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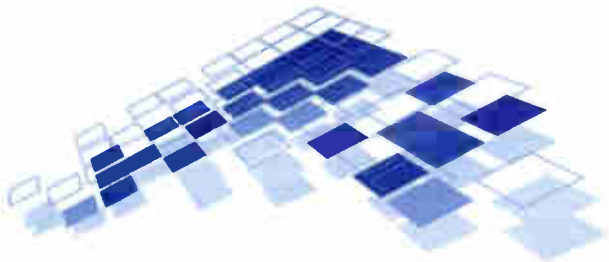

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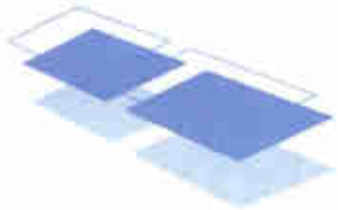

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- 40 or 45 extension arm.
- High light output enhances clarity and low heat increases comfort.
- Fully adjustable internal spring arm can hold the head in any position.
- Ideal for professionals, hobbyist, craftsmen, needleworkers and beauticians.

SPECIFICATION:

	TL-3000	TL-3005
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Dioptre	3 / 5 dioptre	3 / 5 / 8 dioptre
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- Support for both colour and monochrome cameras.
- Playback record can be searched by time or by event list.
- Selectable recording qualities (best/high/medium/low).
- Recording can operate manually or gets activated automatically when alarm is triggered.

SPECIFICATION:

Image system		NTSC	PAL
Resolution	Display	720 x 480	720 x 576
	Record	640 x 224	640 x 272
Video input		BNC x 4	
Video looping output		BNC x 4	
Video ouput		BNC x 1	
Display frame		4 x 30 FPS	4 x 25 FPS (field per second)
Recording frame rate (QUAD)		Max 30 FPS	Max x 25 FPS
Recording frame rate (MUX)		Max 30 / 4 FPS	Max x 25 / 4 FPS
Storage media		Max 2 IDE Hard Disk	
Image format		M-JPEG	
Compress rate		Low. 8k bytes/field High. 15k bytes/field	Medium: 10k bytes/field best: 20k bytes/field
Recording Mode		Manual / Alarm / Schedule	
Playback speed		Fat forward x2 x4 x6 Fast reverse x6 Frame by frame forward playback	
On screen display & setup		Time/date/setup menu	
Alarm input		x4	
Relay output		NO or NC programmable contact x1	
Password control		one for HDD format	
Motion detection		Yes	
Buzzer		Yes	
Video loss		Yes	
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HIGHBURY BUSINESS

Broadcasters in turmoil

Aren't they always, you might ask? Being communicators, those involved in broadcasting are not reticent about making us aware of their views. They are also, naturally enough, concerned about their interests and future. The present is, in particular, a time of uncertainty, with all sorts of prospects and possibilities opening up as broadcasting becomes increasingly digital. Then there is the business, yet again, of the BBC's Charter review – a Green Paper on this is expected from the DCMS soon.

The BBC's situation is particularly significant. It need hardly be said that the BBC is a unique institution of incalculable cultural and public worth. But as a publicly-funded corporation it is accountable to the public, which means that roughly every ten years those who are, for whatever reason, opposed to the idea of non-commercial broadcasting, or have a particular grievance against the BBC, get the opportunity to make their feelings known. Rather more importantly it means that what exactly the BBC is and what it does, or should be doing, can be considered.

The first Royal Charter, which laid down the powers of the Governors, organisational and constitutional matters, was awarded to the BBC in 1927. The position of the Governors is vital in maintaining the independence, from the government and other authorities, of the BBC. The other vital factor is the availability of adequate independent funding, which means the licence fee. This was originally paid by listeners for the right to operate broadcast reception equipment, akin to the radio amateurs' licence. There are those who, if they never make use of BBC services, resent the licence fee. This is understandable, but they should appreciate that what they are paying for is a 'public good', akin to say national defence (an analogy suggested by Gavyn Davies): something we need to have whether or not there's an immediate personal requirement.

In a sense the BBC is a victim of its own success. At the time of its inception (as the British Broadcasting Company) in 1922 it had a staff of four and provided a primitive radio service for the London region. By the time of the first Charter in 1927 the staff had increased to 989. Its staff has since grown to many thousands – the number has waxed and waned at various times. Starting at such an early date, it had to broadcast in the fullest sense – providing and indeed developing the means of transmission as well as the services themselves. During the course of its evolution and expansion other activities were added, in particular a successful publishing side. Its engineering division was particularly important, in making it possible for broadcasting services to develop. The engineering side has been responsible for many significant advances, including sound-in-sync, Ceefax and Nicam for example. Could the equipment required have been obtained from external sources, maybe more cheaply? Probably not in 1922, nor in 1927, and the BBC worked with EMI, the Marconi Company and the Baird Company on early TV development. It's arguable whether engineering is best provided in-house or by external companies. Likewise, should publications be outsourced to others? And, when it comes to actual programme production, should the BBC do this in-house or commission independent companies to provide them? There are those who would like to see the BBC reduced to a very minimal organisation, with virtually all activities provided by outside sources. The danger in paring back its capabilities too far is a reduction in its independence: it needs activities other than scheduling and commissioning to remain an effective broadcaster. If it is to continue to fulfil the role that we, and others, expect of it a very careful balance has to be sought in such matters. Information from an untainted source is vital. In particular there has to be, today, a non-spin provider.

This doesn't imply that the BBC should be the sole provider of public-service broadcasting: in practice the ITV companies and, in particular, Channel 4 have traditionally had this as part of their remit. But the provision of public-service broadcasting – news at peak times, minority programming, educational and cultural programming etc. – does not always fit easily with the priorities of a commercial broadcaster aiming for maximum audiences. It seems that ITV is to be relieved from its obligations in this respect. To maintain such services in addition to those provided by the BBC, Ofcom has suggested the creation of a Public Services Publisher. It's not clear how – or whether – this would work.

What excites and alarms broadcasters is the development of digital multi-channel services. It's exciting because of the endless possibilities that are opened up, and alarming because it could mean inadequate funding and a burgeoning mass of worthless output. Could this overwhelm traditional broadcasting in an untrammelled digital future? It's possible, though unlikely: someone will probably remain as a mass broadcaster.

Broadband transmission adds to the confusion. It's interesting that British Telecom has set up BT Entertainment, with a remit to develop video-via-broadband services – similar to what the cable companies can provide. Further broadcasting possibilities were discussed at a recent conference, Digital TV: The Next Steps. The mobile phone operators are waiting to get in on the act – a transmission standard, DVB-H (H for handheld), has been developed, and a UK trial is to be carried out in Oxford this spring (see News, page 4, November 2004). According to Terry Howard, head of business development at NTL Broadcast, researchers around Europe have established that there is a demand for mobile TV and a willingness to pay for it.

The prospects for broadcasting have never been wider nor the future more difficult to prophesy. It's no wonder that the broadcasters are agitated.

Hollywood line-up for new DVDs

The battle over which next-generation, blue-laser DVD format will prevail, Sony's Blu-ray or Toshiba's HD DVD, seems to be concentrated on gaining the support of the Hollywood studios. The Disney Corporation has announced its support for the Blu-ray disc and has become a board member of the Blu-ray Disc Association, whose other members include Sony, Philips, Mitsubishi and Hitachi. Sony's film studios, including Sony Pictures and MGM, also support Blu-ray. Disney says however that it will keep open its options to use the HD DVD format. Attempts by Sony to persuade Toshiba to support Blu-ray have apparently failed.

Meanwhile Toshiba has announced that its HD DVD format has gained the support of Paramount Pictures, Universal Studios, Warner Bros and New Line Cinema. In the first half of 2004 these four studios accounted for about 45 per cent of US DVD sales. Universal has announced that will release titles in the HD DVD format this year, while Paramount plans to follow in 2006.

HD DVD players are expected to become available late this year, and widely available in 2006. Toshiba plans to launch its first HD DVD products, a consumer player and recorder, in the fourth quarter of 2005. The company also plans to release a notebook PC with a built-in HD DVD drive at the end of the year. Thomson has announced that it will start selling HD DVD players, under the RCA and Thomson brands, before the end of the year. Thomson says it will continue to support Blu-ray development however – a subsidiary will be pressing Blu-ray discs, but it has no plans to market a player.

Sharp has launched a Blu-ray disc recorder with an integrated hard-disk drive and DVD player in Japan. It's also the first Blu-ray disc recorder to be equipped with an HDMI (high definition multimedia interface) output socket. Model BD-HD100 can record and play back high-definition video to/from its built-in hard drive and Blu-ray discs. The 160GB hard drive can store about nineteen hours of HDTV video, while a 25GB Blu-ray disc will store approximately three hours of HDTV programming. The BD-HD100 has a twin Blu-ray disc/DVD tray that allows digital dubbing in six ways, to and from the hard drive, Blu-ray discs and DVD, including the ability to dub five DVDs (4·76GB each) on to a single Blu-ray disc. No price details or information on a UK release have been announced.

HD-ready TV ranges

Toshiba has announced a range of high-definition ready widescreen LCD and DLP (digital light processor) TV models that meet the HDTV Forum's specifications for HD-compatibility. There are three LCD models and two DLP models, as follows.

Model 32WL48 has a 32in. LCD screen and an HDMI (high-definition multimedia interface) socket. It incorporates Toshiba's new Active Vision LCD picture-processing technology. This is claimed to improve detail by increasing the screen's pixel count to three times that of a conventional LCD panel. Improved colour reproduction is achieved by using a pixel illumination sequence that provides 1,024 tones in comparison with the standard 256.

Models 30WL46 (30in.) and 27WL46 (27in.) have LCD screens, a DVI (digital video interface) socket) and twin analogue tuners.

Models 46WM48 (46in.) and 52WM48 (52in.) use DLP and are fitted with an HDMI socket.

NEC has announced a new range of plasma TV models with high-definition capability, also two slim-line widescreen DLP (digital light processor) projectors for home-cinema use. The plasma sets are Model 42XR3 (42in. screen), 50XR3 (50in. screen), 61XR3 (61in.) and 42VR5 (42in. VGA screen). The displays are guaranteed to last for twenty years assuming an average seven hours' use a day. An integrated tuner is an optional extra. The sets all have seven video, DVD, RF and PC inputs and include CCF colour-correction technology. They are compatible with HDCP, HDMI and HDTV signals. The 50 and 61in. models incorporate an advanced picture-in-picture feature. The projectors, Models HT410 and HT510, are said to be very quiet in operation (only 26dB in the eco mode) and are progressive-scan and HDTV compatible.

One of NEC's new plasma TV models with high-definition capability.

Sony opts for LCD

Sony has announced that it is to concentrate on LCD rather than PDP (plasma) TV sets. But the company, which is a major supplier of PDP sets, will not withdraw from this market altogether. It is also to continue production of rear-projection sets that use LCD modulation – these generally have screen larger than 50in. and are popular in the US. There has been speculation that Sony's announcement highlights the financial burden of continued R&D and production of all types of sets in a fiercely competitive market.

In contrast Matsushita (Panasonic) has announced that it is to double its PDP TV manufacturing capacity to 2m sets a year by March 2006. The company expects the worldwide plasma TV market to exceed 5m sets next year and 10m in 2008, taking market share from rear-projection sets.

Hard-disk drive development

Toshiba has announced the world's first hard-disk drives that use perpendicular recording, which increases the capacity of a single 1·8in. hard-disk platter to 40GB. The company is using the technology in two high-capacity drives, Model MK4007GAL that can store up to 40GB of data on a drive just 5mm thick and Model MK8007GAH that provides 80GB capacity in a 1·8in. form. Mass production of the drives is to start in April.

Conventional longitudinal magnetic-disc recording stores the data on a disc as microscopic magnets that are aligned horizontally. Although advances in magnetic coatings continue to improve HDD recording density, the magnetic bits repulse each other because of the in-plane alignment. According to Toshiba, squeezing more of these bits on to a disc will eventually degrade bit quality – the limit on storage capacity is fast being approached. By standing the magnetic bits on end instead, perpendicular recording reinforces the magnetic coupling between neighbouring bits, achieving stable, higher recording density and thus improved storage capacity. The capacity of the MK4007GAL platter is 33 per cent greater than that of Toshiba's conventional HDD.

Samsung has announced the world's first megapixel camera-phone that incorporates a hard-disk drive. Model SPH-V5400 has a 1·5GB hard drive that can store some 3·5 hours of video footage, 300 MP files or 1,000 photographic images. It has a 2·2in. LCD screen. The unit is available in Korea at the equivalent of about £375.

Dual-layer DVD/HD DVD disc

Memory-Tech and Toshiba have announced the development of a dual-layer optical disc that can store content in both the HD DVD and the DVD formats. The newly-developed ROM disc has a single-sided, dual-layer structure with the upper layer, closest to the optical head, storing data in the DVD format while the lower layer stores HD DVD data. The storage capacities are 4·7GB DVD and 15GB HD DVD. Currently available players can play back the DVD content.

The new disc has obvious appeal to the Hollywood studios in that content can be played back by a standard DVD player and, in HD form, by the next generation of HD DVD players. The new structure also increases the options for content providers: the same content can be provided in two formats or the HD DVD layer can be used for a feature film with the DVD layer used to store promotional videos or audio content, including the movie sound track. A dual red and blue laser optical head has been developed for use with the discs.

The new discs can be produced by Memory-Tech's existing manufacturing facilities, which can make both HD DVD and DVD discs. The manufacturing cost of the new discs is expected to be comparable to that of single-sided, dual-layer DVD-ROM or HD DVD-ROM discs, as they have the same physical structure.

Video news

Panasonic has launched its first Freeview-enabled PVR. Model TU-CTH100. It incorporates two tuners and an integrated 80GB hard-disk drive that can store up to 45 hours of video, with timer recording of up to 24 programmes. A navigation facility lists the HDD content and makes it possible to archive footage to an external device such as a DVD or VHS recorder. The picture-in-picture facility enables users to view two programmes simultaneously. Price is about £280.

Humax has announced a range of LCD IDTV sets. Model LB26T, with 26in. screen, is already on sale at about £1,200. It has Freeview and Top-Up TV capability, one analogue plus two digital tuners that provide picture-in-picture capability, a Dolby Digital output, an eight-day EPG and a comprehensive range of input/output sockets. To come are 26 and 32in. Models LB26TP and LB32PT which will incorporate a 40GB PVR.

Harrods has been selling one of the most expensive TV sets on the market, at £15,000 – optional surround-sound speakers are an extra £7,999. The Vivadi Saturn features a 46in. plasma screen, a DVD+RW recorder, a 200GB hard-disk drive PVR, a Windows Media Center operating system, Dolby Digital and DTS sound systems, internet and email facilities, and DVI, VGA and USB outputs.

The Panasonic TU-CTH100 Freeview-enabled PVR incorporates two tuners and an 80GB hard-disk drive that can store up to 45 hours of video.

Joint LCD venture

Hitachi, Toshiba and Matsushita (Panasonic) have formed a joint venture to produce and sell LCD panels for TV sets. The new company is known as IPS Alpha Technology, and is 50 per cent owned by Hitachi with Toshiba and Matsushita having 21 and 25 per cent stakes respectively. Hitachi's advanced in-plane switching (IPS) technology is being used, with screen sizes 23in. and above. IPS is a form of TFT LCD that provides a wide (170° horizontal and vertical) viewing angle, with minimal grey-scale inversion and viewing-angle dependency. The plant, at Mobara in Japan, is expected to have a production capacity of 2·5m 32in. panels by the end of 2008.

Repairing liquid-crystal displays

Increasing numbers of monitors and, now, TV sets have an LCD screen. This means a completely different approach to repair. Much work on LCDs can be done only under Class 100 clean-room conditions. Peter Doxat of Teleplan Warranty Services describes the various fault conditions that arise and the repair possibilities

A problem that can arise with flat-screen LCD monitors and TV sets is failure of the screen itself. For many technicians, failure of this assembly is often enough to make the whole unit "beyond economic repair". This article will look at the main mechanical problems that can arise: we may be able to cover the electronic aspects at a later date.

Testing

To establish what's wrong with a panel, it must be powered. The Teleplan LCD repair centre will accept 'glass', i.e. the display panel, generally without the inverter, used by many different monitor and TV manufacturers. The sheer range of different panels, sizes and technologies in use means that powering a panel can be quite a problem. Cables and interface cards need to be made up for each type of panel, in accordance with the original manufacturers' data. Photo 1 shows an LCD test jig at Teleplan.

Diagnosis can begin once a panel is connected to a test jig. The technician involved will step through various test patterns and note what's wrong. Faults tend to fall into one of three main categories: backlight problems; polariser damage; and tab failure.

After diagnosis, all subsequent operations are carried out in a Class 100 clean-room.

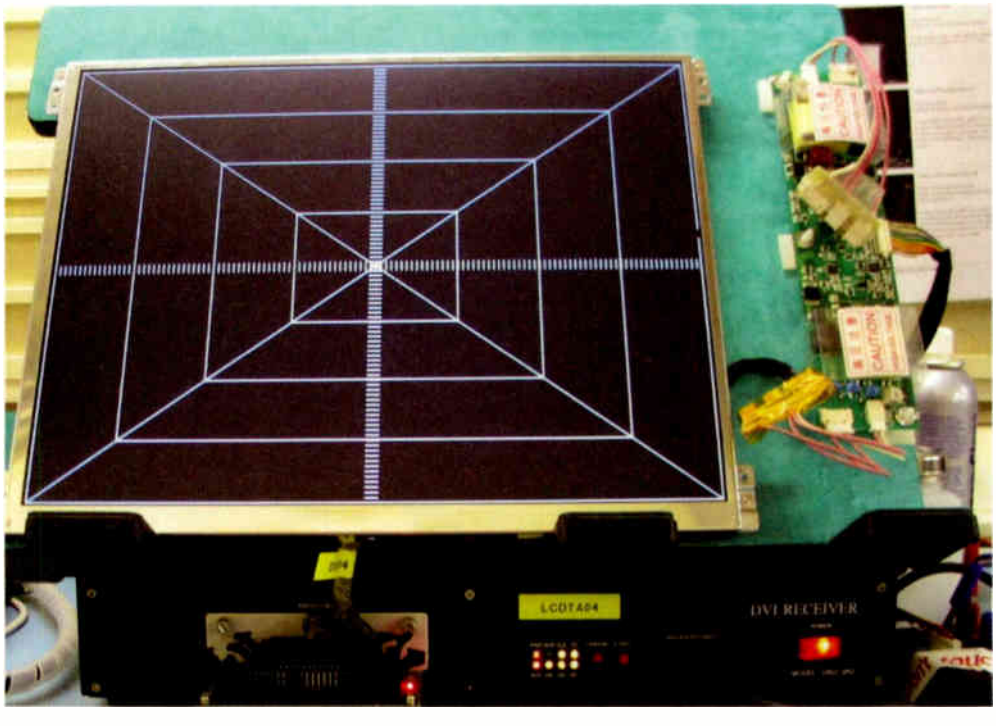


Photo 1: One of the LCD test jigs at Teleplan.

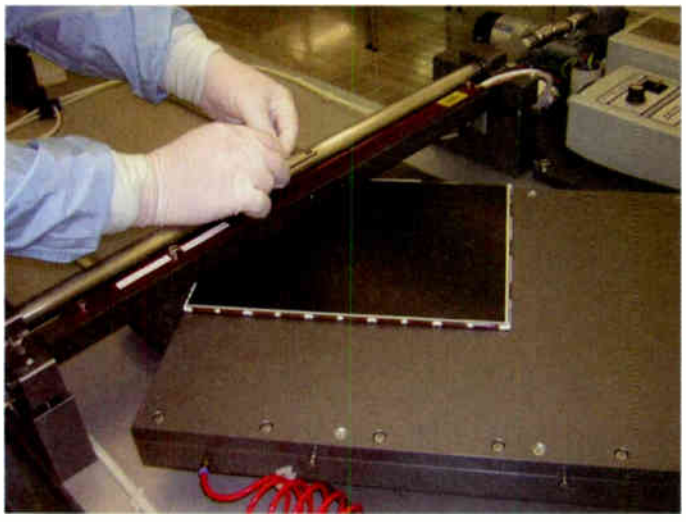
The backlight

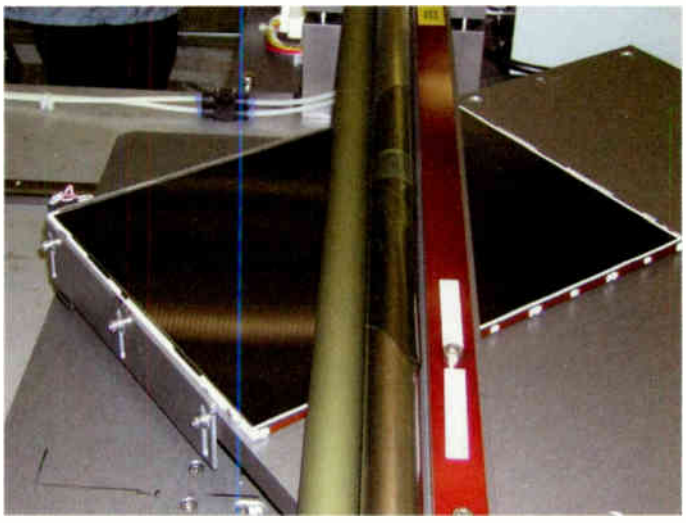
The backlight assembly is about the only part of an LCD panel that could be tackled in a normal TV workshop. Most technicians can work out how to remove the backlight assembly from the surrounding bezel. But the technician should be aware of contamination issues, and ensure that everything is kept clean, vacuumed and is swabbed with an IPA/water mix. Failure to do this can mean that particulate falls from the reflector assembly into the backlight diffuser, causing an effect that's similar to missing pixels.

Backlights range from relatively simple units with one small CCFL (cold-cathode fluorescent lamp) at the top and bottom to arrangements with several tubes and complex reflector/diffuser assemblies. Some tubes are not straight, following twisted or zigzag patterns instead, and are consequently easy to break!

Common backlight fault symptoms include no display; a dim display; uneven brightness (the top of the screen brighter than the bottom, or vice versa); 'curtaining' effects, where tarnishing of the reflector results in undulating brightness across the screen; and low corner brightness because of blackening at the ends of the CCF tubes.

These faults are straightforward to diagnose. The main problems are removal of the CCFL tube assem-





blies, which can become well and truly welded to their end connectors, and subsequent reassembly, as small amounts of particulate can loosen and fall off.

Some panels have reflectors that are prone to tarnishing. It's almost impossible to obtain the reflectors. Rather than write off such a unit, it's possible to repaint the reflector with high-temperature silver or white paint. The brightness will never reach the original level – maybe 80 per cent will be achieved. But, if the customer is in agreement to trying this, the life of the unit can be usefully extended.

The polariser

The polariser is easily scratched or damaged, but can be replaced. In most cases this involves removal of the backlight and the surrounding metal bezel, leaving the glass assembly with its small PCBs at the edges. Although not recommended, the polariser on a new panel can sometimes be removed by lifting one corner of the polarising film then gently pulling by hand at 45° across the surface. With a panel that's more than a few months old the polariser adhesive will have set hard and has to be removed with a specialist delaminating tool. The glass is heated on a hotplate to soften the adhesive, and is then transferred to the delaminator. The top corner of the polariser is raised, using a scalpel, and is threaded into the 'hot-bar' roller assembly of the delamination tool. The roller assembly will then peel back the old polariser, at a constant angle and speed. See Photos 2 and 3.

It is important to note that 'mura' defects (slightly dark smudges, caused by displacement of the liquid crystal) are usually caused by pressure on and flexing of the screen. It is therefore extremely important, when laminating or delaminating, to ensure that a constant pressure and speed are applied.

After delamination, the exposed surface must be absolutely clean. Specialised cleaning fluids are used for this purpose. See Photo 4.

A huge variety of polarising film is available. You can buy it precut or by the roll, in many different angles and several different hues. It's essential to adhere to the manufacturer's specification when carrying out replacement. The wrong polariser can result in inverted colours, a poor viewing angle and other unusual effects that can be confused with video faults.

To replace the polariser the backing film is removed from the new polariser material which is rolled on to the exposed glass surface, using a laminator tool. See Photo 5. To do this accurately is a skilled operation. If insufficient care is taken, minute bubbles or contamination effects will be seen under microscopic examination.

Tab replacement

Replacement of tab chips is the most challenging aspect of LCD panel repair. The tab chips generally run down one side and along the top edge of the glass. A faulty or poorly bonded tab will normally show as a single – or multiple-line error.

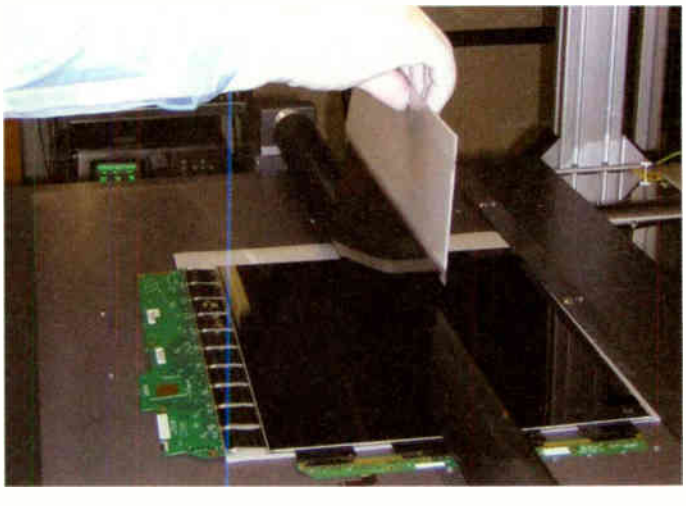
The fault is often intermittent and can be instigated by flexing the panel assembly before the unit is stripped down. This type of fault is caused by poor bonding of the tab, or corrosion of the ITO (indium tin oxide) tracks that lead to it. If ITO corrosion is evident, the panel is not repairable.

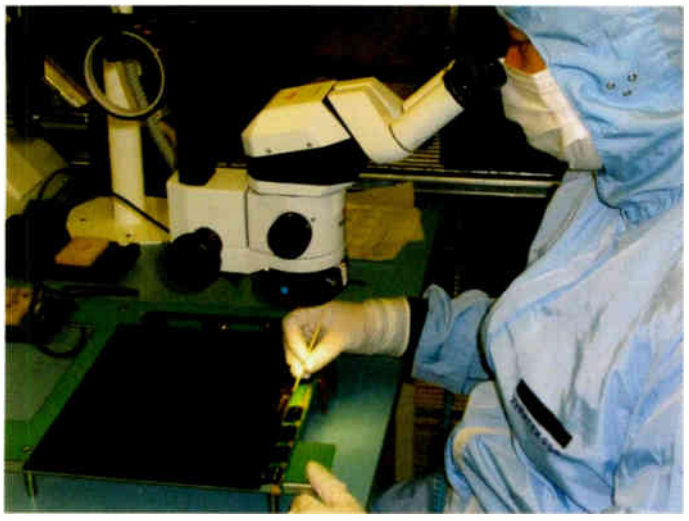
Photo 2 – left: A corner of the old polariser film is attached to the hot-bar assembly of the delaminator.

Photo 3 – right: Half way through delamination. Note the 45° angle of removal.

Photo 4 – left: After delamination a technician cleans the exposed surface carefully.

Photo 5 – right: The new polariser material is rolled on to the cleaned glass, with the technician pulling away its protective film.





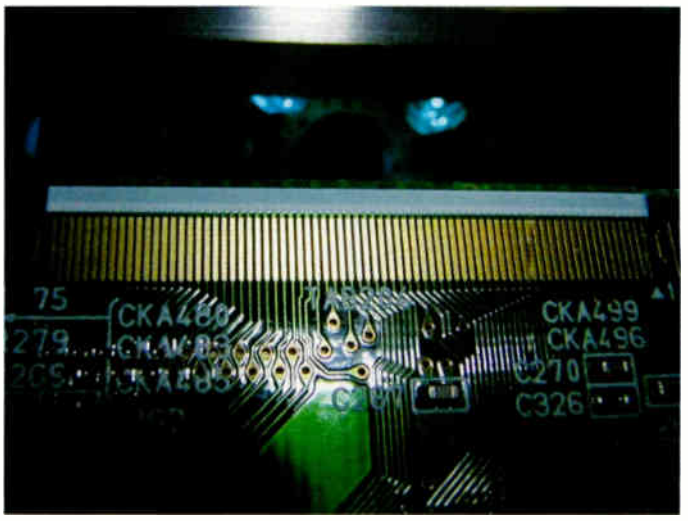


Photo 6 – left: Cleaning the bond site.

Photo 7 – right: The cleaned bond site. after removal of a faulty tab.

The first job is to establish which tab is faulty. Most problems occur at the edges of a tab. As a result, a line fault caused by the final pin of one tab could be confused with its being caused by the first pin of the neighbouring tab, a costly mistake! Specialist testers and software that can give an accurate readout of the exact position of the missing (or bright) line are available. According to the model, you can refer to a table to identify the faulty tab.

Having done so, you remove the tab using a combination of heat and chemicals. The key to successful tab bonding is that the bond site is perfectly clean when examined under high magnification. Cleaning cannot be rushed: the operation normally takes a skilled technician twenty to thirty minutes. See Photos 6 and 7.

The new tab can now be bonded. Photo 8 shows one of several tab bonders, and Photo 9 the head of the tab bonder ready to bond when the new tab is placed in position. The tabs are not soldered, partly because of the microscopic tracks: they are attached using ACF tape. This is extremely expensive and consists of microscopic gold balls that are held in an adhesive resin. A small length is cut off and sandwiched between the ITO tracks and the tab itself.

The temperature and amount of pressure applied via the tab-bonding machine depend on the size of the tab and the type of panel. Lists of temperature and pressure 'profiles' are held in the tab bonder's memory: the correct one for the panel being repaired has to be selected by the technician. The correct combination of time, temperature and pressure crushes the gold balls in the resinous material and spreads them throughout the join, giving excellent conductivity between the tab and the ITO tracks.

Before the tab bonder is activated, the alignment is checked by microscope and also via two cameras at each end of the tab. Once the position is correct, the automated bonding sequence can begin. The bonding itself should take a few seconds. After the bond, the panel is checked on the test jig.

The panel can then be reassembled and put into burn-in. The burn-in test stresses the panel by cycling the display and temperature for several hours.

Viability of repair

Many LCD screen problems, apart from smashed glass, are repairable – if you have the right equipment. The Teleplan facility is primarily geared up to provide high-volume 'equal-to-new' repairs, but there is increased demand from customers who request one-offs or small-batch repairs.

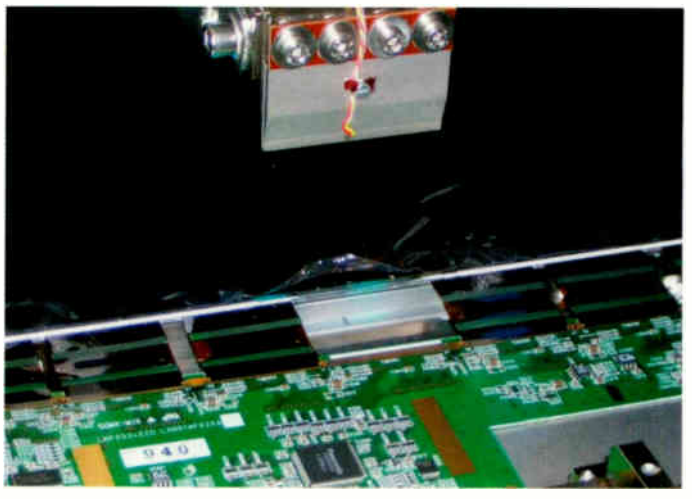
Provided a panel is repairable, the average cost of completely refurbishing a 17in. flat panel is in the region of £80, including parts. For further information contact the Teleplan UK Sales Manager Ron Harckham on 02392 444 241 or email rharckham@teleplan-uk.com

Teleplan is a warranty repair company with some 6,000 employees worldwide, working mainly for the IT industry. Large facilities in the UK, Holland and Poland currently repair several thousand CRT and flat-panel display units a month.

Mobile phones, printers, laptops and anything associated with IT are repaired at other sites. There are plants in most European countries, also the Far East, Australasia and America. ■

Photo 8 – left: One of several tab bonders: there are different types depending on the technology used by the display panel.

Photo 9 – right: The head of the tab bonder, ready to bond when the new tab is placed in position.



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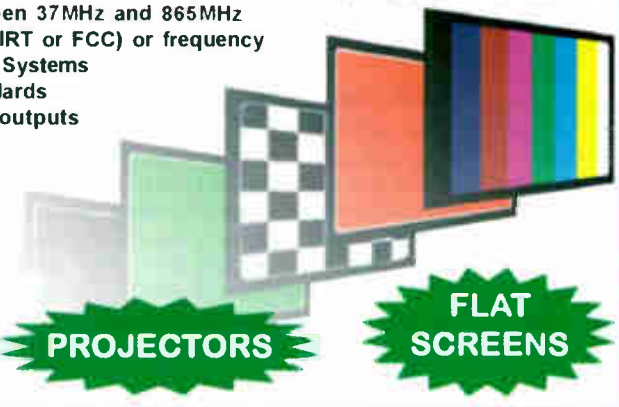

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In the world of computer monitors, unlike those for televisions, there is a multiplicity of different systems involved. To satisfy this incredible demand, PROMAX has designed the GV-241, a universal generator for the testing of computer monitors, which greatly facilitates their adjustment, control and repair.

- Test Patterns : Colour Bars; Red; Green; Blue; Scale of Greys; Cross hatch; Multiburst and White
- Outputs : R; B; G; CVS; HS; VS; CS; C1, C2, and C3

AA 930

AUDIO ANALYSER

The AA-930 has been designed to facilitate the repair, tuning and analysis of audio frequency equipment in general. Hence, why the six indispensible measurement instruments from an audio service workshop have been combined into this one piece of test equipment. The AA-930 is equiped with RCA 600 Ω and DIN 47 kΩ connectors for the inputs and outputs. In addition, two BNC connectors on the front panel and two RCA connectors on the rear panel allow th user to view all of the signals measured by the instruments.

- Low Freqency Generator
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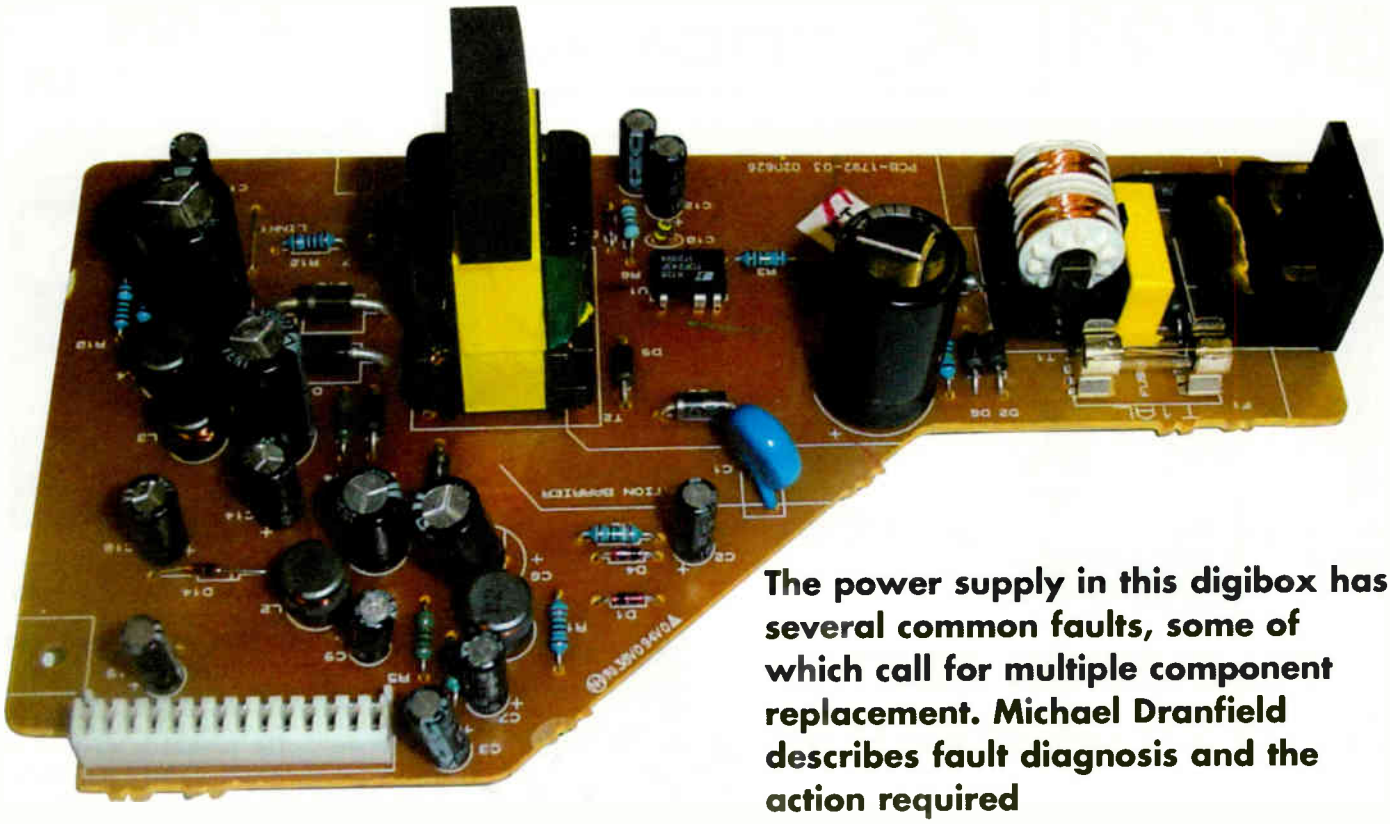
- Millivolt Meter
- Azimut

TA 903B

CRT REJUVENATOR

The TA-903B has been designed to analyse and rejuvenate the cathode ray tubes (CRT) of colour and black and white televisions and monitors. The user can detect and depending upon circumstances repair the leakage or short cicuits, simultaneously measure the current of the RGB cathodes in the cut off point, trace the voltage / current characteristics and rejuvenate each of the three cathodes independently.



The power supply in this digibox has several common faults, some of which call for multiple component replacement. Michael Dranfield describes fault diagnosis and the action required

DRX400 PSU problems

The heading photo shows the Amstrad DRX400's power supply.

The Amstrad DRX400 digibox is becoming a regular visitor to the workshop now that it's out of warranty. Apart from failure of the Connexant CX24108-20ES front-end ZIF tuner chip, which causes signal problems, most faults occur in the power supply. As with earlier Grundig digiboxes, most failures here are caused by the use of poor-quality electrolytic capacitors.

Power supply circuit

Fig. 1 shows the circuit diagram of the power supply which, in comparison with earlier models, is remarkably simple. It's easy to work on, and fault-diagnosis is simple. There are only a handful of components on the primary side of the power supply, the main one being the TOP243P chopper/control chip U1. Regulation feedback is applied to pin 4 of this IC from the PC123 optocoupler IS01, which is driven by the TL431ACZ adjustable shunt regulator chip U2. The latter monitors the 5V and 3·3V supplies at its reference pin, via 1% resistors.

The only slightly unusual arrangement on the secondary side is the way in which the 30V supply is obtained, by a voltage-doubler circuit (D1, D4, C2, C3) that 'sits' on the unsmoothed 20V supply.

Fault diagnosis

After removing the lid, which is very difficult, a visual inspection of the power supply will usually reveal the cause of the problem.

If the power supply is dead with the mains input fuse F1 (1AT) intact, the cause is usually failure of one or both of the 1MΩ start-up resistors R3 and R13. They should both be replaced, using the 0·75W, 350V metal-film type.

If the mains input fuse is blackened and the top has blown off the chopper chip U1, the cause is the mains bridge rectifier's reservoir capacitor C5 (33μF, 400V). You will find that it's open-circuit. In addition, the 1N4007 mains bridge rectifier diodes D2, D3, D6 and D7, IS01 and the 1N4148 rectifier diode D11 will all have been damaged and will have to be replaced, even if a cold check suggests that they are OK – they can fail at switch on.

Finally there's the most serious fault. This is given away by the presence of a loose object inside the box. You will find that capacitor C6 (330μF, 25V), the reservoir capacitor for the 20V supply, has exploded. The basic cause of this is failure of C13 (2,200μF, 6·3V) or C15 (3,300μF, 6·3V). The value of either of these two capacitors can fall dramatically. As they are the reservoir capacitors for the 5V and 3·3V supplies respectively, U2 and IS01 think that one of these supplies has fallen and attempt to increase it, with the result that all the supply voltages on the secondary side rise. In this event, because of internal heating nearly all the capacitors on the secondary side of the circuit will have fallen in value. For any chance of long-term reliability, the whole lot must be replaced. Despite this rise of voltages on the secondary side of the circuit, I have yet to find any damage on the main board.

After carrying out a repair I always give the PCB a good clean with Electrolube FLU Fluxclene, which is available from SEME, and dry it with a hairdryer to give a perfect finish.

Repair kits

As a result of the experiences described above, SatCure has produced two reliability kits, one to upgrade the primary side of the power supply and the other for the secondary side. The part numbers are RELKIT42 and SATKIT42. To order, or for further details, go to the website at www.satcure.co.uk ■

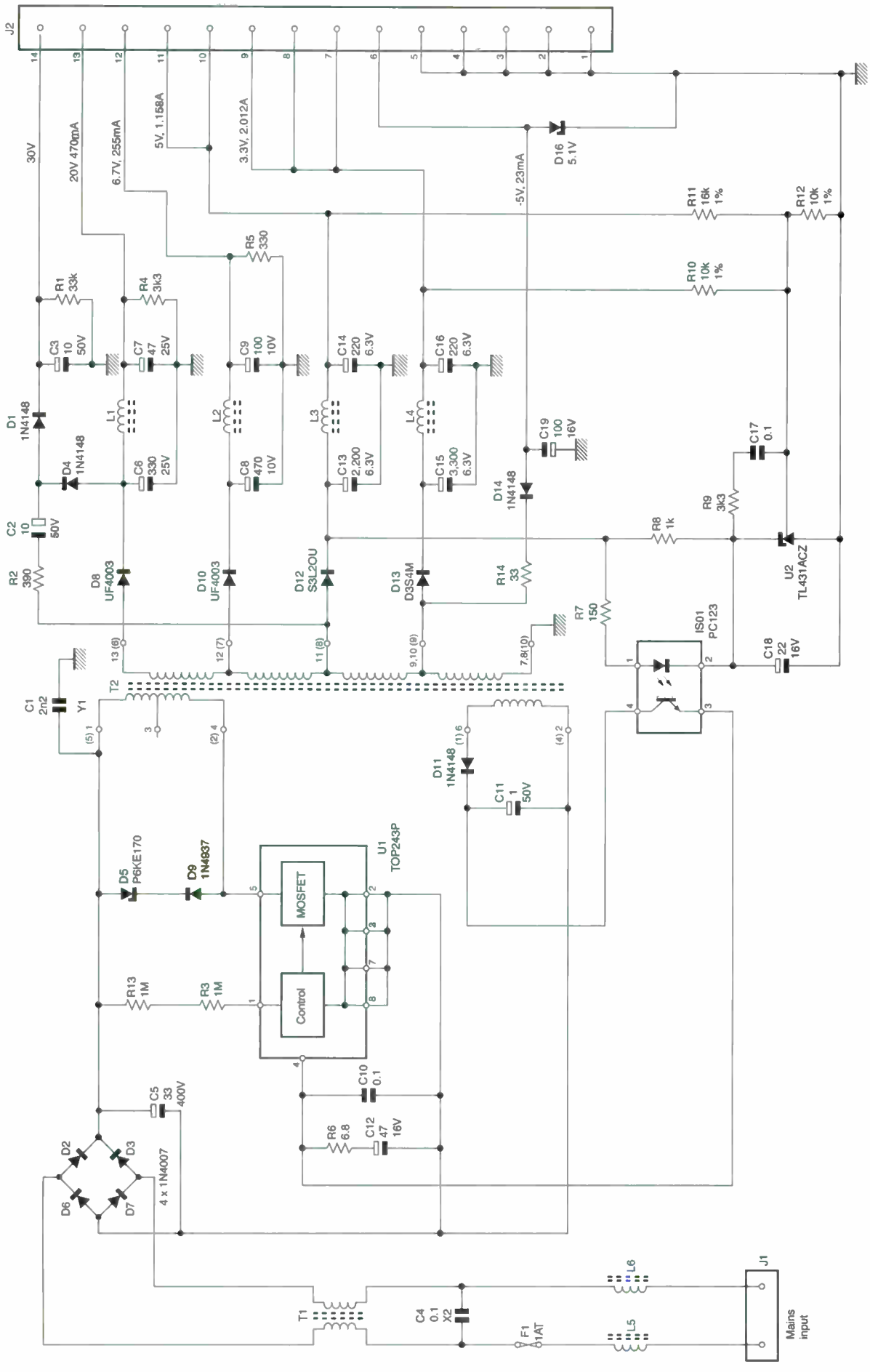


Fig. 1: Circuit diagram of the power supply in the Amstrad digibox Model DRX400. The numbers shown in brackets at the connections to chopper transformer T2 are for an alternative type used in some of these digiboxes.

The cult of the AVO 8

The AVO 8 is possibly the most famous multimeter of all time, putting in its first appearance way back in 1923. You can now buy the Mk 7 version. Why would you want to in this digital age? Well, there are many applications where an analogue meter has decided advantages, and you can't do better than an AVO 8. Eugene Trundle takes a close look at the current model, its features and uses

The AVO 8 may seem to be an incongruous sight on a 21st-century repair bench. Its dial and pointer provide a strange contrast with the digital readouts and PC-based instrumentation of today. But the AVO 8 has many virtues that are not present with its modern counterparts, as we shall see...

Features

The AvoMeter, now in Model 8 Mk. 7 form, first appeared in 1923. It has been much refined since then. The meter is a very analogue device indeed, with a volume greater than two house bricks, two selector knobs and a curved dial and escutcheon. If you turn it so that the dial is towards you, and half-shut your eyes, it presents a monkey-like grinning effect. The AVO 8, based on a very good moving-coil assembly, has AC/DC voltage ranges from 3V to 3kV full scale, current ranges from 50μA to 10A DC and 10mA to 10A AC, and a resistance reading capability of 1Ω-20MΩ. Sensitivity is 20kΩ/V on the DC ranges, 2kΩ/V on the AC ones, with accuracies of 1 per cent and 2 per cent of FSD (full-scale deflection) respectively.

One of the best features of the AVO 8 is its legendary safety cut-out. This is a mechanical device that's triggered by the moving-coil assembly at either end of its travel and very rapidly isolates the whole instrument from its positive input terminal. It is virtually foolproof. I've never seen this mechanism fail in the thirty-odd years I've been acquainted with the AVO 8. The REV MC feature is something else that's handy: it reverses the meter's direction of movement without having to disturb the connections to the circuit being checked. And the recessed glass of the dial forms a useful tray for screws, nuts and sundry little bits from the equipment under test!

The meter is as robust as anything with a sensitive moving-coil assembly can be, but it cannot shrug off the effect, for example, of a one-metre drop on to a concrete floor. Electrically the meter is very rugged, easily surviving the sort of electrical and pulse overloads that would wreck the delicate semiconductor devices in a DMM. If you want to try an experiment, ground the negative probe then touch the positive probe, with each type of meter set to a low DC range, to the A1 or focus pin of a TV CRT. You will probably blow up the DMM while the AVO survives intact.

In terms of circuit loading an analogue meter comes a poor second to a digital type. This is not very often significant in general servicing but, when it is, a DMM must be used. The latter also provides greater accuracy of course. On the other hand DMMs can produce a confusing 'fruit-machine' effect when the quantity being measured varies rapidly, and some of them are vulnerable to strong ambient electrical fields and pulse radiation. See if yours is affected when, for example, it's placed very close to a working line output transformer.

The smoothing effect of a moving-coil/pointer arrangement gives you a better idea of what's going on with a fluctuating input and, in addition, a 'ballistic' test with reactive components. The value and condition of a capacitor can be roughly gauged by the size of the needle's kick when, using an appropriate Ohms range, the capacitor is connected – ensure that it's discharged! The presence of a large inductor such as a 50Hz mains transformer is indicated, using the Ω x 1 range, by the slow rise of the meter's pointer to its resting position – surprisingly slow in terms of the DC resistance of the primary winding.

Driving current

The Ω x 1 range of the AVO 8 has other uses. With this range the test current is about 50mA, which can produce a dim glow in low-energy, low-voltage filament bulbs. This

sort of current is also better than the smaller test current used by other meters at showing contact resistance, for example in switches, plug-socket connections and motor brushes.

Mention of motors brings us to the subject of testing small DC types such as those used in tape and disc decks, camcorders etc. The 50mA-odd test current from the AVO's Ω x 1 range will turn any of these when there is no mechanical load, and any problems within such a motor are immediately obvious because of low or fluctuating resistance readings. If you grip the shaft between a finger and thumb you can feel any torque flutter caused by a bad commutator or rotor coil – a DC-coupled oscilloscope connected across a good motor will show a regular waveform. To check for irregular torque, grip the shaft until it only just turns. Also confirm that the motor always starts from any position. A typical reading with a running motor is a steady 50Ω, which drops much lower when the motor is loaded then stalled, now indicating about 10Ω.

The same test can be carried out with the motor coupled to its mechanical load, so long as this is a light one – for example a camera lens or a laser-drive sled. With these, the resistance indicated by the meter corresponds to the mechanical load inversely, thus indicating 'tight spots' etc. A motor that drives a heavier load, such as a disc tray or tape-deck loading mechanism, will not operate with the energy supplied by the AVO but, if the pulley is turned by hand, the meter will check out the motor. It's often possible to slip off a belt or disengage a worm to carry out the off-load tests described above. Bear in mind that on the Ohms ranges the voltage available from the AVO is reversed, in that the minus terminal is positive and vice versa. This is important when testing electrolytic capacitors, motors and semiconductor devices. It doesn't change when the REV MC key is used...

Semiconductor checks

When using the AVO's resistance ranges to test transistors and diodes the readings obtained are not really resistance – they are related to the forward voltage drop across the junction being checked. With a single junction the indication obtained on the Ω x 1 range, powered by the meter's internal 1·5V battery, will be typically between 15Ω and 30Ω, less for say a Schottky diode, more for the double junctions in a Darlington device. A reading of about 1·2kΩ is typical with a conducting junction on the Ω x 10 range.

LEDs, which have forward voltage ratings from about 2V upwards, cannot be illuminated – or properly turned on – by the AVO's 1·5V cell. They can be checked using the Ω x 100 range however. When the meter is switched to this highest resistance range it draws on its 15V battery. This provides a test for some zener diodes, in that reverse 'resistance' is indicated as infinite with the low-ohms ranges but relatively low with the Ω x 100 setting.

Pulling current

The wide span of the current ranges is a boon, especially when your activities involve more than 'brown' electronic goods. The 10A DC range is very good for testing batteries of the AA and AAA type used in remote-control zappers – an off-load voltage check gives no idea really of a battery's condition. Switch the meter to 10A DC and connect the battery to it momentarily, for the split second it takes for the needle to come to rest. This real test checks the battery's charge, internal resistance and potential life. A good new battery will read 3-4A for an alkaline type, 2-3A for a zinc-carbon type.

A battery that cannot muster more than half an amp should be thrown away, even though it may work the zapper or whatever. Other types of battery, from button cells upwards, can be tested in this way, the current reading being proportional to their internal resistance and energy rating.

Resistance substitution

Because the AVO 8 has a fixed measuring current, each voltage range provides a known and very accurate resistance. This is useful where the voltage to be applied to the meter does not greatly exceed the range to which it is switched. Thus the 10V DC setting provides 200kΩ between the prods, the 100V DC setting 2MΩ and so on.

The AC voltage ranges provide much lower resistances – 300Ω with the 3V range, 10kΩ with the 10V range, 200kΩ with the 100V range and so on. This is useful when, for example, discharging reservoir capacitors: start with a high AC voltage range (even though the applied voltage is DC), then switch down progressively as the charge is dissipated. It's much better than splashing a screwdriver blade across the terminals and, because the switches and prods are always available, often more convenient than using a hand-held resistor for the purpose.

Disadvantages

There are applications where an analogue meter will not do, for example when setting the HT voltage in a TV set and, particularly, when checking the 3·3V and 5V supplies used by digital chips. As an aside, I find that these are best checked with a digital voltmeter and an oscilloscope, set to high gain and with AC coupling, in parallel to show any hash and ripple.

So the AVO sits alongside a DMM on my bench, the latter being used surprisingly little from day to day.

Pedigree

The AVO 8 is an amazingly useful and versatile piece of equipment, with a pedigree second to none. For a period in my youth I abandoned it, tempted away by a superficially similar Taylor multimeter because of this instrument's 100kΩ/V DC sensitivity. But I soon returned to the AVO 8.

The 8 used to have a little, but perfectly respectable, brother called the MultiMinor. According to advertisements in this magazine many years ago, possession of the Minor could make the difference between success and failure in your chosen career! It was, perhaps, a recognition of the fact that the Model 8 was beyond the pocket of junior technicians.

Availability

The current version of the AVO 8, the Mk. 7, costs a cool £585 plus VAT. So I would not suggest that you rush out and buy one this day. They can however sometimes be obtained second-hand, maybe from a retiring engineer or from a servicing company which is, sadly, being wound up in these days of £40 video players and cheap TVs and set-top boxes.

Lesser instruments

Other analogue meters, many of which can now be bought very cheaply, share some of the characteristics of the AVO 8, and can play some of the tricks described above. I do not know of any however that approach the real McCoy in terms of build quality and integrity. ■

Portrait of the CAI

The aerial and signal distribution industry needs a trade body. The CAI was set up in 1978 for this purpose and has expanded to provide a number of services. Graeme M. Young describes its present status and activities

The Confederation of Aerial Industries is a trade body that represents the aerial and signal distribution industry. It was formed in 1978 and today over 85 per cent of its membership is concerned with installation services that conform to its mandatory Codes of Practice. It has grown steadily since its inception and is now recognised throughout the UK as a regulator of the aerial and distribution systems trade and for the training it offers. The CAI aims to raise the standards of the industry, through training, and to encourage dialogue with national and local government authorities and nationalised bodies.

To join the CAI is not easy. An applicant has to prove to the CAI's board of directors that the company is a reputable and stable business. There are several membership categories, including installation members, consultants, affiliates, honorary fellows, transmission platform operators, manufactures and distributors.

The majority of applicants are contractors, installers, manufacturers, retailers or wholesalers involved with aerials and satellite antennas and/or distribution systems, entry control, warden contact or other systems of a similar nature. Conditions of membership include the employment of trained and competent staff; conforming

A busy stand at a recent CAI Trade Fair.

with the CAI Codes of Practice and any relevant British, European or International Standards; and the provision of guarantees for twelve months on equipment and installation work and on manufactured items.

Activities

The CAI's board of directors consists of twelve industry figures, each with a long record of service to the Confederation. There are six full-time staff at the Confederation's headquarters at Wembley Park. The expanding range of signal delivery methods over the last twenty years means that the CAI has had a busy time – in establishing new Codes of Practice, keeping abreast of new regulations, and providing essential training to ensure that its members are able to provide the best possible service for customers. The advent of digital transmissions has called for higher engineering standards.

Testing and approval of various types of coaxial cable has been undertaken and the results conveyed to members, so that only cable of appropriate quality is used. There has also been extensive testing of aerials for performance and construction quality. CAI members have been encouraged to use only those products that satisfy the criteria laid down by the Confederation.

For a number of years the CAI 'Road Shows' have been a major feature of the Confederation's events calendar and the annual Trade Fair, now held at the National Agricultural Centre, Stoneleigh Park near Coventry, attracts a sizeable number of exhibitors and members. The Road Shows have had a theme each year, recent tours being concerned with the changeover to digital transmission. Every Road Show includes a small exhibition and provides a number of free technical and commercial seminars. They give members away from London and Birmingham an opportunity to see the latest equipment and services on offer and catch up on technical and commercial issues.

The annual Trade Fair is a major event that lasts for three days, normally during the early summer. A large exhibition is staged, with numerous seminars given by senior representatives of manufacturers, regulatory bodies and commercial organisations.

Discussion at the Ofcom stand at a Trade Fair.

Training

Knowledge is a major concern of the CAI, which provides it through training courses and publications. These cover a wide range of subjects, from basic analogue and digital technology to aerial installation and alignment, also motorised satellite dishes. Instruction is also available on signal distribution systems. All the training courses are well attended.

Health and safety is emphasised – through adherence to regulations and the application of common sense.

The CAI distance learning course is intended for members who are beyond a reasonable travelling distance from a regular training centre or those unable to attend in person for various reasons.

Whatever course is chosen, tuition is thorough and is constantly updated.

Insurance and obligations

The industry is heavily dependent on the human effort required to carry out installations. This can involve personnel venturing into dangerous places or altering the fabric of a building. So insurance matters have a high priority. The CAI has appointed insurance brokers that specialise in providing correct cover for the types of risks encountered.

Members must agree to investigation, at a moment's notice, of their installation work or the merchandise they manufacture or supply. This is to ensure that the reputation of the CAI and its members is upheld. Members must also provide a minimum twelve-months guarantee on equipment and installations, and bear the costs of any remedial measures required by the Confederation.

Summary

The responsible approach to the provision and installation of aerials and distribution equipment demonstrated by the CAI, along with its concern for the health and safety of members and its comprehensive training programmes, has led to it being represented on significant government committees. Its presence in the legislature ensures that a common-sense approach is taken to regulatory matters. This benefits all those in the aerial and distribution industry.

What of the future? More of the same would be entirely adequate. But, with the forthcoming digital switchover, the ever-increasing convergence of TV and PC technology, the introduction of home networks, and the inevitable integration of all things electronic, including security systems, the challenges that face CAI members will steadily increase. ■

Vintage repair:

the Körting MT157/158 tape recorder

Photo 1: Top view of the Körting MT157/MT158 audio tape recorder.

Remember the era of reel-to-reel audio tape recorders? Michael Maurice has had one in the family since the early Sixties. He describes its construction and operation, and a restoration project

The late 1950s and early 1960s saw the arrival and then a boom in home tape recording, initiated by the advent of the portable (if, at about 20lb, you could call it that) reel-to-reel tape recorder. The compact cassette hadn't been invented: it didn't take off until the mid 1960s. These earlier reel-to-reel machines were basically smaller versions of studio ones. The main players in this field were Grundig and Philips, but lots of other manufacturers entered the market.

History

Back in 1963 my father bought us a Körting MT157 tape recorder – Photo 1 shows a top view. It could accommodate up to 7in. spools, and operated at speeds of 3·75 and 7·5in./sec. Unusually for its time, it was a stereo machine. Our recorder received a lot of use and, unfortunately, some abuse – we were a young family. It went wrong in the late 1960s and was sent away for repair. Apparently smoke came out of it, for which I got the blame. It wasn't until much later that I discovered what had possibly gone wrong!

In the early 1970s I bought an Akai 4000DS, but I was still trying, with some success, to coax the Körting back to life. The main problem was that spares were unobtainable, and several parts needed replacement. The casing and the top cover were also in poor condition.

It's difficult for me to date the MT157/158 series machines. The associated literature and my enquiries suggest that our recorder was of 1961 vintage. Two MT118s I subsequently obtained (see below) had the original literature, in German, and the original bill dated 11 July 1961. An MT158S I obtained has the date 5 January 1962 stamped on the motor.

My earliest recollection of the recorder was at Christmas 1963. Apart from recording some of my mother's 78 RPM records, I distinctly remember dad recording Alan Freeman's *Pick of the Pops*. This included The Beatles, who were at the top of the charts with *She Loves You* and *I Want to Hold Your Hand*, Big D. Irvine's *Swinging on a Star* and items by Gene Pitney and Dusty Springfield. That tape was unfortunately lost years ago.

My father once told me that the tape recorder had cost about £90. That was a fortune in the early Sixties. To put it in perspective, the average wage was £5-£7 and my parents-in-law were unable to move to the house they really wanted because it was £100 too expensive!

Imagine my delight when, not too long since, I found an almost identical machine, Model MT158S, on eBay. There were only two problems: (1) the unit was in Canada, and (2) it was the 110V, 60Hz version. The first was easily dealt with (shipping from Canada cost US$70), but the second was not so easy. I subsequently acquired three more Körtings, an MT158 from the US and two MT118s from Germany. They were in various states and in need of repair. The MT158S from Canada was the best one, though it was built for 117V, 60Hz operation. I decided to try to modify this machine, using the mains

transformer and motor from an MT118.

Operation

First an explanation of how the recorder operates, how it was built and the circuitry it employs. The basic specification is as follows: 1/4in. tape; stereo or mono; three heads, for erase, record and playback; separate record/playback amplifiers for the left and right channels; frequency response 40Hz-15kHz at 3·75in.sec, 30Hz-20kHz at 7·5in.sec.

The MT157 is a stereo model that can record and play back two-track stereo or four-track mono audio. The left- and right-channel controls are coloured red and green respectively. There are a number of input and output sockets, all DIN. The red and green push-button switches at the left select record on the appropriate track. Pressing the red and green buttons simultaneously gives stereo recording on both tracks. The white buttons next to the red and green record ones select microphone or radio input. After pressing either of the record buttons, you press the start button to initiate tape movement. Recording is ended by pressing the stop button. A single magic-eye indicator shows the record level. It shows either channel or, in stereo, the peak of both channels. Record level is controlled by the green and red volume controls, depending on which track(s) you want to record on. To play back, you use the monitoring bank of switches to select the appropriate track – left, right or stereo. When stereo is selected, the internal loudspeaker plays back the right (red) track. A simple tone control and filter, and a mixer control, are provided on the top panel near the head block.

There are two plug blocks under the head block. In normal use the arrows point in the up direction. Several trick features are initiated by changing the position of the switches.

You can record in mono only, and monitor both the input and off-tape by switching from left to right monitoring. Or you can play back one track and use the mixer control to mix it into the other track. You can even get an echo effect.

It was quite a versatile machine for its day, high-tech in the use of transistors and PCBs (remember, this was 1961). It also had an impressive specification.

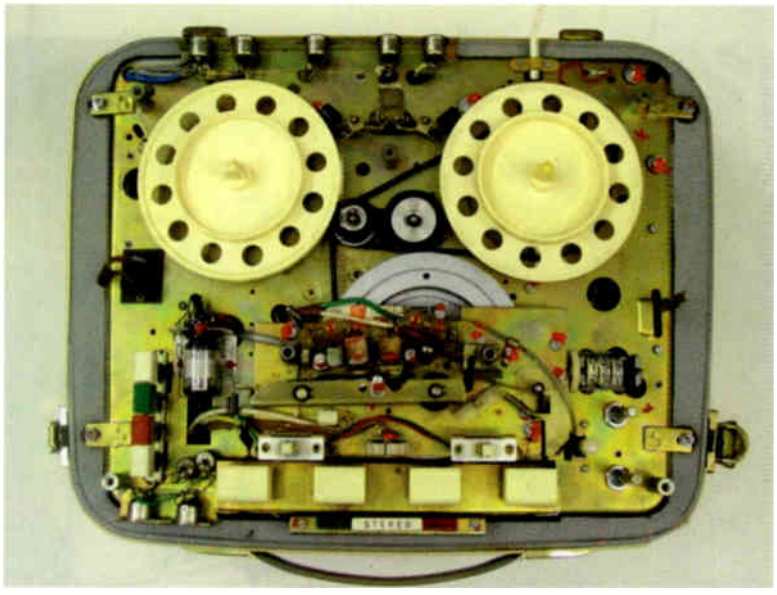


Photo 2: The MT157/158 with the top cover removed.

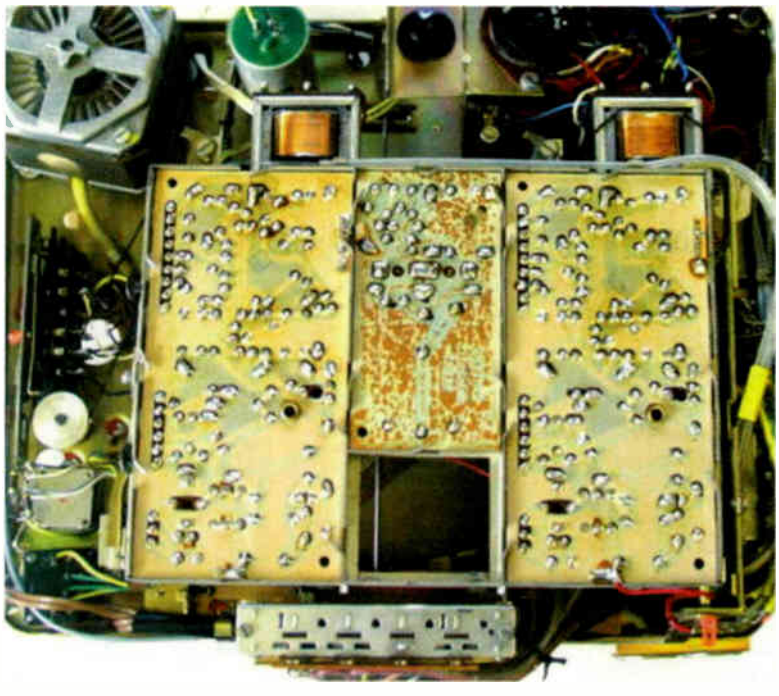


Photo 3: Underside view of the tape recorder after removal from the cabinet.

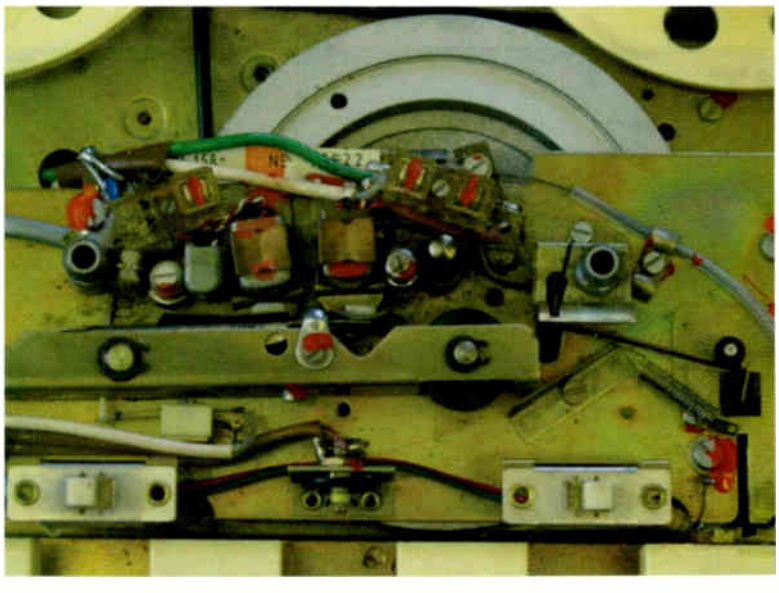


Photo 4: Close-up view of the head block. The mixer control (centre) was broken – it was later replaced.

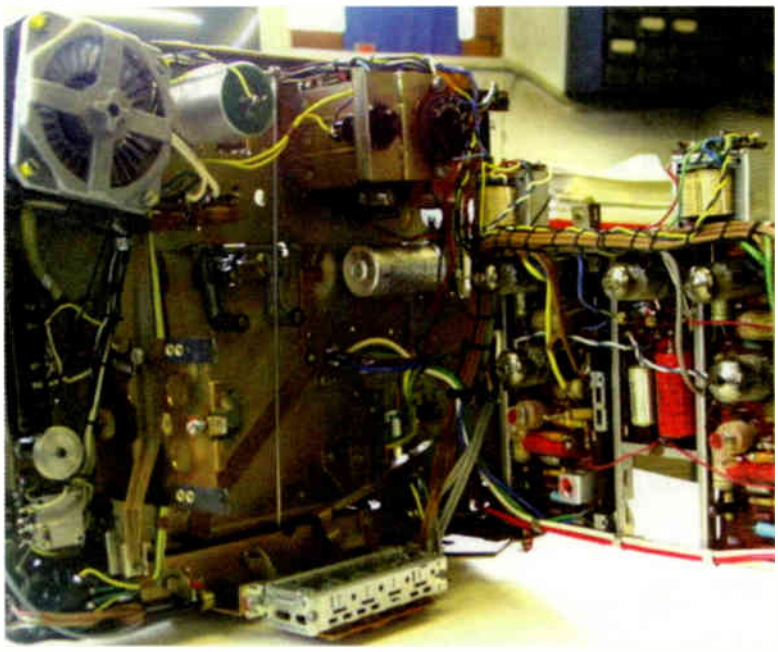


Photo 5: Underside view of the recorder with the electronics cage opened for servicing.

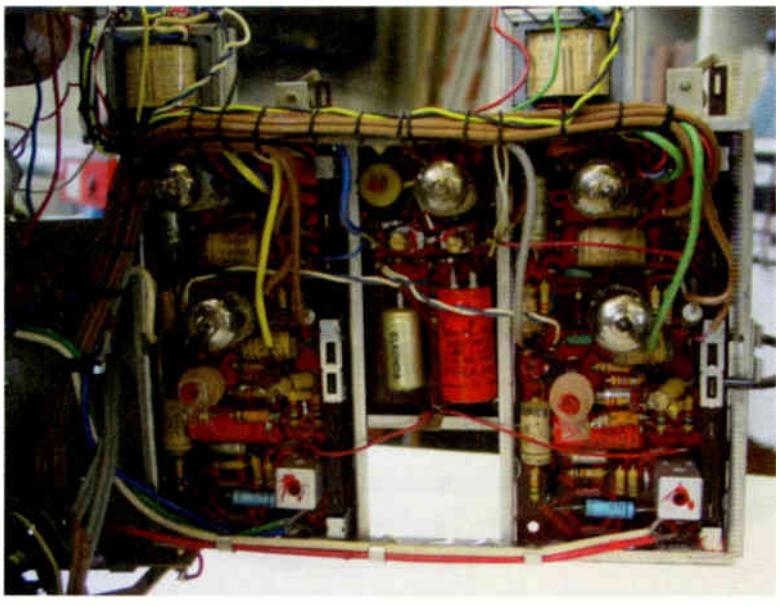


Photo 6: Close-up of the electronics. The erase/bias oscillator is in the centre.

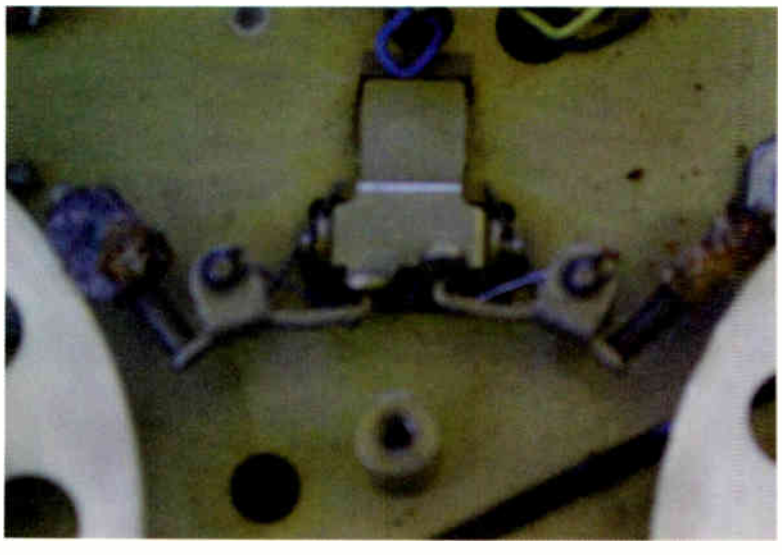


Photo 7: The original brakes were in very poor condition.

Mechanical arrangements

In those days tape recorders were built by arranging the mechanics on a large steel chassis, the electronics being mounted around it. The mechanics are delightfully simple, see Photos 2-5. A single synchronous motor drives the clutch and the capstan flywheel via two belts. In the play/record modes a large lever engages the pinch roller and brings the pressure pads up to the record and playback heads, the brakes being released to enable the take-up spool to rotate via the clutch felt.

In the fast-forward mode an idler connects the flywheel and the take-up spool, while when rewind is selected the rewind idler moves to engage with the supply spool. In the pause mode the pinch-roller lever is moved slightly away while another lever slightly raises the take-up spool to disengage the clutch. Speed selection is achieved by changing the number of poles on the motor from six to twelve. There is a mechanical cable linkage between the speed-change switch and the equalisation switch.

The electronics

The electronics include six valves, two transistors and a selenium bridge rectifier. There are three PCBs, one for each channel and a third for the erase/bias oscillator circuitry. All three boards are mounted in a cage that opens for servicing, see Photos 3 and 5. A number of mechanical and electrical cables connect these boards to the various switchbanks and the volume controls.

The first amplifying device in each channel is an OC44 germanium pnp transistor. This is followed by an ECC85 double-triode valve, with an EL91 output valve. A system switch, similar to that employed in 405/625-line TV sets, is used for record/playback switching. The switch is connected to the appropriate record button by a mechanical cable. Various screened cables are taken to the relevant switches and controls for tone, volume, equalisation and channel switching. A mechanical cable links the speed-equalisation switch to the main motor-speed change switch.

The erase and bias oscillator circuitry is based on an EL91 valve. It's switched on by supplying HT when either or both record buttons are selected.

An EAM86 magic-eye valve is

used as the record-level indicator. It's switched on in the record mode by applying HT when either or both record buttons are pressed.

The PCB was a revolutionary way of constructing electronic circuits in those days, and most service engineers were wary of having to replace components on a PCB. The service manual provides some advice: "Do not attempt to unsolder from the printed board. Instead, cut the old component away and solder the new component on its legs". I must remember that when replacing a 200-pin LSI postage-stamp sized chip!

Repair history

I have to rely on memory to recall the work I carried out when I took the machine apart and 'repaired' it more than thirty years ago! Prior to that the machine had gone wrong on a couple of occasions and had been sent to Körting's agents at Stoke-on-Trent. That would have been in about 1968/9. When we got it back we continued to use it occasionally. Then, in 1970, I discovered pop music and it got a lot more use, as I played back the top 20 as loudly as possible (but not that loud – the MT157 has only a 4W amplifier!).

Then, one day, I came to use it and it didn't go. The main drive belt had broken. It lay unused and forlorn for about a year, after which I first tried repair. I obtained a set of belts but, never having taken the machine to pieces before and not knowing exactly where the drive belt should go, I removed the head plate and broke the end of the tape-stop switch. That wasn't too much of a problem. I got the machine to work, but the belt broke two weeks later.

It was a few more years before I started to tinker with the machine again. By now I had the Akai and had discovered stereo. I obtained some belts down the Edgware Road, the Mecca of electronics enthusiasts, and got the machine going again. They weren't the right size, but the recorder worked. Belt replacement was frequently required however. I had also managed to obtain a service manual and carried out some electrical adjustments, such as bias level, which made the recordings somewhat better. I had also discovered the trick functions, such as off-tape monitoring, mixing and echo.

My interest in the machine then waned, and it was consigned to the loft for about twenty years. By then the speed-change selector switch had broken, the end-of-tape stop switch had broken, both drive belts had failed, the rewind idler was very worn and virtually unserviceable, the on/off/volume switch had broken, as had both volume knobs, the mixer control was broken, there were no pressure pads left and the cabinet was very much the worse for wear. Could the machine be restored to its former glory? Well, not for the time being, but there came a time.

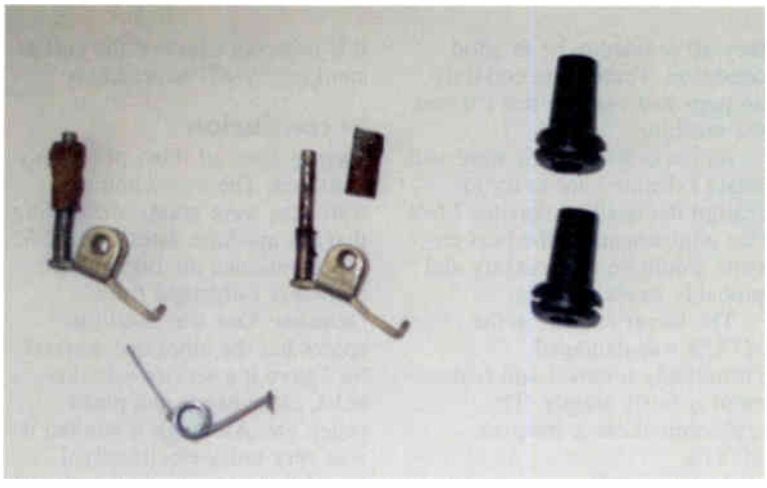


Photo 8: Sequence for repairing the brakes. Left the brake arm stripped of its rubber. Left centre the sleeve removed. Right centre rubber grommets. Right the restored brake arm.

Modification and restoration

There are no spare parts for these machines, though valves and other electronic components can be obtained – or substitutes used. Mechanical parts, including switches and controls, have not been available for some years.

As I said before, the MT158S machine I obtained was made for the American market, operating at 117V, 60Hz. Modifications were required to use it in Europe. I used one of the MT118 machines to obtain parts.

Notes were made of the wiring plans between the motor and the transformer. I then swapped the motors, together with the speed-change switch as there are slight wiring differences. There are also six instead of four wires between the motor and the power supply. The motor in the US model was an 'outer-rotor' type, the one in the European machine being a standard type. I changed the motor because I thought that the motor pulley, which is an interference-fit type, was of different size depending on whether it was for 60Hz or 50Hz operation. I was wrong. The difference between the 50 and 60Hz type is the rewind pulley that connects the two belts. After I'd swapped the pulley the machine ran at the correct speed.

The brakes, see Photo 7, were in a terrible condition. The rubber parts had hardened and disintegrated, while the metal sleeves had seized on their shafts. The belts were stretched though intact, and were in need of replacement – well they would be after forty years!

The brakes were repaired by stripping them out of the mechanism, removing the old rubber, removing the sleeve from its shaft (this required some persuasion) then fitting new rubber. See Photo 8. The rubber came by inspiration. I had some sleeved grommets from years ago, removed the grommet and forced one sleeve inside the other. Then I pushed the new rubber on to the sleeve with the help of some EvoStick. After letting this dry I trimmed the rubber and refitted the brakes to the chassis.

I was fortunate to come across a website for a US firm that sells large rubber drive belts, up to 3·5mm in cross-section and, I believe, up to 17in. in diameter. These belts are available in various different sizes. I put in an order and, two weeks later, they were delivered. For those interested, the firm is called Consolidated Electronics, phone no. 001 937 252 5332. The website is at www.ceitron.com and you can email to scoy@ceitron.com

I cleaned up the spool tables, the pinch roller, the FF idler and the rewind pulley – the latter was taken from an MT118. I cleaned the switches with silicone switch cleaner. The electronics were left alone. I was going to replace some of the electrolytic capacitors but

they all seemed to be in good condition. There were certainly no pops and bangs when I tested the machine.

As the original seals were still intact I decided not to try to realign the heads. Likewise I felt that adjustments to the bias circuits would be unnecessary and probably cause damage.

The mixer control in the MT158 was damaged. Fortunately removal and replacement is fairly simple. The replacement came from an MT118.

As previously mentioned our MT157 was sent off for repair in the late Sixties – my dad said that smoke was coming out of it. I don't know exactly what caused this but, while playing with the machine a few years later, it suddenly started to smoke. The cause was C801 (C802 in the right-hand channel) which was short-circuit. It decouples the supply to the output pentode. Could have this been the cause of the earlier smoking? We'll never know.

In conclusion

Having done all this I played my old tapes. The sound and performance were good, considering that the machine dates from 1962.

I mentioned the two MT118 recorders I obtained from Germany. One was used for spares but the other one worked. So I gave it a service – brakes, belts, clean heads and pinch roller, etc. Although it worked it was very noisy electrically. I found that someone had replaced the OC44 transistors with AF124s. Fitting the correct type got rid of most of the noise. The cause of the rest was eventually traced to a leaky 68nF, 250V capacitor. I decided to replace all the capacitors in both channels as they had seen better days. So this machine, very similar to the MT158, is now working well.

I may still revive dad's Körting MT157. I certainly now have sufficient spares, from the other machines, I know that the electronics work and that the mechanics can be made to work with not too much difficulty. Just give me a few months – and watch this space!

It's been a good old trip down memory lane. I wonder if these machines will still work in another 42 years' time? By then I'll be close on 90! Will we look at the junk that's produced today with such nostalgia? I doubt it. We throw things away far too readily nowadays, and certainly don't value them any more.

You would be surprised at how many of these old recorders are still around, working or not. Not just Körting but Grundig, Philips, Revox, Ferrograph and some less well-known makes. If you want to see some examples, go to www.ebay.co.uk and put tape recorder in the search bar. You'll be amazed at what is around. ■

Test Case 506

There are now several product categories that cannot be handled by the general-practitioner repair technician, primarily because of lack of service data and spares from the manufacturers concerned. In addition repair would be impractical for most workshops and technicians because of the complex, miniature PCBs and assemblies involved and the need for special training, tools, jigs and test equipment. These factors make it necessary for diagnosis and repair to be carried out in centralised, specialist workshops, where advantage can be taken of economies of scale, i.e. a large throughput. Even so it's amazing what a clever and determined technician can achieve. An example is the digibox faults and other problems regularly described in our Satellite Notebook pages: how do these fellows suss out the faults, with so many handicaps in the way?

Camcorder service work presents similar problems, though in this case there are more independent specialist repairers. Such work is still denied to the likes of the Test-Case gang – or is it? A good and regular customer brought us his mini-DV recorder, which was now a few years old, and explained that he was shortly off on an unexpected visit to relatives in Australia. It was vital to have a camcorder for that, so he had to get this one mended pronto or buy a new one. Had he known about the impending journey earlier, he would have brought the camcorder in for repair sooner.

The problem was confined to the sound, the symptom being intermittent dropout. It had been getting gradually worse with time. Depending on odd factors such as the make of tape, how far into the tape the recording had got, and even maybe temperature, playback of the camcorder's footage was marred by crackles and dropout of the sound track. These symptoms appeared at the same points on the tape with each playback, suggesting that it was a record-mode problem. The picture remained unaffected throughout, with no signs of any break-up or pixellation, even when the audio problem was at its worst.

The first thing that the lads tried was playback of one of the little cassettes brought along with the camcorder in another mini-DV unit, which had been borrowed from the shop for the purpose. An SP recording was tried, because LP recordings in this format, especially from an older machine, are not guaranteed to play back on another deck – the mechanical tolerances are very tight. They found that playback of the tape on the new machine was even worse. Sound was absent more often than it was present and, in addition, the picture became a bit ragged from time to time, with frozen pixels present intermittently, especially at the points where the sound reproduction was particularly bad. So much for the symptoms.

A head-cleaning tape was tried, with no beneficial result. No surprise about that really. The machine was then carefully dismantled and the tiny deck was examined. All present were impressed by the miniaturisation of the mini-DV format, having last dealt with 8mm and Hi-8 decks. A quick bone-up on the theory of this format revealed that the same head-pair is used for both sound and vision, which are recorded on the tape sequentially. It would have been interesting, and instructive, to have examined the off-tape signal, and indeed that might have provided an instant clue to the cause of the symptom. But no obvious test-point presented itself, and the problem was quickly solved anyway. How? See page 251 for the explanation. ■

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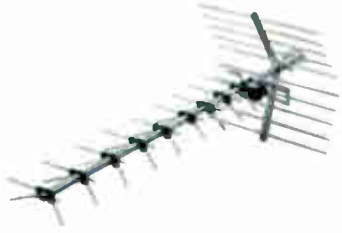

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4 way with Bypass	6dB	SLX4B	£ 14.00 + vat
6 way	12dB	SLX6	£ 18.00 + vat
6 way with Bypass	6dB	SLX6B	£ 19.00 + vat
8 way	12dB	SLX8	£ 18.50 + vat
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Carriage charged at £ 2.00 + vat or £ 6.00 + vat for 2 or more

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Combines TV , FM , DAB , CCTV & Satellite signals on to one down cable for feeding into a triplexed faceplate.

Return cable from VCR / satellite box to SLx Distribution System feed 8 other viewing locations around the home with AV signals.

Integrated digitial bypass for Sky™ digital feature - Intergrated UHF pre-amplifier - Intergrated power supply

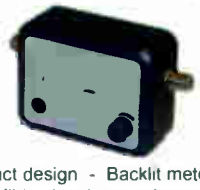
Fully screened - Available in 4 way and 8 way distribution

4 way System
Order Code : 27855R
Price : £ 40.00 + vat

8 way System
Order Code : 27856R
Price : £ 45.00 + vat

Carriage charged at £ 2.00 + vat or £ 6.00 + vat for 2 or more

Satellite Finder



Compact design - Backlit meter scale
Audible signal strength reading
Adjustable level control
Adjustable sensitivity adjustment
Frequency Range : 950 - 2250Mhz

Order Code : 27860R
Price : £ 10.00 + vat

Screened Triplexed Outlet with UK Faceplate

Flush Outlet with satellie F outlet , TV (male) and FM (female) coaxial outlets

Intergral filter seperates FM , UHF and satellite signal from one downlead

For use with the above distribtuion systems

Order Code : 27965U
Price : £ 4.50 + vat

Variable TV attenuator

Coax plug to socket.
0 - 20db variable attenuation.
Freq range 5 - 1000Mhz.
Insertion loss <=2dB

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Price : £ 2.25 + vat

Coax Plug Aluminium

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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
Bag of 100
Price : £ 12.50 + vat

Twist on F Connectors

Order Code : PLG101
Bag of 10
Price : £ 1.00 + vat
Bag of 100
Price : £ 6.00 + vat

TV & satellite combiner

Digital satellite compatible.
UHF TV input 5 - 860Mhz.
Satellite input 950 - 2400Mhz.
Output 5 - 2400Mhz

Order Code : 27955R
Price : £ 3.50 + vat

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Grandata Ltd

distributor of electronic components

Television Repair / Mod Kits

MAKE & MODEL	KIT TYPE	CODE
ALBA		
1452T	PSU	ONWAKIT
1427T	PSU	ONWAKIT
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
AKAI		
CT1417	PSU	ONWAKIT
CT2159U	PSU	ONWAKIT
CT2162UNT	PSU	ONWAKIT
CT2863UNT	PSU	ONWAKIT
DECCA/TATUNG		
F SERIES	PSU	MODKIT30
TVC563	STANDBY	MODKIT37
GOLDSTAR		
CF25A50F	FRAME	MODKIT36
CF25C22C	FRAME	MODKIT35
CF28A50F	FRAME	MODKIT36
CF28C22F	FRAME	MODKIT35
CF28C28F	FRAME	MODKIT36
CF29C42F	FRAME	MODKIT35
GOODMANS		
147TT	PSU	ONWAKIT
149T	PSU	ONWAKIT
1430RA	PSU	ONWAKIT
1430RS	PSU	ONWAKIT
1430RW	PSU	ONWAKIT
1450T	PSU	ONWAKIT
1455TS	PSU	ONWAKIT
2019R	PSU	ONWAKIT
2029T	PSU	ONWAKIT
2029TA	PSU	ONWAKIT
COMPACT 11	PSU	MODKIT47
F16 CHASSIS	FRAME	GOODKIT1
F16 CHASSIS	LINE	GOODKIT1
F16	PSU	GOODKIT1
F16	VIDEO	GOODKIT1

MAKE & MODEL	KIT TYPE	CODE
GRUNDIG		
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
HINARI		
HIT14RC	PSU	ONWAKIT
JVC		
AV29SX1EK	FIELD O/P	JVCKIT1
AV29SX1EN	FIELD O/P	JVCKIT1
AV29SX1EN1	FIELD O/P	JVCKIT1
AV29SX1PF	FIELD O/P	JVCKIT1
AV29TSIE1	FIELD O/P	JVCKIT1
C14E1EK	PSU	ONWAKIT
C14T1EK	PSU	ONWAKIT
C21ET1EK	PSU	ONWAKIT
CS21M3EK	PSU	ONWAKIT
MATSUI		
1455	PSU	ONWAKIT
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
TVR180R/208	STANDBY	MODKIT37
TVR185T	STANDBY	MODKIT39
MITSUBISHI		
AV1 SERIES	PSU	MITSKIT3
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
CT25A6STX	TDA 8178S	MITSKIT1
CT25AV1B	PSU	MITSKIT3
CT25AV1BS	PSU	MITSKIT3
CT25AV1BD	PSU	MITSKIT3
CT25AV1BDS	PSU	MITSKIT3
CT28AV1B	PSU	MITSKIT3
CT28AX1BD	PSU	MITSKIT3

MAKE & MODEL	KIT TYPE	CODE
MITSUBISHI..continued		
CT28AV1BDS	PSU	MITSKIT3
CT29AS1	TDA 8178S	MITSKIT2
CT29A4	TDA 8178S	MITSKIT2
CT29A6	TDA 8178S	MITSKIT2
CT29B2	TDA 8178S	MITSKIT2
CT29B3	TDA 8178S	MITSKIT2
CT29B6	TDA 8178S	MITSKIT2
CT33B3	TDA 8178S	MITSKIT2
M5 SERIES	PSU	MITSKIT3
NEI/NIKKAI		
CE25 CHASSIS	PSU	NIKKAIKIT1
C289FTXN	PSU	NIKKAIKIT1
C28F41FXN	PSU	NIKKAIKIT1
PANASONIC		
IC561	TDA 8175	PANKIT1
TX25XD60	VERT OUTPUT	PANKIT2
TC28XD60	VERT OUTPUT	PANKIT2
TX28XD70	VERT OUTPUT	PANKIT2
TX29XD70	VERT OUTPUT	PANKIT2
TX-W26D3	VERT OUTPUT	PANKIT2
PHILIPS		
28PT4457/05	PSU	MODKIT50
28PW5407/05	PSU	MODKIT50
28PW6006/05	PSU	MODKIT50
310.10708		PHILKIT3
310.20491		PHILKIT2
310.20496		PHILKIT10
310.31994		PHILKIT6
310.32252		PHILKIT5
310.32253		PHILKIT4
310.32254		PHILKIT9
310.32255		PHILKIT7
310.32262		PHILKIT8
310.62264		PHILKIT1
ANUBIS A	SOPS	PHILKIT2
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
L01.1E CHASSIS	PSU	MODKIT50
SAMSUNG		
CI5944	FRAME	SAMKIT2
CI6844	FRAME	SAMKIT2
VIK310	PSU	SAMSUNGKIT
VIK320	PSU	SAMSUNGKIT
VIK350	PSU	SAMSUNGKIT
VI375	PSU	SAMSUNGKIT

MAKE & MODEL	KIT TYPE	CODE
SAMSUNG..continued		
VI395	PSU	SAMSUNGKIT
WINNER 1	PSU	SAMSUNGKIT
SHARP		
51CS03H	PSU	SHARPKIT1
51CS05H	PSU	SHARPKIT1
56FW53H	PSU & DOLBY	MODKIT45
59CS03H	PSU	SHARPKIT2
59CS05H	PSU	SHARPKIT2
59CSD8H	PSU	SHARPKIT2
59DS03H	PSU	SHARPKIT3
59FW53H	PSU & EW	MODKIT49
28HW53H	PSU + EW	MODKIT52
56FW53H	PSU + EW	MODKIT52
66CS03H	PSU	SHARPKIT2
66CS05H	PSU	SHARPKIT2
66CSD8H	PSU	SHARPKIT2
66EW53H	PSU + EW	MODKIT52
66FW53H	PSU + EW	MODKIT52
66FW53H	PSU & DOLBY	MODKIT45
66FW53H	PSU & EW	MODKIT49
66FW54H	PSU & DOLBY	MODKIT45
66FW54H	PSU & EW	MODKIT49
66FW63H	PSU + EW	MODKIT52
76FW53H	PSU & DOLBY	MODKIT45
76FW53H	PSU & EW	MODKIT49
76FW54H	PSU & DOLBY	MODKIT45
76FW54H	PSU & EW	MODKIT49
76FW53H	PSU + EW	MODKIT52
76FG64H	PSU + EW	MODKIT52
DA-100 CHASSIS	PSU & EW	MODKIT49
SONY		
SLV715HB	VCR - PSU	MODKIT40
SLV777UB	VCR - PSU	MODKIT40
THOMSON		
35029400		THOMKIT2
35065920		THORNKIT1
FV70	PSU	THORNKIT1
ICC7 CHASSIS	TDA 8178FS	THOMKIT1
ICC7 CHASSIS	FRAME	THOMKIT3
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
TX92F CHASSIS	EAST/WEST	THOMKIT4
VESTEL		
11AK31 CHASSIS	PSU	MODKIT51

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MODKIT35	£ 9.50
MODKIT36	£ 5.00
MODKIT37	£ 6.50

ORDER CODE	PRICE
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MODKIT40	£ 6.00
MODKIT41	£ 6.00
MODKIT43	£ 7.00
MODKIT44	£ 7.00
MODKIT45	£ 4.00
MODKIT46	£ 12.00
MODKIT47	£ 15.50
MODKIT48	£ 8.00
MODKIT49	£ 13.00
MODKIT50	£ 18.00
MODKIT51	£ 10.00

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NIKKAIKIT1	£ 12.00
ONWAKIT	£ 12.00
PANKIT1	£ 15.00
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
SAMKIT2	£ 8.00
SAMSUNGKIT	£ 16.00
SHARPKIT1	£ 11.00
SHARPKIT2	£ 11.00
SHARPKIT3	£ 9.00
THOMKIT1	£ 7.00
THOMKIT2	£ 12.00
THOMKIT3	£ 9.00
THOMKIT4	£ 4.00

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10559560	LOT1814	£16.50
105936.4	LOT1148	£19.00
10593640	LOT1148	£19.00
10593640.P2	LOT1148	£19.00
106122.8	LOT1814	£16.50
10612280	LOT1814	£16.50
106552.2	LOT1545	£19.00
10655220	LOT1545	£19.00
106699	LOT2184	£16.00
10669900	LOT2184	£16.00
10669900-P1	LOT2184	£16.00
106966.6	LOT2184	£16.00
10696660	LOT2184	£16.00
10696660.P1	LOT2184	£16.00
11030936351000	LOT2262	£22.00
11030936351136	LOT2262	£22.00
11040102331136	LOT2262	£22.00
BEKO		
057.834 TR 2	LOT2238	£26.00
058.434 TR 4	LOT2238	£26.00
058.834 TR 1	LOT2238	£26.00
058.834 TR 2	LOT2238	£26.00
058.834 TR 5	LOT2238	£26.00
3311159	LOT2238	£26.00
3311167	LOT2238	£26.00
3311187	LOT2238	£26.00
3313110	LOT2238	£26.00
58.834	LOT2238	£26.00
M 12-130	LOT2238	£26.00
M 12-133	LOT2238	£26.00
M 12-138	LOT2238	£26.00
M 12-157	LOT2238	£26.00
M12130	LOT2238	£26.00
M12133	LOT2238	£26.00
M12138	LOT2238	£26.00
M12157	LOT2238	£26.00
RO 682	LOT2238	£26.00
RO 685	LOT2238	£26.00
TR 682	LOT2238	£26.00
TR 685	LOT2238	£26.00
FERGUSON		
473197	LOT304	£11.00
06 D-3-084-001	LOT23	£8.00
06 D-3-087-001	LOT23	£8.00
06 D-3-088-001	LOT84	£5.00
06 D-3-093-001	LOT204	£16.00
06 D-3-508-003	LOT276	£14.00
06 D-3-512-001	LOT204	£16.00
102706	LOT1262	£16.50
102706.4	LOT1262	£16.50
10270640	LOT1262	£16.50
102706E0	LOT1262	£16.50
102756.4	LOT1262	£16.50
10275640	LOT1262	£16.50
103194.1	LOT1262	£16.50
103194.11	LOT1262	£16.50
103194.8	LOT1262	£16.50
FERGUSON...continued		
103194.B0	LOT1262	£16.50
10319410	LOT1262	£16.50
10319411	LOT1262	£16.50
10319480	LOT1262	£16.50
103194B0	LOT1262	£16.50
104061.2	LOT1262	£16.50
104061.6	LOT1262	£16.50
10406120	LOT1262	£16.50
10406160	LOT1262	£16.50
104525.2	LOT1262	£16.50
104525.3	LOT1262	£16.50
10452520	LOT1262	£16.50
10452530	LOT1262	£16.50
GOODMANS		
1142 5057	LOT1164	£15.00
1142.5077	LOT1164	£15.00
1142.5079	LOT1164	£15.00
1142 5081	LOT1164	£15.00
1179.0387	LOT1147	£16.00
1192.0527	LOT1147	£16.00
1342 0006	LOT1148	£19.00
1342.0006	LOT1148	£19.00
1352.5008	LOT1167	£15.00
1352.5016	LOT1934	£19.00
1352.5027	LOT1270	£16.00
1352.5033	LOT1270	£16.00
1152-5016	LOT1934	£19.00
1192.1421	LOT1262	£16.50
1342.0006	LOT1148	£19.00
1342.0006 A	LOT1148	£19.00
1342.0006 B	LOT1148	£19.00
1342.00662	LOT1148	£19.00
1342.0060	LOT1148	£19.00
1352 0052	LOT2262	£22.00
1352 0052 A	LOT2262	£22.00
1352 5006	LOT1814	£16.50
1352 5006 A	LOT1814	£16.50
1352 5006 D	LOT1814	£16.50
1352 5006 R	LOT1814	£16.50
1352 5008E	LOT1167	£16.00
1352 5033	LOT1933	£19.00
1352 5033 A	LOT1933	£19.00
1352 5033 B	LOT1933	£19.00
1352 5036	LOT1545	£19.00
1352 5036 A	LOT1545	£19.00
1352 5036 F	LOT1545	£19.00
1352 5037	LOT2184	£16.00
1352 5037 A	LOT2184	£16.00
1352 5037 D	LOT2184	£16.00
1352 5058	LOT1933	£19.00
1352 5058 A	LOT1933	£19.00
1352 5058 C	LOT1933	£19.00
1362 3005	LOT1262	£16.50
1362 5001	LOT2262	£22.00
1362 5001 A	LOT2262	£22.00
1362 5002	LOT2262	£22.00
1362 5002 A	LOT2262	£22.00
1372 0052	LOT2262	£22.00
1372.0052 A	LOT2262	£22.00
GOODMANS...continued		
1372 0052 B	LOT2262	£22.00
1372 0062	LOT2262	£22.00
1372 0062 A	LOT2262	£22.00
1372.0066	LOT2262	£22.00
1372.0066 A	LOT2262	£22.00
1372 00662	LOT2262	£22.00
40313-16	LOT1814	£16.50
40330-10	LOT1262	£16.50
40330-11	LOT1262	£16.50
40330-26	LOT1262	£16.50
40330-27	LOT1262	£16.50
40348-01	LOT1933	£49.00
40348-02	LOT1148	£19.00
40348-06	LOT1545	£49.00
40348A-01	LOT1933	£19.00
40348A-02	LOT1148	£19.00
40348A-03	LOT1814	£16.50
40348A-06	LOT1545	£19.00
40348A-09	LOT2184	£16.00
40348A-10	LOT1148	£19.00
40348A-12	LOT2184	£16.00
GRUNDIG		
29201.029.63	LOT1987	£18.00
29221.029.63	LOT1987	£18.00
M 29221.029.63	LOT1987	£18.00
HANTAREX		
1242 0178	LOT1153	£20.00
28020280	LOT1158	£20.00
28029390	LOT1153	£20.00
HITACHI		
2433891	LOT23	£8.00
2433892	LOT84	£5.00
2433893	LOT23	£8.00
2433952	LOT33	£7.50
2434141	LOT33	£7.50
2434393	LOT405	£10.00
2435131	LOT251	£5.00
2436201	LOT90	£11.00
45150504	LOT362	£16.00
053 X 0624-001	LOT1986	£30.00
053 X 0642-001	LOT1986	£30.00
2433891H	LOT23	£8.00
2436771	LOT1149	£18.00
42-0719-00	LOT1986	£30.00
53 X 0624-001	LOT1986	£30.00
BW 00231	LOT1986	£30.00
L.G.		
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058.434 TR 4	LOT2238	£26.00
058.834 TR 1	LOT2238	£26.00
058.834 TR 2	LOT2238	£26.00
058.834 TR 5	LOT2238	£26.00
3311159	LOT2238	£26.00
3311167	LOT2238	£26.00
3311187	LOT2238	£26.00
L.G....continued		
3313110	LOT2238	£26.00
58.834	LOT2238	£26.00
M 12-130	LOT2238	£26.00
M 12-133	LOT2238	£26.00
M 12-138	LOT2238	£26.00
M 12-157	LOT2238	£26.00
M12130	LOT2238	£26.00
M12133	LOT2238	£26.00
M12138	LOT2238	£26.00
M12157	LOT2238	£26.00
RO 682	LOT2238	£26.00
RO 685	LOT2238	£26.00
TR 682	LOT2238	£26.00
TR 685	LOT2238	£26.00
OREGA		
40153201	LOT349	£17.50
PANASONIC		
TLF 14512 F	LOT39	£5.00
TLF 14520 F	LOT40	£8.50
TLF 14521 F	LOT39	£5.00
TLF 14567 F	LOT39	£5.00
TLF 14568 F	LOT40	£8.50
PHILIPS		
3119 108 31260	LOT90	£11.00
3119 108 31290	LOT73	£10.00
3119 198 62930	LOT57	£9.50
3122 138 36920	LOT57	£9.50
3122 138 36922	LOT57	£9.50
3122 138 36923	LOT57	£9.50
3122 138 37050	LOT132	£15.00
3122 138 37620	LOT90	£11.00
3122 138 37992	LOT1116	£10.00
3122 138 38040	LOT73	£10.00
3139 128 30400	LOT90	£11.00
40348-08	LOT1577	£16.00
40348A-08	LOT1577	£16.00
40348A-09	LOT1577	£16.00
4812 140 10369	LOT90	£11.00
4812 140 10421	LOT90	£11.00
4822 140 10306	LOT57	£9.50
4822 140 10381	LOT128	£10.00
4822 140 10406	LOT73	£10.00
AT 2076 / 10	LOT57	£9.50
AT 2079 / 40	LOT73	£10.00
AT 2079 / 99	LOT276	£14.00
SHARP		
RTRNF 1220 CEZZ	LOT39	£5.00
RTRNF 2001 CEZZ	LOT338	£12.00
RTRNF 2006 CEZZ	LOT308	£13.50
RTRNF 2023 CEZZ	LOT310	£11.00
SONY		
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1-439-332-42	LOT101	£8.50
SONY...continued		
1-439-332-52	LOT100	£10.00
1-439-387-11	LOT311	£14.50
1-439-387-21	LOT311	£14.50
1-439-416-11	LOT255	£11.00
1-439-416-12	LOT255	£11.00
1-439-416-21	LOT255	£11.00
1-439-416-23	LOT255	£11.00
1-439-416-41	LOT255	£11.00
1-439-416-51	LOT255	£11.00
1-453-308-11	LOT2196	£31.50
1-453-308-21	LOT2196	£31.50
1-453-308-31	LOT2196	£31.50
1-453-310-11	LOT2196	£31.50
1-453-314-21	LOT2196	£31.50
1-453-372-11	LOT2196	£31.50
8-598-834-00	LOT2196	£31.50
8-598-834-10	LOT2196	£31.50
8-598-834-20	LOT2196	£31.50
8-598-834-30	LOT2196	£31.50
8-598-834-40	LOT2196	£31.50
8-598-834-50	LOT2196	£31.50
THOMSON		
105009.8	LOT1505	£19.00
10500980	LOT1505	£19.00
10500980.P1	LOT1505	£19.00
10531460	LOT1505	£19.00
105660.6	LOT1505	£19.00
10566060	LOT1505	£19.00
10566060.P2	LOT1505	£19.00
105660060	LOT1505	£19.00
105880.8	LOT1505	£19.00
10588080	LOT1505	£19.00
10588080.P2	LOT1505	£19.00
151128140	LOT1505	£19.00
151281.4	LOT1505	£19.00
15128140	LOT1505	£19.00
153144.6	LOT1505	£19.00
15314460	LOT1505	£19.00
1531447 A	LOT1505	£19.00
1532873 A	LOT1505	£19.00
3233500	LOT244	£14.50
3233900	LOT244	£14.50
40011200	LOT244	£14.50
40148300	LOT244	£14.50
TOSHIBA		
23236098	LOT288	£11.00
23236198	LOT288	£11.00
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A recent broadcasting event in London reviewed the development of HDTV, the current situation and the prospects. George Cole reports on the presentations

HDTV: the vision for Europe

In December Sony hosted a major high-definition TV (HDTV) event in London to review the progress of HDTV around the world and the latest developments here in Europe. The main message from the event was that HDTV is progressing faster than many people think. HDTV-compatible equipment is already present in the living rooms of many households.

Systems

Joe Flaherty, senior vice-president of technology at CBS Broadcasting and a TV pioneer – he joined CBS in 1957 and helped bring HDTV to the US – was one of the keynote speakers. He made the point that high definition is in fact a moving target. The 343-line system developed in the US in the early Thirties was described as "high definition", as were the UK 405-line format of 1936, the 441-line format of 1939, the 1953 NTSC format and the 1967 PAL format. In the Eighties the Muse 1,125-line analogue system (marketed as High Vision) was developed in Japan, while Europe considered adoption of the 1,250-line HD-MAC format, which was abandoned for a digital system in 1993.

Our heading picture shows a JVC high-definition TV.

Today, HDTV means 720 lines with progressive scanning or 1,080 lines with interlacing, though some broadcasters, including the BBC, recognise only the latter as being true HDTV (see below). The aspect ratio for HDTV is 16:9, while audio is 5.1-channel surround-sound. HDTV pictures contain five times more information than standard-definition pictures. As a result, images have stunning clarity. Flaherty's verdict on the future of standard-definition TV was blunt: "Standard-definition TV is doomed worldwide" he declared, "there's no future development in SDTV – SD is rushing to oblivion."

HDTV today

Chris Deering, president of Sony Europe, drew attention to the results of a survey carried out by the US Consumer Electronics Association (CEA). This established that the top three types of programmes liked by viewers were movies, sport and educational, such as documentaries. These are ideal for HDTV. The new home video formats like Blu-ray will offer high-definition playback and recording from the start, and Sony Picture Entertainment plans to convert its library of 6,000 films to the HD format. Sony has already launched the HDR-FX1E camcorder, which records in the 1,080i format.

David Mercer, a principal analyst at the research company Strategy Analytics, had much of interest to say about the state of HDTV today. His company had forecast that there would be some 11·9 million homes with HDTV in the US and Japan by the end of 2004. With Korea and China set to introduce HDTV services during the next couple of years, the number of HDTV households worldwide is forecast to reach 90 million by then. Mercer suggested why the US and Japan have taken the lead with HDTV. In the US there was an initial government mandate that forced more and more broadcasters to carry HDTV signals. This, together with the adoption of DVD and home-theatre systems, has helped grow the HDTV market.

Joe Flaherty said that 88 per cent of the US's 106 million TV households have access to digital TV and/or HDTV programming. Some 70 million homes are passed by cable services that include HDTV programming. CBS currently provides sixteen hours of HDTV

programming a week, while cable operators offer more than 100 hours and satellite broadcasters more than twenty hours a week.

Prices of HDTV sets have also fallen sharply in recent years. The average price of the first HDTV sets on the market, back in 1999, was typically about the US equivalent of £2,000. This has fallen to less than £600. Flaherty pointed out that it took seven years before more than a million US households had converted from black-and-white to colour TV: it took HDTV two years to reach the same milestone. The CEA forecasts that 44 million, or one third, of US households will have adopted HDTV by 2006.

There has been strong collaboration between the government, broadcasters and manufacturers in Japan to promote HDTV. Already 90 per cent of the programmes transmitted by the national broadcaster NHK in the three major metropolitan areas, Tokyo, Osaka and Nagoya, are in HDTV form. In addition 50 per cent of the content produced by commercial broadcasters in the Tokyo area is in the HDTV format. This means that 40 per cent of Japanese TV households have access to HDTV services: the figure is expected to reach 50 per cent later this year.

There are now three million HDTV households in Japan, six per cent of the total. The HDTV market has also been driven by the falling price of HDTV-compatible TV sets, with CRT versions selling for less than the Japanese equivalent of £400 and LCD versions costing less than £1,500. HDTV is available via terrestrial transmission, satellite transmission and cable distribution. Analogue terrestrial TV services are due to be switched off in 2011.

HDTV services are being rolled out in other countries. In Australia for example twenty hours of HDTV are now being broadcast each week, though there are only 400,000 DTT households. There is currently fourteen hours of HDTV broadcasting a week in Korea, though the roll-out has been hampered by a standards dispute. Canada has HDTV via all three transmission/distribution systems, and China is expected to launch HDTV by about 2007.

The picture is not so clear in Europe says Mercer, partly because broadcasters got their fingers burnt by the HD-MAC debacle. However the two major satellite operators, SES Astra and Eutelsat, are selling HD capacity to broadcasters and many consumers are buying HDTV-compatible equipment without realising it – about half the flat-panel displays sold in Europe last year (500,000 out of 0·9 million) were HDTV-compatible. As Mercer puts it, HDTV is entering the European market via the back door. He adds that there are some issues to be resolved, including the availability of content and digital rights management.

But there is already a European HDTV service in operation, albeit one that's aimed at a limited audience: Euro 1080 is designed to promote HDTV to broadcasters and consumers (see below). Commercial services are due to be launched in France (TPS) in 2005, in Germany (Premiere with three channels) in November 2005 and in the UK (BSkyB) in 2006. Strategy Analytics forecasts that one in eight European homes will have HDTV in 2008.

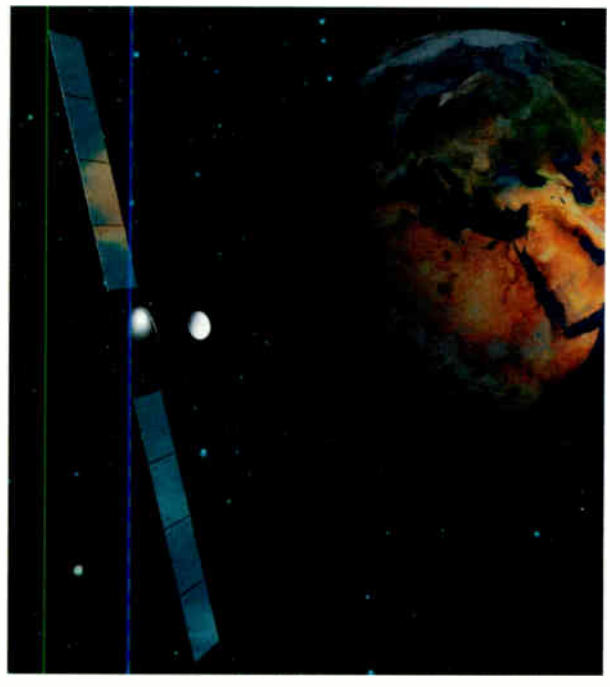
Euro 1080

Euro 1080, an HDTV service provided by the Belgian TV production and services company Alfacom, was launched in January 2004. It has become Europe's first HDTV service, with a promotional remit. It's transmitted via transponder 88 (12·168MHz V) from the Astra 1H satellite at 19·2°E. To receive Euro 1080, a viewer requires a suitable satellite receiver or a PC with a PCI tuner card, an HD display, and a conditional-access card – the transmissions are encrypted.

The Euro 1080 service is primarily aimed at businesses, such as cinemas and electrical retailers, but consumers can sign up and new, low-cost set-top boxes are due to come on the market in mid 2005.

The service has two basic channels, the main one HD1 and the events one HDe. HD1 provides a range of programmes that include rock music, sport, lifestyle, concerts and opera; HDe conveys major events, such as Euro 2004 football, to cinemas in fourteen European countries. At its launch Euro 1080 provided 180 hours of HDTV content: an additional 500 hours were added in September 2004. The programme material is broadcast as a loop.

Euro 1080's chief executive officer Gabriel Fehevari revealed that the company is to launch a new pay-TV channel in June. A new MPEG-4 set-top box, MPEG-2 compatible, will be launched at the same time. It's expected to sell for about £70.



Alfacom is transmitting the Euro 1080 service via transponder 88 (12·168MHz V) of Astra 1 (19·2°E).

In June 2004 SES Astra, European broadcasters and hardware manufacturers agreed on a set of HDTV technical specifications and a standard HDTV label for use with display devices in an effort to drive the HDTV market forwards in Europe. The specifications include standard interfaces for peripheral equipment. In September SES Astra launched an HDTV channel for retailers to use as part of point-of-sale demonstrations.

HDTV in the UK

Andrew Stirling, manager of strategy development at the media and communications regulator Ofcom, said that his organisation's main concern is the digital switchover. While it isn't Ofcom's role to drive the HDTV market, the regulator wants viewers to get the best from any increased spectrum allocated to digital TV. He added that HDTV could be one of the significant technologies that might use the extra capacity.

Andy Quested of the BBC's HD Support Group gave a very interesting presentation. He began by saying that HDTV is an issue for all broadcasters, public and commercial, and drew attention to a small paragraph in the BBC's digital strategy document *Building public value: renewing the BBC for the digital world*. This states that by 2010 the Corporation plans to produce all its TV output to meet the HDTV standard. When the BBC starts HDTV transmissions, it

wants to offer a full service – most broadcasters in other countries provide HDTV programming mainly at peak times.

He added that the BBC has no short-term plans to launch HDTV via DTT. It might start by providing HDTV services via satellite or cable before DTT. Examples of programming could include major sports events such as the FA cup final or the Olympics. Part of the reason for a switch to HDTV would be pressure from overseas broadcasters – it's easier for broadcasters to have one standard. In the last financial year the BBC bought £74m of TV programmes, primarily from the US: the vast majority of this material was in HDTV format, at no additional cost.

In the same period the BBC made £110m from sales and co-productions. There's great pressure to make programmes in HDTV format – for example NHK will no longer buy classical-music programmes unless they are in this form. Incidentally the BBC does not regard 720-lines with progressing scanning as an HDTV format.

Quested mentioned that the BBC is moving away from tape as a storage medium, adopting hard-disk based systems instead. He showed a major forthcoming TV series, *Planet Earth*, which is being shot in HD form. It's a co-production with NHK and Discovery. The images looked great.

In the history of broadcasting there are many examples of broadcasters and viewers being out of sync in terms of hardware and programme availability. When TV services were first launched there were very few receivers in homes. Early colour TV sets were so expensive that few people could watch the first colour TV programmes in the UK in 1967. The situation was reversed with Nicam stereo: many viewers owned Nicam TV sets and VCRs long before regular transmissions began. It looks as if many UK homes will have HDTV-compatible displays well before the first public-service HDTV transmissions begin.

Prospects

But the prospects look good, with broadcasters stockpiling HDTV programmes and consumers buying large, flat-screen displays that are HDTV-compatible. There is also the falling cost of HDTV production. The success of DVD shows that, contrary to what was believed in some quarters, consumers do appreciate good picture quality. Will they want to make the leap from standard- to high-definition?

Formats such as PAL-Plus, Laser Disc and Super VHS provided improved picture quality but failed to sell in quantity. The success of the audio CD led some to think that there was a market for 'super-CD' formats like SACD and DVD-Audio, but it has so far failed to materialise. HDTV has a much stronger chance of success however.

One thing is certain. Today's HDTV will eventually become tomorrow's SDTV. Andy Quested ended his presentation with a joke about a new system called 'Ultra HDTV', offering 32-megapixel images and 22.2-channel surround sound. It was said in jest, but who knows what the future of TV will bring?

Bench Notes

Adrian Gardiner describes some particularly obscure faults he has encountered recently with Hitachi and Beko TV sets

Some right awkward faults have come my way this month, caused by obscure fault conditions. I'll start with a widescreen Hitachi set, Model C28W440, which is fitted with the Vestel 11AK45 chassis.

Hitachi C28W440

The complaint was simple enough – stuck in standby. As with many Vestel chassis, the power supply operates in a burst mode when in standby. This reduces the HT voltage (B+ rail) to 12V. Checks showed that the set didn't even attempt to come out of standby. My first thought was that there might be a fault in the line output stage, but I couldn't find anything wrong here. So attention was turned to the secondary side of the power supply. The rectifier diodes were all tested, then resistance checks to chassis were carried out so see if any of the outputs were being loaded. Once again there was nothing amiss, so it was time to investigate the primary side of the supply.

This is based on the popular MC44608 8-pin chopper control chip, and is therefore straightforward. Some quick checks showed that the snubber network was OK. As everything else seemed to be in order, I came to the conclusion that the set was suffering from an EEPROM crash and removed the chip for reprogramming. After resetting the EEPROM with default AK45 software I refitted it then powered up. There was no change, with the set still lifeless. Having had this sort of trouble before with sets that use an MC44608 chip, I decided to fit a replacement. Again no change.

At this point I reached for the service manual, then carried out checks in the standby switching circuit and around the optocoupler feedback system. But still no cause of the fault was apparent. Tracing back farther, I discovered that the microcontroller IC didn't produce a power-up signal. Could the chip be the cause of the trouble? Further checks revealed that the microcontroller wasn't receiving information from either the front control buttons or the IR receiver. These items are mounted on a separate PCB at the front of the set, with connection to the main board via connector PL502. Pin 5 of this socket, the earth pin, had a cracked joint.

A good clean up here and remaking the connections cured the problem. A rather roundabout way of getting to the bottom of things, but it happens to all of us!

A Beko NR284239NC

The second strange fault I've had recently involved a Beko set fitted with the 14.2 chassis. I have to confess that I like this chassis: it's very reliable in general, is easy to work on and provides good results.

This particular set would sometimes produce a 'negative' picture however. It seemed to happen only at switch on, and lasted for just a couple of minutes. After that the set would run fault-free. When the fault was present, the symptom gave the impression that the CRT was starved of first-anode voltage. But voltage checks showed that this was not the case. In addition the cathode drive voltages were fairly normal, also the heater supply. So the fault had to do with the actual video information.

A combined microcontroller and video jungle chip, type TDA9563, is used in this chassis. Fig. 1 shows the peripheral video processing circuitry. The demodulated video IF output appears at pin 38, returning to pin 40 after passing through the filtering circuitry required. Basically this consists of the emitter-follower transistor T104, ceramic filter F104 and then another buffering transistor, T105. When the fault was present there was a strong signal at pin 38 but a severely crushed one at pin 40. Checks along this signal path narrowed the fault area to T105.

In the fault condition this latter transistor was starved of supply voltage at its collector. Decoupling capacitors C162 and C161 were the obvious initial suspects: they could have been leaky and, indeed, replacing them appeared to cure the fault. But the problem returned during a soak test.

I eventually found that the 47Ω supply feed resistor R162 would go high in value intermittently – to over 1kΩ. Replacing this surface-mounted resistor finally cured the fault.

You never learn!

Regular readers may well remember the epic battle I had recently with a Sony hi-fi system (see the October issue, page 738). The moral of that story was 'never quote high just to get rid of a job'. Unfortunately I never seem to learn!

A customer phoned me the other day to ask about having an old Amstrad TV/VCR combi unit, Model TVR2, repaired. I didn't like this unit even when it first came out. So, after listening to the complaint, I gave an estimate of about £100 over the phone. After all, you can get a modern replacement for less!

But, you've guessed it, the estimate was accepted! My report on the repair will follow next month.

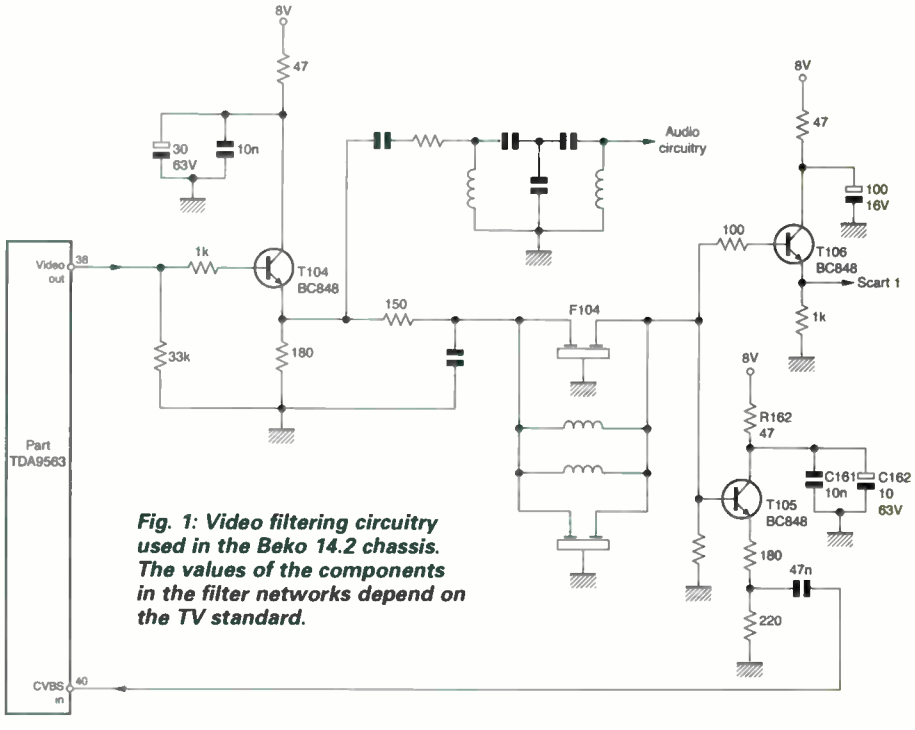


Fig. 1: Video filtering circuitry used in the Beko 14.2 chassis. The values of the components in the filter networks depend on the TV standard.

A laptop caption generator

A recent article highlighted difficulties in this area. As a follow-up, Bill Wright describes the problems he experienced when he wanted to provide information on a channel change for the users of a large TV signal distribution system

I was prompted to write the following account of a recent laptop video output problem by Ray Porter's description of his trials and tribulations in the August 2004 issue. As regular readers will know, I install and service communal TV distribution systems. There is often a need to get information to those connected to such a system. It might be to warn them about an interruption to the service, or to explain to them the need to retune their TV sets and VCRs.

The time-honoured way of doing this is to push leaflets through letterboxes, but sometimes this isn't a good solution. Twelve letterboxes aren't a problem, but a hundred take some legwork. Another problem is that some people seem to have an aversion to the printed word, especially when it flutters through the front door looking like something boring from the council. I have found that the message, when provided in this way, simply doesn't get across to some of the residents. Ask one of them if they have the leaflet and you may get a blank look along with "what leaflet?" This has caused a lot of unnecessary visits and general time wasting.

Faced with an upcoming job that would involve moving Five from channel 37 to channel 56, I started to think seriously about some sort of gadget that would display a message on residents' TV screens when they attempted to watch Five on channel 37. A hundred and fifty houses and flats were involved. Incidentally the reason why I had to move Five was that reception from Emley Moor on channel 37 is very poor here: channel 56 from Belmont is much better.

Initial ideas

I already had some kit that consists of a colour-bar and tone generator, a frequency-agile modulator, a chunky UHF amplifier and some tuneable bandpass and notch filters. This enables me to replace any channel in a system with bars and a tone, and has proved to be invaluable when tracing a system layout. Replace ITV with colour bars at one of the head-end outputs and go door knocking. Residents will soon tell you if their ITV has 'broken down'! All I needed was something to generate captions and provide them as a baseband TV picture. I would then leave the kit running continuously at the head-end for a week or so.

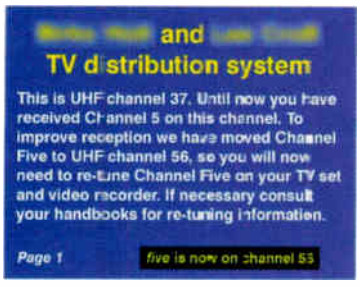
My first idea was to use a very old computer, the sort that used a TV set as a monitor. I gave this up before I even started. The idea of messing about with antique computer equipment gives me the shivers. Modern ones are bad enough! Unfortunately my next idea had me struggling with badly outdated gear even though I bought the equipment brand new.

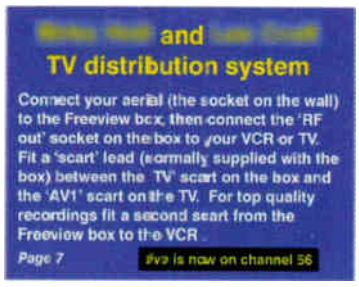
I bought a graphics generator for £170. It was supposed to be the bee's knees – the perfect way of adding captions to your home video recordings. Since I bought it in 2004, I rather expected that it would use 21st century technology. In this I was sorely disappointed. Strongly reminiscent of the computer-graphics technology of the Seventies, it was the most clunky, annoying, primitive bit of kit I've seen for a long time (excluding my dad's lawnmower).

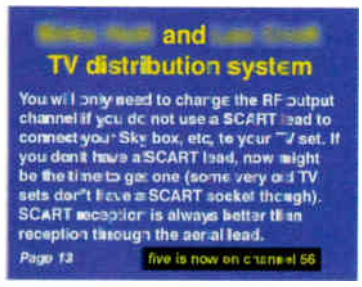
It would have seemed quite sophisticated in the Seventies, as did flares and kipper ties. Yes, it did have a qwerty keyboard. But text could be typed in only very, very slowly, with a pause after each letter. There were none of the modern text features that we take for granted, such as justification, kerning and so on. And there was no return key. To move about the screen, you had to use the arrow keys. There were only eight fonts, and they were all very dated, especially the 'ultra modern' one. Remember that strange typeface with very thick and very thin strokes? It was supposed to look 'electronic'.

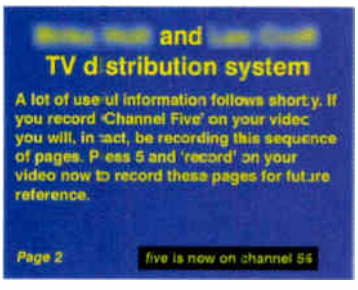
Text had to be fitted on to a fixed grid that allowed a fixed number of lines, each with a fixed number of characters. After each line you had to wait eight seconds for the CPU to digest such a massive amount of data. If you increased the font size the letters on the right-hand side of the screen disappeared, never to be retrieved.

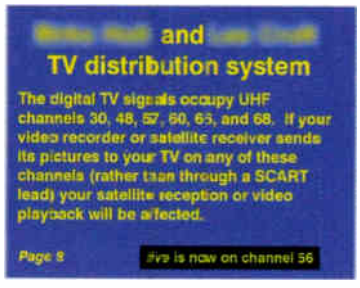
I persevered, and spent four solid hours learning how to drive the thing. I made up, laboriously, a sequence of primitive pages, letter by agonising letter. At the end my triumph was short-lived. When I attempted to play the sequence back the display stopped, started, stuttered, lost colour, regained it and finally froze, showing the top

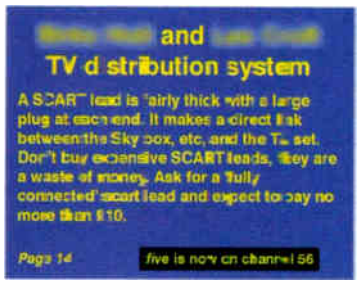

and
TV distribution system
This is UHF channel 37. Until now you have received Channel 5 on this channel. To improve reception we have moved Channel Five to UHF channel 56, so you will now need to re-tune Channel Five on your TV set and video recorder. If necessary consult your handbooks for re-tuning information.
Page 1
five is now on channel 56

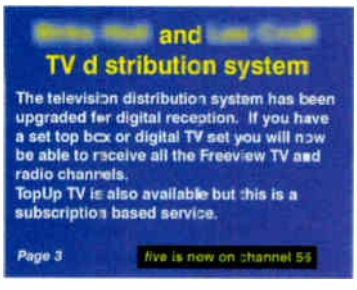

and
TV distribution system
Connect your aerial (the socket on the wall) to the Freeview box, then connect the 'RF out' socket on the box to your VCR or TV. Fit a 'scart' lead (normally supplied with the box) between the 'TV' scart on the box and the 'AV1' scart on the TV. For top quality recordings fit a second scart from the Freeview box to the VCR.
Page 7
five is now on channel 56

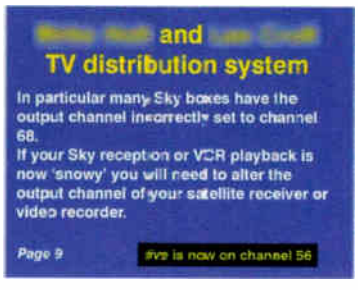

and
TV distribution system
You will only need to change the RF output channel if you do not use a SCART lead to connect your Sky box, etc, to your TV set. If you don't have a SCART lead, now might be the time to get one (some very old TV sets don't have a SCART socket though). SCART reception is always better than reception through the aerial lead.
Page 13
five is now on channel 56

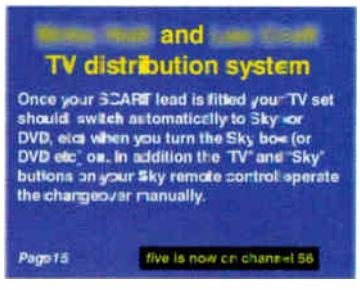

and
TV distribution system
A lot of useful information follows shortly. If you record 'Channel Five' on your video you will, in fact, be recording this sequence of pages. Press 5 and 'record' on your video now to record these pages for future reference.
Page 2
five is now on channel 56


and
TV distribution system
The digital TV signals occupy UHF channels 30, 48, 57, 60, 65, and 68. If your video recorder or satellite receiver sends its pictures to your TV on any of these channels (rather than through a SCART lead) your satellite reception or video playback will be affected.
Page 8
five is now on channel 56

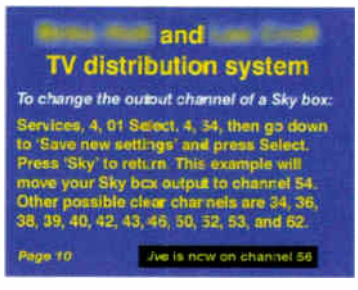

and
TV distribution system
A SCART lead is fairly thick with a large plug at each end. It makes a direct link between the Sky box, etc, and the TV set. Don't buy expensive SCART leads, they are a waste of money. Ask for a 'fully connected' scart lead and expect to pay no more than £10.
Page 14
five is now on channel 56


and
TV distribution system
The television distribution system has been upgraded for digital reception. If you have a set top box or digital TV set you will now be able to receive all the Freeview TV and radio channels.
TopUp TV is also available but this is a subscription based service.
Page 3
five is now on channel 56

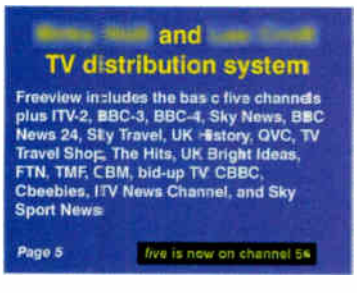

and
TV distribution system
In particular many Sky boxes have the output channel incorrectly set to channel 68.
If your Sky reception or VCR playback is now 'snowy' you will need to alter the output channel of your satellite receiver or video recorder.
Page 9
five is now on channel 56

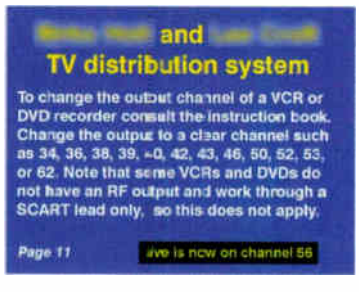

and
TV distribution system
Once your SCART lead is fitted your TV set should switch automatically to Sky or DVD, etc, when you turn the Sky box (or DVD etc) on. In addition the 'TV' and 'Sky' buttons on your Sky remote control operate the changeover manually.
Page15
five is now on channel 56


and
TV distribution system
So you now have the option of 'going digital', using either a set-top box or an Integrated Digital TV set.
Page 4
five is now on channel 56

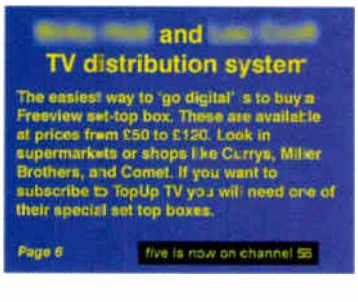

and
TV distribution system
To change the output channel of a Sky box:
Services, 4, 01 Select, 4, 34, then go down to 'Save new settings' and press Select. Press 'Sky' to return. This example will move your Sky box output to channel 54. Other possible clear channels are 34, 36, 38, 39, 40, 42, 43, 46, 50, 52, 53, and 62.
Page 10
five is now on channel 56

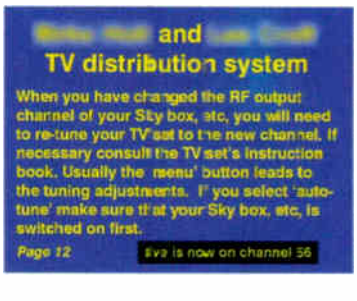

and
TV distribution system
UHF Channel usage (21 to 44)
Page16
five is now on channel 56


and
TV distribution system
Freeview includes the basic five channels plus ITV-2, BBC-3, BBC-4, Sky News, BBC News 24, Sky Travel, UK History, QVC, TV Travel Shop, The Hits, UK Bright Ideas, FTN, TMF, CBM, bid-up TV CBBC, Cbeebies, ITV News Channel, and Sky Sport News
Page 5
five is now on channel 56


and
TV distribution system
To change the output channel of a VCR or DVD recorder consult the instruction book. Change the output to a clear channel such as 34, 36, 38, 39, 40, 42, 43, 46, 50, 52, 53, or 62. Note that some VCRs and DVDs do not have an RF output and work through a SCART lead only, so this does not apply.
Page 11
five is now on channel 56


and
TV distribution system
UHF Channel usage (45 to 68)
Page17
five is now on channel 56


and
TV distribution system
The easiest way to 'go digital' is to buy a Freeview set-top box. These are available at prices from £50 to £120. Look in supermarkets or shops like Currys, Miller Brothers, and Comet. If you want to subscribe to TopUp TV you will need one of their special set top boxes.
Page 6
five is now on channel 56


and
TV distribution system
When you have changed the RF output channel of your Sky box, etc, you will need to re-tune your TV set to the new channel. If necessary consult the TV set's instruction book. Usually the 'menu' button leads to the tuning adjustments. If you select 'auto-tune' make sure that your Sky box, etc, is switched on first.
Page 12
five is now on channel 56


five is now on channel 56
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five is now on channel 56
five is now on channel 56
five is now on channel 56

half of one page and the bottom half of another one. What a useless device! It went back, and I got a refund.

The laptop approach

Having tried a relatively cheap solution, I decided to bite the bullet and use a laptop to generate my caption sequence. In the past I've installed a few systems that carry an in-house bulletin board as a TV channel, the picture being provided by a PC's video output. A modulator converts the video signal to RF. This works really well. I've used Microsoft PowerPoint to assemble and play the sequence. But for the present project I decided that a cheap slideshow program would suffice.

Now everything I know about computers could be written in large type on the back of a postage stamp. So I was aware that I was entering a minefield. Nevertheless I looked around, and found a second-hand Compaq Armada E500 for sale. It had a lot of blemishes on the screen, and looked and felt as if it had been owned by a messy eater. But these drawbacks didn't bother me. I made sure that the video output worked, then bought the machine – aware that the battery was faulty and that there was no power supply.

The machine came to me loaded with an ATI program that enables you to adjust and control both the laptop screen and the TV out displays. At first sight this seemed to be very good. You can adjust the contrast, colour, gamma, screen position and goodness knows what else. All this fine-tuning results in a very good TV display.

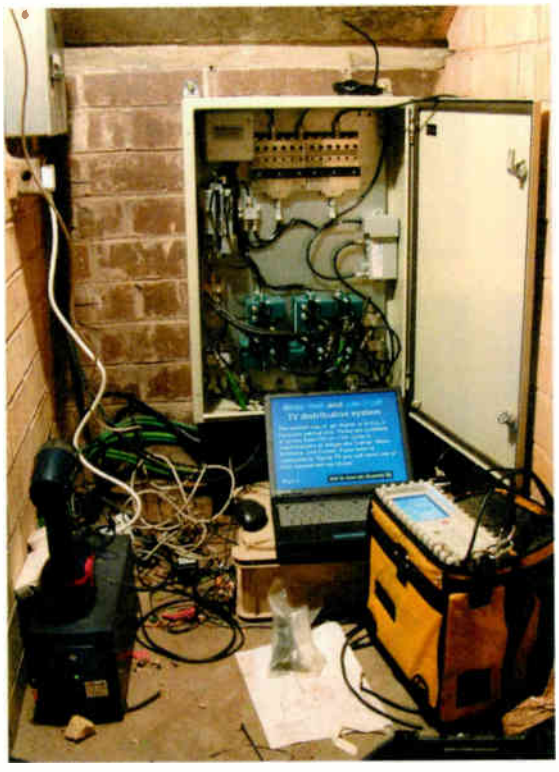
Snags

The main snag is that the software attempts to detect the presence or otherwise of a TV set connected to the output. I've no idea how it does this, but I do know that it doesn't do it very accurately. Connection to some TV sets isn't recognised at all. Connection to a Vision V40-104 modulator, my goal, was hit and miss. If no TV set or other load is detected, there's no video output. In theory it's possible to force recognition of a TV set, but I couldn't get this to work. At least this is better than the software I used for an in-house channel some years ago. It allowed TV out to function only when the computer screen resolution and refresh rate were at absurdly low settings that made by eyes water.

The next snag came when I tried to buy a new battery. The cost was £138 or more from any of the usual sources, far too much for this project. Since the machine would always be powered from the mains, I considered running it from an external power supply with some sort of minimal battery back-up. As a temporary measure I used a bench power supply, but it was a bad idea to run the machine without a battery because the mouse cord caught the power cord, with the result that the power plug disconnected momentarily. The machine crashed of course, and wouldn't power up thereafter.

Solutions

The man at the shop was very kind: he got the machine to work again for nothing. But when I brought it back the ATI software had disappeared, which seemed to be bad news. The video out function now worked perfectly and reliably however, as long as a TV set or a modulator was connected before the laptop was switched on.



The laptop in situ at the TV system head-end. The UPS is on the left.

Reference to an internet auction site revealed a brand new battery for £50. It didn't say Compaq on it, but I was quite happy as it would last for about six hours.

A week later I set up the laptop at the system head-end and turned it on. Great expectation turned to great annoyance when the laptop came on then immediately died. The new battery had failed. Later, in the workshop, I found that it was completely dead and couldn't be revived. I was less than happy when I checked on the net and found that the seller seemed to have disappeared from cyberspace without trace. When I entered the battery type number into Google I found that several other people had bought these batteries, only to find that both the battery and the seller had very limited durability.

Back at the site I was now in a fix. I had removed Five from channel 37 and put it on channel 56. It wouldn't be easy to restore it to channel 37, because the large, high-gain Emley Moor aerial had been taken down. No explanatory leaflets had been prepared and, in any case, I had foolishly gone on about the splendid new computer graphics idea to several important people and didn't want to look like a charlie. Time was of the essence. I didn't want to pay £138 + VAT for a genuine Compaq battery and, in any case, it would take a week to get one.

At this point an imaginary light bulb just above my hard hat lit up and a voice in my head said "get an uninterruptible power supply, you dummy!" It was the answer, of course. The whole point of a UPS is to protect IT equipment in the event of a mains failure, momentary or otherwise, and high-voltage spikes. A UPS is basically a large lead-acid battery with a charger and an inverter. You plug it into the mains supply and the computer into the UPS. Simple! If the mains supply fails, the UPS maintains the supply for as long as the battery lasts. As I was only concerned about short power cuts and the laptop uses very little power, battery life wasn't an issue. And a UPS is a jolly good thing to

have at your disposal. It would, for example, power head-ends at new sites where there was no mains supply. There's a really good computer shop near us, so I rang them. "Can you sell me a UPS?" I asked.

Instead of Sid's familiar tones a young voice answered. His words were discouraging – "what's a UPS?" I took a deep breath and asked if Sid was available. He was out of course, "on an emergency". So I asked if Sid could give me a call when he got back and meanwhile rang another firm some ten miles away. They were slick and efficient. Yes, they had a UPS in stock, several in fact.

I set off through the rush-hour traffic. Why is it that the more impatient you are feeling the more the idiot brigade gets in your way? After what seemed like three hours I arrived at the impressive showrooms of Whizzbang Information Technology Ltd. I bought a Trust UPS 1000 Energy Protector for £90. My pleasure diminished when Sid rang, just as I pulled into the rush-hour traffic for a second time. "Hello Bill, sorry I was out. I've got a Trust UPS 1000 Energy Protector here for you. Would £70 be all right?"

Since the laptop came without a manual, I had to do a bit of random key pressing. As a result I discovered that the machine produces a video output with its own screen turned off, and continues to run even with the lid closed. I bypassed the dodgy DC connector on the laptop so that there was no chance of a supply interruption as long as the UPS was on. Everything now seemed to be perfect.

I installed the laptop and the UPS at the head-end. An eighteen page sequence of slides – see accompanying photographs – had been made up and went out on channel 37 for the duration of the job. It covers everything the residents needed to know, including the channel Five move, the availability of Freeview, the need to retune the outputs of VCRs and satellite receivers, and more. Just to show off, I've included a picture of my lovely little granddaughter Katie sitting in the middle of a test card. The laptop, aided by the UPS, ran unattended for six weeks with never a hitch.

Conclusion

This had been an experiment, and I had not been all that confident about the outcome. Would all the effort result in happy residents, or would it add to the unrest? Information overload seemed to be a real possibility. In fact the idea turned out to be a real winner.

We had very few retuning problems, only two or three in fact when a job of this size could be expected to give rise to dozens. Seeing the message repeated endlessly on their TV screens seemed to convince the tenants that they would jolly well have to bite the bullet and get that TV instruction book out.

I've now got the laptop, UPS and modulator set up and will be able to use them on future jobs with very little trouble. Perhaps I'll add an audio message, to give the presentation a bit more impact. ■

Service Casebook

Michael Maurice

Philips 32PW9536 (MG7.1 chassis)

This set was dead apart from flashes from the standby light: the cause was that the main power supply had blown up. These sets are very complex, and access to the various PCBs is not easy. Unfortunately a power supply repair kit was not available from the main suppliers, so I had to obtain all the parts required individually. Once these had been fitted the power supply ran and the set started. But every so often it hiccuped: the picture would go off abruptly then fade back on, with an accompanying thud from the speakers.

By luck I had a complete chassis taken from a set with a duff CRT. Board substitution proved that the fault was on the signals PCB. Not wanting to give the customer a second-hand board, I reflowed all the joints around the main ICs and any others that looked suspicious. After that the set worked perfectly.

Mitsubishi CT37C2STX

When I take on one of these sets it's on the clear understanding that it must be repaired on the premises. It takes at least four people to lift this monster. That said, the power supply is in many ways similar to the one in the Euro 14 chassis. I usually dismantle the set and remove, as best I can, the power/deflection PCB, bearing in mind that the EHT cap is cemented to the tube! Then I replace all the electrolytic capacitors in the power supply, on both the primary and the secondary sides. This clears most faults, as it did in this case.

Proline NV3200

I was a bit sceptical about taking this one on, then thought why not? The reported fault was that the picture went green and yellow then the set went off. Sure enough after a few hours it did just that. In fact it was loosing sync. The chassis was sensitive around the field and line processing ICs. I couldn't actually see any dry-joints, but resoldering a number of joints at and around these ICs cured the fault.

Ferguson M8421U (ICC17 chassis)

The problem with this set was simple enough: the line output transformer was arcing over. So I ordered and fitted an HR replacement. The set then worked, but after a few minutes it went to standby with the LED flashing. If the set was left for a few minutes it would start and run, but for only a few minutes. Disabling the protection circuit didn't help either.

As Thomson technical couldn't shed any light on the matter, I decided to try replacing the LOPT with an original Thomson one. This cleared the fault, the set running normally without any shut downs.

Philips 29PT5463

There was no sound with this set. Checks showed that the supply was present and correct, but the output ICs were being muted – because the TDA2616Q audio output IC on the surround-sound module had failed. Replacing this and the safety resistor restored the sound.

Grundig Super Colour 2222

This really is an old-timer! Who remembers thyristors in the line output stage, modular field output stages and dozens of modules for just about everything else? It was one of the first to use an in-line gun CRT, so we are going back to the mid/late Seventies!

The fault was field collapse, because of a supply line failure. Fuse Si627 was open-circuit while diode Di627 was short-circuit. It's fortunate that I had kept my old television servicing books, because the parts are in the power-supply circuit and are hidden behind the LOPT. The picture was surprisingly good for a set that's nearly thirty years old.

Fidelity CTV3228

The customer said there had been loss of sound then the set had gone dead. This description should have given me a big clue as to what had happened. The power supply had failed, and went bang again after a rebuild. Then it dawned on me. The TDA2616 audio output IC had failed, and the audio supply rectifier diode had gone short-circuit. Failure of the audio output chip had in turn been caused by a number of dry-joints in this area. I attended to these, replaced the IC and rebuilt the power supply. The set was then OK.

B&O 8800

The standby LED lit up but apart from that the set was dead. As there was 330V at the collector of the chopper transistor, there seemed to be a control fault. Power supply/EHT control comes from panel 7. When it switches to on, 7TR1 supplies 12V to the control chip and other parts. The control signal appeared, but the power supply did nothing. To cut a long story short, I found that all the transistors on this board had failed, together with 7IC1 (TDA2581).

The set came on once these items had been replaced, but there was no sound. The TDA2020 chip 9IC1 had also failed. Replacement of this IC restored normal operation.

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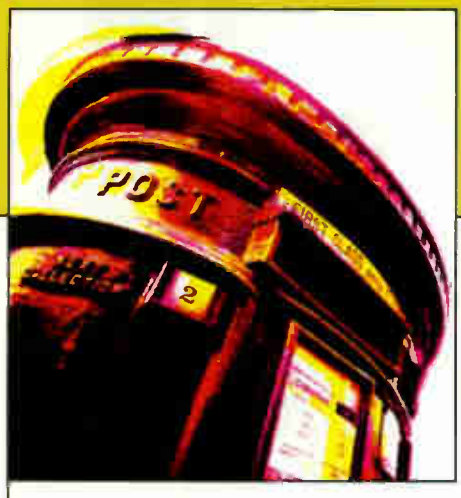


DTT reception

In last month's issue Dr Les May described DTT shortcomings, based on his experience as a viewer. His experience is almost totally at odds with my own, both as a viewer and as an installer. I can only wonder if he has a faulty receiver, outdated software, or an aerial that's deficient in some way or screened by trees. Or could he be tuned to the channel 40 and 43 transmissions from Winter Hill which, theoretically, are radiated only to the west?

My own experience as a DTT viewer has been almost completely satisfactory. My receivers are far from new but they all seem to work well enough. The box in the office is an elderly Grundig – the ugly square thing that represented their first attempt. The only problems with it are that there's a slight delay when changing channel and that it lacks the software required for teletext. The box in the kitchen is a Thomson DTI1000, which works perfectly. The Thomson box in the workshop falters only when I use an electric drill within three feet of it: the drill wipes out analogue reception as well – unsurprisingly, as sparks fly off the brushes.

I'm a very critical viewer and much prefer DTT, in the RGB mode, to analogue. I don't regard DTT as perfect, but to me analogue looks very crude in comparison, mostly because of the PAL artefacts. Our analogue reception here is as good as it gets, but it still annoys me more than DTT does. And I'm sure that if we had significant analogue-signal ghosting I would find it absolutely intolerable after seeing DTT. To me the lovely clean dark backgrounds with DTT are a major plus point after a lifetime of irritation caused by analogue-signal smearing and echoes. The faults that annoy Les so much are virtually unknown in this house. We simply don't experience the picture freezing, lack of lip sync and 'drifting artefacts' that plague Les.

My experience as an installer and repairer of TV distribution systems confirms my experience as a viewer. Believe me, on my patch I have grannies who reach for the phone whenever their viewing pleasure is interrupted for even a millisecond – people with time on their hands are of course the most critical consumers. For various reasons DTT is very popular with the residents of the types of housing served by distribution systems, and in some cases sixty per cent of households use DTT. People surely complain when there's a system fault that causes picture freezing, even when it is of much less severity than that about which Les complains. So I know that in general reception must be pretty reliable.

I agree with Les that DTT faults such as picture freezes are more annoying subjectively than analogue-picture snow. Yes indeed, people will tolerate snowy analogue pictures but won't tolerate stop-start DTT. This only goes to prove my point. My phone would melt if the faults Les describes occurred with any regularity at any of the thousands of outlets on my systems! On this basis, I feel that Les is far too pessimistic in his assessment of DTT's reliability and robustness.

Les suggests that instead of counting the number of boxes to assess DTT penetration we should count the number of people who use DTT in preference to analogue for the five main channels. I can tell him that these two figures are almost identical. Granny will explain that she uses the old remote to turn the telly on "then I puts it down and only uses the new one". This is what pretty well everyone with DTT does.

A lot of things can go wrong with DTT in a signal distribution system, but I've been surprised at how robust the signal can be. A rather ridiculous example occurred only this week, when a young lady complained about occasional picture freezing. Her RF daisy chain started with a VCR then went to the DTT box. The VCR wasn't connected to the mains supply, so the signal that reached the DTT box was at about 15dB below the theoretical minimum level. This caused 'occasional freezing'!

A system fault will often leave DTT more or less unscathed but degrade analogue-signal reception severely. I came across an example of this recently, where an amplifier at the head-end of a large signal-distribution system decided to oscillate at 650MHz. The resultant high-amplitude noise spikes gave the repeater amplifiers severe indigestion. The complaints were "poor analogue, DTT OK". The DTT multiplexes were affected of course, with a poor bit error ratio, but as far as I know all the receivers handled the degraded signal very well, with very little visible effect as far as viewers were concerned. But analogue-signal viewers saw strong patterning on all channels.

I remember being totally unimpressed when DTT started. The receivers were very clunky, taking ages to change channel. Switching transients on the mains supply or a passing Honda 50 would freeze the picture or even result in the box crashing. Sensitivity was poor, and many transmitter powers were lower than they are now. I recall standing in the Miller Bros showroom looking at DTT for the first time. I thought it would never catch on!

How different things are today. Current receivers, apart from the very cheap ones, are much better, and a succession of software downloads has improved some of the old ones. In many cases the broadcasters have increased transmitter powers, and many of the channel allocation 'anomalies' (mistakes?) have been sorted out. Use of the more robust 16QAM instead of 64QAM for multiplexes 1, B, C and D has produced a great improvement.

I'm not claiming that DTT is perfect. The effects of compression are sometimes annoying (grass can look very odd when the camera is moving), and I think everyone will agree that teletext is hopeless. A big fault with some current receivers is the tendency to search for new channels automatically. As a result a receiver can tune in signals from a transmitter that's not the correct one and produce badly pixellated pictures. This option is enabled by default. Turning it off will not always solve the problem, because the default is sometimes restored

after a mains interruption.

These drawbacks are as nothing however compared with the terrible problems reported by Les May. Sound and vision out of sync? Freezing every twenty seconds? Half a dozen breaks in a thirty-minute radio programme? I've had DTT Radio 3 on all the time I've been writing this, and it hasn't faltered once. My experience of DTT has been radically different from Les May's. Could other readers comment?

Bill Wright,
wrightsaerials@aol.com

Analogue vs. digital

As a former service engineer who has been involved with the repair of domestic, defence and, more recently, broadcast and professional equipment, I have followed with interest the analogue vs. digital debate in your pages. I have no doubt that the quality of DTT pictures and sound is very good – provided you can receive a strong, stable signal. This is where the problem lies.

My house is less than thirteen miles from the Emley Moor transmitter and less than six miles from the Sheffield relay transmitter. The aerial, when I moved in two years ago, was an 18-element group A type with a masthead amplifier, aligned for reception from the Belmont transmitter. It provided weak analogue reception with much impulsive interference and no channel Five. I have since fitted a wall-mounted, wideband Televes DAT75 with MRD option and a distribution amplifier. This provides improved gain. There are reasonable analogue pictures from Emley Moor, with some ghosting on all five channels. All digital channels can be received, with signal levels in the green with my Sony ONdigital box and my more recently acquired Panasonic IDTV set. Unfortunately there is signal breakup even when the signal strength remains in the green. At other times the signal level will drop or it will completely vanish. I've tried reception from the Sheffield relay, but the best I can achieve is good analogue with the four main channels, Five being too weak and the digital signals not receivable.

So it seems that for many people the only hope for decent DTT reception is an increase in transmitter ERPs. In fact it seems that the whole business of adding channel Five analogue and then digital has been badly organised. When I attended training courses about digital transmission and reception I was given to understand that the DTT transmission system enabled the same carrier frequency for a multiplex to be used by every transmitter. The receiver would accept only the strongest incoming signal and reject any weaker ones. Indeed this system is the only one that makes sense if the object is to sell off as many frequencies as possible following the closure of analogue TV. But it would require most DTT transmitter frequencies to be changed. It may have made more sense to put DTT on six national frequencies in the first place, even though this would have meant moving some analogue transmission frequencies around.

Until decent reception can be guaranteed, many people will not be interested in buying a DTT receiver – unless it's incorporated in every TV receiver and recorder on the market, giving no choice in the matter. It may be pointed out that there's the satellite alternative. The problem with this is that because of encryption one is currently tied to the Sky monopoly. If you want to be able to record one channel while watching another one, which we have all become used to doing, you have to subscribe to Sky+ and buy the box. The equipment becomes useless if you stop subscribing. Until all free-to-view channels become free-to-air channels, allowing a choice of receiver and two different receivers to be used, one for viewing and one to record, I don't think that satellite provides a reasonable option.

Mick Spooner,
Chapeltown, Sheffield.

Effect of weather

Reception of Freeview digital TV is normally 98 per cent satisfactory at my home in the East Midlands. So imagine my surprise when, during a spell of very still and foggy weather in late December, with the atmospheric pressure static at 30·4in., I found that Freeview was unusable. Analogue services produced poor but viewable pictures from Waltham-on-the-Wolds and very badly patterned pictures from our alternative source, Belmont. The Freeview signals from Belmont were also unusable. Analogue Anglia TV signals from Tacolneston romped in at the side of the aerial to provide a perfectly viewable picture for over an hour, until about 20.00. On the following morning the fog had cleared – a slight breeze had seen to that – and the pressure had begun to fall. All the analogue and digital services normally receivable here had returned to normal.

I had often wondered how DTT reception would be affected by strong co-channel and also foreign interference. The simple answer is that one either hits the 'digital cliff' and gets nothing, or the signals flutter rapidly with an effect like motor-boating. I would like to think that this problem will lessen when the UK's analogue TV transmissions are switched off, leaving only the remaining continental analogue transmitters to give problems occasionally. The best solution available to me personally was to use the digital transmissions from Astra 2 – these have been as solid as a rock since they started over four years ago.

J. LeJeune,
Nottingham.

Thanks

I am writing to express my sincere thanks to the three readers who contacted me following a couple of requests in the Help Wanted section of the magazine recently. The mysteries of the VW car stereo's cunning CAN bus connection have been explained to me, and my parents' ancient Tatung TV set now has a scart connection and proper remote-control operation. I would especially like to thank the mystery benefactor who sent me a package that contained the parts required for the TV set completely free of charge. Their efforts are greatly appreciated, and I hope I am able to return the favour one day.

Nick Arnold,
Oxford.

An early set

Some fifty years ago I was asked if I could repair a TV set that other engineers wouldn't look at. I was suspicious but nevertheless called at the address, where I was shown an object that resembled a wardrobe, about 6ft high. Three men managed to move it for inspection. Its two enormous full-length doors concealed a radio/TV receiver with, rather oddly, a 9in. CRT.

I doubted that it was "a few years old", as alleged. The instruction manual that was still with it suggested contacting the factory for service or assistance! I then found, in the back corner, a date: December 1936! It was obviously well out of guarantee! I did deign to remove the back however. What a shock. I found a massive transformer, several chassis connected by large screened cables, and the 9in. electrostatic CRT.

I declined to take the set away for free but did remove the tube, which I subsequently sold for about £5 as a replacement for a black/green 6in. ex-radar VCR97. I never knew whether it actually worked!

Philip Bearman,
New Barnet, Herts.

DX and Satellite Reception

Terrestrial DX and satellite TV reception reports. Broadcast, satellite TV and transmitter news. DAB DX. Receiver notes. Meteor shower dates for 2005. Roger Bunney reports

We're now well into the winter doldrums, with little or any DXTV reception. Strong solar storms during November 8-9 produced auroral activity in the north but no noticeable AR reception here in the sunny south – though a close check on all Band I TV channels was maintained with a scanner. In fact all I heard on the 9th were sharp buzzing noises every 37kHz right across Band I. They had disappeared two nights later. Most odd! There was a little Sporadic E activity however, as follows:

10/11/04	RAI (Italy) ch. IA; Tele-A (Italy) ch. E2–; also unidentified ch. E2, 3 and 4 signals.
11/11/04	RAI IA, B; Tele-A E2–; unidentified ch. E3 signal.
20/11/04	Signals in chs. E2 and 3 at 1730 hours, possibly TVE (Spain) as vertically polarised.

Peter Schubert (Rainham) summed up the period with a post-card message "DX conditions at home this month very bad". The anticipated mid-month Leonids meteor shower failed to produce any excitement in Band I during the periods when I was monitoring conditions and, the weather being cold and damp during much of November, there was minimal tropospheric activity.

There is good news from the US on the terrestrial digital DX-TV front however, with reports of successful SpE and tropospheric DTV reception at the dxfm.com website (http://www.dxfm.com/fmdx_main.htm). It's interesting that the solar storm around November 7-8 was classified here as auroral EX, mid latitude, "a severe geomagnetic storm in progress with auroral hash very evident with antennas pointed north". This site is highly recommended.

Skywaves

The *Skywaves* bulletin, published by the British FM and TV Circle, ceased to appear in printed form with the 93rd issue (November 2004). It had been published for nearly ten years but, for a number of reasons, had been increasingly difficult to produce. The British FM and TV Circle remains active with the Skywaves Yahoo! Group and on-line for news, views and reception activities via the website at http://www.skywaves.info

Satellite sightings

Reaction to the declared results of the presidential election in the Ukraine was first seen via Eutelsat W1 (10°E) on November 20-21, at 10·972GHz V, with footage of the protests. As I write this on the 27th intermittent live pictures are being uplinked from satellite truck NTVRUS-5 0070 via Eutelsat W2 (16°E) at 12·554GHz H (SR 5,632, FEC 3/4). The truck is reporting from a snowy street in Kiev, where large crowds have marched to the centre and surrounded the presidential HQ. The army and security forces were called but told not to open fire. The Russian TV reporters updated their viewers as the unrest grew then, at 2000, the pictures from NTVRUS-5 started to be encrypted. Despite the importance of the election and the subsequent public unrest, none of the Russian TV channels via the Express AM-22 satellite provided extensive coverage.

The weekend of 20-22nd also featured reports from Chile, where President Bush was paying a visit to his counterpart in Santiago. The visit was not without a few political gaffs, which were well reported in the press. The Path 1 and Path 2 feeds for European distribution were uplinked via W1. Chile seems to provide the same ceremonial pomp as Spain. Outside broadcast coverage was provided by Channel 13 Santiago.

Perhaps the most spectacular sighting of the month was of the X43A test flight, which was carried live by NASA-TV on the 16th via W1. This was a major test of the new 'Scram-jet' motor, a non-turbine device for rocket 'aircraft'. The X43A

was dropped from a NASA B-52 aircraft high above the Pacific. It accelerated rapidly through several Mach numbers and in turn shed the rocket which, within about 70 seconds, reached Mach 10 (ten times the speed of sound) and eventually slowed to splash down in the Pacific. High-quality pictures from B-52 mounted cameras and a 'follow' aircraft covered the whole drop and launch, finishing with beautiful shots of the B-52 as it returned successfully to the Edwards AF base, California, where the Dryden Research Centre is located. The rocket craft is said to have reached hypersonic speed. The Scram-jet draws in air, compresses it with hydrogen, ignites the mixture and expels it from the rear outlet.

The number of TV channels carried by the Russian Express AM-22 satellite (53°E) has increased several-fold over the last couple of months. Most of the programming seems to come from the Caspian Sea region and the eastern Ukraine. At 11·046GHz V (SR 29,812, FEC 3/4) there are TV channels 1-MUZ, NEO-TV, CTC-2, CTC-0, MuzTV-LOVRV and MNS, plus Love Radio, with distribution by the GPKS Network. There's a single channel, TV PROG, at 11·083GHz V (3,750, 3/4). At 11·099GHz V (10,942, 3/4) there are TV channels UTR, HTH and KTM, with the distribution identification UKRKOSMOS. Finally there are two educational TV channels, SGU TV1 and SGU TV2, at 11·186GHz V (8,882, 3/4) with distribution by SGU NET. MNS appears to be on test, as it features a repeating video of mountain streams and pretty views. KTM carried a chat shown on the 18th with no less than President Putin as a guest – there was no mention of the Ukraine election.

As a final note Nick Harrold (Essex) reports on the channels currently carried by Telstar 12 (15°W). At 12·524GHz H (19,125, 3/4) there's DAD-5 with NBC news content, now often encrypted. DAD-2 at 11·518GHz H (3,744, 3/4) carries similar Iraq footage. There is also CNN New York at 12·524GHz H (19,125, 3/4). At 12·608GHz H (19,820, 3/4) there's VOA.

Broadcast news

DAB: Following successful DAB tests in Germany with an accompanying EPG (electronic programme guide) to provide additional information, an international DAB-EPG standard is to be published shortly. This should encourage DAB broadcasters to include an EPG. The first regular DAB-EPG transmissions are due to start this year, with the EPG providing details of current and future programmes. If anyone is considering the purchase of a DAB receiver, it might be worth a slight wait until EPG-enabled models appear in the shops.

Far East: The Japanese company NEC is to supply digital transmitters for the Oriental Pearl commercial TV channel, Shanghai. Viewers in the Beijing area will be able to receive FTA digital terrestrial TV transmissions next year, funded by local government: the first transmitter will cover the Chaoyang district.

France: DTT is due to start on March 1 but an appeal court has cancelled the six licences awarded to the Canal Plus/Lagardere group following a complaint from rival TF1 about Canal Plus's DTT licences exceeding, through subsidiaries, the five-channel limit. The French broadcasting CSA (Conseil Superieur de l'Audiovisuel) has expressed hope that the dispute will be settled in time for the official start.

South Africa: The SABC is to open two ethnic TV channels in 2005, SABC-4 and SABC-5, with Sesotho- and Nguni-language programming respectively. The two regional services will provide both public-service and commercial programmes.

Satellite news

Sigma (Sirius Interior Glass Mounted Antenna) is a new non-steerable mobile satellite aerial for use in vehicles. It fits in a car or lorry windscreen's tinted sunshield strip, and is thus protected against the weather. It's also cheap to include during vehicle manufacture and is virtually invisible. The aerial, developed by Sirius Satellite Radio in conjunction with RecepTec, was launched at the end of October.

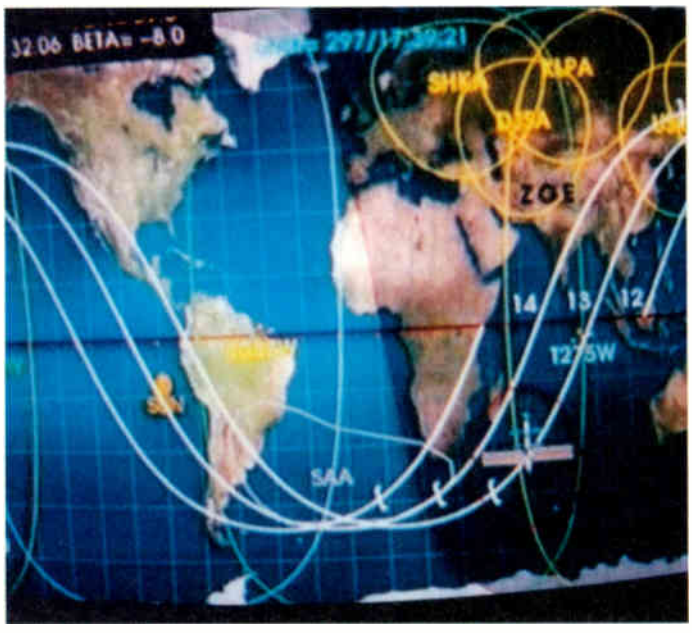
Al Jazeera is now available via Sky as an FTA service, EPG no. 819.

The CSA-230M tracking Ku-band satellite aerial is another one intended for vehicle use. It consists of a small spherical dish and universal LNB that sit in a dome which can be mounted on the roof or other part of a vehicle. The manufacturer is IMC GmbH of Trittau, Germany. Once the vehicle is in motion the aerial will track a selected DTH-strength satellite through a full 360°. The aerial is powered from the vehicle's electrical system at between 10-30V. The tracking electronics and receiver are mounted inside the vehicle. A marine version able to withstand salt water is to be launched shortly. For more details email info@camos-multimedia.de. It's expensive.

GlobeCast Australia has signed a downlinking agreement with Horizon World Plus TV to distribute four Russian TV channels across Australasia. As a result viewers can watch RTR Planeta, RTVi, Teleklub/Detski Mir and Nashe Kino. Uplinking is via PAS-8 (166°E), using Ku-band telecom capacity.

Good news for Czech exiles elsewhere in Europe: the Czech Parliamentary Channel 24.cz is now available FTA from Astra (19·2°E) at 10·832GHz H (22,000, 5/6), bringing political news and information.

Shot from the NASA-TV X43A test flight programme, received via Eutelsat W1 (10°E). This is the Scram-jet rocket.



Final tracks of the ISS Soyuz-8 flight, October 23.

The 24-hour Alhuurra satellite channel via ArabSat (26°E) and NileSat (7°W) has attracted high viewer figures, providing news, documentaries, entertainment, sports and fashion. The channel was launched in February 2004. Two RTM (Morocco) TV channels are now available via ArabSat (26°E), at 11·938GHz V (27,500, 3/4).

8TV is now providing satellite TV programming in eastern Malaysia via Astro All Asia Networks capacity.

The Kurdistan Democratic party has launched Zagros TV, with studios in the three main cities in the area (northern Iraq). It joins the other Kurdish channels Kurd-Sat and Kurdistan TV.

Transmitter news

A fire led to the collapse of the Crown Castle transmitting mast near Peterborough on October 30, removing all BBC FM/DAB national and regional radio programmes plus Classic FM and mobile-phone services. The elderly four-sided lattice structure, reaching almost 600ft, fell across the transmitter building, causing severe damage. A criminal investigation is under way. Temporary lower-powered transmitters from nearby locations were brought into operation during the following two days, restoring most services.

The APTN European distribution feed via Eutelsat W1.

The mast was erected in the Fifties by BICC, using rolled-steel angle sections similar to those used at Londonderry and Rosemarkie. The structure had several access platforms that provided easy dish mounting. The square design for medium-height masts was discontinued in the mid/late Fifties, when a slimmer design with a three-sided lattice and solid round corner legs came into use. This had less wind resistance and used less steel. Taller masts, such as the 750ft Sutton Coldfield one erected in 1949, used the triangular structure from the start. According to the BICC catalogue this mast weighs 140 tons, though the "total downward thrust exerted by the stays amounts to 336 tons". At the bottom the lattice tapers to a small section that sits on a pedestal embedded in a concrete base in the ground. To prevent horizontal movement across the pedestal and lattice taper, there's a single 2in. steel ball between the mast and the base.

The problems at Solent TV continue, with the ch. 54 transmissions from the Rowridge mast still off air. An electric storm at 0320 on October 14 produced a knockout lightning zap that hit the aerial high on the mast at 90m above ground level. This took out the aerial and the 2kW transmitter was a write-off. It's hoped that the replacement transmitter ordered will be in operation in time for Christmas. This is a blow for a successful RSL-TV station that has a loyal viewer base. It provides local news and programming, with outside broadcasts from important local events, and has high technical standards. For the latest updated information refer to the website at www.solent.tv, where streamed programming is also available.

DAB DX

John Broome (King's Lynn) reports success with his DAB DX installation during the lift in early October. Using a home-made, three-element Band III aerial and Pure Evoke 1 receiver, he received BBC Scotland Aberdeen ch. 11C, Peterborough ch. 12D (just in time, see above!), Yorkshire ch. 12A and Sheffield ch. 11C. The aerial is similar to the design shown in these pages in December 2003, but consists of a 'loop dipole' with a reflector and director.

Many more DAB stations that are receivable during enhanced tropospheric conditions are coming into operation across the UK and the nearer parts of continental Europe. Gosta van der Linden reports that the first Danish DAB network is now in operation. He suggests checking channel 12C (227·360MHz V) where 17 programmes are transmitted. Further expansion this year will bring on air Western Denmark ch. 13B and Eastern Denmark ch. 11C.

RTBF (Belgium) is in operation on ch. 12B V aiming, with its music channels, for quality equal to or better than analogue FM, using a bit rate of 192kbits/sec and 48kHz sampled stereo. There are La Premiere, Musiq 3 and Pure FM and, at a lower bit rate (64kbits/sec, 24kHz), BRF. At present only three RTBF DAB transmitters are in operation, at Leglise, Profondeville and Wavre. Another fourteen are due to start in the coming months.

As yet French DAB transmissions are in Band L only, with none in the Band III DAB spectrum.

More information on DAB can be obtained from the excellent Skywaves site at
www.skywaves.info/dab.html

An updated list of BBC transmitters is available at
www.bbc.co.uk/reception/radio_transmitter/digital_radio.shmtl

Those interested in general information on FM, AM, DRM and DAB can refer to
www.rwonline.com/reference-room/special-report/03_rw_drm_5.shmtl

Receiver notes

Readers of this column over the years will be aware of my interest in bandwidth reduction to receive low-level or marginal sig-

Meteor shower dates 2005

Shower	*Overall period*	*Peaking*
Quadrantids	January 1-6	January 3 at 1000 hours GMT
Lyrids	April 19-25	April 22 at 0800 hours GMT
ETA Aquarids	April 23 to May 20	May 4-5
Cetids	May 7 to June 9	May 14-25
Delta Aquarids	July 15 to August 20	July 29 to August 6
Perseids	July 23 to August 20	August 12 at 1200 hours GMT
Orionids	October 16-27	October 20-22
Taurids	October 20 to November 30	November 3
Leonids	November 15-20	November 17 at 1600 hours GMT
Geminids	December 7-16	December 12-14 (best at 2200 hours on the 13th)
Ursids	December 17-25	December 22

Information courtesy Neil Bone, Director, BAA Meteor Section.

nals. The Sony SA3ES FM tuner is highly respected for DXing, so much so that an internet site provides great detail on switched bandwidth reduction for low-level signals, particularly where the frequency is adjacent to a very strong local transmission. Modification details can be found at www.dxradio.co.uk.sony

It's possible, with the Sony switched wide/narrow bandwidth tuner, to replace existing ceramic filters with ones of different bandwidth. The internet provides information on Murata filters (same pin spacing) and where specialised filters (small order) can be purchased. A US site www.dxfm.com/IF%/20Filters.htm offers filters at $1.50 each plus $2 post within the US.

Finally, in my review of the Roberts Gemini RD-6 DAB/FM radio (September 2004) I mentioned low-level hum and buzz. There was no response from Roberts Radio. Twelve weeks later the receiver, after nominal use, suddenly gave up, with no FM and only a very local DAB multiplex audible: the front-end gain had gone very low. Supplier QED-UK reacted quickly, recalling the unit and offering a replacement. But five weeks later Roberts has apparently been unable to supply QED with a replacement from stock. Not a good introduction to DAB! ■

HELP WANTED

The help wanted column is primarily intended to assist readers who require a part, circuit etc. that's difficult to obtain. Requests are published at the discretion of the editor. Send them to the editorial department – do not write to or phone the advertisement department. If you have access to email they can be sent to t.winford@highburybiz.com

Wanted: A VDP3112B chip (IC801) for the Sharp Model 66ESD7H and a VDP3108-25 chip for the Panasonic Model TX25MD1L. Also a WPO Communications Omega communication receiver or the IF unit. John Twamley, Fingal TV, 68 Main Street, Sword, Co. Dublin, Ireland. Phone 353 1 840 2206.

Wanted: LOPT type FCC 2215BE for the 22in. Murphy Model M22501 (Fidelity 4200 chassis). Phone Cedric on 01275 879 620.

Wanted: Bush Model TV53 or TV63. These are wooden-cased sets, not the popular Bakelite-cased one. Please phone David R. Dunmall on 01242 524 234 or email mail@majentamusic.freeserve.co.uk

For disposal: Brand new HR7195 LOPT and remote-control unit (RwidorIR9891) for the NEI CE25 chassis. Free except for postage. Nicholas Arnold, 30 Mere Road, Oxford, OX2 8AN. Phone 01865 556 991 or 07960 646 061 or email nicholas_arnold@hotmail.com

Wanted: Replacement video head for the Philips N1502 VCR. Phone David on 01473 214 865 (Ipswich).

For disposal: Lots of Hitachi spare parts, including camera spares, also Hitachi and other remote-control units, and camera batteries. Whole lot for £300. Some test equipment to go as well. Ex Service Place, closing down. Phone Malik on 020 8574 5827 after 6 p.m. Monday-Friday or any time Saturday/Sunday.

Wanted: 5S0765C IC for a computer monitor identified as Hansol E15BL. It's a five-pin device that controls the power supply. Keith Patton, 1 Glenvale, Glarryford, Ballymena, Co. Antrim, BT44 9QB. Phone 028 2568 5531 or email sabrinapatton@aol.com

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.

Wanted/for disposal: Dual-standard monochrome TV sets, e.g. GEC, Bush, Murphy, Pye etc., and early colour sets. Are there any BRC 2000 chassis sets left out there for sale/disposal? Also require an A63-120X 25in. colour CRT. Have for disposal two colour sets fitted with the Philips G11 chassis, one G22C703 with white cabinet (rare), instruction book and remote control, and one G26C672 in large cabinet with sliding door and ultrasonic remote control. Phone Mike Leach on 01733 577 552 (Peterborough) after 8 p.m. most evenings.

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

Wanted: Remote-control handset for the Goodmans System 1350 mini-stack unit. Also a circuit diagram or any other information for the Sony Video 8 recorder Model GV-8E.PAL. Phone or fax Jack Richman on 020 8590 4947 or email jacko@ricko50.fsnet.co.uk

For sale: Various VCRs, all must go as soon as possible and must be collected. The following Betamax models at £25 each: twelve Sony C6s Mk 1/2; nine C7s; three C5s; three C20s; and an NEC PVC744E. VHS models, £25 each: six Ferguson/Baird piano-key models and an Akai VS5EK with remote control. Also many other VHS VCRs and CTV sets, Hitachi, Sony etc. Phil Gay, 28 Ilminster, Dunster Crescent, Old Mixon, Weston-Super-Mare, North Somerset, BS24 9EB.

AUDIO FAULTS

Reports from
Chris Bowers
Geoff Darby
Owaid Hussain
Eugene Trundle
Steve Roberts
Freddy Ghys
and
Mike Ainscoe

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

Reports can be sent by post to:

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

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

Sony HCD-RG333

This unit's CD tray wouldn't eject and, after a few minutes, it would revert to standby. Investigation inside revealed that there was a fourth disc in the three-disc carousel. It must have come off the shallow three-disc tray and, unknowingly, been replaced with another disc, leaving one disc to jam the tray shut. All that was needed to restore normal operation was to remove and reset the CD tray mechanism. **C.B.**

Sony HCD-H881

There was no sound from this unit's speakers. Meter checks showed that the power amplifier chip IC1201 was the cause. A replacement, part no. 8-749-920-10, restored normal sound output. **C.B.**

Sony HCD-HP7

This unit wouldn't play CDs. Meter checks proved that the cause was the optical pick-up. Unfortunately with this model it's supplied only as a base assembly (607), part no. A-4735-357-A. One was ordered and fitted, restoring normal CD play. **C.B.**

Sony ICF-CD2000S

There was sound from the headphones but not from the speakers. Multimeter checks on the main board revealed the cause of the fault, which was the two flexible PCB connector wires 65 (part no. 1-791-188-11) and 72 (part no. 1-791-189-11) that connect it to the display board. Over time, as a result of opening and closing the unit, they had developed an open-circuit fault across the wires. Replacement of these connectors restored sound from the speakers. **C.B.**

Panasonic SA-DT310

This is the tuner/amplifier section of a two-piece hi-fi/DVD system. If, shortly after switch on, you get the error message F61 in the display, take a look at the fan. If it hasn't started to operate about two seconds after the system has been taken out of standby, the chances are that this is the cause of your problem.

A replacement is easy to fit. Simply remove the unit's top and side covers and one screw to enable the bracket that holds the fan to be removed. The fan plugs in, so you don't even have to warm up your soldering iron! **G.D.**

Technics SU-CH900

This hi-fi unit went to standby at high volume levels. The cure was to replace the fan motor. **O.H.**

Philips CDR675

When this CD recorder had warmed up the display would flash on/off. The cure was to replace the 30V zener diode D6201. **O.H.**

Aiwa MX-Z9500

If there is no display with the amplifier section of this hi-fi system, or the display is dim, replace the following components: C113, C114, Q111, Q112 and R104. **O.H.**

Eltax AVR250

The complaint with this AV amplifier was the front panel controls not working. As I have commented before with items that have a similar problem, the first move should always be to check that the mechanical operation of all the buttons is sound. With this unit the buttons produced a small movement and a reassuring click until I came to the ones marked 'DTS' and 'Bypass'. There was absolutely no movement with either of these.

On closer examination I was not greatly impressed with the build quality. The cause of the problem appeared to be insufficient clearance between the switch tops and the button pins. Rather than reducing the length of the pins, I increased the clearance by adding thin fibre washers between the PCB and a couple of its mounting pillars, in the area of the offending buttons. This provided a complete cure. **G.D.**

Sony HCD-RXD5

When this unit was powered it produced the error message 'protect, push power' in the display. This happens when the hybrid output chip, type STK407-090E, is defective. A-replacement restored full normal operation. Nothing unexpected or noteworthy here then. But what was interesting was that the unit had been in exactly a year before, to the day, with exactly the same problem.

As it was a trade job, I was unable check with the customer about my suspicions. But I guess that birthdays, parties and loud music came into the equation somewhere. **G.D.**

Panasonic SA-AK28

The reported problem with this trade job was "not working – no switch-on from standby". When I plugged the unit in and applied power there was no display at all, just a red AC-in light below the standby pushbutton. The main power relay operated when this button was pushed, as did the output protect relay, but shortly afterwards both dropped out again, one after the other.

When I started to dismantle the unit it was clear that someone had been there before me. A pair of missing screws that should have secured the CD changer to the rear panel were immediately apparent. The

particular dealer is pretty good at not touching equipment prior to sending it on to me, so this sort of thing is always a worrying sign that the owner, or his helpful neighbour who used to mend motorbikes and radar during the war, has had a go.

I decided to start by looking for the reason why the unit wouldn't stay on. A meter connected between chassis and each of the output channels in turn showed that a momentary hefty negative voltage appeared at the left channel output during the brief relay-on time. This led me to suspect the hybrid output IC, type RSN309W44A.

The easiest way to get at the output board is to remove the CD changer and the back panel. When I did this I noticed that four of the five 'flying-saucer' disc spacers were missing from the stacker mechanism at the rear of the changer – another bad sign. And one of the screws was missing when I came to remove the power amplifier. At this point I decided that if a new output hybrid didn't produce at least a basic cure I wouldn't waste any more time on the job.

There was actually one of these rather expensive ICs in stock, so I went ahead and fitted it. The unit then powered up normally. When the CD changer was refitted it shuffled encouragingly, and opened tray 1 on request. A disc inserted at this point played all right, with audio from both channels. So I went ahead and culled four disc spacers from a scrap deck and popped them into place. This is easily accomplished by removing the crossmember (two screws) that holds the boss on to which the spacers then clicked. A full exercise of the deck proved that it was now working. This left the remaining problem of no display.

A quick DC check at the heater pins of the VFD panel produced a reading of several volts positive instead of the usual 30V odd negative that's used to float the heater supply to the same DC level as the display electrodes. It's a convenient place to check for the VFD supply with any make or model, as this heater-biasing scheme is used universally. A look at the power circuit diagram drew my attention to R529 (4·7Ω safety), which is in series with the –VP supply regulator transistor Q501. Replacement of this resistor restored the display, and a full-function test proved that the system was now fully working.

With three distinct and different faults, you can't help but wonder what the original problem was, who had been at it, and what exactly they had done to cause such a trail of damage. **G.D.**

Pioneer VSA-E06

This monster AV amplifier and I got off to a bad start. I had it standing upright, on end, at floor level awaiting attention when I moved towards it at high speed heading for an insistently ringing phone. I collided with the sharp corner of the front panel, which caused some pain and injury, before I gritted my teeth and told the nice salesman that I didn't need a new kitchen.

The reported fault was no sound. Someone had pencilled "display faulty, needs replacement" on the job ticket. I thought that this was highly unlikely and was probably a major clue as to the cause of the missing sound problem. When the unit was put on the bench and powered, the standby relay operated but not the output-protect relays. There was no VFD operation.

A look at the circuit diagram revealed that D157 and D158, along with a couple of resistors and capacitors, produce the –29V supply (–VF) for the display. The diodes are fed straight from an auxiliary winding on the mains transformer, via the 4·7Ω fusible resistors R101 and R102. A quick meter check revealed that they were both open-circuit.

As I couldn't find any reason for their failure, I went ahead and fitted replacements. This restored full operation. A long soak test proved hat there were no other problems. **G.D.**

Aiwa NSX-F9

This was the model number shown on the front: on the back it was given as CX-NF9K. There were three faults: failure to read a CD's TOC; the tape decks not working but clicking; and erratic operation of the front-panel volume control. The cures, respectively, were to clean the CD lens; to replace all four drive belts in the cassette mechanism; and to clean the volume control, which in fact is a rotary pulse-generator switch. The latter had to be removed from its PCB to gain access to a small aperture for the aerosol switch cleaner used. **E.T.**

Hughes and Kettner Warp 7 guitar amplifier

I've repaired several of these 100W amplifiers recently, the fault in each case being that the primary winding of the mains transformer had gone open-circuit. Spares for these German-made amplifiers seem to be almost impossible to obtain, so I use a transformer listed in the CPC catalogue, order number TF00647. It does the job with ease, and is inexpensive (about £21). I would hate to think what the manufacturer would charge for a 'genuine' spare!

I had a lot of trouble with one amplifier however. It kept coming back with the complaint that it had failed, though no obvious fault could be found. On one occasion the 500mA time-lag mains fuse had blown. To cut a long story short, the cause of the trouble turned out to be the Euro mains input socket. It's of very poor construction, and incorporates a fuse that was making intermittent contact. I replaced it with a decent Bulgin-type socket and fitted a separate fuse-holder, which I loaded with a 1A time-lag fuse.

So be careful if you are asked to repair one of these amplifiers. You could waste a lot of time and find it expensive. **S.R.**

Kenwood RXD-M35

This unit was dead except for illumination from the standby light, and the latter went out when the power button was pressed. Some quick checks revealed that the primary winding of the power transformer was open-circuit. As there are no fuses connected to the secondary windings, a check was carried out to see if any high loads could have been the cause. This revealed a short-circuit capacitor, C633 (10nF), which is directly behind one of the secondary windings. Normal operation was restored once this capacitor, an identical one (C632) that's connected to another secondary winding, and a new power transformer had been fitted. **F.G.**

Quad 405-1

No output from the right-hand channel was the complaint with this power amplifier. Checks showed that one of the current-dumping transistors, TR10, had gone short-circuit and blown one of the 4A fuses, F2. As the transistors used were the early BDY77 type, I decided to replace them with the 2SD424 type fitted in later models and replace F2.

I switched on confidently, but there was still no output from the right-hand channel! Further investigation brought me to the op-amp chip IC1. R8 (3·3kΩ) in its negative supply was open-circuit. Once this had been replaced the amplifier worked correctly.

TR9 and TR10 can also be replaced with type 2N3773 transistors or the Motorola type MJ15003, as fitted in the later Quad 405-2 amplifier. **M.A.**

VCR CLINIC

Reports from
Michael Dranfield
Peter F. Exeter
John Coombes
Bob Flynn
and
Brian Battams

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Sharp VCM321HM etc

This VCR wouldn't record etc a new sound track. I found that the bias oscillator wasn't running, and spotted a 4·7Ω safety resistor, R658, that had burnt up. It's a common problem, and Sharp has issued a technical bulletin. The following components should be replaced: R658 (part no. VRD-RA2EE4R7J), C655 (47μF, 16V, part no. VCEA9M1CW476M), Q652 (part no. VSDTC323TS/-1) and inductor L651 (part no. VP-DF221K0000). Also bend transistor Q651 away from oscillator coil T651.

The inductor looked OK, but when it was tested with a digital inductance meter it was found to have shorted turns.

This advice also applies to Models VCM301HM, VCM302HM, VCM311HM, VCM312HM, VCM331HM, VCM522HM, VCMH711HM, VCMH721HM, VCMH73HM and VCMH731HM. **M.D.**

Panasonic Z mechanism

This machine would stop after three seconds in either play or record. The cause was found to be a bent supply brake arm (part no. VXL2733). At the end of this arm there's a spigot that connects with the main lever (VML3166). It was this part that was bent. As a result the supply brake didn't operate when the tape was unloading. Because of this there was a certain amount of slack in the tape and, when play was selected, the supply reel didn't turn for about five seconds. The microcontroller chip detected this failure of the supply reel to move and switched the machine to the stop mode. **P.F.E.**

Matsui VP9401

The cause of tape damage after fast-forward operation is usually the brake pad having parted company with the brake lever. You might find it anywhere in the deck assembly.

The cause of no RF picture, EE or playback, or sound only with scart use, is the 2SA1037K buffer transistor Q4015. It goes open-circuit base-to-emitter. **J.C.**

Panasonic NVHD630

There was no EE or playback sound, though sound was recorded. This can be a difficult fault to trace. We found that the culprit was the BH7803K chip IC4501. Check it by replacement. **J.C.**

Goodmans VCR2000

If tuning drift continues to be a problem after replacing the tuner and associated components, check for glue around capacitor C135. It's necessary to remove all glue from the cpacitor and the PCB. **J.C.**

Panasonic NVSD40

Because of the age of some of these machines, intermittent line twitch is often caused by a faulty impedance roller (part no. VXP1402).

Loss of line lock in the cue and review modes can usually be cured by relubricating the upper capstan motor bearing. More rarely the cause is a badly worn lower drum, but in this case the symptom is usually more noticeable in the review mode. **J.C.**

Sharp VCMH75HM

This is a new VCR I'd not come across before. Playback of its own recordings and prerecorded tapes lasted for only a second, after which there was just a blue screen. In addition the counter stopped running. This suggested that the control pulses were being lost during playback. They were being recorded all right, as playback via another machine proved.

The cable connector to the audio/control head is of the flat-film type, and close examination revealed that the soldering of one of the connections was shorting to an adjacent one. **B.F.**

Panasonic NVHD700B (K deck)

The two tape arms would stop about an inch short of the tape-loaded position, leaving the loading motor struggling before it gave up and the tape was ejected. Much time was wasted replacing the main lever unit and both tape arms, which I've known to cause this problem. I then noticed that the pinch-roller arm was seizing up on the shaft on which it runs up and down. The cure was to clean and slightly grease the shaft and arm.

This is very similar to Mitsubishi F deck problems. **B.F.**

JVC HRS9500EK (1998 deck)

This top-of-the range machine would remain on for two seconds then revert to standby, but it allowed a tape to be loaded to the play position before again reverting to standby. The VCR has a dynamic drum system and, if you look at the right-hand side of the lower drum, you will see two gears. These should spin for a few seconds at switch on. If this doesn't happen, the machine goes to standby.

These gears were jammed. Unfortunately it seems that only a complete drum replacement will provide a reliable repair. **B.F.**

Daewoo DVK985P

The fault symptom with this machine was intermittent failure to play with no drum rotation. The cure was to remove and clean the mode switch. In addition I found that the cassette door didn't always open on eject, thus jamming the cassette. This second problem was cured by placing a sleeve over the eject lever, at the door end. It enabled the door to lift a little higher. **B.B.**

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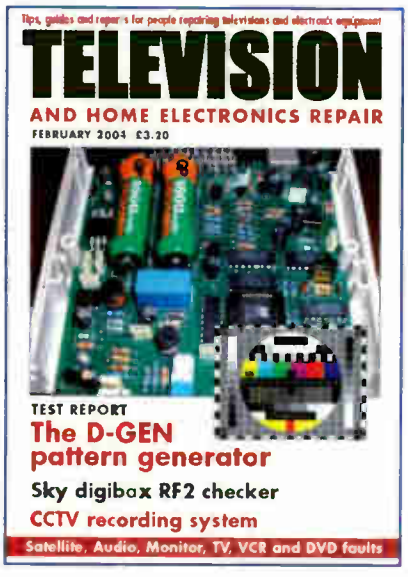

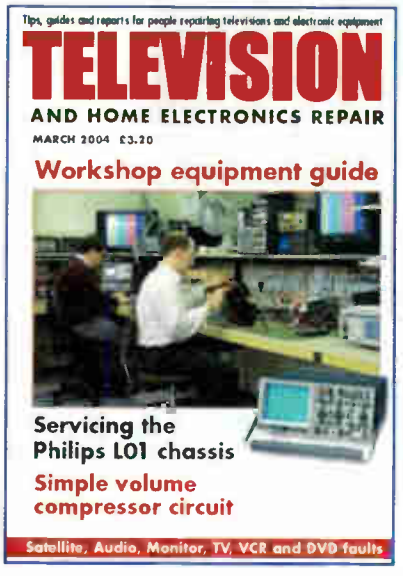

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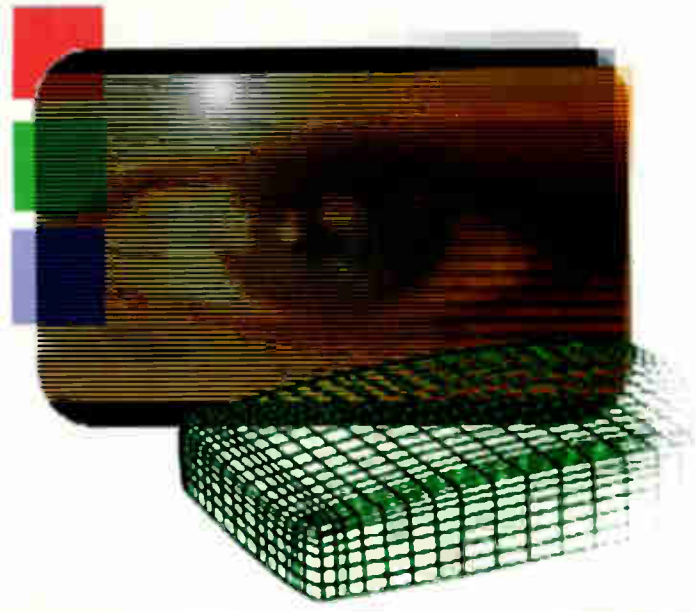

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Beko NR28422NDS

This set produced a bright white raster with flyback lines. The 200V RGB output stage supply was OK however. Reducing the first anode voltage cured the problem, and the picture was fine, but the A1 voltage was now too low. The cause of the fault was found on the tube base panel, where R709 (220Ω) was open-circuit. It appeared to be connected to the CRT's grids and I suspect that a flashover had been responsible for its demise. **M.D.**

Sharp DV5105 (DECO 4 chassis)

A nice easy one. This set wouldn't come on, though the green LED at the front lit up. The 0·33Ω safety resistor R751 had risen in value to 1Ω. It's in the feed to the main 5V regulator. **M.D.**

Hitachi C2565TN

This set was dead though the chopper transformer was making a noise and there was 10V at the HT output from the power supply. The cause of the problem was traced to the 82kΩ, 0·5W safety resistor R901, which was open-circuit. It provides a start-up bias feed for the chopper transistor.

In this model it's always worth resoldering the field output IC, as it runs very hot. **M.D.**

Grundig CUC7301 chassis

One of these sets had an over-bright picture even with the brightness set to minimum. When I removed the back I found that the set had received previous attention. Most of the components on the CRT base panel had been replaced, and a nice new line output transformer had been fitted – presumably because someone thought that the A1 control was the cause of the fault.

With so many components having been replaced there was only suspect left, the surface-mounted BC858B transistor CT181 on the main board. It sets the DC operating conditions for the RGB output transistors. When I checked it I found that it was leaky. A replacement cured the fault. **M.D.**

Sharp DV3760H (4BSA chassis)

Stuck in standby is quite a common fault with these sets. The usual cause is one or both of two components, C604 (1,000μF, 16V) and R601 (0·68Ω, safety). The latter rises in value. Always replace both components. **M.D.**

Grundig CUC6330 chassis

The usual cause of a tripping power supply is a leaky diode in the EW modulator circuit. Check D569 (BY228) and also the 4·7Ω safety resistor R569 which sometimes burns up, causing EW distortion.

Another common fault is field collapse, caused by a dry-joint at the field-scan socket.

When working on this chassis take extra care not to break the long-shafted on/off switch button – it can very easily be damaged when propping up the chassis and, as far as I am aware, this part is no longer available. **M.D.**

Samsung CZ21A083N (KS1A chassis)

This set was dead with no tripping noises or anything. I went straight to the collector of the line output transistor to check whether the 135V HT supply was present. It was, and I then found that there was no activity in the line driver stage. This brought me to the main microcontroller/jungle chip IC201, type TDA9351PS/N2/31. When I obtained and fitted a replacement the set sprang to life. The part no. is AA09-00418A. **P.S.**

Hitachi C28W430N-311 (A7 chassis)

This set came in because of the common switching-off symptom which, as usual, was caused by dry-joints at the regulators on the large heatsink in the middle of the PCB. When these had been attended to I switched the set on and found that there was what appeared to be poor luminance. After spending some time on checking possible causes I decided to phone Hitachi

technical to see what they could suggest. This proved to be a good idea. I was advised to solder the link between C528 and C529. This action restored a normal picture. **P.S.**

Beko 14272R

This in-guarantee set was dead. It was fitted with the usual sand-filled internal mains fuse that's generally open-circuit with this fault symptom. Not this time however. Before diving into the power supply I checked to see whether the 112V HT supply was present at the collector of the line output transistor. It was, so the next step was to check the rectifier diodes on the secondary side of the power supply. I found that D609 was short-circuit and that R615 (1Ω, 0·5W) was open-circuit.

The diode fitted in this position had a strange number, so I decided to fit my 'universal' BYV95C that always gets me out of trouble. It didn't let me down. **P.S.**

JVC AV28GT1SJF (11AK45 chassis)

The fault symptom with this set was no reception – there was just a blue screen. It didn't take long to find that the tuning voltage at pin 9 of the tuner (TU200) was missing. The 33V supply is derived from D610, which is fed from pin 11 of the line output transformer, and is stabilised by zener diode D601. The voltage at this point was low at about 12V. Checks on the diodes were a waste of time, so I removed the tuner. This restored the 33V supply. A replacement tuner, part no. VE-30009637, restored reception. **P.S.**

Hitachi C28W440N (11AK33J4 chassis)

This set was tripping slightly with the red LED blinking. The best approach seemed to be to carry out some cold resistance checks in the power supply. I found that D119 (UF5402), which produces the –14V audio supply, was short-circuit. A replacement from a scrap chassis brought this just out of guarantee set back to life. **P.S.**

Grundig 28EKBT70-1020A

I didn't recognise this as a Grundig chassis – the set had been supplied by a catalogue company. The fault was a strange one: the picture frame was erratic for about two minutes, then corrected itself. Application of freezer around the field output stage brought the fault back, but fitting a new TDA8358J IC made no difference. In desperation, I decided to freeze a cotton bud and dab around different components in order to instigate the fault. This revealed the cause, which was the 51V zener diode ZF1 (BZT03C51). All was well when an equivalent had been fitted. **P.S.**

Hitachi C28WF540N

Line twitching and incorrect colour phasing were the symptoms with this set, which is fitted with a Vestel chassis. Hitachi technical was aware of the fault. The cause is C611 (5·6nF, 2kV), which changes value. It's part of the reference pulse feedback network between the line output stage and the jungle chip. All was well once a replacement had been fitted. The part no. is VS30000165. **P.S.**

Panasonic TX25MK1L (EURO-4 chassis)

If one of these sets is stuck in standby and replacing the usual culprit C454 (22nF) doesn't provide a cure, check Q857 (2SA1018QTA) in the excess HT current protection circuit. On this occasion it was leaky. A BF423 seems to be a suitable replacement. **D.M.**

Philips 29PT632A (GR2.4 chassis)

Lack of height was the complaint with this 29in., 4:3 aspect ratio set. The linearity was perfect, and the condition didn't vary with temperature. The cause turned out to be a very leaky surface-mounted transistor, Tr7546 (BC848B), which is effectively in parallel with lower end of the height control potential-divider network. It's switched on for aspect-ratio changes as, in this model, the viewer can select screen size options via the menu. **A.J.**

Ferguson B14C (later TX90 chassis)

This 14in. portable wouldn't tune in any channels. I quickly found that the 33V supply at pin 4 of the tuner was missing. In this chassis the tuning supply is derived from the line output stage. The 180V supply produced here for the RGB output stages is dropped via two series-connected resistors, RH04 and RH06, and stabilised by DH04. RH04 (27kΩ, 0·43W) was open-circuit. This component is tucked in between the line drive and output transformers and seems to lead a hard life. **A.J.**

Philips 25PT4101/07 (AA5 AB chassis)

Our rental records show that these sets have been very reliable. One that was dead came in recently however, with the 3·15A mains fuse blown. In addition a large spring was lying amongst the components on the primary side of the power supply. It had come from the tube's Aquadag coating, as a plastic securing lug had snapped.

We've seen this before in other Philips models. The extent of the resultant damage varies depending on where the spring ends up. In this case the chopper control chip IC7520 (part no. 4822 209 90025) and D6524 were the only damaged items. This diode is connected to the gate of the chopper FET. **A.J.**

Ferguson 29DH73JD (ICC9 chassis)

Excessive width with bad EW bowing is quite common with this model and other large-screen sets that use this chassis. I find that the cause, every time, is CL42 (4·7μF. 160V) in the EW amplifier stage. It falls to a very low value. **A.J.**

Toshiba 36ZP18P (C00S chassis)

The fault symptoms with this set were switching to standby from cold and an intermittently blank screen. As they were so intermittent I checked with Toshiba to find out whether it was a known problem. The recommendation was to remove the small text sub-PCB close to the tuner to see if the fault cleared. If so, the cause was likely to be dry-joints at a surface-mounted IC (QT09) on this module. This advice turned out to be spot on. Removal of the PCB cleared the fault, and resoldering QT09 then refitting the sub-PCB provided a complete cure. **A.J.**

Thomson 10MG70B (TX91 chassis)

This compact 10in. mains/battery portable appeared to remain in standby when start-up was attempted. Checks showed that there was HT at the line driver and output stages but no line-drive signal. This comes from pin 36 of the STV2118B video/chroma/timebase generator chip IV01. It was also missing here, and further checks revealed that there was no 13V supply at pin 22. This supply comes from the chopper circuit via RV02 (56Ω), the relevant rectifier diode being DP90. There was only 4V at the cathode of DP90, because the associated reservoir capacitor CP90 (2,200μF, 16V) was open-circuit. **A.J.**

Nokia 3724UKFX (Mono Plus chassis)

Set dead was the complaint with this one. When I tested it I heard the power supply and EHT briefly at switch on, then all signs of life disappeared. Checks showed that the HT supply rose to about 80V then quickly fell back to zero. No obvious shorts were found and, when the feed to the line output stage was disconnected,

the power supply happily produced 112V with a bulb as a dummy load. Checks in the line output stage revealed a low resistance (approximately 100Ω) across the line output transformer derived 200V supply for the RGB output stages. The cause of the problem was that the TEA5101N/B RGB output chip NH01 was short-circuit. **A.J.**

Grundig ST55-725FT/GB (CUC7350 chassis)

The complaint with this set was no sound after an hour. Actually it took the best part of a morning for the fault to show up, but eventually the sound did go off. Spraying freezer all over the audio output stage made no difference, but we could hasten the fault from cold by using a hairdryer. Once the right circuit diagram had been found it soon became obvious that the output stage was being muted. There are two surface-mounted npn transistors in the muting circuit, CT40025 and CT40030. When we replaced them the sound remained on during a long soak test. **M.L.**

Sanyo CE28FWN4-B (EB7-A28 chassis)

There had been a severe power supply failure in this 28in. widescreen set. Several components had deteriorated physically and had blown apart. A major rebuild was carried out, but after that the set refused to work, with no sign of any outputs from the power supply. After some while attention was turned to the various surface-mounted components beneath the chassis. Checks here showed that R623 had risen in value from 1·5kΩ to 200kΩ, while R617 which should have read 1·2kΩ was open-circuit. Neither of these resistors showed any signs of physical deterioration but, nonetheless, had suffered. Replacements brought the set back to life. **M.L.**

Hitachi C32W511TN (A7 chassis)

After completing all the usual resoldering that's required with this chassis, the set still reverted to standby intermittently. Much time was spent, to no avail, investigating various possibilities. We eventually found that one end of R975 (18Ω, 2W) was shorting against IC952's heatsink, and thus to chassis. **M.L.**

Bush WS6680SIL (Beko 14.2 chassis)

This set was slow to power up or, rather, it took a long time for the picture to appear. The HT was present and correct at switch on, but there appeared to be no line drive. Scope checks around the line driver and output transistors confirmed that the problem was drive related.

Initially the waveform at the collector of the line driver transistor was low with lots of 'mush' on it. After several minutes of this the waveform improved and the set sprang to life. I tried again after the set had cooled down, concentrating this time on the power supply. Voltage checks at switch on revealed that the 15V supply was low at 7·4V. This voltage comes from D613, with C620 (1,000μF, 25V) as the reservoir capacitor. C620 was leaky. Why can't all faults be as straightforward! **M.L.**

Sharp C1431H (8P-SR chassis)

Sometimes we make a loss on a set to prove that we can still repair sets rather than declare them uneconomic! This set would work for a few seconds then die. Removal of Q603 restored normal operation, which proved that the fault was in the trip circuit. It was cured by replacing R343 (100kΩ). To be on the safe side I replaced the other high-value resistors in the trip circuit. **G.D.**

Sony KVA2542 (AE2 chassis)

The picture and sound were intermittent, with the LEDs sometimes flashing. I resoldered the field output IC and the regulators and pronounced the set fixed. When it was tested from cold however it seemed to power up normally but there was no picture or sound for a minute or so, and it would sometimes trip. More by luck than judgement, I discovered that the A1/G2 preset RV701 had been fully advanced because R701 (680kΩ) was high in value. A replacement resistor and resetting cured the fault. With this chassis both the sound and the picture are muted until the auto grey-scaling is successful. **G.D.**

Samsung WI28W5VN

The owner of this set complained about an intermittently dull picture. I also noticed that the grey-scale varied. The tube was a Thomson one but, when I came to check it, the base socket fell off! It had not been inserted properly during manufacture, but had worked faultlessly for about four years. **G.D.**

Bush BTV170T (Orion televideo)

This set, an alarming emerald green, tripped back to standby when switched on. Usually the cause of this is the EEPROM, but I wasn't sure this time as there was a slight smell of burning. Repeated switching on and off revealed the culprit – smoke came from the scan coils. Fortunately I found some in a scrap set. I've since had this fault again, on a second set – luckily not a green one! **G.D.**

JVC AV25SX2EK

The complaint with this set was intermittent results. I checked for dry-joints then, when I tried again, the set came out of standby but with no EHT, and shut down after five seconds. That was long enough to check for waveforms however. There was line oscillation but no input at the line driver transistor, which was faulty. Unusually, it's an FET. **G.D.**

Grundig ST63-775DPL (CUC2040 chassis)

The complaint with this set was that it reverted to standby intermittently. Looking over the chassis I noticed a dry-joint at C53009 in the line output stage. Another dry-joint was revealed when I unclipped the small PCB on the scan coils. Over in the power supply C60009 in the snubber circuit was dry-jointed. The set worked correctly once these connections had been remade. **C.R.**

Toshiba 28N04N

This set was dead with the 2·5AT mains fuse blown. I found that the IRFBC40 chopper transistor T60005 was short-circuit and that R60001 (270kΩ) was open-circuit. I replaced these components and, as a precaution, the TDA4605-3 chopper control chip IC60010. After that the set worked normally.

I've not come across this chassis before and suspect that it may be a Grundig in disguise. **C.R.**

Black Diamond BDS3251WS (11AK19PRO chassis)

This set was stuck in standby. When it was switched on the front LED glowed green. Normally when these sets are switched on the LED glows red then, when a channel button is pressed, the set comes out of standby and the LED goes green.

I initially thought that the supply to the microcontroller chip IC501 was low. But in this version of the chassis the microcontroller has a 3·3V supply. I then discovered that there was no activity on the SDA and SCL lines, and no reset activity at pin 33 of IC501 at switch on. The reset circuit contains a surface-mounted, 2·4V zener diode, D505, which produced a high reading when an in-circuit diode test was carried out. A replacement restored normal operation. **C.R.**

DVD

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Chris Bowers
Chris Plaice
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and
John Coombes

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Sony DVP-CX860

Sometimes this unit wouldn't power on. Multimeter checks in the power block inside showed that C301 (680μF) was faulty. When consulted, Sony technical said that it should be upgraded to 1,500μF, part no. 1-137-921-11. The replacement restored normal power-on operation. **C.B.**

Sony HCD-SC5

This unit wouldn't switch off: it would constantly switch itself out of standby and start playing. The cause of the trouble was the play button (S803) on the control PCB. A replacement press button restored normal standby operation. **C.B.**

Sony HCD-S550

This unit wouldn't play discs: it showed 'reading' in the display with no playing. The cause of the problem was lack of rotation, or very poor rotation, of the spindle motor. This item is not available separately, only with a complete optical pick-up block assembly, reference number 703, part number A4713410A. Normal DVD playing was restored once a replacement block had been obtained and fitted. **C.B.**

Sony HCD-CP11

This unit was stuck in standby. The only response was a buzzing sound from the left-hand speaker. Checks inside with a multimeter revealed that IC101 and IC201 (part no. 875958438) were both short-circuit. As a result the fusible link resistor in the mains transformer (T901, part no. 143538611) was open-circuit. Replacement of these three items restored normal operation. **C.B.**

JVC XVS302SL

The complaint with this unit was stuck in standby. When I removed the cover I noticed two capacitors that looked distressed, with their tops bulging, in the power supply. They were C934 (1,000μF, 10V) and C935 (470μF, 10V). Once they had been replaced the unit sprang to life. But when it was connected to a TV set there was no line sync. Fortunately it was just that the rear YC/comp switch was in the YC position!

I fitted replacement capacitors of higher temperature and voltage ratings than the originals. They were quite cool after a two-hour test run. **C.P.**

Pacific DVD1002

This was one of those 'must do' jobs, for two reasons. First, the owner is the service centre manager of a company for which I do some commercial board repairs – a lot of them, actually. And secondly because he's my daughter's boyfriend's boss! Anyway, the problem had been described as "seems to do random things – pauses, stops, goes into x2 or x4 search, that sort of thing!" My heart sank when I saw it. This was a budget model if ever there was one!

I set it to run and the first thing I noticed was that none of the front-panel controls worked, irrespective of whether or not the remote 'keylock' function was engaged, as indicated on the screen, when this remote-control unit button was pressed. Everything worked normally when the remote-control unit was used however.

The problems started when the machine had been playing for about a quarter of an hour. They were exactly as described, and got worse and worse until the unit went to pause and couldn't be persuaded to move to any other function. At this point I applied finger pressure to the system-control micro chip on the front PCB. This restored functions again, until pressure was released.

Suspecting a bad joint at one of the IC's pins, I removed the front panel to get a better look. Close examination then revealed the cause of the trouble. Just above the chip there's a bank of four pull-down resistors that are connected directly to four of the IC's pins. One of them had no solder at all at one end. Adding some provided a complete cure, with the front-panel controls working as well. Genius status restored then, and brownie points all round! **G.D.**

Panasonic DVDL50

Some DVD players incorporate a jitter test, which gives an indication of whether the operation of the pickup assembly is within specification. To initiate the test with this model, press playback and pause for five seconds, either at the unit or via remote control. A figure of 095 means the jitter figure is 9·5 per cent. The figure should not be higher than this. **J.C.**

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John Crisp

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S W Amos; R S Amos

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Eugene Trundle

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9th edition ▲ Aug 2001
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Jan 1998 ▲ 238 pages ▲ HB
Code BUTD-7506-3448-0 **£14.99**

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Revised 2nd edition ▲ Nov 2001 ▲ 336 pages
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PB ▲ Published in UK
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TV FAULT-FINDING GUIDE

Edited by Peter Marlow

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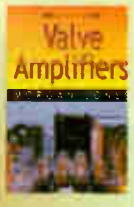
VALVE AMPLIFIERS



Morgan Jones

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

VCR FAULT-FINDING GUIDE

Edited by Peter Marlow

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

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

VCR IC DATA FILES

J Edwards

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

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Keith Jack

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3rd edition ▲ Jul 2001 ▲ 784 pages & CD-Rom
References ▲ Glossary ▲ Index ▲ PB
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Ian Poole

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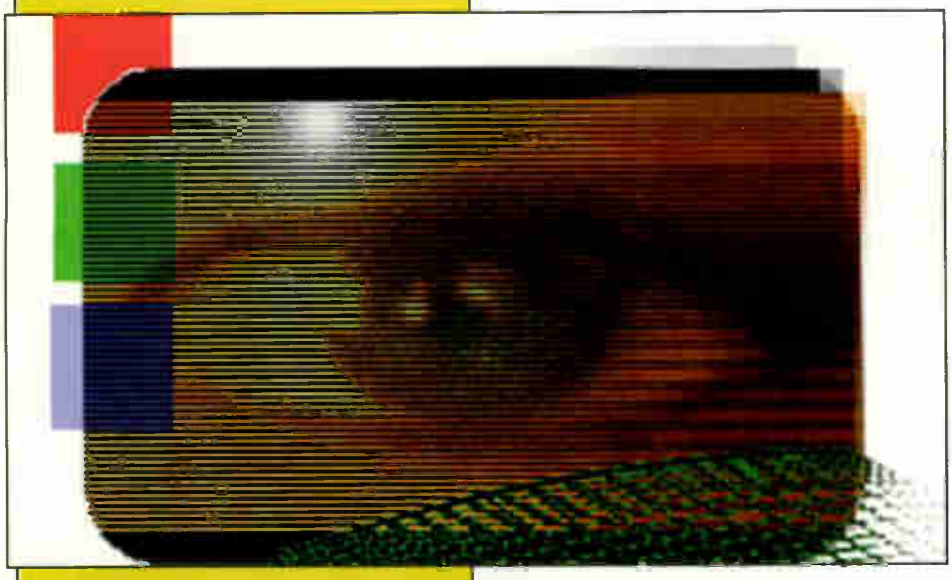

Extended Reports

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

Charles Ritchie

Malcolm Russell

M.J. Abbott

Gordon Haig and

Philip Blundell

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

Reports can be sent by post to:

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

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

Fault

Thomson 14CD25FT

The customer said that this combi unit worked correctly with a mains supply but not with a battery. While putting it on the bench I heard a rattle from within. When the back had been removed I saw that the mains bridge rectifier's reservoir capacitor had dropped from the AC power supply and was now resting in the VCR section. So I was quite surprised that the customer had claimed that mains operation was OK. In theory it shouldn't have been. It worked once the reservoir capacitor had been fitted back in place.

Moving over to the DC inverter stage I found that part of the DC input print had burnt out, though the fuse was OK and no shorts were found. Bridging the burnt-out print with a stout wire link restored DC operation. **C.R.**

Sanyo 21DN9 (EB8-A chassis)

This relatively new set, which was still under warranty, produced a bright white screen with flyback lines. I immediately suspected loss of the 200V supply at the CRT base panel, and a quick check around the TDA6107AF RGB output chip IC701 and associated feeds proved that this suspicion was correct. The cause was likely to be a faulty diode or resistor in the LOPT-derived 200V supply.

In these sets the relevant components are R480 and D481 on the main PCB. Checks showed that they were both OK however, and that 195V was present at this point. So, cracks in the print, or a broken wire or plug and socket? It was not that simple. The correct circuit diagram was required to see that Sanyo has inserted a small transistor, Q401 (2SA1371), in series with this feed. It's on the main panel, and was open-circuit. A replacement cured the fault.

I've not seen this arrangement before. The idea seems to be to switch the 200V supply, control coming from the standby circuit. Perhaps it carries out some sort of spot suppression at switch off. The 25 and 28in. versions of the set have a standard arrangement without the transistor. **M.R.**

Philips 32PW6006 (L01.1E chassis)

This set was supposed to be dead, but in fact the power supply was continuously tripping. A short-circuit line output transistor, Tr7460, was found to be the cause. After a thorough check for dry-joints and anything else that might have led to its failure a replacement got the set working. But the width would come in intermittently, along with line foldover and a squealing noise.

There are three transistors in the line-drive circuit, Tr7461, Tr7462 and Tr7463. I decided to replace them and also the small line-drive transformer T5461 – which incidentally has had a part number change. After that the set worked happily for the rest of the day.

Next morning however when the set was switched on from cold it was back to its old tricks. When I studied the circuit diagram more closely I noticed a small electrolytic capacitor, C2455 (47μF, 25V), in the coupling to the driver transformer. My trusty ESR meter proved that it was faulty. The ESR had gone up and the capacitance had gone down. Replacement and a long soak test proved that it had been the cause of the trouble.

We've had the problem many times since, and nowadays always replace this capacitor when the line output transistor has failed. It looks like stock fault. **M.R.**

Goodmans 2018R (Daewoo CP330 chassis)

The 2SD5072 line output transistor (Q402) in this set had failed. When a replacement was fitted and the set was switched on again the line output transformer flashed over after a minute or two, killing the new transistor. The underlying cause of the trouble was in the power supply however. There was poor HT regulation because C811 (100μF, 16V), the chopper transistor's base drive coupling capacitor, had fallen in value to 13μF – in addition an ESR check produced a reading of 6·9Ω. Because of its small size the line output transformer is vulnerable to an over-voltage condition, particularly at switch on in a cold room.

Further checks were carried out in the power supply before fitting a replacement line output transformer. C816 (100μF, 16V) also had a high ESR and needed replacement. C814 (1μF, 50V) and C817 (330μF, 25V) were also replaced. An HR7916 line output transformer was obtained from Wiltsgrove and fitted. A

2SD1555 will do as a substitute for the line output transistor.

The set worked once these replacements had been fitted. To provide protection against excessive HT I decided to fit an avalanche diode across the HT reservoir capacitor C822 but couldn't find one with a suitable value. Instead I fitted a 75V zener diode (BZT03C) and a 47V zener diode (1N5368B) in series, giving a total rating of 122V with failure at about 140V. **M.J.A.**

Sharp 51DT25H

There was a strange field-scan fault with this set – see Photo 1. The top three inches of the picture were blanked off. Below this there was a section of distorted field scanning that extended down towards the centre of the picture. A bright line was present across the centre of the screen, and the bottom half of the picture was perfect. The field scan circuitry is discrete – the output transistors manage without heatsinks, presumably because of class D operation.

Checks with my in-situ transistor tester and ESR meter failed to reveal anything amiss. I found the culprit using my cheap Netto supermarket DMM in the diode-test mode. So long as there is no stored charge about you can test diodes in-situ, noting their forward-voltage drop in millivolts. With the red lead connected to the anode of a silicon diode you should get a reading of say 5xx up to even 9xx (figures in millivolts). With the leads reversed the reading should be 1. When I checked D501 in this set the reading was 1630, which was clearly wrong. A new 1N4004 diode cleared the fault.

A problem with these sets, but not a fault, is as follows. With the set I had the front programme up/down buttons would allow only position 1 or VCR to be selected. You need to have the exact remote-control unit from the owner – other Sharp handsets won't do. With the correct handset you may notice that some programme positions are in red and some in green. It depends on whether a position has been tuned to a station and stored – storing changes the colour of the number. If a position hasn't been tuned in and stored, it won't be available via the TV programme buttons. Simple when you know! The owner had supplied a Sharp TV/VCR remote-control unit that couldn't be used for sweep tuning. **G.H.**

Photo 1: Strange field-scan fault symptom encountered with a Sharp Model 51DT25H.

Philips 25PT410A/05 (GR2.2AA chassis)

This set had failed with the BU508AF line output transistor short-circuit. Back at the bench I fitted a replacement but didn't like the noises I heard when I powered the set. So I switched off quickly. I decided to order and fit a new line output transformer, type HR7279. Things were better when this had been installed, but there were problems with picture geometry – expansion and contraction. This led to the discovery that the HT, which should be 148V, was too high. It was 158V even with the set-HT control at minimum. I then tried with a 60W bulb as a dummy load instead of the line output stage. In this condition the HT was correct with the control at mid-range. But it was high again when the feed to the line output stage was reconnected.

I eventually found D6560 (L4148) and D6591 (1N4148) in the over-voltage protection circuit were faulty. Replacements cured the fault. Don't forget to resolder the socket pins on the scan-coil assembly when one of these sets comes in for repair – they are often badly soldered.

I'm sure that it was the above trouble that had put the customer's scart-connected Pace Sky digibox into permanent standby. I have now been told that the set is changing channels of its own accord, which suggests that the microcontroller/memory section has been spiked. The customer says he's thinking of buying a new set. Oh well, you can't win them all! **G.H.**

Sharp 56FW-53H (DA100 chassis)

This widescreen set came in with the BUH515 line output transistor Q601 short-circuit. As there were no obvious dry-joints, I wondered whether the HT was too high. To check it, lift R792 in the power supply and, to isolate the line output stage, R623. Unless R792 is disconnected, the power supply won't run. Connect a meter between the cathode of D720 and chassis – a bulb dummy-load is not required. When I did this I found that the HT supply was near the mark at 145V (150V is the voltage given in the manual).

C607 (330μF, 10V) is a known cause of failure of Q601. I removed it for test and found that it measured only a few microfarads. When you replace this capacitor, note that the polarity shown on the board is correct. The circuit that appeared in the October 2003 issue, on page 729, shows it the wrong way round. When I checked the voltage across C607 with a DMM I found that it was –3·2V with respect to chassis.

An S2000AF line output transistor will do for testing in the workshop, but make sure that you fit a BUH515 transistor before you return the set to the customer.

The teletext page display is novel. You can display and work teletext at the right-hand side of the screen and, at the same time, watch a picture at the left-hand side of the screen. This could avoid some family rows: widescreen TV does have some advantages after all!

This chassis was covered in detail in the September 2003 to February 2004 issues of *Television*. **G.H.**

Grundig TVR3710

This TV/VCR combi unit wouldn't come out of standby, though it would accept and eject a cassette. I had a service manual for a similar model, the TVR3700, so I started to check the power supply's output voltages. But it soon became clear that this set was not the same as the one covered by my manual. It had been made by Philips, who had thoughtfully put the type numbers on white labels that were affixed to all the PCBs. The power supply board was marked PLSP14. A search through my Philips manuals revealed that the same board is used in the Beta range Model 14PV163/05.

The 33V supply, which is dropped across resistors R3391 and R3393, was missing. The resistors were blameless however. Cold tests showed that the TL431CLP adjustable shunt regulator IC7331 was leaky.

Once a replacement had been fitted the 33V supply was back again and, when the set was called out of standby, the field timebase could be heard to start up. But there was still no EHT, and the set reverted to standby again. I found that the PROT (protection) line was permanently low because Tr7550 (BC548B) was leaky.

The set worked when a replacement transistor had been fitted. As I was testing the video section however an arcing sound came from the area of the line output transformer and the set went to standby – and wouldn't come out. Yup, the line output transformer had a crack in the base.

So to restore normal operation I had had to replace the LOPT, IC7331 and Tr7550. **P.B.**

WHAT a LIFE!

There's one constant in this trade: odd customers! Also various interesting faults of course, and you can get the occasional visitor from the past. Donald Bullock's servicing commentary

The products we sell have certainly changed over the years, but the antics of our customers are much the same.

In the Fifties Grundig brought out a super-duper stereo audio recorder, Model TK830/3D. The multiple branch where I worked at the time was allowed to stock just one of them. It recorded one track on a 7in. tape then, in less than a second, the tape direction reversed and it recorded a second track. The technical achievement for the time was quite something, and playback matched perfectly between tracks. It sold for over a hundred pounds, at a time when my wage was about £8 a week. I'd have given anything to get one, and there was at least one other chap in the city who obviously felt the same way. He devised a very cheap way of getting it.

A con

It was mid-summer, and sales were slow. Our branch managers (they came and went) were paid peanuts plus commission (also peanuts), and were keen to sell in order to keep their jobs a while longer. Our manager at the time, the sixth in as many months, was a prickly, fat fellow who was known as the Porcupine – Porky for short.

One day his sales telephone rang and the enquiry excited him so much that he started to gibber. The gentleman on the other end of the line offered to have the Grundig at home on demonstration for an evening. It was a commonly employed sales ploy at the time, known as 'getting the product into the house'. The house concerned was very grand and in a good area. As he spoke Porky checked the name against the address in the Kelly's street directory, then agreed to deliver the machine himself that evening on his way home.

The customer was apparently trimming his tall front hedge, on the pavement side, when he reached the house. He greeted Porky, thanked him for turning up a bit earlier than he thought he would, and got Porky to place the recorder just inside the open drive while he finished the hedge.

"I know how to set it up" he explained, "as I already have a cheaper model. I don't see much doubt that we'll be having it. I'll phone you in the morning to confirm."

Porky sang all the way home.

Next morning wore on, but no telephone call came. By mid afternoon Porky decided to call at the house. The crochety old girl who answered the door grew increasingly outraged as Porky explained his call, and finally exploded in his face.

"Get off my drive, you insolent man, or I'll call the police to you" she shouted. "I don't know what Gruntapes are but, in any case, if I needed anything I wouldn't deal with a cheap credit shop like yours!"

Porky had been had. The 'customer' had borrowed the bit of pavement and the tall hedge of the respectable house to con him into parting with the machine, and he had obliged.

It wasn't long before manager number seven came along.

Help wanted

I like Grantley Best, though I've no idea where he comes from. He has sent me an email telling me that he reads this column with delight, marvelling at my expertise. Since I know the true story, I need all the people like Grantley I can get. So, naturally, I want to help him with his problem.

It concerns a Sony Model KVX2962U (AE2 chassis) that produces no sound or raster, though he hears the EHT rustle up then, after five seconds, a click. "The standby LED flickers on and off" he adds.

I spoke to Stephen about it, but he needs to know how many times the LED flickers from cold. I've emailed Grantley to find out. Until I know, I can't apply that expertise. How I like that word!

The card man

Then there's Amos Puke, who carries a deck of cards and constantly pesters people into selecting one. He notes what it is then puts it back into the pack so that he can do his act and find it again. Only he almost never gets this right. His fidgeting dance and floundering excuses are nevertheless great fun. Once he did get my card right but, to keep him going, I pretended that it had been a different one.

The other day he came into the shop with his cards and a 21in. Matsui TV set, Model 2107R, that was suffering from field collapse. In spite of the continuous badgering to "take a card", it didn't take Stephen long to find that R408 (4·7Ω, 1W) in the supply to the field output stage had never been soldered from new. It had been making partial contact with the print until it had sparked its way free.

Another Sony

Albie Squirt is a thick countryman, quite an embarrassment in fact. Every time he finishes a sentence he looks you in the eye and winks slowly. This bothers some people, and one fellow nearly clouted him, but Albie doesn't seem to notice this. Anyway, he'd brought in a 28in. widescreen Sony set, Model KV28WS2U (BE3D chassis).

"Haw daw" he said to Paul, "him comes on tuh start with like, then him goes off and the little light flashes like the devil!" This was followed by the slow wink.

The light was actually flashing error code 19, which drew our attention to the 9V supply. Circuit

fuse PS602 was open-circuit, because the LM2940CT regulator IC606 was short-circuit. The job was done in a few minutes, then Paul told him the news. First the good, then the bad.

As Albie faced up to the bad news and paid his bill, Paul gave him a slow, deliberate wink. Albie froze, frowned and eyed Paul carefully. Then he departed uneasily, with a puzzled look on his face.

A class act

Mr Grossman is a portly businessman of about sixty. We've dealt with him before, and it's always much the same. He draws up in the latest Jag, with a much younger woman in the passenger seat. Then they come in.

"There's a television set in the boot" he announced, "and I'd like it repaired quickly please. I'll pay just as quickly. Can't say fairer than that! Oh, and it's a new car. Don't scratch the paint!"

The set turned out to be a Sharp portable, Model C1430H. It came on when we powered it, then the field collapsed. Examination of the field output chip IC501 revealed dry-joints at all the pins. Some resoldering put that right, and the set then worked. As it was being boxed up, Mr Grossman turned to the girl.

"There you are, like I promised" he said. Then he studied the bill. "Fifteen pounds seventy five, eh? Look, I'll pay you a round fifteen pounds here and now. All right? Then he swept out, smirking happily, as we put the set back for him.

A visitor from the past

Steven and Paul had to finish a nearby aerial job next morning, and our younger son John had agreed to open the shop. He was about ten minutes late when I saw his car coming along the road like a bullet. He braked so hard that people spun round to look.

"I, er, overslept a bit" he said, "but got here in four minutes!"

"Overslept!" I exclaimed. You shouldn't, nor drive like a lunatic. That's two things I never did." Greeneyes gave me a funny look.

Steven and Paul turned up shortly after, then a chap who seemed to be vaguely familiar came in with a huge 28in. Panasonic set, Model TX28PK2 (Euro 4 chassis).

"Can you take a look at this for me please?" he asked. I fancied I knew the voice too, but I couldn't place him. "Name's Gough" he said. "The set works all right for five minutes or so, then goes to standby."

I looked at him, then it all fell into place. Meanwhile Greeneyes brought in some mugs of tea.

"Fugg!" I exclaimed, "thought I knew you. Haven't seen you since we were lads at school!

"Are you old Don?" he asked, "heavens, what time does! Remember our early-morning pike-fishing days with old Fred, and how you couldn't get up in the morning?"

Fugg looked at Greeneyes, who had settled on a stool, then at me. "Your daughter?" he asked

"My wife" I replied, "but never mind the funnies, Fugg. Nor the bit about getting up."

"Pleased to meet you Mr, er, Fugg" said Greeneyes, "so Don used to have trouble getting up, eh? Do tell me about it."

"He just couldn't get up. We'd be at his place at six on a January morning, eager to go piking, but we couldn't get him out of bed! It was always his father who got up. And did he let us have it! Mind you it was six o'clock on a Sunday morning."

"Perhaps tell it some other time, Fugg?" I intervened.

Paul had been checking the set and had discovered that the HT supply was low at 130V. The 220μF, 160V reservoir capacitor C851 was bulging and leaking, and had fallen in value to 100μF. Once a replacement had been fitted the HT was back to 150V and the set worked a treat. We felt it best to run the set for a while to make sure.

Fugg decided to kill the time with a few more reminiscences. "I remember the time he took me fishing in his car. The lake was along a track across a bumpy field. Drove like mad he did, frightening me to death. And he never noticed the four-foot thick stone wall coming up until we were upon it. Braked and spun the car like a top, he did, and we ended up half an inch from the wall."

"A late riser and a bad driver, eh, Fugg?" Greeneyes commented as she gave me a sweetly poisonous smile.

One more Euro 4

It's often been mentioned how sets tend to come in groups. So it possibly wasn't surprising when our next caller, a bundle of rags called Minnie Thomas, turned up with another 28in. Panasonic set in the back of her car. This time it was a Model TX28LD4DP, but it was once more a Euro 4.

"'E don't give us nuthin'" she grated. She was right. Apart from a rustle of EHT at switch on the set was dead. There was no on-screen display, no vision, no text and no audio.

"I wants 'm beller 'n that" Minnie said. I had to agree.

Steven took the back off and, after a few checks, decided that the microcontoller chip IC1101 was the cause of the problem. Fortunately we had the correct one in stock. Once it had been fitted the set worked normally. He was right again.

There are some points to note about this however. Replacements should be obtained directly from Panasonic, and it's important to quote not only the chip type but the full model number of the set.

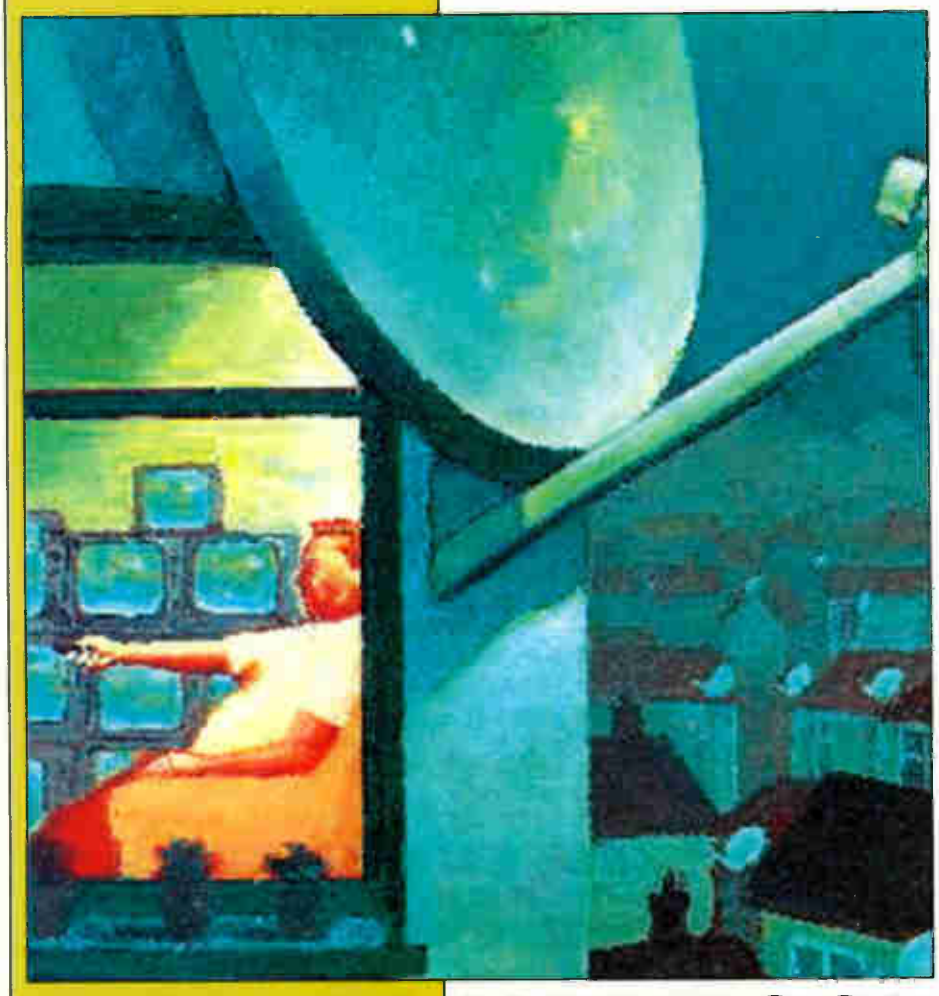
Emails

That story about Grantley Best reminds me to mention again that emails are always welcome. Send them to donald@wheatleypress.com ■

Corrections

We apologise for the error that occurred at the end of the Vestel 11AK37 power supply article in last month's issue – the last three lines on page 139 were omitted as a result of a production error. The missing words, after R830, are "increasing in value, C837 going low in value or Q803 developing leakage".

There was an important electrolytic capacitor polarity error in the Sharp DA100 chassis line output stage circuit shown on page 729 of our October 2003 issue. C607 should have been shown with its positive plate connected to chassis and its negative plate connected to the emitter of Q602.



SATELLITE NOTEBOOK

Reports from Christopher Holland and Michael Dranfield

HDTV tests

Following the German Pro 7 channel's high-definition transmission last October, see pages 118 and 120 in the December issue, at the end of November the rival SAT 1 service transmitted a film in high-definition form. Photo 1 shows an off-screen shot. The transmission was via the Astra 19·2°E slot, at 11·671GHz H (symbol rate 22,000. FEC 5/6), and was in parallel with the Pro 7 625-line service at 12·480GHz V (SR 27,500, FEC 3/4).

The HD uplink ceased soon after the film was transmitted but, some days before, the normal SAT 1 transmissions were present within a 1,080-line high-definition raster, appearing as an inlaid 625-line image surrounded by a black rectangle. **C.H**

Photo 1: A SAT 1 HDTV test transmission.

Photo 2: A BBC feed via Atlantic Bird 1.

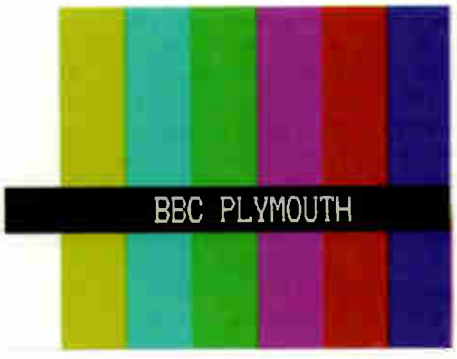


Photo 3: A BBC feed via Atlantic Bird 1.

Photo 4: A BBC feed via Atlantic Bird 1.

Photo 5: A BBC feed via Atlantic Bird 1.

Photo 6: A BBC feed via Atlantic Bird 1.

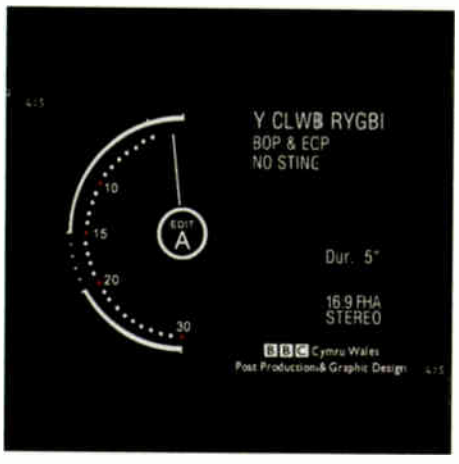


Photo 7: An S4C Rugby feed via Atlantic Bird 1.

Photo 8: An S4C Rugby feed via Atlantic Bird 1.

Photo 9: Turkish horseracing via Atlantic Bird 1.

Table 1: Unscrambled channels always available via Atlantic Bird 1 (12·5°W)

Frequency/pol	*SR*	*FEC*	*Service*
11·126GHz/H	3,666	3/4	Russkij Mir
11·132GHz/H	3,255	3/4	BHT (Russia)
11·137GHz/H	2,894	3/4	Sailing channel
12·510GHz/V	9,765	1/2	Tiziana TV (Italy)
12·515GHz/H	17,455	3/4	La7, MTV Italy, Music Box Italy, Canale D
12·541GHz/V	2,170	3/4	Canale D
12·545GHz/H	21,200	3/4	Duplication of 12·515GHz/H
12·581GHz/H	1,160	3/4	Videobank (Italy). Caption only + FM radio station

Digital channel update

Only one channel addition to report this month at 28·2°E. Challenge + 1 hour, EPG no. 122, is at 11·307GHz H (Eurobird transponder C3).

ITV News, EPG no. 525, has moved from Astra 2A transponder 22 to Astra 2D transponder 49 (10·831GHz H) – symbol rate 22,000, FEC 5/6.

The Bonanza Channel (EPG no. 238) has been renamed Majestic TV.

Some of the shopping channels have been renumbered in the EPG. **C.H.**

Atlantic Bird 1 (12·5°W)

This month we'll take a look at Atlantic Bird 1, which is used mainly for newsfeeds but is also home to some permanent channels. The satellite has European and American footprints but, because of its location, the latter would be limited to the extreme eastern part of North America.

During November the BBC moved all its satellite newsgathering activities from the heavily-inclined orbit Eutelsat 2F3 (21·5°E), which we looked at a year or so ago, to Atlantic Bird 1. Sky and ITN remained with 2F3 until the end of the month, when they transferred to Eutelsat W3 which has been moved to 21·5°E. This satellite has a very wide footprint, from the western part of Europe across to India! Presumably 2F3's increasingly inclined orbit had become too much for practical day-to-day use by the broadcasters.

BBC feeds use the following frequencies/polarisations:

10·956GHz V	11·007GHz V
10·962GHz V	11·012GHz V
10·968GHz V	11·018GHz V
10·974GHz V	11·024GHz V
10·980GHz V	11·162GHz H
10·986GHz V	11·171GHz H
10·996GHz V	11·180GHz H
11·001GHz V	11·189GHz H

The SR is 4,224 and the FEC 7/8, but with the horizontally-polarised channels they can be 5,632 and 3/4. The frequencies are approximate. Transmissions may be in MPEG 4:2:2 form, which requires the use of a suitable (expensive!) satellite receiver or a PC-based receiver, though some still use MPEG 4:2:0. Activity is heaviest at around 6.30 PM, with reports for the local BBC-1 service (see photos 2-6), regional news programmes appearing and disappearing rapidly. The higher (horizontally-polarised) channels seem to appear when the lower (vertically-polarised) ones are congested, typically at the same time.

I've seen a couple of Rugby feeds for S4C, produced by BBC Wales, at 10·967 and 10·976GHz, using an SR of 6,138 and 7/8 FEC, see Photos 7 and 8. This was during the late Saturday afternoon period when newsfeed activity is quite light. On the following Saturday the frequencies used were 10·959 and 10·967GHz, with the same SR and FEC. There have also been tests at 11·014 and 11·023GHz.

GlobeCast feeds from the US can be found at 11·013GHz H (20,150 and 3/4). This is possibly the easiest way to find the satellite, being always present just a little to the west of the strong French analogue signals in the 12·5-12·75GHz range from Atlantic Bird 2 and 3 (formerly Telecom).

Table 1 lists unscrambled channels always available – some other channels are scrambled and needn't concern us here. Table 2 lists some other feeds. The Moroccan TV feed (Photo 10) shows part of their uplink equipment. The MPEG encoder is just visible at the bottom of the picture, with the front panel display showing the symbol rate used (2,666). Their uplink is fairly busy with feeds, mainly for the Moroccan second channel 2M Television. The Swedish feeds are sometimes in the clear but often scrambled.

I've also seen very occasional feeds for various TV networks at around 12·63-12·75GHz H, with various symbol rates and FEC values. **C.H.**

Photo 10: Moroccan TV via Atlantic Bird 1.

Table 2: Other feeds available via Atlantic Bird 1 (12·5°W)

Frequency/pol	*SR*	*FEC*	*Service*
11·147 and 11·152GHz/H	2,170	3/4	Russian TV
11·371GHz/H	6,111	3/4	Turkish horseracing. See Photo 9
12·583GHz/H	2,666	3/4	Moroccan TV. See Photo 10
12·608 and 12·617GHz/H	5,404	5/6	Swedish TV

Photo 11: Burkina Faso TV logo via Intelsat 802.

Photo 12: Burkina Faso TV newsreader via Intelsat 802.

Photo 13: A Burkina Faso weather forecast via Intelsat 802

More C band signals

It's been a while since we've mentioned C band (4GHz) reception. Intelsat 802 has recently been stationed at about 33°E, just beyond the two Arabsat craft at 26 and 30°E. The latter have a lot of C band activity and are best to use as a strong signal reference to help find 802, which was originally at another orbital position where the later Intelsat 9 and now 10 series are located. The new position for 802 makes it free for leasing primarily by African countries.

At the moment the only TV signal via Intelsat 802 is from Burkina Faso, to the north of Ghana and the south of Mali. The frequency is 3.898GHz (SR 6,000, FEC 1/2) with right-hand circular polarisation. The left-hand channel of the dual-channel audio signal is used for TV sound in French, while the right-hand channel is used to transmit state owned Radio Nationale Burkina Faso. TV transmissions start at 0800 GMT and finish at about midnight. The radio station continues through the night but TV just goes to sleep, transmitting black level with no sound. No exotic test cards are to be found here unfortunately! Photos 11, 12 and 13 show the station's logo, newsreader and a warm weather forecast!

Signal reception should be possible with a dish as small as 1·5m, which is quite small in C band terms, helped by the low forward error correction value of 1/2. If a higher value was used a larger dish would be needed. **C.H.**

An Amstrad DRX100

Mr Jones had decided to have his living room redecorated. While the work was in progress he moved his TV cabinet, complete with its old Amstrad digibox, VCR and TV set, to another room. When he wheeled the cabinet back into the newly spruced-up living room and reconnected the digibox to the dish feed it stubbornly displayed the 'no signal being received message'. He then phoned us, in some panic: he was afraid that Mrs Jones was going to miss her favourite satellite channel, which was due shortly.

Mr Jones told us that he had double-checked the state of the F plug that connects the signal from the dish to the digibox. But it seemed to me that there was either a problem here or that the tuner had failed, which is fairly common with this model, especially as it had been disconnected from the mains supply for a while. Everything inside would have had time to cool down to room temperature after having been at normal operating temperature for a considerable time. This can produce problems when equipment is switched on again.

When I checked the receiver I was surprised to find, even before taking the lid off, that there was no DC supply to the LNB from the F socket. This was obviously at the root of the problem! Once I had removed the top the cause was fairly obvious. The connector that links the power supply PCB to the main board was pushed in firmly at only one end. The other end wasn't at all flush with the board socket. Once the connector had been pushed in properly normal signals were present – and I couldn't pull it out easily. It had possibly been in this state since it left the factory! **C.H.**

Grundig GDS3000

A word of warning: the power supply in this model is not interchangeable with those in earlier models even though it has the same plug and wire colours. With the GDS3000 power supply one of the black wires is the 22V LNB supply whereas with earlier models it's an earth line. If a GDS3000 power supply is fitted in say a GDS300, the 22V supply will be earthed. Although no damage will be done, the power supply will be tripping.

With the GDS3000 most power supply/tripping faults can be cured by replacing the IM0365R chopper control chip IC101. **M.D.**

Sony VTXS760

This digibox's red standby LED wasn't alight though the power supply was running. Its outputs were slightly high except for the 3·3V supply, which was low at 1·7V with a large ripple present across the reservoir capacitor C819 (2,200μF, 16V). C819 had dried up, a replacement curing the fault. **M.D.**

Panasonic TUDSB30

There was a nasty intermittent fault with this digibox: the TV scart's output kept switching on/off, and the sound would mute itself. The picture via the RF output remained OK however. After a lot of messing about the cause of the problem was traced to IC602 (type 74LCX16245). **M.D.**

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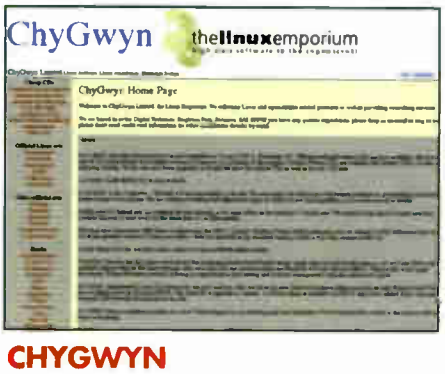

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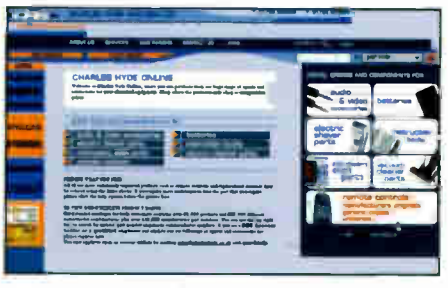

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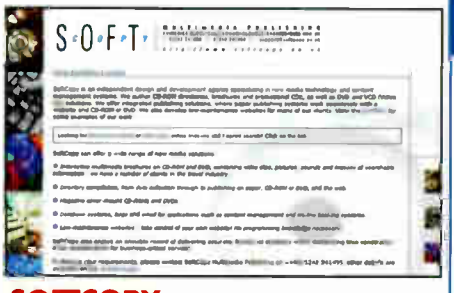

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Daewoo 710BN (chassis type 710B)

There was no operation: the front LED was not alight and the power supply was obviously under strain, though no tripping could be heard. A strong smell of burning Bakelite came from inside. I found that the 2SK2799 B+ regulator transistor Q577, a plastic TO220 device located at the centre of the chassis behind the line output transformer, became red hot when the monitor had been on for only twenty seconds or so. To get at any of the PCB's soldered connections it has to be removed from the metal mounting. Beware of the charge on the mains bridge rectifier's reservoir capacitor – there's no discharge path.

The cause of the trouble was that the 2SC5386 line output transistor Q574 was short-circuit all round. In addition Q577 and the 10kΩ surface-mounted resistor R537 had to be replaced. The resistor had fallen in value – it's marked 103. **A.R-W.**

CTX E700F

When this monitor was powered without being connected to a PC it displayed 'no signal present' perfectly. But when an input was present the line oscillator chip failed, i.e. there was no line drive. The monitor worked correctly once the sync processor (IC501) and line oscillator (IC401) chips had been replaced. Both chips are mounted at the front of the PCB. The line oscillator chip is a Weltread WT9055. These two ICs are rather expensive and are available only from the USA via the internet. In this case I was able to retrieve replacements from a scrap chassis. **A.R-W.**

Microvitec 7CK1464AN

This monitor is not of Microvitec manufacture: it was bought in by the company to fulfil an urgent order. The problem was no green in the display. Checks on the two transistors in the green output circuit, Q502 (2SC3788) and Q502 (2SC1906), showed that they were OK. So scope checks were carried out at the MM1203N control chip U501. There was a green signal at the input but nothing at the output.

When a replacement chip was eventually found and fitted the monitor produced a full-colour display. The MM1203N chip is a Mitsumi device that is extremely hard to find. I eventually obtained one from a scrap chassis. Don't assume that because of the similar number it's another LM1203N: the MM1203N has completely different pin connections. **A.R-W.**

Dell Ultrascan 17ES (P1728E)

The complaint with this monitor was no picture. At switch on an EHT rustle-up could be heard and, shortly after that, operation of the degaussing relay was heard. When the setting of the A1 control on the LOPT was advanced a small, misshapen pinkish display with severe frame foldover appeared. It was unsynchronised, with bits of 'picture' drifting through. The monitor tripped when the V-output subpanel was touched. After a lot of resoldering in this area of the main PCB the tripping ceased – the subpanel was OK.

But there was still foldover, and the display was no better in any other respect. Then I recalled that some of these monitors, which are fitted with a Mitsubishi chassis, use a non-standard VGA cable. Sure enough, when I examined the 15-pin sub-D connector at the rear of the main panel I found that one row of pins (11-15) was not connected. With the Dell/Mitsubishi cable pins 8 and 9 are used for V sync H sync respectively (pins 14 and 13 are used for these purposes with a standard SVGA cable). The RGB and earthing pins also differ. **I.F.**

IBM 6322-002

Excessive width was the complaint with this monitor. The cause was C418 (22μF, 63V), which had a bulged top. Checks on the EW modulator transistor and its drive circuitry didn't reveal any faults, so I came to the conclusion that C418 had failed as a result of internal heating because of the power wasted by its ESR. It appeared to be standing in a 'pool' of hot-melt glue, but the smell produced when it was unsoldered suggested that this could have been congealed electrolyte. Whatever the substance was, it was evident that the capacitor had been running too hot. So the replacement was upgraded to a 200V type and an 0·22μF Mylar capacitor was added in parallel to reduce ESR heating. **I.F.**

UC3842 protection

The UC3842 IC is widely used in monitor chopper power supplies as the control device, producing an output at pin 6 to drive a chopper MOSFET, e.g. type MTP3N60. Sensing for excess current is carried out by monitoring the voltage across the MOSFET's source resistor. This voltage is fed back to pin 3 of the 3842 via an *RC* filter. One problem is that when the MOSFET dies violently its source resistor normally goes open-circuit, with the result that the HT is applied via the series resistor to the IC – I've seen the IC split in two! One way of providing protection, used by some monitor manufacturers, is to connect three diodes, e.g. of the 1N400X type, in series between pin 3 of the IC and chassis, with the anodes at the IC side and the cathodes at the chassis side. It's worth adding these diodes if you come across a monitor that blows its MOSFET chopper transistor from time to time and doesn't include this protection – which, incidentally, is not shown in the device manufacturer's data sheet. These diodes will reduce repair bills considerably. **I.F.**

Answer to Test Case 506

– see page 212 –

The same two recording/playback heads are used for both the sound and the video data with the DV tape format. The sound and video data is not interleaved or combined in any way however, because of the need to be able to edit it. As each head scans the tape it first writes or reads an ITI segment, which is concerned with 'housekeeping', then an audio segment, followed by a longer video segment, and finally more housekeeping data. It then runs off the top edge of the tape, at the exit point of the head wrap. The separate audio segment can be edited by fast-synchronised switching of the heads.

With the mini-DV track width of 10 microns in the SP mode and 6·7 microns in the LP mode, mechanical alignment and tape-path precision are obviously crucial – much more so than with the VHS format, where the SP track width is five times greater. So it seemed likely that the tape path alignment was slightly out at the entry side, where the audio data is recorded. Without an alignment tape and guidance on capturing and displaying a head-output envelope signal, our worthies should have given up!

In the event however a thorough clean of the tape guide, its slide and stop surfaces, and the lower drum and groove did the trick. It may have been that there was a 'bottleneck' in the off-tape data, corresponding to the audio signal, with the other data segments virtually intact.

NEXT MONTH IN TELEVISION

The Philips MD2.12E/MD2.25E TV chassis

John Coombes provides a detailed fault-finding guide for the Philips MD series chassis.

Cable tester project

Intermittent faults with audio and RF cables, meter test leads and other bits of wire can cause a lot of trouble and often don't show up with a straightforward continuity test. Robert Kerr describes a simple cable tester that overcomes the problem.

Blu-ray developments

Although the Blu-ray optical disc system has yet to be launched in the US and Europe, its developers are already planning to improve the format considerably. Enhancements include the use of a new scratch-resistant protective coating, multiple-layer discs with greatly increase data storage capacity, and new copy-protection technologies. George Cole describes the latest developments.

Vintage repair: the Bush DAC10 radio

This is one of the classic valve radios from the early Fifties. Macolm Burrell describes a recent renovation.

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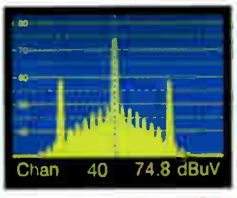

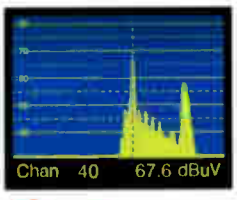

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