget hi-fi midi system was that when power was applied the CD carousel just went round and round without stopping. When I tried it, this is exactly what happened. In addition if the tray was ejected, once it had come out it wouldn't go back in.

There are four small sense switches on a small board under the CD deck, which is a long-winded job to remove. Two of them are worked by levers, one from the deck carrier to detect the deck up/down position, the other from the centre of the carousel. This second one is pushed by a bump moulded in the underside of the carousel at disc position 1, to give the control system a reference. Cleaning and lubricating the contacts of this switch cured the ever-rotating carousel problem.

The remaining two switches are operated by bumps moulded in the side of the track in which the tray slides to eject. They sense tray in/out. Cleaning and treating the contacts on these two switches cured the problem of the tray refusing to go back in. **G.D.**

JVC CA-MXGT88

This item was dead apart from a brief relay click when power was first applied. There was no display, and no action from any of the front-panel buttons. In addition to the main power transformer there is also a small standby transformer, on the main PCB. This was working, and a raw standby supply was being produced.

This led me to PIC01, a 78L05 regulator IC. The board was quite discoloured in the area where it is located, which suggests that it probably runs too hot for its own good. There was about 12V at the input but only 1V at the output. There should have been about 5·6V, as there's a diode in series with the chassis pin. I replaced it with a standard 1A 7805, in a TO220 package, rather than using the little 100mA TO92 type originally fitted. A 7805 will drop straight into the board, pin for pin, with the same pin spacing. As a further precaution I fitted a small heatsink to the device's tab.

When I tested the unit the 5·6V standby supply was correct and the whole system powered up and performed normally. **G.D.**

Quad 405-2

The complaint with this classic old-timer was that it crackled after five minutes. I found that it did exactly this, from the left channel. My trusty can of freezer soon revealed the cause, which was the TL071 BiFET op amp at the front end of the left channel. When it was touched with the tip of a soldering iron the crackling immediately started up again. A replacement IC cured the fault. **G.D.**

Audiopro A4-14

These active-three-way speakers, of Swedish design, worked but produced no bass output. When I removed the base, which houses the amplifier section, of the first one I saw that the 5in. bass units (two in push-pull) had the rotted-surround problem and needed replacement. The original type of surround is of unusual design, with a flat section to the speaker frame and a raised lip where it's attached to the cone.

The obvious thing I noticed when I inspected the amplifier was that the PCB-mounted fuseholders had begun to break away, losing their springiness. So these were also replaced. There are five per PCB. The design of the bass-drive circuit applies positive feedback at low frequencies to compensate for the restricted LF response with the small cabinet.

When I opened the second cabinet I found that the 4,700μF, 40V smoothing capacitors had begun to leak, discolouring the PCB etc.

Back to the first one. The positive supply fuse for the bass amplifier was blowing. The output stage uses BDW93/4 Darlington transistors. These, along with a collection of BC546/556 transistors, were replaced. Two of the latter are in a delay circuit (a resistor from collector to base and a 22μF capacitor to 0V) to the drive section of the amplifier. It prevents switch-on thumps – or, in this case, didn't when the fuse blew. As I couldn't get any quiescent current through the output transistors I checked the presets, which had a similar problem to the fuseholders and fell apart when I tried to adjust them. So these were also replaced. The amplifier then powered up all right.

The other channel had no quiescent current through the output transistors. New Darlington output transistors sorted that out. The heatsink arrangement is borderline in view of the dissipation. I suspect that the output transistors had overheated.

These active speakers received rave reviews in 1983/4, because of the excellent bass response – down to 30Hz – from such a small cabinet. **P.R.**

Pioneer SA9100

This 65W per channel amplifier dates from 1974. It would work all right for about ten-fifteen minutes, then trip the DC protection. A couple of Fuji 2SC1451 transistors on the power amplifier board run at gas 6 and were suspect. I have noticed that some transistors have tarnished leads and turn out to be faulty. Whether the leads are oxidising and allowing oxygen to reach the

junction I don't know. Anyway once I had replaced them and the other transistors the amplifier worked reliably.

There was another problem however. This didn't show up until some probing was called for. A regulator PCB is mounted under a screen that runs the length of the front panel, just behind it. See Photo on the right. The regulators for the drive stage in the power amplifier are inside, and there are small holes in the cover to allow the heat to dissipate. They are more of a token gesture than being of any practical use. As a result all the electrolytic capacitors on the board were open-circuit and needed replacement.

The amplifier also has a wooden cover that would be better left off when it's in use, as the heat is unable to escape. Just a thought! **P.R.**

Behringer MDX1400 audio processor

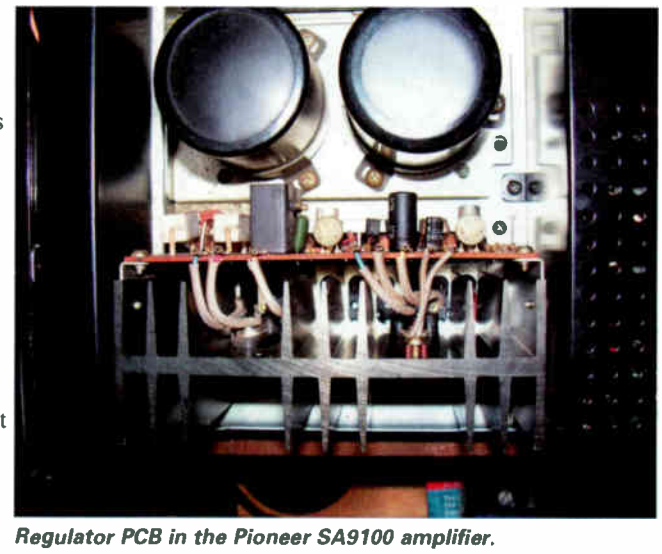
I was called out to a local sound recording studio to investigate a loud 100Hz buzz that had developed in one of the stereo output channels. After checking a few things I discovered that the buzzing stopped when the output jack from an auxiliary output socket of the Behringer compressor was unplugged. It seems that the buzz started during a thunderstorm, just after a nearby flash of lightning.

I opened the unit, expecting to find blackened components, but no such luck. Not having a circuit diagram, I traced back from the stereo output jack socket of the offending channel and carried out a few measurements. The output is balanced, but the jack's hot and cold pins were both at –14V, almost the negative-supply voltage. I replaced the dual surface-mounted op-amp chip IC4580 that drives the output jack, then tested the unit. There was a large output from the hot pin but only a tiny output from the cold pin. Fortunately there are two almost identical channels side by side and the other one was OK, so I used a meter to compare the resistor values. I quickly found that a resistor marked 60Ω on the board read about 600Ω. When I replaced this item with two 120Ω resistors in parallel I was relieved to get a good output from both the hot and cold pins, in anti-phase of course. It seems that the cold side of the channel was connected to ground via the mono jack plug, thus effectively shorting the cold output to ground.

The cable attached to the jack plug is over a hundred metres long, and I suspect that the lightning had induced enough voltage along the cable run to damage the op-amp chip. A stereo jack plug was fitted, leaving the ring disconnected as the driven equipment doesn't have a balanced input. The whole system was then tested and found to be OK. **C.C.**

Cambridge Audio T500

"The display went black on the left-hand side, then the middle went black, then it all went black!" the customer said. For once it was a very accurate fault description, not even followed by "I think it's the fuse". This is a standalone FM tuner for use with an external amplifier, and the display was indeed completely black.



Regulator PCB in the Pioneer SA9100 amplifier.

The illumination is provided by three bulbs that are mounted directly behind the display, in a plastic reflector box. They had all blown, one after the other, to create the left to right display failure. The PCB on which this lot is mounted has to be removed to gain access to the display which, in terms of size and the number of pins, is very similar to a VCR digitron. It has to be unsoldered and removed to reach the bulbs, which can then be unsoldered and changed.

The bulbs are connected in parallel and are powered from a winding on the mains transformer via an 0·5W resistor, the combined resistance of the bulbs being used to reduce the voltage partially. Thus when one bulb fails the voltage across the remaining two increases quite dramatically, hastening their failure. Reassembly is the reverse of removal, accompanied by strong language.

When I switched on I discovered that the tuning range had changed! It was now 76-90MHz, which is not much good for local radio. And all I did was replace the bulbs! To restore normal conditions, power up while simultaneously pressing the programme up and down buttons, holding them down until every icon in the display is illuminated. This takes about ten seconds. You can now let go and rotate the tuning knob, until it shows 'E'. Next power down. When you power up again, normal conditions should have been restored. If not, you are in the wrong country – there are a few other choices, such as 'O', 'A' and 'J'. 'A' is interesting, as this option gives you an AM receiver! All this fuss because of a blown bulb! **P.G.**

Sony HCD-C33

This midi box would power up and greet you with "initialising" then do nothing. It should check its five internally-stacked CD drawers in turn and, once satisfied that all is well, continue with the show. All was clearly not well, so removal of the CD mechanism seemed a good opening move.

I removed it from the rear of the unit after disconnecting the two ribbon cables at the side of the assembly. There are four screws at the bottom of the machine. Once these have been removed there is sufficient play to be able to remove the CD mechanism, which is held in place by four more screws. I found that there was a full complement of CDs inside, and one DVD that shared an already occupied compartment! It's fairly straightforward to remove discs by turning the mechanism manually. Once it had been emptied it was ready for reassembly and testing.

Fortunately no damage had been done. The machine powered up with "initialising", checked itself and began. Reloading the CDs, minus the extra DVD, proved that all was as it should be. **P.G.**

Sony SA-WBE1

This unit's power/standby button would flicker green but with no audio output. The unit produced an odd popping sound when touched. Inspection inside revealed that one of the wires at CN404 on the jack PCB had split, causing a short to the metal back plate. All was well once the wire had been repaired, with shrink-wrap applied to it. **C.B.**

Sony HCD-MDX10

There was an incorrect display when a name was inserted via the 'name-in' function. Multimeter checks inside revealed that the microcontroller chip IC601 wasn't working correctly. You have to fit an improved IC, part no. X-4952-960-1, also an improved chip (IC316, part no. 8-759-657-09) on the MD digital board. **C.B.**

DVD

Fault reports from
Geoff Darby
Chris Bowers
A. Haq
Richard Lewis and
Uel Harte

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

or e-mailed to:
TVeditor@nexusmedia.com

Sony DVP-PQ1

The complaint with this curious little clam-shell style unit was that it refused to play discs. When it was powered it emitted a noise that can only be described as sounding as if an angry wasp was trapped inside. Closer examination revealed that the laser was at the far end of its travel and not homing. The sled motor is a miniature stepper type, and I suspected that the buzzing noise was caused by the drive waveform applied to it.

The deck is very easy to get at. When the four screws under the little cover discs have been removed the whole top and door come off. Removal of three further screws, and disconnection of two readily-accessible flexiprints, enable the deck to be lifted clear. Once it was out, removal of the motor was a two-minute job (four solder joints on a flexiprint and two screws). The motor's shaft is several centimetres long, and it's also the drive worm for the laser. It was seized solid.
The motor is not available as a separate part. But a quick hunt through the scrap box turned up an almost new deck that had been discarded because of a faulty laser. It used exactly the same motor. When I fitted this in the player it worked perfectly, saving the customer the unnecessary expense of a whole new deck.
G.D.

Sony HCD-SA30

The complaint with this unit was "drops back to standby sometimes". In fact it did this every time after just twenty seconds. It's not a problem that I have come across before, but is apparently a common one. I am indebted to a colleague for drawing my attention to the cause, which is the surface-mounted crystal X450 on the digital audio output board. It appears to be the clock-generator crystal for the three digital-processor chips that drive the output ICs.

As a matter of interest it's a very sensitive circuit. If you try to scope the crystal to check for activity, even using a x10 low-capacitance probe, all audio immediately disappears and the unit goes into a shutdown condition. **G.D.**

Philips DVD755VR/05

I wonder why it is that Philips DVD players and DVD-VCR combi units, such as this one, suffer so much from short-circuit diodes on the secondary side of the power supply? Typical symptoms, as with this unit, are a machine that's to all intents and purposes dead. A standby supply is sometimes present and, occasionally, a very faint chirping can be heard.

This time D113 had failed. A replacement restored full operation. **G.D.**

JVC XV-THV70R

This was a good example of making promises you are not sure you can keep. The complaint was that the machine played OK but there was some rotational noise. I had a quick listen, and it didn't sound serious. So I promised it back the same day.

When I took the machine apart to determine the exact problem my heart sank. There's a phosphor-bronze pressure spring on top of the disc clamp. A thin Teflon disc is fixed to the underside of this. It bears on a plastic pin that sticks up from the centre of the disc-clamp moulding. The rotating pin had worn through the Teflon bearing disc and then worn itself away on the underlying metal. This had allowed the phosphor-bronze spring to get close enough to the outer metal rim of the disc clamp to start rubbing against it, hence the noise.

I quickly found a suitable piece of hard-wearing plastic to replace the Teflon disc, but this left the problem of the worn-down pin. Eventually I had a brainwave. I have some two-part epoxy resin made by a company called Handy Helper. I had bought it from one of those downtrodden looking youths who call at the door in the worst weather, trying to sell you dishcloths and suchlike. They are usually on some sort of grant scheme, and I had bought it more out of sympathy than need. But it's actually the very best Araldite-like material I have ever used. It sticks like the proverbial to almost anything, and sets like rock in about fifteen minutes at room temperature.

I mixed up a quantity then put a small blob in the centre of the clamp, using the remains of the pin as an anchor. Half an hour later I had a solid, perfectly formed shiny 'dome' where the stubby worn-

down pin had been. I put a tiny smear of general-purpose grease on it, then replaced the click-fit pressure spring with its disc of new bearing material. The edges of the spring now cleared the disc clamp, and there was smooth rotation when a disc was inserted.

Some may consider this repair to have been a bodge. But, looking at the materials used in the original items, I'm pretty sure that my replacements will be at least as durable – and will probably outlast the machine. **G.D.**

Sony HCD-SA30

An easy one! Don't ask me how, but the turntable had come right off the spindle motor's shaft and was generally jamming up the works. Once it had been refitted, set to the correct height and secured with a spot of superglue, introduced to the turntable's centre hole (be careful to keep it off the upper part, where the cone-shaped moulding in the disc clamp locates), the unit was tried again. All was now well, with normal disc playing and tray operation. **G.D.**

Sony SLV-D930GI

This DVD/VCR unit would freeze when playing DVDs but played CDs all right. The cause of the problem was the pick up assembly H211, part no. 9-885-061-34. A replacement restored DVD playback. **C.B.**

Sony DVP-NS355

This unit would switch off when different buttons on other remote-control units, including non-Sony programmable ones, were pressed. If the firmware is not v6.3 (check in test mode) you need to replace IC204 on board MV-044 with an improved version, part no. 6-805-288-01. This will restore correct operation. **C.B.**

Sony DVP-NS300

This unit had no power. I checked the supply lines on board IF-80 with a multimeter and found that the IC link PS401 (1A) was open-circuit. A replacement, part no. 1-576-509-21, restored the power. **C.B.**

Sony DVP-S735D

Digitalised square blocks would appear in the DVD picture and also in the different menu displays. The cause of the fault was IC504, a 16M SDRAM, on board MB-86. A replacement restored normal pictures. The part no. is 8-759-463-47. **C.B.**

Ferguson DVD430FE

The symptoms with this DVD player were no functions and no display. The cause was C807 (1,000μF) which had gone low in value. **A.H.**

Grundig GDV520A

The problem with this home-cinema, 5.1 surround system DVD player was intermittent or no drawer operation. The cure was to replace R603, which is a 47Ω surface-mounted resistor. **R.L.**

Philips LX3700D/25S

Suffering from lack of confidence, I kept this home-cinema unit to the last repair of the day. 'Not working' was written on the job card. From my experience with the shop staff, this can mean anything. I removed the top cover and homed in on a shattered mains fuse. Component checks then revealed a short-circuit mains bridge rectifier, circuit reference BR901. Further extensive checks showed that there was nothing else amiss on either the primary or the secondary side of the power supply.

Two days later the replacement, part no. 99650014176, arrived. I fitted it and, with bated breath, switched on. This unit takes a few seconds before the display appears. I then inserted a disc and tested the unit. Everything was OK. **U.H.**

HELP WANTED

Wanted: Tuner unit for the Sharp 10in. TV/radio/cassette combi Model C1020GA. The tuner has VHF/UHF coverage and the old one is labelled VTA-6C3S F1011B. Also require the March, July and August 2005 copies of *Television*. Phone Fred Denny on 0117 964 6687 or email freddenny2@hotmail.com

Wanted: A Telectron Model T80 hand-held transmitter for use with Telectron receivers fitted to Wessex Lifeboy Model GB1 garage-door operators. Approximate date of manufacture 1988. Phone Mike Scholes on 020 8660 7039 or email mandcscholes@btinternet.com

Wanted: Quad 33, 34 or 44 preamplifiers, 405 power amplifiers and FM2, FM3 or FM4 tuners, for spares. Also boards and modules for these units. Contact Mike on 01758 613 790.

Wanted: Any information on a Tiny 42in. plasma TV Model PS-42D8, i.e. a service manual or telephone assistance. The set blows fuse F902. Phone Doug Carson on 0122 977 4749 or email dougcarson@fsbdial.co.uk

For disposal: *Television* magazines 1975-1995 plus a few older issues, any reasonable offer considered. Shelf-space needed! Also a large pile of assorted service manuals including many Sony TV, audio and Beta ones and a C7 training manual. Free if collected. Phone Mike Rathbone on 01704 563 178 (Southport, Lancs.) or 07960 931 169 (mobile), or email mike.rathbone@gmail.com

Wanted: Circuit diagram for the Soundcraftsmen A5002 power amplifier – the 240V UK model. It's a bit old now but it would be a shame to bin it! Phone Colin Oldfield on 0163 667 4095.

Wanted: Main reservoir capacitor for the Toshiba 15in. portable Model 150R6B. It's C810 (120μF, 400V), part no. 24086949. This is my own set and I would like it to last a little longer – the picture quality is still very good. Any reasonable cost plus postage will be paid. If you have the part, please email Ian Johnson at ian.electronics@blueyonder.co.uk

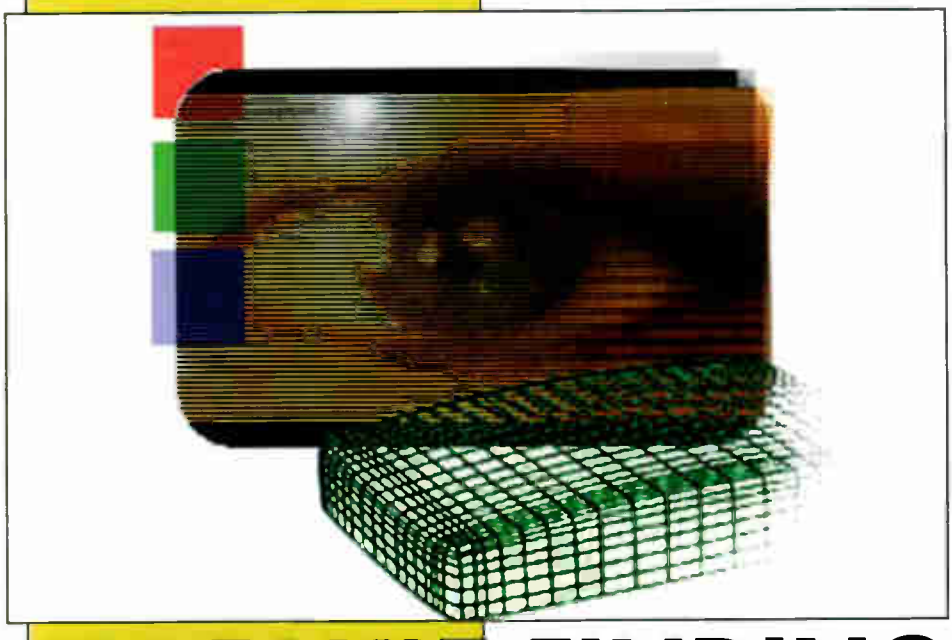
Wanted: Old half-inch diameter ferrite rods. Must be six inches or more long. Will pay very good money for them. Peter Tankard, 16A Birkendale Road, Sheffield, S6 3NL. Phone 0114 231 6321 before 10 p.m.

For disposal: 250 issues of *Television* dated from 1974-2003, in mint condition. Can split. Phone Ramesh Raichura on 0116 255 2491 or email telescan@hotmail.com

For disposal: A 22in. Pye colour set fitted with the 697 chassis, dating from about 1975, with service manual and other data and some spare boards and valves. Free to a good home, but will have to be collected. Ralph Moore, 44 Moor Close Road, Queensbury, Bradford, BD13 2EA. Phone 01274 815 911 or email ralph@moores44moor.fsnet.co.uk

Wanted/for disposal: Require a remote-control unit for the Goodmans System 1350 mini stack unit. Does anyone know the timing method for a Sharp Model CD-C421 mini component system with 3-CD drawer changer? It shows error 3001. Have for disposal the following Canon items, all as new and of Panasonic manufacture: DP10 adapter-film/video converter; VT30B tuner/timer; VT20 colour camera; WL10 remote-control unit. Also a Panasonic NV-B30 AC adapter. Instruction manuals for all these items. E. Jack Richman, 13 Parkway, Seven Kings, Ilford, Essex, IG3 9HS. Phone or fax 020 8590 4947 or email jacko@ricko50.fsnet.co.uk

Wanted: Older type combined aerial/earth connector plugs of the type that were available in the UK in the late 1970s to early 1980s. The accompanying photo shows the connector. Please email James Eubanks at jme3@cconnect.net



TV FAULT FINDING

Reports from
Michael Dranfield
Philip Salkeld
Eugene Trundle
Arthur Jackson
Brian Battams
Chris Avis
Charles Ritchie
Martin McCluskey
and
Glyn Dickinson

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

or e-mailed to:
TVeditor@nexusmedia.com

Tatung T28NG80S

The set had a faulty line output transistor (BU2508AX), which is not uncommon in this model. The usual cause is dry-joints at the line scan socket, but they were all right this time. As no obvious cause of the transistor's failure could be found I fitted a replacement and switched the set on. The EHT came up then the set started to trip – the new transistor had blown. I suspected a flyback tuning problem and found that the two capacitors, C405 and C407, connected in parallel with the line output transistor both read 2·4nF. The value of C407 should have been 9·1nF. This capacitor is one of the dark red type usually seen in Japanese sets. They are normally very reliable, but this one was faulty. **M.D.**

Alba CTV3419SIL (11AK36 chassis)

If the BU808DFI line output transistor is faulty, make sure that you replace it with this exact type. Also replace C822 (470µF, 16V), C604 (47µF, 50V) and C607 (10µF, 50V). Finally, fit a 10kΩ resistor between the base and collector of the line driver transistor. Pay particular attention to any poor soldering in the path to the base of the line output transistor. **M.D.**

Hitachi 42PD3000E

This in-warranty plasma set was stuck in standby. The plasma screen acts as a monitor that's controlled by the AV power board, which is a separate unit. A general check on this unit brought me to D911, a 5·2V zener diode, which was short-circuit. It's connected across pins 1 and 5 of the STR-F6668B chopper chip I901, which I decided to replace as well (part no. CZ00869). I fitted a standard BZY type zener diode in position D911. All was well after this action. **P.S.**

Daewoo GB28G2ST

Whenever the report with one of these sets is that it went off with a smell of burning I suspect the line output transformer. On this occasion however C413 (22µF, 160V) was overheating. After fitting a replacement the problem was field collapse. This was cured by replacing the TDA8351 field output chip I301. **P.S.**

Panasonic TX32LXD1

This LCD set was completely dead. Checks on the usual circuit protectors and low-value resistors didn't help. The chassis has two power panels, one down the side where I couldn't find any HT voltages, and the other on top. I noticed that IC801 on this panel was split. The number on it, which is the part no., was STRL351LF428. Further checks revealed that R808 (5·6Ω, 5W) was open-circuit. Fortunately replacement of these two items restored the set to normal working order. It's going to take me a time to get used to LCD sets. **P.S.**

Sony KF42SX300U

This projection set came on for a few seconds then reverted to standby. I noticed that the lamp went out after this period of time. When I removed the lamp it appeared to be all right. Its supply comes from a small power panel and, fortunately, we had another of these sets in the workshop at the time. So I was able to try swapping over the panel, which confirmed that it was the cause of the fault. As the set was in warranty there was no cost for the replacement, part no. 1-468-798-14.

A few days later I had the same trouble with another of these sets. This time the panel was chargeable – at £136.94 + VAT. There are expensive parts in these projection sets. **P.S.**

Technosonic WCT2816T(PT90 chassis)

We have had several of these sets with the same fault, field bounce. Technosonic eventually came up with a modification, part no. PT90-frame mod. It consists of a 300nF, 63V capacitor and a 50mm length of insulated wire. There is also a clear diagram that shows you what to do. The modification has cured this fault every time. **P.S.**

Daewoo DTY28A8GBS

I've noticed that the microcontroller chip used in these sets is easily corrupted, the result being geometry errors. These are corrected by going into the service mode.

the procedure being as follows: tune in channel 91; go into the picture mode; turn the sharpness down to minimum; exit menu; press red, green, menu within a second. Set up the geometry, which is straightforward. To store, press standby. **P.S.**

Beko 20272TDS (12.1 chassis)

This fairly new set was dead. It took only a few moments to find that the STP3BNA60 chopper FET T601 in the power supply was short-circuit. In addition the 2·7Ω, 5W surge limiter R601 was open-circuit. Finally the basic cause of all this was R606 (1MΩ, 1W), which was also open-circuit. Replacement of these three items brought the set back to working order. **P.S.**

Samsung SP42W5HG

This rear-projection TV set uses three CRTs. The fault was intermittent and spasmodic contraction and horizontal 'jitter' of the green raster only. We traced the cause to dry-joints at the pins of the G horizontal-convergence drive chip ICZ104 and at its heatsink mountings. Reflowing these joints appeared to cure the trouble, but the set came back after a while. To provide a reliable cure we had to replace the chip itself, type STK392-040. **E.T.**

Bush 2867NTX (11AK19 chassis)

Intermittent shut-down was the problem with this set. It would happen completely at random. Tapping and flexing the PCB revealed a dry-joint at one leg of coil L602 in the EW circuitry. There were several other dodgy-looking joints in this area. We refreshed them as well as a precaution while we had the chassis out. **E.T.**

Hitachi C2864TN

Many of these older sets are still in use, around here anyway. They often develop a problem with the sound: it starts to cut in and out intermittently. The usual cause is dry-joints at the 5V regulator IC4010 on the Nicam daughter panel. **E.T.**

Samsung CI5373

There was no picture and no sound from the speaker, but a loud rushing/tearing noise came from the chopper transformer in the power supply – even when the set was switched to standby. The mains bridge rectifier's reservoir capacitor C801 (150μF, 400V) was open-circuit. **E.T.**

Bush 2138TSL

From time to time the screen would light up very bright blue. We've had so much trouble lately with faulty CRTs that we thought the set would be a write-off. Absolutely not! We discovered that the wires soldered to connector X101 on the CRT's base panel had not been cropped, or at least they had been left too long, and were thus able to touch together. **E.T.**

Thomson 32WX211S (ICC17 chassis)

This very large set would switch to standby at random. It would sometimes come on again while at other times it would remain off. I heard a crack from the tube base just before it went off, the cause being a fault in the socket assembly (part no. TPAR2560). A replacement cured the problem, but we find that it's becoming quite common with all versions of the ICC17 and replace this item whenever one of these sets comes in for repair. **A.J.**

Philips 20PT1547/05 (TE1.1E chassis)

This modern 20in. set was dead. When I opened it up I was surprised to find the PT92P chassis, which is used in some Bush sets and those of other brands. Voltage checks showed that there was a full supply at the drain of the chopper FET TP01, but no drive appeared at its gate at any stage. The start-up resistors RP05 and RP06 were suspected but turned out to be OK, so the next step was to check the voltages around the TDA16846P chopper-control chip IP01. These were all low. In particular the voltage at pin 2, which is referred to as PCS (primary-current simulation), rose to only 0·3V and then dropped quickly to zero. A tiny surface-mounted capacitor, CP12 (680pF, 50V), is connected between this pin and ground. When I checked it cold the reading was 21kΩ. A replacement cured the fault. **A.J.**

Sharp 28KF-84H (GA200 chassis)

This superflat, widescreen set had been brought into the workshop because it was dead. When I tested it I heard a low, fast tripping sound. Cold checks soon revealed the cause: diode D753 on the secondary side of the chopper transformer was short-circuit. The chassis is unusual in using a bridge rectifier to produce the 150V HT supply. D753 is one of the bridge rectifier diodes, the others being D720, D721 and D746. In the interests of reliability I decided to replace all four – the part no. is RH-DX0643BMZZ. When the set was tested it produced a particularly good picture. **A.J.**

Thomson 21MG17UG (TX807CS chassis)

I recently repaired three of these 21in. sets within a few days. All had the same fault. The set would appear to come on, then revert to standby. Checks on the first one showed that the HT supply rose to the correct level, and that the line output stage briefly tried to work. But it quickly shut down again.

I spent some time disconnecting the feeds on the secondary side of the line output transformer and checking for shorts etc. As everything seemed to be OK I ordered a replacement transformer (part no. 10654690). This proved to be the only faulty item. New transformers cured the other sets as well, so this could become a common problem. Fortunately the replacements are reasonably priced, so repair is economic. **A.J.**

Sanyo CB1443 (EC2-A14 chassis)

This portable set was reported as being dead, but checks showed that the primary side of the power supply was active though stressed, with the chopper transistor Q313 getting hot. Cold checks revealed what appeared to be a short-circuit across the 130V HT line (B1), but this short remained when the feed to the line output stage was disconnected. The cause of the fault was the EU2A HT rectifier D351, which was dead short. **A.J.**

Sharp 59DS-05H (CA10 chassis)

This set was stuck in standby with the line output transistor Q602 short-circuit. A close visual inspection revealed that the connections to the line-scan coupling capacitor C613 were badly dry-jointed. Checks in the line drive and power supply areas showed that they were OK – this particular chassis seems to run quite cool. Once I had resoldered C613 and fitted a new BUH517 line output transistor the set worked normally. **A.J.**

Hitachi C28W430N (A7 chassis)

Sometimes this set wouldn't switch on but, if left in standby for about an hour, it would function when the mains switch was turned off then on. The cause of the trouble was eventually traced to poor joints on the top surface of the PCB, around the power supply and timebase ICs. **B.B.**

Sony A1/2 chassis

I have had problems with the loudspeakers used in these sets. The rubbery material that attaches the cone to the front seems to perish after several years. As the speakers cost over £30 each, I've used instead suitably-sized replacements from newer Panasonic and other brand TV sets. Perhaps someone could suggest other sources of 130 x 75mm speakers that would fit these Sony TV sets. **B.B.**

Matsui 2109NS

The cause of intermittent reduced height

was eventually traced to dry-joints at IC201, which is hidden under a screening plate on the underside of the PCB. **B.B.**

Philips 14PT1342 (L6.1AA chassis)

"Fizzy picture" was the reported symptom with this set. When I checked it on the bench I saw that here were also slight variations in picture size along with random colour drop-out. All this pointed to EHT fluctuations, especially as the line output transformer has push-in-and-lock EHT and focus lead connections. Sure enough, when I removed the EHT lead I saw that the exposed wire end had been blackened by arcing. I cut back the lead, prepared a fresh end then pushed it back firmly into the transformer socket. This cleared all the symptoms.

Memories of the G11 chassis! **C.A.**

Grundig W70-2020

This dead set's mains fuse had blown because the degaussing posistor R628 was faulty. It's an 'EPCOS T209' device, which is used in several other popular models. I've found that the cheapest equivalent replacement appears to be the 96706 or 140M, which is available from Wiltsgrove under order code DT17. **C.A.**

Schneider Scinema 2818 (TV9 chassis)

I recondition quite a lot of Schneider TV sets for resale, and find that many of them are well assembled and easy to service. This one had been discarded because of severe EW distortion. On inspection I saw that C313 (12μF, 100V) beside the EW coil was visibly bulging. I used a 10μF, 250V 105°C type as the replacement. There were no other component problems, and the picture required only small geometry adjustments. It then went on sale with a new Wiltsgrove-supplied remote-control unit and my usual twelve-months' guarantee. **C.A.**

Sharp CV2133H (8P-SR chassis)

This set was stuck in standby. When it was switched on there was just a brief flash of red from the front tri-colour LED (D1002). Normally when these sets are switched on the LED is red and changes to green once the line output stage is up and running. The green section of the LED gets its supply from the LOPT-derived 27V supply, and this is where the problem lay. R521 (3·3Ω, 0·5W) was open-circuit because the IX064C field output chip IC501 was faulty. Replacing these two components restored normal operation.

The LA7830 is a suitable replacement for the IX064C and costs a lot less. **C.R.**

Philips 21PT4475/25 (L9.2E chassis)

The complaint with this set was intermittent audio. When the set was switched on and the fault was present I could hear a plop from the speakers, which suggested that the audio output stage was working. A check on the audio-processing PCB revealed a dry-joint at pin 2 of connector 0240. Resoldering this cured the fault. **C.R.**

Muruyama PHL20 (Philips CTN-AA chassis)

This set was dead with the internal fuse F1500 (2AT) blown. Checks revealed that one of the 1N4005 bridge rectifier diodes (D6502) was short-circuit and that there was a leak across the source and drain of the FET chopper transistor. The transistor itself was OK, the culprit being C2524 (470pF, 1kV) which is in parallel with it. The set worked normally once these two items had been replaced. **C.R.**

JVC AV25S1EK (MXII chassis)

The fault with this set was lack of height when cold. It cleared when the set had been on for a quarter of an hour. There was no field distortion when the fault was present, just lack of height. I noticed that the set had received previous attention from another repairer, and this is where the problem lay. The TDA3654 field output chip IC441 had been replaced, but the flux hadn't been removed after the replacement. Cleaning the flux off cured the fault. **C.R.**

Hitachi C2574TNY-311

This model contains a large internal bass speaker and is very heavy. The complaint was field collapse, and a new LA7838 field output chip (IC601) cured this. But I noticed that with non-letterbox format pictures the top third of the picture was covered with flyback lines. This was cured by replacing C603 (100μF, 50V) in the field flyback boost network. **M.McC.**

Toshiba 36ZP38B

"Picture going off" was the complaint with this huge, heavyweight widescreen set. After a few minutes the picture would bounce vertically then go into a 'freeze frame' of coloured vertical bands. Occasionally the picture would blank out altogether and the set would revert to standby.

A call to Toshiba technical provided the solution to the problem. There's a screened can that Toshiba calls the DFS module, circuit reference HX01, in the centre of the signals panel. Once a replacement, part no. 23148027, had been fitted there was no further trouble. Although the fault had been sensitive to tapping, the man at Toshiba said he had never been able to repair one of these modules. After a look inside I believed him! **M.McC.**

Durabrand 14in TV/DVD

This supermarket TV/DVD combi unit played DVDs all right but the TV side was unusable because signals couldn't be tuned in. As I had no circuit diagram I carried out some checks around the tuner and found that there was 0V at the tuning voltage pin whichever channel was selected. The tuning system seems to be conventional, and I found a 33V voltage stabiliser (ZD101) near the tuner. There was no voltage here either. Tracing back, I came to its feed resistor R161 (100kΩ) which is in front of the line output transformer. One leg was dry-jointed. Attention to this restored normal operation. **M.McC.**

Matsui 28N10 (11AK37 chassis)

The fault was described as "flickering". At first I couldn't get the set out of standby, but the child lock was on of course! When I used the remote-control unit a picture appeared briefly then tripped off. But I had sensed rather too much EHT, and a quick check revealed that the HT was at 175V.

The usual culprits are R817 and R854 in the HT sensing network, but in this set they had been replaced with a single 140kΩ, 1 per cent resistor. Still just as unreliable however. The HT was correct when I replaced it with two hi-stab 68kΩ resistors. **G.D.**

JVC AV28GT15JF (11AK45 chassis)

The owner reported that the off-air picture had become intermittent then failed altogether. This looked like a tuner fault, but checks showed that its 12V supply was missing. The 2·7kΩ surface-mounted feed resistor R210 had gone open-circuit because the associated decoupling capacitor C213 was leaky. When checked it produced a reading of under 200Ω. **G.D.**

Matsui 25BKG/25N03

The line output transformer in this set was arcing so I fitted a replacement. Unfortunately the resulting picture was wrapped around at the right-hand side, with a bar at the left. Looking at the data for the TDA8843 jungle chip led me to pin 41 (blanking and line feedback), where there was a curious waveform. This pin is connected to a resistor, RL14 (8·2kΩ), which is buried under the heatsink. It was open-circuit. **G.D.**

Servicing transport over the years

Alun Rawson-Williams recalls some of the vehicles that were provided in the trade over the years

During their careers most radio/TV technicians will have been provided with a company van, car or, in more recent times, an estate car to enable them to make their calls and carry out their duties. The vehicles provided in more recent years can be quite plush. This certainly wasn't the case years ago. I've driven atrocious company vehicles over the years, some of which would today never pass an MOT test. A few are mentioned below. They will undoubtedly bring back memories for many of you.

The Jowett Bradford

In the mid-Fifties the Jowett Bradford van seemed to be the standard delivery and service vehicle used in the radio and television trade. If I remember correctly it had a water-cooled 7 h.p. engine and was a very basic utility vehicle, with the minimum of instruments and comfort. A passenger seat, if you were lucky, was provided as an extra. The passenger, when carried, had to sit – in the ones I drove anyway – on your spares or tool box, with maybe the luxury of a cushion on top. This was loose of course, and there was no back support. The safety belt was many years away.

The fitting of the rear doors was the worst I have ever come across, and the rattle from them made conversation while driving almost impossible. The vehicle was also fitted with the old-type flag indicators. After some years of use these tended to fail to drop back into their receptors when cancelled. Those were the days, when hand signals were the norm when turning left or right.

The Ford 10cwt

The first one of these I had was fitted with the four-cylinder 93E side-valve engine which, as was said at the time, "couldn't pull the skin off your rice pudding". Early models, I'm not sure whether they were post World War II ones, had the accelerator pedal in the middle, the brake pedal on the right and the clutch one on the left, but they all had crash three-speed plus reverse gearboxes. To add a bit of complication, later versions had the pedals in the conventional places.

In all versions the electrical system was based on a 6V battery, with negative earth. If you were very lucky it would only just manage to get you started on a cold winter's morning. So a starting handle was provided – it was virtually essential. The 6V battery itself was located in a hole in the floor, where the passenger seat should be. These vans all had the option of a passenger seat. They had the normal at that time flag-type indicators.

Ford Thames 5cwt

This van was luxury indeed in comparison with its predecessors. It was one of the first modern-style vehicles produced after World War II. The early ones continued to be fitted with the 93E side-valve engine, and again had the option of a fitted passenger seat. Later ones were fitted with the newer overhead-valve 95E engine.

The electrical system was based on a 12V battery. Mine was also fitted with a Pye Cambridge 2000 valve-type radio-telephone – so that the depot could keep in touch with you right up to your supposed finishing time.

The Bedford Doormobile

Another atrocious vehicle, this time with a column gear change. If you could get into first gear you thought you had hit the jackpot. If you could find any of the others after that you thought you were in heaven.

You were also very lucky if you finished the day with the sliding driver and passenger doors both opening and closing properly. I distinctly remember arriving back at the workshop one day with one door off altogether and in the back of the van. I must say however that driving it on a hot summer's day with the driver's door open was a delight. If you were seen doing this today in an urban environment, with no safety belt, you wouldn't get far.

Ford Thames 15cwt

This was an improvement on many of its predecessors. A forward-control type van fitted with the Ford Consul 1,598cc engine, its two drawbacks were the column gear change (though a vast improvement on the Bedford) and the engine compartment situated between the driver and front passenger seats. The later made for a rather noisy cab and hindered courting somewhat. Its long wheelbase was great for carrying ladders etc. – there was very little overhang.

At one time I had one of these vans equipped as a small workshop, with its own 240V Brigs and Stanton generator, so that we could carry out repairs on site. It was used as a follow-up to the technicians we referred to as valve-pushers, to save return calls in rural locations.

The Austin A30/A35

These were used as delivery vehicles by the rental company I worked for and were fitted with a quite sophisticated anti-theft device. To start the engine the driver had to push down two hidden switches, one with his left hand and the other with his right knee, while operating the starter key with his right hand.

The cargo space was limited, so only one large wooden-cabinet 17in. set or, with luck, one even larger 21in. set could be carried. What a ridiculous choice of transport for this task. It was quite common to have to return to the depot three or four times a day.

More modern times

Many more vehicles come to mind – the Morris Minor, Morris Mini, Ford Anglia, Hillman Husky etc. However we have now come to more modern times, when some technicians were offered the option of providing their own transport and collecting a car allowance. Many technicians took up the offer of a company-provided fleet estate car, sometimes at a discounted price or in some cases company-financed. This enabled them to customise the vehicle to their own taste, and provided a family vehicle for the weekends without having to grovel to the manager for permission to use a company vehicle.

There were exceptions however. I remember for example a particular technician who insisted on driving his Mk 10 Jaguar. If you followed him on the next service call the customer wanted to know who you were seeing to him this time, as the boss or manager had called on the previous occasion. He later upgraded to an even grander car, but had to comply with the company's minimum of twenty miles per gallon at his own expense.

Occasional visits by area managers from headquarters left them in a daze of envy when his transport was seen. He was always the technician who was sent to service Lord X or the Dowager Duchess of Y's set when a service call was required to their residences. He is now retired and living happily abroad: I have no idea what his current mode of transport is!

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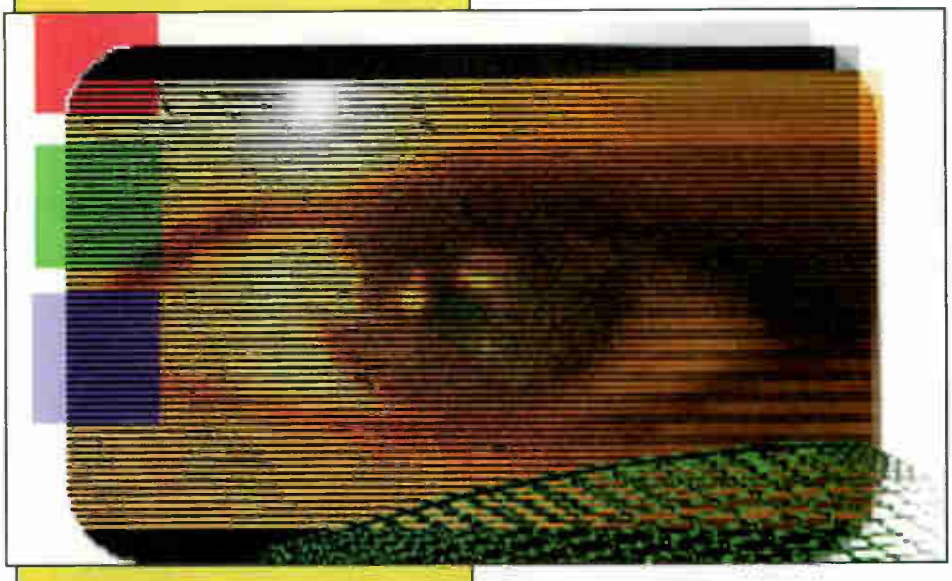

Extended Reports

Reports on complex or tricky TV fault conditions are sometimes too long for inclusion in our basic fault-finding section. We've put a few of them together in this extended fault report feature

Reports from
John Tennant
Bernie Storey
G.M. Smith
Gordon Haig
and
Arthur Jackson

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Fault

Mitsubishi CT15M2TX (Euro 7 chassis)

Low contrast and brightness were the complaints with this set. In fact the picture was barely visible, with only highlights showing. There was no improvement when the setting of the first anode control was advanced.

The symptoms suggested that the TDA3651A video/chroma chip IC251 could be faulty. Before replacing it however I decided to carry out some checks. Contrast level and beam limiting are carried out at pin 7, where the voltage should be about 3V with a normal picture. The voltage was low at only 0·9V, and using the remote-control unit to alter the contrast brought little increase. The brightness level is set at pin 11, where the voltage was also low – 1V instead of 2·2V for a normal picture.

Both pins are connected to a switching transistor, Q704 (type JC501), via diodes D728 and D729 respectively. This transistor was faulty, and as a result the voltages were being pulled down. A BC368 proved to be a suitable alternative, providing a complete cure. **J.T.**

Sharp CE28DN-4 (EB6A chassis)

This set belonged to my son and had worked perfectly for four years. An intermittent fault then appeared. The picture would become either all blue or all green, accompanied by raster size reduction and bright flyback lines. I found that the TDA6103 RGB output chip IC701 got very hot in the fault condition. As a precaution I fitted a replacement, but this made no difference. I eventually found that the fault could be brought on by tapping the neck of the CRT gently. This suggested that the CRT was the cause of the problem, and in fact there was a heater-cathode short in the blue and green guns when the fault was present.

It occurred to me that isolating the heater supply from the chassis might work. I found an old 6·3V transformer and connected it in circuit. A three-hour soak test brought no recurrence of the fault, so this seemed to be the solution. But the colours were all wrong. I went into the service mode and adjusted the RGB balance. After a bit of fiddling I managed to get a nigh perfect picture.

I soak tested the set for a couple of days, with some CRT neck taps, and found that the fault had been 'cured'. In case the line output transformer had been stressed by the fault condition, I fitted a replacement then returned the set to my son. His wife commented that it now worked "better than ever"! What should have been a journey to the tip turned out to be a case of happy families. **B.S.**

Tevion TBCTV2800 (Beko 14.2 chassis)

This set had been through our hands a few weeks previously, but came back with the same symptoms, i.e. dead apart from the LED glowing. The LED dimmed, as it should, when attempts were made to bring it out of standby, but nothing else happened. On the previous occasion replacing the optocoupler in the power supply had got the set going, but obviously the real cause of the trouble was elsewhere.

I won't take up space with all the dead ends and red herrings we followed before we found that the MC44608 chopper control chip was working with only its start-up supply, which is applied to pin 8 via D601, straight from live mains. The running supply at pin 6 failed to appear. This is derived from the chopper transformer, rectified by D607 with C610 as the reservoir capacitor. There's also a 4·7μH choke, which is in series with D607. This was the cause of the fault – it was open-circuit. Ironically it's mounted close to the wrongly-accused optocoupler, so it is possible that the process of optocoupler replacement had temporarily healed the fault in the choke. At least that's my excuse!

Here are a couple of points to note with this chassis. The power supply will not work when a tungsten lamp is used as a dummy load. Use a high-wattage resistor of about 2·2kΩ instead. Also beware of the main reservoir capacitor. With the fault above the chopper stops instantly when power is removed, leaving the charge with nowhere to go. So if you encounter one of these beasts with a charged-up mains reservoir capacitor you'll know what to look for. Also note that some versions of the MC44608 IC won't work unless a 4·7kΩ resistor is fitted in series with the

start-up diode D601.

Although this is a Beko chassis, the power supply has much in common with those in some Vestel chassis. The 11AK30 is almost identical except for the component numbering, and the standby arrangement is very similar to the system described by Alan Dent in the April issue.

A CD-ROM version of the service manual can be obtained from SEME. You will find it amongst the components listed for the LG Model RI-28CZ10RX. Fortunately we had one of these at the time the Tevion came in. **G.M.S.**

Sharp CV3730H (14B chassis)

This set is a mains portable that was assembled in Malaysia. The cause of the fault took me a long time to find. At switch on there was a flash from the red LED for about a second, then nothing. No results at all. A check for HT at TP702 produced a reading of almost 120V – the correct voltage is quoted as 115V. TP702 is connected to the 10Ω resistor R611, which provides the feed to the line output stage where nearly 120V was present. There was almost 11·5V at the output from the LT rectifier, D302, on the secondary side of the chopper power supply. Meter and scope checks in the line driver stage then showed that there was no line drive input. This comes from pin 37 of the TDA8362 IF/colour decoder/timebase generator chip IC801.

I eventually found that Q605 had no base bias, because the surface-mounted resistor R625 (100kΩ) was open-circuit. Q605 provides a start-up supply for IC801, at pin 36. See Fig. 1. The board is drilled to take a normal resistor as an option in the R625 position, so I fitted a conventional 0·5W type. This restored the start-up supply and the set then worked. **G.H.**

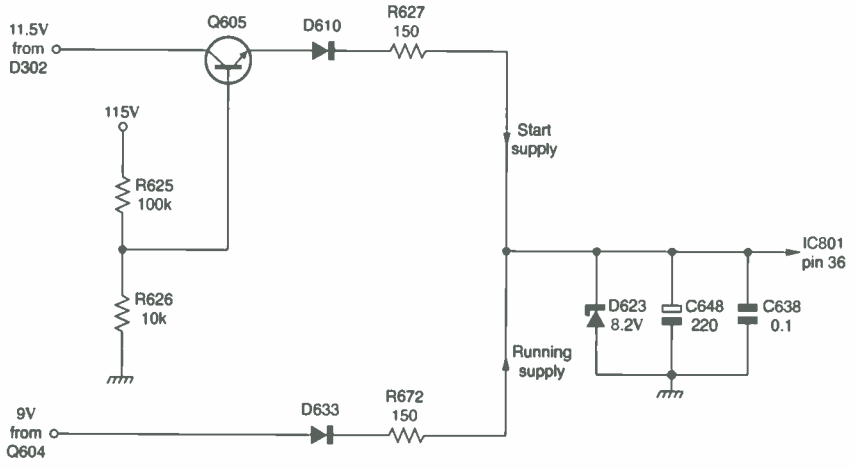


Fig. 1: Start-up supply circuit for IC801 in the Sharp 14B chassis.

Thomson 28WF45E (ICC20 chassis)

The complaint with this set was that it had for some time been difficult to get it to switch on properly. The sequence would often be as follows. The LED quickly changed from red to amber then, after 20-25 seconds, the set would go into the protection mode and produce error code 26. The customer reported that if he switched the set off for a few minutes and tried again it would usually come on and continue to work normally.

When I tested the set the symptoms were exactly as described above. But I noticed that when the picture appeared it was very soft and badly focused. It improved significantly after a short time. The cause of this is a poor tube of course. Error code 26 is generated when the tube's warm-up time is too long.

I attempted to set up the tube's focus and A1 voltages to improve the picture quality, in the hope that this would reduce the warm-up time, but unfortunately it made no difference. I then considered tube reactivation, but before trying this I decided to check with Thomson technical to see if they had any suggestions.

This proved to be worthwhile, as a software modification is available. It ignores the warm-up time, effectively deleting error 26. The answer is to change the surface-mounted NVM IR002 to a new software type, part no. 35701490. Note the original geometry settings, as a few will need to be altered when the new device is fitted.

With the new software-type IC a picture appears after eight seconds but is still poor for a time. To prove a point I removed the tube's heater and A1 supplies and found that the set powered up fully, with a green LED, sound and no sign of error 26, in eight seconds. I think this could become a common problem, as I subsequently had two more of these sets with the same trouble. **A.J.**

Sony KV32FX68B (AE6B chassis)

The symptoms with this large, ten-month old set were no sound or picture with just a flashing red LED. Checks proved that one of the line output transistors, Q8804 (part no. 8-729-056-17), was short-circuit, and a closer look revealed a split down the side of the line output transformer (part no. 1-453-340-41). When replacements for these two items were obtained and fitted the symptoms were the same. Voltage checks quickly showed that the 130V HT supply wasn't reaching the line output stage, because the two parallel-connected resistors R8894/5 (4·7Ω safety type) were open-circuit. Once these had been replaced the set powered up with sound and a picture, but there was bad EW bowing.

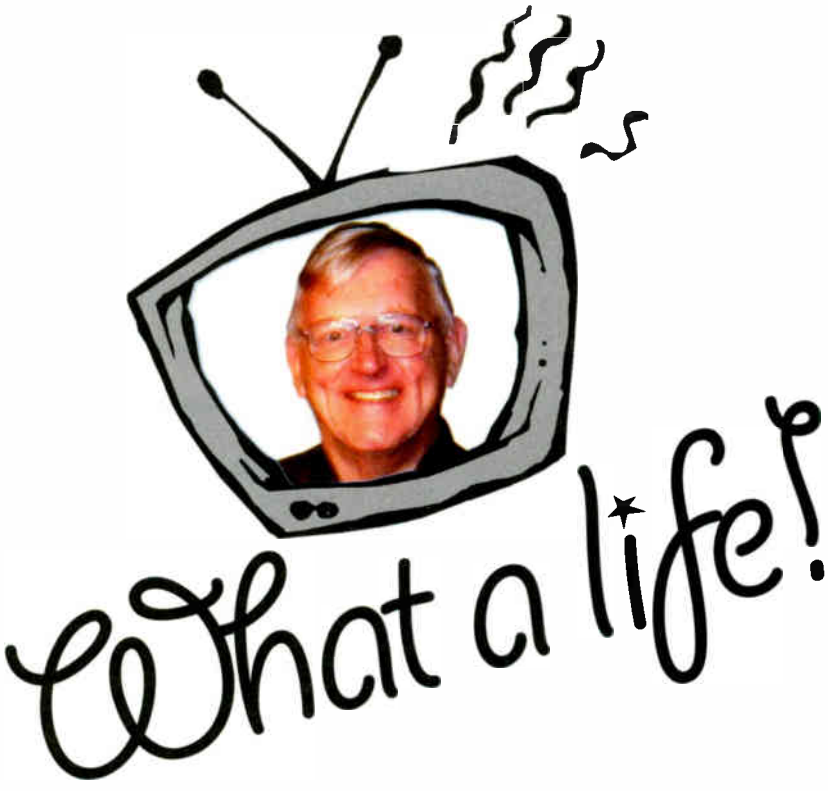
The raster-correction circuitry in this model is very complex, with a large component count. I found it easiest to carry out cold checks in this area, and eventually cured the problem by replacing four surface-mounted transistors that were short-circuit all ways round. These were Q8119, Q8120, Q8122 and Q8123, which are all identical pnp devices (part no. 8-729-216-31). They are mounted on a small panel, called D board, that's separate from the main PCB. **A.J.**

Thomson 10MH73B (TX91 chassis)

The complaint with this 10in. mains/battery model was "difficult to get it to come on from standby or, if it does come on, it runs for a varying length of time then reverts to standby". When I tested the set it came on normally, ran for about ten minutes then shut down with the red LED alight. Some quick checks cleared the power supply, as its outputs were still present and correct, but there was no line drive. It was missing at source, which is pin 36 of the signals processor chip IV01.

Checks around IV01 revealed that the 9V supply at pin 42 fell to about 1V when the set failed. This supply comes from pin 8 of the 9-pin voltage regulator chip IR02. The voltage here was varying wildly. This was also the case with the voltage at pin 7, which receives a feedback sample of the output at pin 8 via a potential divider that consists of RR05 and RR06. The voltage inputs at pins 1 and 2 of IR02 remained stable and correct at all times.

The set ran normally when an external 9V supply was connected to pin 8 of IR02, so attention was turned to resistors RR05 (4·3kΩ) and RR06 (1·6kΩ). The value of RR05 was correct but the value of RR06, at the earthy end of the network, read between 3kΩ and 10kΩ as the temperature changed. RR06 is a surface-mounted component. As there was room I replaced it with standard carbon resistors, making up the value (approximately) by using two of them. This provided a reliable repair. **A.J.**



Donald Bullock's servicing commentary

Radio and TV faults and a laptop problem ▸▸ Are consumer electronic products going the right way? ▸▸ Emails and moans

It's not often that I get a good laugh before the customer has actually reached the shop. But it happened the other morning. Old Sam Crust was bringing us his radio for repair, with his dog pulling him towards the shop. As usual, Sam had his head in the clouds. When his dog stopped abruptly to battle with another one Sam fell over the pair of them, also the other dog's owner, a surly looking lady. It took several passers-by to sort them all out. A couple more ran after their hats. All very amusing I thought, and I was still laughing when Sam came in.

"That Matilda Cresswell set 'er nasty dog on mine, Mr Bullock" he exclaimed as he put down a Sony radio, Model STR-DE495.

"Good" I thought. Then I realised I had said it as well. "Er . . . ha ha . . . This radio of yours . . . it's er . . . good?"

He looked at me thoughtfully. "No Mr Bullock, 'e's bad."

When he'd departed Paul opened the set and blew through his teeth. "Boy, what a mass of dry-joints" he said. He then spent the next twenty minutes on a resoldering operation. When he had finished the set worked very well.

"Never seen so many bad joints before" he commented, "all over the place and particularly around the function control chip IC201.

Stinger Short's Black Diamond

Just then a huge pile of dried mud and straw pulled up at the front. When I looked closer I saw that it had a wheel at each corner. Then a piece of it swung open and a scruffy old-timer rolled out.

"Blimey it's old Stinger Short the pig-farmer!" I said, "I thought he'd seized up thirty years ago!"

Meanwhile Stinger was negotiating himself and the farm smell through the front door. "Gotta Black Diamond in there" he croaked, jerking his thumb at the pile of mud.

"Must be worth thousands" I said.

"'E's a big 'un. Twenty eight inches" he said, "and he's chirping!"

"Good god, some diamond!" I replied, "millions, never mind thousands!"

"Never mind the funny stuff. Get 'im out" Stinger commanded.

Remembering the days when he lashed us kids off his land with his long, stinging cane, we complied.

It was a Black Diamond Model MD2850PFS, a widescreen set fitted with the 11AK33J3 chassis. Steven started to take the back off.

"Dead as a doornail" said Stringer. "Fresh from Snoddies. But I ent gonna back there, 'cos if I do I'll clout that tall thin chap. Told me to get out because I stunk!"

"Never!" I said.

Steven went straight to the line output stage, which was the logical thing to do. But the problem was that its supply was missing. Checking back to source he found that the HT reservoir capacitor was bulging and short-circuit.

There's a modification for this chassis that is recommended whenever trouble is experienced on the primary side of the power supply – increase the value of R101 in the start-up network from 1kΩ to 4·7kΩ. This prevents damage to the MC44608 chopper control chip by reducing the amplitude of spikes and dirt from the mains supply. It works, so we carry it out with all sets that come our way with the 11AK33 chassis.

A monster Hitachi

Our next customer, Edgar Mange, struggled in with yet another monster 28in. set. This time it was an Hitachi Model C28WF560N, which is fitted with the 11AK45B5 chassis.

"The set looks new, Edgar" I said.

"It's only four months old, but it's dead" he replied. "Got it from Snoddies, and the tall thin chap remembers selling it to me, 'cos it was his wife's birthday. But he won't repair it because I've lost the receipt."

Paul had a look at it and found that the primary side of the chopper power supply had broken down. He had to replace the chopper FET Q102, the MC44608P40 control chip IC106, D104 and D105 (both type BA159) and the surface-mounted 1kΩ resistor R112.

Edgar ended up with a tidy bill. When he came to pay it he made a few bitter comments about the tall thin chap at Snoddies.

"Some might say he needs his snout lifted a couple of inches" muttered Paul.

I looked at him aghast.

"Don't you mean four inches?" I said.

Another laptop

The phone rang and Steven answered it.

"That's Steven" said a foreign-sounding voice.

"How do you know?" asked Steve.

"Because I'm psychic" the voice said.

Steven looked up and saw that Ribby Ellis, the practical joker, had just come into the shop. He was laughing insanely as he stowed his mobile phone away.

"Sorry about that" he babbled as he wiped his eyes dry. Then he put a Toshiba SA30-203 laptop on the bench.

"It's only the power-socket thing" he continued. "Can you pop another in while I wait?"

"Sorry Ribby, but it's a custom-made part that has to come from Toshiba." Steven said. He then made a phone call to Toshiba and found that a replacement socket on its own couldn't be supplied. A main board would be required, at over £400.

For once Ribby couldn't muster a laugh when he was told the sad news. He left with a longer face than the one he'd come in with.

Resistor problem

Percy Paltry brought his set along in a gleaming new Jaguar. It was a Naiko Model N2850W, which is fitted with the PT92 chassis.

"It's got a very funny fault on it" he said, giving a little laugh. "Very funny indeed!"

"Seems almost a pity to mend it" I said, "but what's up with it?"

"Well, the picture sort of tears and twitches sideways, and an upright black band comes on the screen. And there's a soft arcing noise, especially with bright scenes."

"Sounds like corona sparking being picked up in the RF circuits and upsetting the line sync" said Steven.

Paltry looked anxious. "Don't forget I'm an old-age pensioner, and my wife's been ill" he added.

"Worry not!" declared Steven, "we've had the problem with these sets before. It's simply because of a nasty little 330kΩ resistor on the primary side of the power supply."

He was right. But note that there are different versions of this chassis.

A satellite receiver

An email from Ian Campbell of Warwickshire mentions a Toshiba satellite receiver, Model PRO 6100, that had shut down for no apparent reason. "After cleaning the ventilation slots and reapplying thermal compound to the processor's heatsink" he writes, "I am convinced that the cause of the trouble is in the power supply. The only problem is that, having tried to get into it several times, I've still not managed this. I'm going to try again, following the detailed steps in a previous article."

Best of luck, Ian. Let me know how you fare.

He also mentioned that he managed to get only one job interview when, in 1980, he emerged from the Swindon SkillCentre with his City and Guilds certificate. "This was at a small shop where, as a test, I was asked to repair a line timebase fault in a Decca Bradford chassis and converge a Philips G8 set. Having passed these tests I was interviewed by the owner. This didn't go too well and, although I was offered the job, I didn't feel able to accept it."

He went on to say that, being desperate for work, he hung around the local Co-Op service centre, trying to persuade customers that he could repair their sets equally well at a cheaper price. "Naughty, I know, but it paid off – and I was self-employed for fourteen years, with a large customer base."

Consumers' problems

A recent survey concludes that of all the modern devices consumers have difficulty with, the bulk of them are supplied by our trade. Top of the list came difficulty with programming VCRs, despite three decades to get used to this. Most people said they find VCRs unnecessarily fiddly and complicated. Second came the operation of digital TV sets, third the installation of a child's car seat, then the operation of digital cameras, washing machines, dish washers and electrical tin openers. Opening the wrapping on CD discs, batteries and DVD discs also came high on the list.

"It's amazing that, with all the technology at our disposal to make products easier to use, so many everyday items still manage to frustrate customers" says Chris O'Rorke, a director of User Vision. He added that while VCRs have been superseded by more advanced technology millions of people still own and use them, and that some of their poor interfacing has been inherited by newer innovations such as digital cameras and set-top boxes. "Manufacturers should be looking at their basic design mistakes and listening to their frustrated customers" he concludes.

I've long been saying this!

The mobile phone

While introducing a device that makes phoning on the move even easier – and more annoying – Comet's divisional managing director Simon Turner announced that "the days of old-style fixed-line telephone calls are numbered". If he's right, more is the pity.

I am writing this in my peaceful garden hut. Before going to the shops Greeneyes dumped a radio-linked phone here. When she'd gone a frantic ringing started. I couldn't find the phone of course. Never can. So I jumped about patting everything in sight to locate it. When I did, it had ceased to ring. I eventually found that it had been the mobile phone in my trouser pocket, and a wrong number at that.

How nice and peaceful it was when the phone was a fixture and was always in its place!

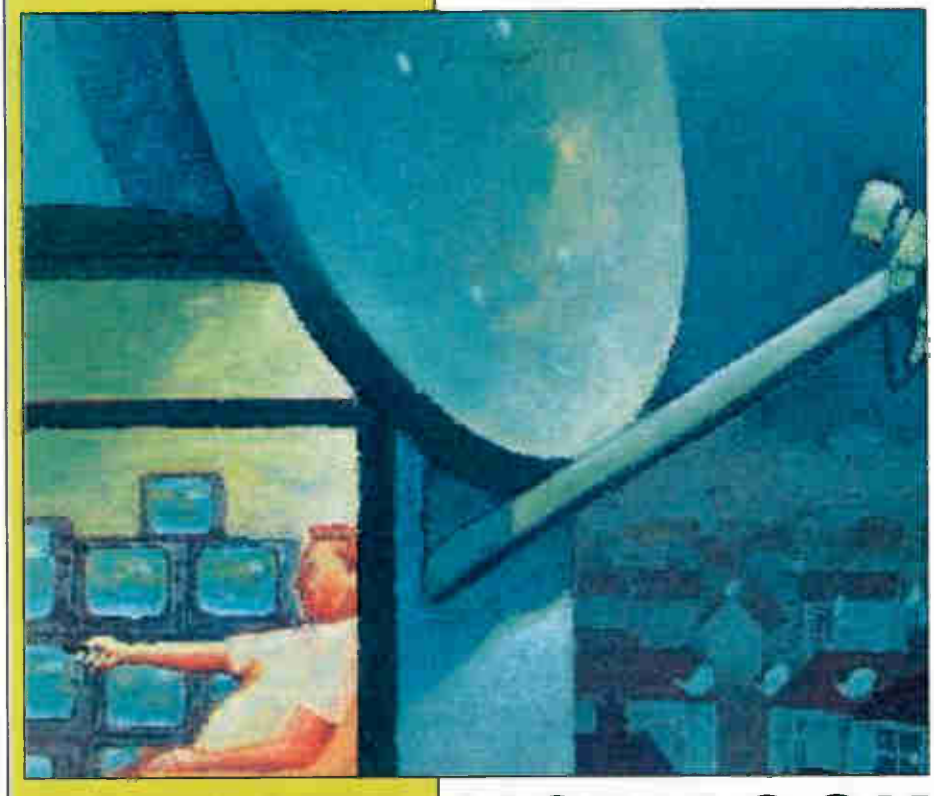
Moans

Nor am I convinced that the digitalisation of our radio and TV services is a good thing. The problems with digital TV are the plastic and pixelating images and the stuttering sound. Those in favour admit that there can be reception difficulties, and that the cost to all concerned will be enormous, but point to the vastly increased selection of channels.

This is surely the best case against digital TV however! There are already far too many channels on offer, with less and less talent available to support even the main ones.

And finally, is the DVD such an advantage? People just get confused by the complex and unwanted features with recorders, while most players are now cheap, rubbishy, troublesome and don't last. They either develop a software fault or the laser fails prematurely. And a new laser is often more expensive that a new machine! No wonder some people are going back to their fiddly old VCRs. Sales of the older, reconditioned ones we offer are more buoyant than ever!

Well that's it for this month. Letters and communications are always welcome. You can email me at donald@wheatleypress.com



SATELLITE NOTEBOOK

Reports from
Christopher Holland
Michael Dranfield
Michael Maurice
and
Pete Haylor

BBC's HDTV demonstration

The BBC transmitted HDTV material during the recent IBC in Amsterdam. Two Eurobird frequencies were used to transmit the same material, one with MPEG-2 video compression and the other with the new H.264 (MPEG-4/10) compression standard. The MPEG-2 transmissions were at 11·481GHz V, with a symbol rate of 14.467 and 3/4 FEC. The H.264 transmissions were at 11·469GHz V with a symbol rate of 10.125 and 3/4 FEC – a narrower symbol rate was used because of the higher compression with the H.264 standard. Fortunately the transmission system was DVB-S, so existing tuners could be used for reception.

A loop of material was transmitted by the BBC broadcast division, some of it showing HD pictures from programmes previously transmitted with standard definition, including the general election studio (May this year). See Photos 1-4. There didn't seem to be any sound. On 5 September, prior to the start of the IBC, a mix of standard-definition material was transmitted, including a live broadcast from the proms (see Photo 5) and a Siemens promotional video (see Photo 6). At the time of writing the promotional HD video loop is still being transmitted, but this will probably cease before long. **C.H.**

DVB-S2

The DVB-S digital satellite transmission system, with MPEG-2 video compression, has been in use for ten years now for TV and radio broadcasting. Things don't stand still in the digital world however, and a new system called DVB-S2 is to be introduced, particularly for HDTV transmissions. It has been developed over the past few years.

DVB-S2 is the transmission system itself: it can be used with MPEG-2, MPEG-4/10 (H.264) or other compression/encoding systems. The important feature is that it provides a bandwidth saving of approximately 30 per cent. So where seven standard-definition TV channels with MPEG-2 compression can be transmitted in a transponder multiplex using the DVB-S system, ten channels can be transmitted using the DVB-S2 system. The number of channels can be approximately doubled by using H.264 compression as well. Thus several HDTV channels, which naturally require a greater bandwidth than a standard-definition channel, can be carried by a single transponder multiplex.

We will see the DVB-S2 system being used first for Sky's upcoming HDTV service. DVB-S2 digiboxes will be backwards compatible with the current DVB-S transmissions, which are likely to continue for many years to come. The facility exists with DVB-S2 to transmit DVB-S signals

Photo 1: BBC HDTV demonstration transmitted via Eurobird during the IBC.

Photo 2: BBC HDTV demonstration transmitted via Eurobird during the IBC.

in parallel in a common multiplex so that existing decoders can continue to work. But they won't even lock to DVB-S2 carriers, there being no requirement for a standard-definition digibox to receive the new HDTV services. These are currently being tested by Sky via Astra 2A and 2B transponders 1, 5 and 33 which, as mentioned last month, have been reactivated for the purpose.

DVB-S2 will also be used by broadcasting organisations for satellite news-gathering links, reducing satellite spectrum use and thus providing an all-important cost saving. A further advantage is that adaptive coding and modulation (known as ACM) is built into the new system. This enables the FEC value to be altered on a frame-by-frame basis depending on the weather at the uplink and downlink sites (and hence the signal attenuation), a lower FEC value being used when the received signal strength falls. This is particularly important with Ka-band uplinks and downlinks where, because of the higher frequency, rain fade is more significant than with Ku-band operation.

The use of ACM enables uplink power to be saved, as the present margin of 'several dBs in hand' in case of rain is needed to a much lesser extent. An extra requirement however is fairly rapid feedback between the receiving and transmitting sites, so that the correction can be set to the required value. How this will affect enthusiasts wanting to watch newsfeeds remains to be seen. We will find out once DVB-S2 receiving equipment becomes available. **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.

EPG no.128 was previously assigned to Paramount 2, which has been moved to EPG no. 129. Discovery Real Time Extra, which was listed in Table 1 last month, has been given EPG no. 135. Similarly Passion TV has been given EPG no. 280. You TV3 was briefly given EPG no. 180 but has now left the EPG. If it's tuned in directly (transponder C2) via the 'add channels' menu a caption which says that "technical difficulties" are being experienced is displayed. Disney ABC 1 has been given EPG no. 281. **C.H.**

Eutelsat W2 (16°E)

Last month we looked at the signals from this satellite in the 12·5-12·75GHz band. This month we'll look at its output in the 10·95-11·7GHz spectrum. The footprint covers all Europe and eastwards, and there's a spot beam centred on Madagascar. The latter is not receivable in Europe, so we won't list the channels –

Photo 3: BBC HDTV demonstration transmitted via Eurobird during the IBC.

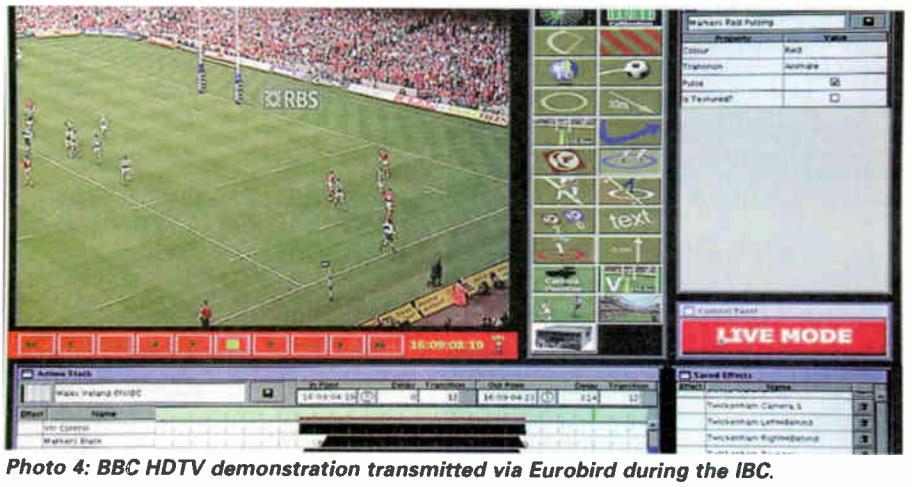


Photo 4: BBC HDTV demonstration transmitted via Eurobird during the IBC.

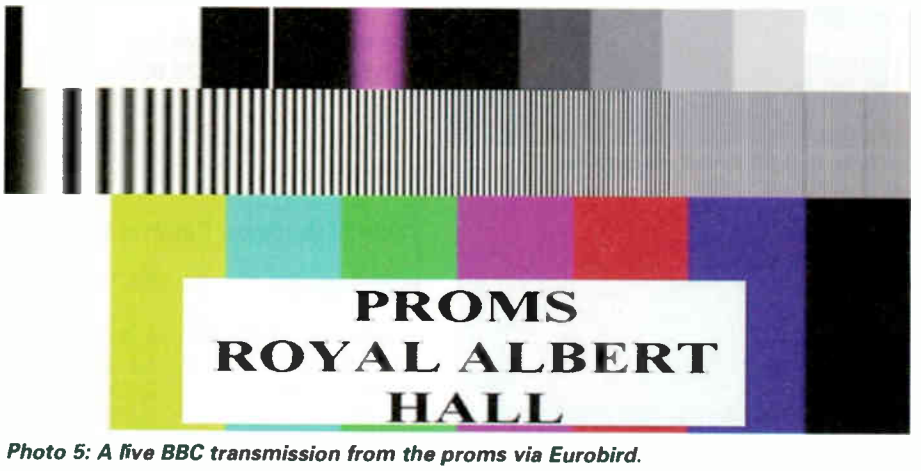


Photo 5: A five BBC transmission from the proms via Eurobird.

Photo 6: A Siemens promotional video transmitted by the BBC via Eurobird.

Photo 7: A CBS feed via Eutelsat W2.

Photo 8: A CBS feed via Eutelsat W2.

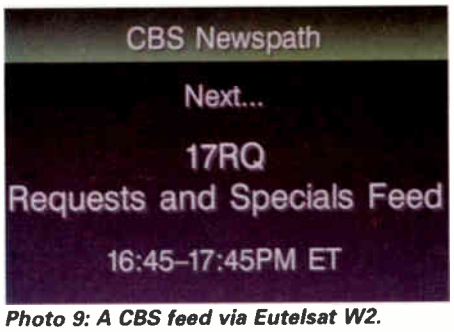


Photo 9: A CBS feed via Eutelsat W2.

Photo 10: A CBS feed via Eutelsat W2.

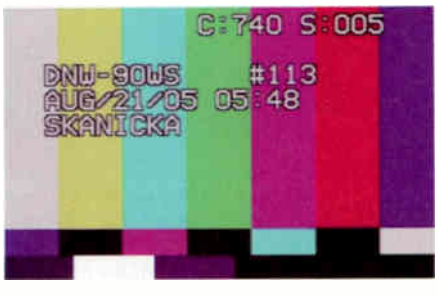


Photo 11: A CBS feed via Eutelsat W2.

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

Channel and EPG no.	Sat	TP	Frequency/pol
Gospel channel	EB	C2	11·265GHz/V
One TV	EB	C2	11·265GHz/V
Paramount Comedy + 1 (128*)	EB	D5S	11·544GHz/H
Quiz TV (282)	EB	C2	11·265GHz/V
Star Bazaar (698)	EB	C2	11·265GHz/V

EB = Eurobird. *See text.

Table 2: Free TV channels available via Eutelsat W2

Frequency/pol	SR	FEC	Services
10·956GHz/H	2,818	2/3	Alsat TV (Albania). One radio station
10·961GHz/H	2,888	3/4	Telemarket TV (Italy)
10·972GHz/V	–	–	RTM 1 Morocco. Three radio stations at 7·02/7·20MHz stereo and 7·38MHz and 7·56MHz mono
11·020GHz/H	2,495	2/3	Studio Europe (Italy)
11·024GHz/H	2,887	3/4	7 Gold (Italy)
11·082GHz/H	5,210	5/6	Jetix Italia (Italy). Europa 7. Six radio stations
11·089GHz/V	32,000	5/6	Albanian TV package (scrambled). Some radio stations (clear)
11·183GHz/H	2,665	3/4	Kurdistan TV
11·450GHz/H	27,500	7/8	Albanian TV package (one channel clear)
11·470GHz/V	29,950	3/4	Romanian TV package: TVR 1 and TVR Cultural are scrambled, TVR 2 and TVR International are clear. Two radio stations (clear)
11·513GHz/V	28,800	7/8	Bulgarian TV package. Hit TV (clear)
11·553GHz/V	28,800	7/8	Bulgarian TV package (one channel clear). Plus at least one radio station clear

Table 3: Common Eutelsat W2 feed frequencies

Frequency/pol	SR	FEC	Feed
10·968/10·977GHz/H	6,400	3/4	Mediaset Italy
11·133GHz/H	5,632	3/4	Sky Sports News
11·141GHz/H	5,632	3/4	Reuters Baghdad
11·189GHz/H	5,632	3/4	Miscellaneous CBS feeds
11·189GHz/V	5,632	3/4	Duna TV Hungary

they are in the 11·45-11·7GHz spectrum with horizontal polarisation.

Table 2 lists the free TV channels in the 10·95-11·7GHz spectrum. Morocco RTM 1 is a PAL analogue signal with the audio at 6·6MHz. The other transmissions are all MPEG-2 digital.

There are also various feed frequencies. Table 3 is by no means complete: the feeds listed are from broadcasters I have identified. Various feeds are likely to pop up, using either vertical or horizontal polarisation, at frequencies between 10·95-11·2GHz, with SR 5,632 and FEC 3/4, SR 6,111 and FEC 3/4, SR 6,666 and FEC 7/8, or SR 8,055 and FEC 7/8. Feeds at above 11·45GHz are rare, but I have seen one at 11·675GHz with SR 5,632 and FEC 7/8.

CBS feeds at 11·189GHz H are quite frequent and are likely to come from different locations during the day. When not in use, the Newsforce caption from New York is often transmitted. See Photos 7-11.

Photo 12 shows a Mediaset Italy feed.

Sky Sports News feeds can be very busy, for the Sports News channel in the Sky package.

Reuters Baghdad is not always present. It's mainly on air when there is important news from this area. **C.H.**

TSReader

In last month's column I promised to provide more information on this computer program, which analyses digital TV transport streams. Because of time and space limitations I will have to defer this until next month. **C.H.**

Sony VTXS750

The dealer who brought this digibox in said that some channels were missing. It's quite a common complaint with this model, and is usually caused by a faulty tuner. You normally find that four channels are missing. The tuner was not the cause of the problem this time however. On test I found that the vertically-polarised channels were all OK, but with the horizontally-polarised channels the box displayed the "no satellite signal received" message.

My first check and, as it turned out, first mistake was to plug my little home-made polarisation checker into the LNB socket. This told me that the 13V and 18V supplies were both OK. Checks around the LNB supply generator and 22kHz tone chip IC500 failed to reveal anything amiss. After much wasted time I discovered that the output at pin 3 of IC500 fell to 5·6V for the horizontal channels when the LNB was connected. My little device has no dummy load for this test. The fault was cured by replacing IC500, which is type LNBP11SP. **M.D.**

Amstrad DRX400

There was a nice easy fault with this digibox. The cause of the "no satellite signal received" message was a faulty 10·111MHz crystal, X101, in the ZIF tuner section. You can check the clock signal at pins 16 and 17 of U102. **M.D.**

Sony VTXS760U

This digibox produced the "no satellite signal received message". A quick check showed that there was nothing wrong with the LNB, the dish or the cable. There are four 2,200µF electrolytic capacitors in the power supply in the receiver itself. All was well once I had fitted replacements. **M.M.**

'Under guarantee'

Why is it that when you repair something you are blamed for all future faults? An old Grundig Sky receiver had been repaired several months ago because of a power supply problem. A call then came to say that it was stuck. I advised the customer to switch off at the mains, wait a short time and switch on again, but this didn't make any difference. So a call was booked for next day.

On arrival the receiver was on but there was no channel changing when the remote-control unit was used. The fault persisted when new batteries had been fitted. A new handset restored normal operation. But the customer thought it should have been provided under the guarantee for the power-supply fault!

A second 'under guarantee' call was to a Technomate receiver used for reception of the Italian channels from Hotbird. The complaint was that all channels had gone. When I called I found that the old TV set was just about working, but had drifted off frequency. A quick retune was all that was required. A short wait until the equipment had reached normal operating temperature confirmed that there were no further problems, even after switching all the equipment off then on again. **P.H.**

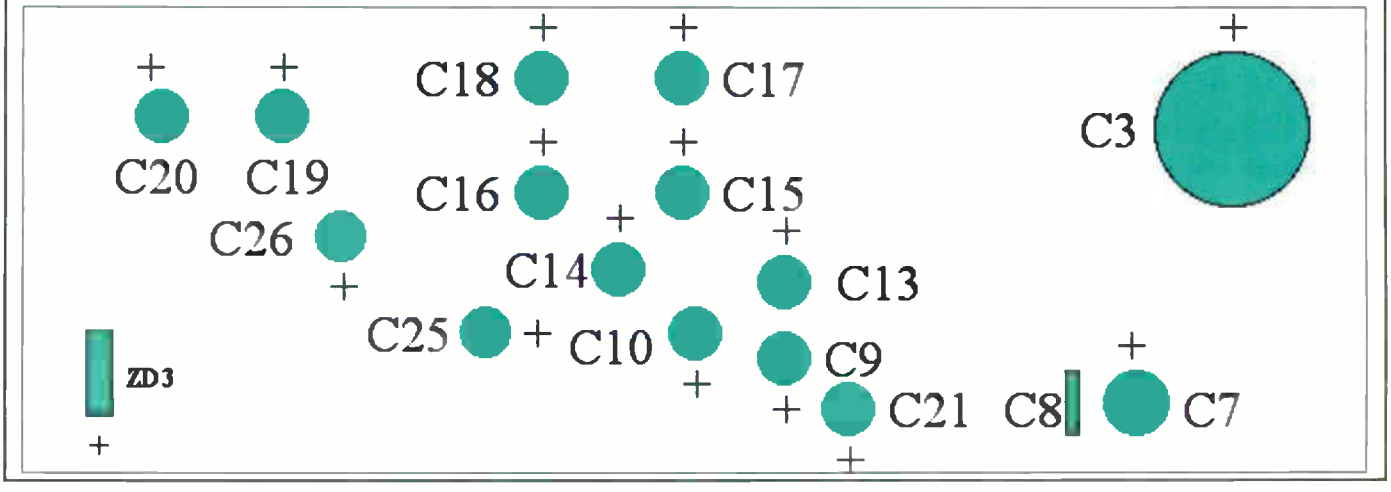
Photo 12: A Mediaset Italy feed via Eutelsat W2.

Humax power supply

The infamous Humax 5XXX series power supply has been replaced with a Mk 2 version. I had hoped that capacitor failure was now a thing of the past. But no, these power supplies are now starting to come in for repair. Fig. 1 shows the capacitor layout. Note that there are two more capacitors than with the earlier version, and R21 has been replaced with a link.

The easy way to tell is that the on/off switch is now a double-pole type, so a four-way connector is fitted with a modified two-pin connector for the mains lead. **P.H.**

Fig. 1: This new version of the Humax power supply has a four-way connector for the mains switch and a new type of mains-lead connector. The electrolytic capacitors are all of the 105°C, low-ESR type. Values are as follows: C3 82µF, 400V; C7 33µF, 50V; C8 220nF, 50V; C9 1,500µF, 10V; C10 1,000µF, 10V; C13 and C14 1,000µF, 25V; C15 680µF, 25V; C16 470µF, 25V; C17/18/19/20 220µF, 50V; C21 1µF, 50V; C25 33µF 50V; C26 1µF, 50V. ZD3 is a 30V zener diode rated at 1·3W.



VCR CLINIC

Reports from Brian Battams and Peter Graves

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

or e-mailed to: TVeditor@nexusmedia.com

JVC HRA230

This machine was brought in for repair after the customer complained that a power surge had destroyed his beloved video recorder. Checks revealed that the only faulty item was a low-value capacitor in the power supply, C906 (2·2μF, 50V). All was well once a replacement had been fitted. **B.B.**

Daewoo V60

This VCR was dead. When I opened it up I found a Sony SOPS-2021 power supply. Checks inside this unit revealed that C53 (1μF, 100V) was open-circuit. Replacement of this electrolytic capacitor brought the machine back to life. **P.G.**

Sony SLV725

"Machine cuts out and shows 20.01 or 30.01" said my friend, who owns this VCR. These are error codes that are supposed to tell you what was happening at the time of failure. 20 means that the machine was recording while 30 tells you that it was playing back. So far so good. The 01 part indicates that the take-up reel has stopped. So, assuming that tape take-up had stopped during play and record, a full mechanical service seemed reasonable. Service kits appear to be thin on the ground these days, so the likely troublemakers were ordered individually.

My friend and I have a thing about electrolytic capacitors. He insisted that every one in the power supply be replaced, which is not a bad idea at this stage in the life of one of these VCRs. After doing this I fitted a nice new chassis block assembly and idler-arm pendulum, along with a back-tension band and pinch roller. By request, and against my own judgement, also a new head-cleaning roller. A new timing belt was fitted on the underside. The lot was then reassembled and tested.

It's a good thing I was doing it for a friend as, five minutes after he arrived home with it, he phoned with the good news: "it's still doing it".

"But I tested it all evening!"

He brought it back and we both watched *Toy Story* without interruption – twice!

Five minutes after he got it home gain he phoned. "It's done it again!"

"What code are you getting?" I asked.

"30.01."

"But everything to do with the take up has been changed!"

My friend works with computers for a living, so I was happy to let him perform the next step. While he was still on the phone he opened the machine and stared at the mechanism until it failed. Within a minute or so I heard the thing cut out. "There, 30.01" he said.

"Are there any loops of tape hanging out on the take-up side" I asked.

"No" he replied.

The penny then dropped, or so I thought. "It's all done with mirrors" I said, "bring it back."

After removing most of the new bits previously fitted and a few more I had access to the take-up and feed gears, which have alternating mirrored and black segments on the underside. The purpose of these, as we all know, is to reflect light back to the sensor when it hits a mirror-part of the gear and not when it hits a black part. Pulses are thus created, and the machine knows that the take-up reel is rotating. Cleaning the mirror sections while carefully avoiding the black areas (which can clean up a bit too well) produced good reflections once more.

I put it all together again and we watched another video. My friend then took the machine home.

Three minutes later, "it's still doing it!"

"Any loops of tape hanging?"

"No, but I'll watch it more carefully this time." One minute later he reported that there seemed to be a knocking sound. Then "30.01 again!"

He tried once more and noticed that a moment before the error code appeared the motor stopped.

"It must be the motor" I said, "there's virtually nothing else left!"

"Couldn't it be anything else?" he asked, with the intonation of a man who was open to any suggestion as long as it didn't involve a faulty motor.

"It might, but we've done the power supply and been through every mechanical part by now. That leaves only the motor, the drive chip or the bearing."

"If we change the bearing, it might stop the knocking at least!" he said, quite reasonably.

"Well, as the whole lot now comes as a as a motor assembly it doesn't really make much difference" I replied.

He tried again, and reluctantly concluded that the knocking was indeed coming from the motor, as touching the top of the bearing stopped it. The trouble was that the motor would stop completely without provocation, and we had now established that this definitely happened a split second before the error code was generated.

So in went a new motor. The knocking had then gone. My friend took the machine away, and it hasn't cut out or produced any error codes since. How come a faulty motor produces error codes that say "take-up failure during play or record"? Who cares anyway? The machine now works!

"Why repair this oldie when a supermarket model can be obtained for less than the cost of the parts required?" I hear someone asking. Well, this VCR has manual audio-level record controls. For those who really care, this is an important facility to have. **P.G.**

Solution to Test Case 515

– see page 37 –

Perhaps Sage should have tried to get a service manual for that oscilloscope. It wouldn't have made the fault any less elusive or intermittent, but might have helped with the process of diagnosis!

When Sage and Cathode Ray dismantled the instrument they noticed that there were five small bridge rectifiers in the power-supply section. They were four-legged, full-wave devices, little round ones that were mostly marked C250. So it was reasonable to assume that all the feeds to the scope's amplifier and timebase sections came via them. Now the output from a full-wave rectifier is at 100Hz: the 10msec ripple is dealt with by the reservoir and smoothing capacitors. But the on-screen ramps/spikes were at 20msec intervals, which is characteristic of half-wave rectification. So Sage concluded that one of the diodes in one of the bridge rectifiers was going open-circuit intermittently. This would also account for the louder buzz from the mains transformer. When the fault was present it was working harder, with higher secondary current, because of the half-wave operation.

Which of the bridge rectifiers was faulty? Sage thought that one of them ran hotter when the fault symptom was present. So the other oscilloscope was connected across its + and – legs. Sure enough when the fault finally put in another appearance the ripple here halved in frequency and increased in amplitude. Just a faulty rectifier then.

NEXT MONTH IN TELEVISION

Domestic TV distribution systems

There's a large market nowadays for domestic signal-distribution systems. In this new series Bill Wright describes the design and installation of systems that include the Sky remote-eye control system and various other innovations. The aim is to provide users with maximum value from their TV reception equipment. Examples from the simplest to state-of the-art installations are included. It's often necessary to explain to customers the full range of facilities that a modern distribution system can offer.

Servicing the Samsung KS3A chassis

John Coombes provides a detailed guide to fault-finding with this chassis. Models in which it is used include the Samsung CZ21A8VN and the Toshiba 21S04A.

Vintage repair: the Bush AC11

This vintage radio, dating from 1949, was discovered in the corner of a barn on a small farm! Despite that it was in reasonable condition, with nothing missing. After restoring it Malcolm Burrell felt that the set was too good to pass on. The circuit diagram is included.

PLUS ALL THE REGULAR FEATURES

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MONITORS

Fault reports from

Mike Garton

Bob Bradley

and

Alun Rawson-Williams

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,
Nexus Media Communications,
Media House,
Azalea Drive, Swanley,
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or e-mailed to:
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Dell 1028

These monitors are common and are fitted with a Philips chassis. With the one I had recently the relay clicked on and off and the power LED flashed. After checking the usual suspect diodes in the line output stage I found that the BSN254A FET in position 3640 was short-circuit. It's near the line output transformer. An IRF630 worked as a replacement. **M.G.**

Compaq S510

The customer said this monitor was dead. Once it was on the bench I found that the power LED failed to light up when the on/off switch was operated. A DVM check on the mains fuse proved that it was OK. Sometimes the line output transformer can produce the same symptoms by holding down the supply. In this case however the cause was a faulty power regulator IC (DP106), as a replacement confirmed. **B.B.**

Nech CB6525DL (CA6515)

I have mentioned this fault before: an intermittent CRT heater supply because of a dry-joint between the CRT base PCB and the heater earth connector. It has become so common that we now mark all monitors that have been seen by us. The job is simple but tedious. You have to remove the screening on the CRT base panel to get at the joint. Last year the monitors affected were ones manufactured in 1998. The same fault is now affecting monitors manufactured in late 1999. **A.R-W.**

Samtron PN17LT (AN17LT7L/EDC)

With some monitors, such as this one, it's a pain in the neck just to remove the casing. The monitor was a little over two years old, still under its three-year return-to-base guarantee.

The two PK screws at the bottom are easy enough, but the top is firmly held in place by two plastic clips, one at either side. To release them, cut a piece of aluminium 9mm wide, no more than 1·5mm thick, and about 8cm long. Insert this in turn in the two slots at the front/top of the cabinet, at an angle of 30°, with the top pointing forwards. Press down hard, at the same time pulling the monitor cover backwards. A flat screwdriver blade is too thick and, if used, will damage the top of the monitor.

The front LED showed that this monitor's power supply was tripping quietly once every two seconds. But my dismantling problems weren't over yet. To gain access to the print side of the PCB, the chassis has to be removed and dismantled. There are seven earthing points, five plugs, plus the CRT base panel and EHT connector. While doing this it is worth making a note of where everything fits. The PCB can then be removed after taking out the fixing screws. All this just to replace the 2SJ6810 line output transistor Q404 and make good some of the soldered connections to the line output transformer. **A.R-W.**

Nech CA/CB6525DL

No, not another CRT heater dry-joint job! Once this monitor had warmed up it displayed a white, unmodulated raster. So off came the screening plate that surrounds the CRT's base panel. I then found that all three connections to the collectors of the RGB output transistors were dry-jointed. This was plain to see, without the need for a magnifying glass. **A.R-W.**

Lex X83

This was the second printer/scanner of the same type I've come across recently with exactly the same fault. The complaint was 'dead machine'. These machines have an external 30V switch-mode power supply that's connected to the printer via a DC power plug. The power supply is short-circuit protected, and any excessive current will shut it down completely. There's also a 7812 12V regulator inside the printer, mounted on the single PCB. The PCB is painted over on both sides with green paint, hiding all traces of the print and the reference numbers of the mostly surface-mounted components. It's connected to the printer mechanism via four plugs and three ribbon-type cables.

When the six-pin plug to the scanner motor was unplugged the machine sprang to life of sorts, with "unlock scanner" displayed (it was already unlocked). One of the motor's windings turned out to have shorted turns, and one of the 2N5551 driver transistors was short-circuit. The scanner motor, part no. 12G3125, is available from Express Terminals (phone 01765 694 100) while the 2N5551 can be obtained from Grandata. I also replaced the 7812 regulator, because it gave unusual cold-resistance readings in comparison with a new one.

Most home printers I am asked to look at these days would cost more to repair than replace. But the more expensive office types are worth looking at. **A.R-W.**

Kyocera F1000

This real oldie mono laser printer was used in an office to print out letters. It had recently been fitted, against our advice, with an expensive, brand-new drum unit. The printer was now dead and the owners wanted to know if repair would be economic.

When I dismantled it I found that the 2AT mains fuse F1 was intact and that some 350V was present across the mains bridge rectifier's reservoir capacitor. But there was no output at the secondary side of the power supply. The cause was simple: the value of the 560kΩ start-up resistor R5 had risen to 15MΩ. After repair the machine was returned to the delighted customer at minimal charge. **A.R-W.**

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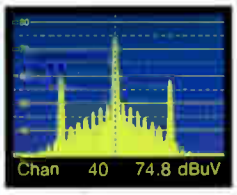

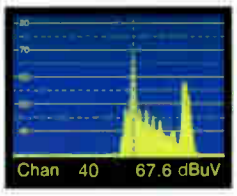

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