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December 2006 Vol. 56 No. 14

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Next issue, dated January, on sale December 22



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# TELEVISION

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86 Newman St, London, W1T 3EX.

**ISSN 0032-647X**

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**SUBSCRIPTIONS**
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MEDIA COMMUNICATIONS

# A FLAT MARKET POSES A CHALLENGE

There has been lots of market data recently predicting big rises in the sales of flat screen TVs, particularly LCD TVs. In particular the leading role the European market is playing in developing new formats has been highlighted. According to screens analyst DisplaySearch, Europe accounted for 41% of the global LCD TV market in 2005 and the European LCD TV market is expected to grow at a Compound Annual Growth Rate of 35.4% from 2005 and expand more than three-fold by 2009.

According to Hitachi, European sales of LCD and plasma TVs combined are set to reach 20 million a year by the end of 2008 due to the robust spread of digital broadcasting.

Strong conversion rates in Europe from CRT to flat panel have continued throughout 2006 and this has lead several companies, including LG.Philips and Hitachi, to expand their European based manufacturing operations.

It is very difficult at this time to predict how fast an impact these increases will have in term's of placing more flat panel products on engineer's benches up and down the country. But increase they will. However, as we all know, access to service and repair information on flat panel is not always easy to come by. Next year will be a challenging time for *Television* to convince some of the more cautious manufacturers that it is in their interests to be more forthcoming in this regard. However, it is also up to engineers to be aware that new approaches may be necessary in this more 'information sensitive age' by looking at options such as approved repair and service contracts with specific manufacturers, or expanding into new sectors such as CCTV.

Despite all the talk of increased flat panel sales, the manufacturers have not had everything their own way. Significant drops in retail price have made profit margins very tight and in some cases non-existent. However, manufacturers have little choice but to press ahead with new product launches and this month saw Sharp releasing new LCD and PVRs, and Samsung adding a new LCD line and a Blu-ray player. All of this new product, however, has to be seen in the context of the new WEEE directive that will come into force in the UK in July of 2007. See page 838 for a small business perspective on the impact of this legislation.

Lastly, I would like to wish all *Television's* readers a happy Christmas and very prosperous New Year. It has been a challenging, but very enjoyable first few months in charge of the magazine and I hope you have found some of the changes we have made useful. Rest assured, next year we will continue to strive to add useful and interesting content. As always we cannot do this without your help and feedback, so please continue to send us your requests, comments and suggestions to daniel.sait@nexusmedia.com or TVeditor@nexusmedia.com or just give us a call on 01322 611 270.

**Daniel J Sait**
Editor

More consumers enjoying flat panel TV poses a continuing challenge for the service industry

# LG.Philips and Toshiba join LCD forces

Toshiba and LG.Philips LCD have announced a strategic alliance to jointly develop their positions in the growing European LCD TV market.

The agreement means Toshiba will take a 19.9% equity participation in LG.Philips' subsidiary in Poland currently under construction and due to come online in the first quarter of 2007.

The partnership will allow both companies to better align new product development and manufacturing goals. Toshiba will also benefit by securing a steady supply of LCD panels from the plant.

Mr. Bon Joon Koo, vice chairman and CEO at LG.Philips, said: "Through this strategic partnership, both LG.Philips LCD and Toshiba will build a strong foundation for growth in the European market. We hope it will serve as a model for additional strategic alliances between LG.Philips LCD and global TV manufacturers around the world."

Mr. Toshio Yonezawa, corporate senior executive vice president of Toshiba Corporation said: "Our partnership with LG.Philips LCD is an important step toward reinforcing Toshiba's presence in the trans-European TV business."

Despite predictions of big rises in LCD demand from many market analysts, LG.Philips suffered some disappointing results in the third quarter of 2006, loosing £182 million, its second quarter loss this year.

Mr. Bon Joon Koo of LG.Philips said: "During the third quarter our business did not perform at the level we expected, primarily due to higher than anticipated price declines mainly for LCD TVs."

The company says that its deal with Toshiba is just one way it is looking at return to profitability.


Toshiba has joined forces with LG.Philips in the European LCD market

# SED challenges LCD

Toshiba and Cannon want SED to take on LCD

Toshiba and Cannon recently demonstrated a 55" version of their Surface-Conduction Electronic-Emitter Display (SED) TV technology. The unit was demonstrated at the CEATEC trade show in Tokyo, but apart from the 1920 x 1080 resolution and a reported contrast ratio of up to 10,000 to 1, details were in short supply.

SED uses surface conduction electron emitters for every individual display pixel. The pixels themselves are housed in between two plates of glass where a vacuum exists. The surface conduction electron emitter emits electrons that excite a phosphor coating on the display panel, the same basic concept found in a CRT. Its inventors say SED can produce the contrast ratios and response times of a CRT, but in a slim TV design with low power consumption.

Naoaki Umezu, who heads up Toshiba's SED programme, said that SED would be more competitively priced than LCD, but would provide a performance free of ghosting with potential contrast ratios of 50,000 to 1.

After some delays for the technology, Toshiba and Canon now say the 55" model will be released in Japan in late 2007 and mass production is due in early 2008. Details on any European launch are as yet unavailable.

# LCD and plasma leads digital spend

Consumers worldwide will increase spending on digital home devices by 32% to £87 billion by the end of 2006, according to market analyst company Strategy Analytics. In a report entitled 'Digital Home Devices Global Market Forecast,' the company predicts that in terms of revenue, LCD and plasma TVs will be the strongest performers with the total world spend coming in at £37 billion. In terms of units sold, digital cameras, DVD players and MP3 players are predicted to come in as the most popular.

Strategy Analytics says Europe will be the world's largest digital market this year, with revenues of £27 billion and a growth rate of 38%.

The report also argues there is a growing trend towards Internet Protocol (IP) connected devices, as the concept of the digital home starts to become a reality.


Flat screen TVs are set to represent the highest earning category in world wide digital sales for 2006

# Samsung launches LCD range and Blu-ray deck

Samsung has launched a new premium LCD range called the N73

Designed to build on the success of the R7 collection, Samsung has launched a new premium LCD range called the N73.

Samsung has gone out of its way to achieve not only a strong picture performance, but to deliver a high level of connectivity and additional functions. Consequently, the whole range features two HDMI sockets, two memory card slots which are compatible with nine different card types as well as a USB port. The screens are PictBridge compatible so, after viewing from a memory card, pictures can be printed (using the USB connection) direct from the TV, via a PictBridge enabled printer.

The series is available in 32", 40" and 46" versions, all of which are HD ready and possess a 10 bit colour processor. Equipped with digital tuners, the sets also have a viewing angle of 178° horizontally and vertically and possess 2x10W TruSurround XT speakers.

Also new is the F7 series. This carries a similar features set to the N73, but is also Samsung's first fully High Definition LCD TV at a resolution of 1920 x 1080 lines and boasts a contrast ratio that the company claims is 6000:1.

Rob Shaw, CTV product manager at Samsung said: "This is a new step forward for Samsung which will provide viewers with an enhanced experience. Not only do these products produce unrivalled image clarity, they also perfectly integrate into your main digital hub."

Able to take full advantage of the new sets is Samsung's Blu-ray player the BD-P1000. The player can deliver 720p, 1080i and 1080p video resolutions and can up-convert standard resolution content to improve picture quality.

Samsung has entered the Blu-ray market with the BD-P1000

The company developed most of the core elements of the BD-P1000 internally. For example, the product has a 'one pick-up with two lenses' arrangement which allows the playback of CDs and DVDs without big cost additions at the manufacturing level.

Apart from Blu-ray, supported disc formats include DVD, DVD-RAM, DVD-RW and DVD-R. Additional features of the BD-P1000 include pop-up and always-on menu options and improved bitmap and text subtitles.

The BD-P1000 also has a memory card reader supporting Compact Flash, XD Picture card, Micro Drive, SD, MMC & RS-MMC, Memory stick and Memory stick duo.

# Wi-Fi set for big rise


ABI believes many more products will be W-Fi enabled like Microsoft's Zune

A study from New York based industry analyst ABI claims that Wi-Fi connectivity will play an increasingly important role in consumer electronics. ABI claims the market is in the midst of a major shift to a greater reliance on network-based delivery, and Wi-Fi is particularly well placed to deliver this across a range of hardware.

Wi-Fi enabled consumer electronics devices will grow from just 40 million shipped worldwide in 2006 to nearly 249 million in 2011, claims ABI.

"From the enormous interest in online gaming to the rapid emergence of new Internet distribution channels for top-tier movie and TV content, the need for connectivity in mainstream consumer electronics is growing rapidly," said ABI research director Michael Wolf.

He added: "While the consumer Wi-Fi market has previously consisted largely of routers, gateways and adapters, ABI believes that as the market evolves towards digital distribution, its growth will be fuelled by the inclusion of embedded Wi-Fi in consumer electronics."

This phenomenon is being led by portable gaming consoles, as both Nintendo and Sony have equipped their latest generation devices with Wi-Fi to facilitate multiplayer and online gaming options. Microsoft's Zune, its tilt at the hand held music player market, also has Wi-Fi while camera manufacturers Nikon, Kodak and Canon have all included Wi-Fi on recent products. DVD players and audio receivers are expected to be amongst the next products that will add the function.

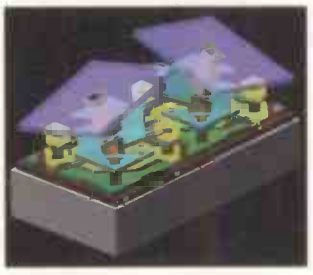
# DLP training course

The College of North West London is launching a course on digital light processing (DLP) technology. The technology is most commonly found in rear projection TVs and front projectors and has at its core the Digital Micromirror Device (DMD) developed by Texas Instruments.

The course covers the theory and practical applications of this technology as well as testing and fault finding on DLP and other projection systems. The course is fully approved by City and Guilds and those attending would receive a level three certificate. The plan is to deliver the course as a normal 30-week one evening a week course. However, a short one-day course for industry is also planned.

The course is designed for practicing TV engineers as well as students who have attained level two qualifications in electronics or who have appropriate industrial experience. Fifty percent of the course will be dedicated to hands-on practical tasks.

The main components of the course will include: Video projection systems, LCD, DLP; single and triple chip operations; operation of DMD; DMD drive requirements and Bit splitting; PWM drive techniques. Also included will be DLP television systems; block diagrams; schematic diagrams; video processing and formatting; high definition systems testing; DLP LCD video projection; TV systems fault finding.



A new practical course covers all the aspects of DLP technology

The first one-day course is scheduled for February 16, 2007 and the academic 30-week course will start in January 2007.

**To find out more Fawzi Ibrahim may be contacted on 07976350724 or email: Fawzi.ibrahim@cnwl.ac.uk**

# Hitachi increases flat-panel capacity

Hitachi has announced plans to form a manufacturing plant in the Czech Republic to meet the expansion of demand for flat-panel TVs in Europe. A new company, Hitachi Home Electronics (Czech), will establish the plant with initial production expected in to begin in summer 2007.

According to Hitachi, sales of flat-panel TVs in Europe are expected to reach 20 million a year by the end of 2008 due to the robust spread of digital broadcasting.

Hitachi decided to establish a flat-panel TV manufacturing plant in Europe to increase the company's total production capacity. Setting up a manufacturing plant in Europe, will allow the company to achieve reduced production costs through optimised supply chain management, logistical efficiencies and a consistent supply of product for the European marketplace for more effective customer acquisition.

The new company will assemble flat-panel TVs and produce plasma panel modules. Furthermore, Hitachi will establish a design and R&D division within the new company to meet local requirements, such as digital broadcasting, and strengthen its development capabilities in cooperation with the R&D division of Hitachi Europe.

Hitachi has plans to increase its European manufacturing capacity

# Nokia launches Wibree

Nokia has announced a new wireless short-range communication technology which is more energy efficient than Blutooth.

Wibree is a radio frequency technology that can work alongside Blutooth (usually found on mobile phones and printers) but uses a fraction of the power.

The new system is said to be as much as ten times more energy efficient than Blu-tooth and has taken the Finnish communi-cations giant five years to develop. The technology will now be put through a standardisation process so that the wireless system can be offered to third-party firms.

Wibree radio chips - which operate over a distance of 30 feet - are also smaller than Bluetooth chips and will suit devices which up to now do not typically have wireless technology built-in, such as watches, health monitors and sport sensors. The chips operate at 1Mbps (about a third of the speed of blutooth) and the firm expects dual Blutooth-Wibree devices such as mobile phones to hit the market within two years.

Wibree has been developed at Nokia's own research facility in Finland

# Sharp introduces key LCD TV and recording products

Sharp's new Aquos XD1E range has a 176° viewing angle

Sharp claims a new standard in High Definition (HD) has arrived in the shape of its range of Aquos XD1E 'Full HD' or '1080p' LCD TVs. Four models are included in the Aquos Full HD line-up, 37" - Aquos LC-37XD1E, 42" - Aquos LC-42XD1E, 46" - Aquos LC-46XD1E and 52" - Aquos LC-52XD1E

The company says, compared to the widely-used 1,366 x 768 picture resolution, Sharp's Full HD 1,920 x 1,080 models provide twice the number of pixels (6.2 million versus 3.1 million) meaning HD signals do not need to be digitally reduced to fit the screen. Sharp also says its full HD approach with its smaller pixels will reduce 'visual acuity' (where the viewer can see the pixels that make up the picture).

Contrast ratio claims for the range come in at a maximum of 2,000:1 on the LC-46XD1E and LC-52XD1E (10,000:1 with Dynamic Contrast Enhancement) and for the 42XD1E and LC-37XD1E 1,200:1 (6,000:1 with Dynamic Contrast Enhancement).

Sharp has also introduced advances such as a 4ms response time on the 46" and 52" models and 6ms on the 43" and 37" units. The move is designed to improve performance on fast moving sports and movie sequences as well as improving performance on HD gaming.



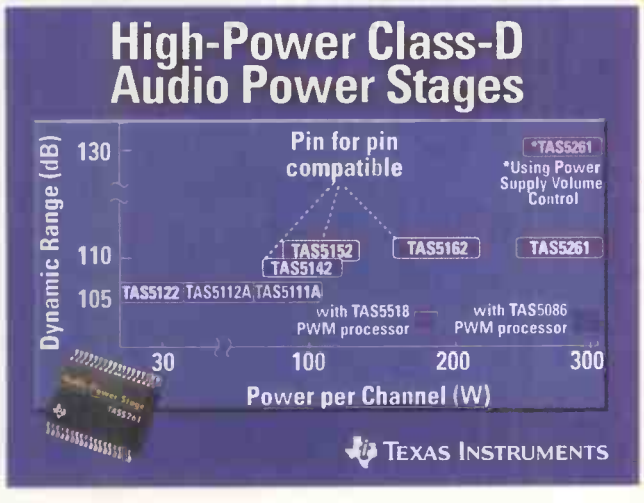
Sharp has entered the DVR market with the TU-R160H

The whole range also has Sharp's Four-Wavelength Backlight System, which includes an additional Crimson Red as well as the standard RGB (red, green blue) colours. This system is designed to deliver more natural reds, and enable smoother reproduction of neutral shades, such as clear or translucent colours and skin tones. All the new sets incorporate a 176° viewing angle (horizontally and vertically) allowing viewers to see the picture on screen clearly from anywhere in the room. All the sets also come with a built-in Freeview digital receiver.

Sharp has also introduced its TU-R160H twin-tuner Digital Video Recorder (DVR). This DVR includes two Freeview tuners and a 160GB hard drive allowing simultaneous recording of one digital channel and viewing of another. The unit has an 8-day EPG (electronic programming guide) and offers up to 80 hours recording capacity as well as live pause functions. The DVR also allows the user to record any subtitles that accompany a programme and has picture in picture options.

# More power from Texas Instruments

Texas Instruments (TI) has introduced two new digital audio amplifier power stage options that offer increased power delivery. TI says the TAS5261 provides OEMs with the industry's highest power single-chip digital amplifier power stage, capable of driving more than 300W into a 4Ω speaker. The two-channel TAS5162 version can drive 200W per channel at 6Ω and 125W at 8Ω. TI claims the devices enable higher efficiency and sound quality in a variety of audio applications, including many previously restricted from using digital amplifiers due to power requirements, such as high-end DVD receivers and middle to high-end audio/video receivers (AVRs).




Texas Instruments (TI) has introduced two new digital audio amplifier power stage options

TI says existing 300W systems (4Ω) such as AVRs have had to utilise less efficient Class-AB amplifiers or modules due to power and current limitations of available digital audio power stages. However, as the TAS5162 and TAS5261 offer a single-chip power stage option. TI says designers can leverage TI's industry-leading Class-D technology, which offers greater efficiency and signal-to-noise ratio (SNR) of 110dB.

The manufacturer also says, unlike other high-power digital amp or Class-D solutions, the single-chip devices eliminate discrete components such as MOSFET H-bridges, reducing board size, making layout easier, simplifying heat sink design and lowering manufacturing costs.

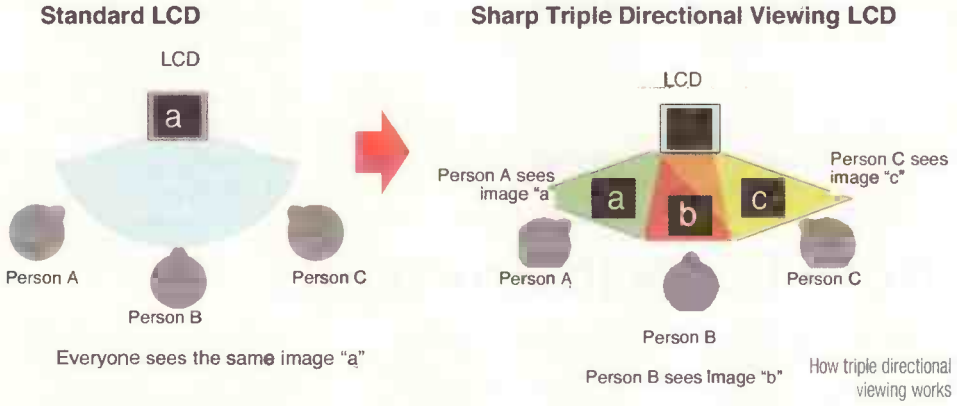
# A triple choice from Sharp

Sharp Corporation and Sharp Laboratories of Europe, Ltd. (SLE) have developed a technology they are calling the triple directional viewing LCD. The display can control the viewing angle so that the screen can show different images from the left, right, and center simultaneously. Last year, the company developed two world-first products for controlled viewing angle: the two-way viewing-angle LCD and the switchable viewing-angle LCD. Sharp says, with this type of technology already in use in products like car navigation systems and mobile phones, these displays have allowed Sharp to create new demand and development within new product categories.

The new triple directional viewing LCD takes this controlled viewing-angle technology a step further. Using a proprietary 'parallax barrier' placed between a standard TFT LCD and the unit's backlight, the screen splits light in three directions – left, right, and center – and displays three separate images on the same screen at the same time. The parallax barrier itself is a series of vertical slots which are carefully designed to focus pixels in different directions, creating viewing 'diamonds' depending where the viewer is sitting.

Suggested applications from Sharp include multiple uses for several passengers traveling in the same vehicle. The driver could use a car navigation system screen, the person in the passenger seat could check-out tourist sites and restaurants, while the person in the back seat enjoyed a movie on DVD, all in full-screen view.

Sharp says its Triple Directional Viewing LCD is also ideal for multipurpose signs in public: as it could display three different ads for stores or restaurants, each aimed at people walking in a certain direction.




How triple directional viewing works

# LG's LCDTV world record

LG's 100" LCD holds the world record for the largest of its kind

LG Electronics has announced that its 100" LCD TV has made it into the 2007 Guinness Book of World Records for being the world's largest.

The 2007 edition of the book introduced the 100" LCD TV as the first product in its Science & Technology Gadgets section. The LG 100" LCD TV is approximately 1.5 times larger than the next largest currently available LCD TV (82-inches), and is similar in size to the largest plasma display TV currently available.

The screen measures an impressive 1.2 metres high and 2.2 meters wide and has a resolution of 6.22 million-pixels with full HD grade picture quality and 1.07 billion colours.

The product also features a contrast ratio of 3000:1 and a 180° viewing angle based on Super IPS and super-large compensation film technologies.

# Humax launches 'second TV' options

Humax has increased competition in the integrated digital TV (IDTV) market with the launch of some new 20" and 23" LCD TVs. The LU20-TD1 and LU23-TD1 models offer an internal analogue tuner as well as a built-in digital Freeview tuner. Humax says the mid-sized black TVs combine sleek and stylish design with the company's high standard of features, making them ideal for second rooms.

The LU20-TD1 has a 4:3 screen, while the LU23-TD1 offers widescreen viewing. Both sets provide digital text and interactive services, as well as over-the-air upgrade capability designed to extend product life. The screens also have a PC input so they can be used as PC monitors and both have attachments that mean they can be wall mounted.

Graham North, UK Commercial Director for Humax commented: "These new additions to the Humax IDTV family provide us with a comprehensive range to suit the needs of anyone wanting to invest in superior TV viewing in a second room. The stylish, feature-rich TVs are perfect for the kitchen, playroom or bedroom, without carrying a huge price tag to match."

Humax is aiming at the 'second TV' market with the LU23-TD1

# A first step in digital switchover

What is described as a unique broadcast industry partnership has achieved success in the earliest stages of the UK's digital switchover programme. The partnership between broadcast technology company, Radio Frequency Systems (RFS), and specialists in broadcast network engineering, Eve, played a central role in the upgrade of the Selkirk broadcast site, located in the Border region of the UK. The Selkirk site is one of many owned by transmission services provider, Arqiva, and is the first to be upgraded as part of the switchover programme. Appointed by Arqiva in early 2006, the RFS/Eve partnership was tasked to provide a total turnkey RF system upgrade at the Selkirk site, specifically to meet switchover's new channel allocations and higher-power digital broadcasting requirements.

Installation of the Selkirk site's new 14-sided, six-level reserve antenna array, founded on RFS's PHP horizontally-polarised broadband UHF panel antenna

The centrepiece of the Selkirk upgrade is the new main and reserve antenna arrays, which are founded on RFS's renowned PHP horizontally-polarised broadband UHF panel antenna. The upgrade also features a unique RFS 14-port 4-7/8" patch panel, specifically designed to permit the widest switching combinations. RFS also provided dual (main and reserve) CZAE-series multi-channel balanced combiners, comprising a mixture of six and eight-pole 200mm combline filters, specifically designed to meet the demanding ETSI mask requirements, and for adjacent channel operation.

"We are delighted with the smooth deployment and excellent HRP results achieved at Selkirk. It is the result of some excellent RF engineering development on our side, and seamless teamwork between RFS and Eve," said RFS senior systems engineer, Dave Thickett.

Mike Stewart, Eve Project director for broadcast concurred: "We have a team of guys, both in the office and out on the site, who are willing to do whatever is necessary, within normal safety criteria, to ensure the work is completed on time."

Arqiva's DSO programme director, Peter Heslop, views the Selkirk switchover success as a significant step forward, he said: "It's been a very dynamic exercise all the way through. RFS and Eve have responded to these changes and come up with new and innovative solutions."

The sites next scheduled for digital upgrade are those of England's West Country and Wales. Work is expected to commence at these sites in 2007.

# Britons – Europe's biggest spenders

Britons spend more on consumer electronics than any nation in Europe, claims market analyst GfK. In total, Britons spent £16.8 billion on high-tech items in 2006, with every UK household spending an average of £325, £42 more than the next biggest spenders the Swiss.

Surprisingly the Germans only managed number nine in GfK's list, having spent the equivalent of £191 on technology items in 2006. The Germans are only just ahead of the Italians, who despite a strong performance in mobile phones sales, tended not to splash out in 2006, spending just £159 on consumer electronics.

The GfK study also pointed out that the UK has the highest ownership of TVs in Europe, with each home containing, on average, 2.5 TVs. MP3 ownership is also very high in the UK and British buyers also tend to go for the more expensive models. Another area that has seen big growth this year is in the sale of satellite navigation gadgets. None of these figures take into account the peak buying period and the market can only hope that consumers in Britain continue to outspend their European counterparts in the Christmas period.

So far in 2006 British families have bought more consumer electronics products than their European counterparts

Custom installation jobs involve kit that is already familiar to many engineers (installation: DSE Digital)

# THE KEY TO custom installation

**Matt Nimmons,** operations manager at CEDIA, the Custom Electronic Design & Installation Association, takes a look at some of the key differences between the worlds of service engineering and custom installation

Through your normal day-to-day work many of you may have already come into contact with specialist custom electronic installation companies. This market has seen amazing growth in recent years and represents a real opportunity for installation companies with the vision and resources to embrace a new set of skills. The chances are that much of the technology and jargon will already be understood or at least familiar to you. The vast majority of custom installations include as a key element in the job, projector-based, LCD or Plasma home cinema systems, satellite receivers, A/V signal distribution systems and related cabling and components. So if you come from a TV background, you've already got a decent head-start.

However, all opportunities hold risks for the uninitiated. This is especially true for entrepreneurs who fail to take the time to find out about the market and to learn about the key business differences in the sector. Time spent assessing this aspect will ultimately enable you to understand how and why custom installation businesses actually succeed.

## Secretes of success

Arguably, the core reason behind success will prove to be the strength of the relationship between the custom installer and the client, a relationship fundamentally based on trust. The individual client spend on a typical custom installation project can be considerable, six figure sums for whole house A/V and automation systems are not unusual. The greater the bond of trust, the more services a client is likely to buy. However, to maintain this trust, custom installers have to deliver quality and service in spades for the length of the contract and often beyond. The contracts themselves can be complicated to administer and, in these circumstances, the entirely new skill of project management becomes incredibly important, taking greater precedence even than product knowledge. Put simply, a business will live or die by the custom installer's ability to do what he or she said they would do, when they said they would do it.

Critically, it's important for businesses to model themselves on other businesses operating in the house building and renovating sector. The job documentation should look like an architect's, the project management should be like a surveyor's and the standards of customer service should match those of an interior designer.

Financially, these projects are themselves differently structured. For a start, it would be unusual to receive all the money up front. A typical challenge for custom installers is to negotiate a payment structure from their client which ensures that they have money when they need it, not when it is convenient for the client to pay them. Many of you will be used to invoicing upon the completion of a job, often with relatively simply paperwork. Dealing with long running projects (regularly more than a year from signing the deal to collecting the last payment) is a big part of making

Building strong client relationships is as important as understanding the technology

sure that you are getting paid for your work. However, these people aren't looking for friends to share their precious moments with - they want the job done efficiently and professionally. Whilst it may seem above and beyond the call of duty to be working at a customer's home at 9.30 on a Friday night in order to get a plasma TV working, from the client's perspective he will just be asking the question: why are you still here at this time of night?

Truthfully, the danger isn't 'will I be able to find the work?' instead, the challenge is whether a custom installation business is able to deliver the results to all the people who will come looking for its services. A nice problem to have to deal with, I'm sure everyone would agree.

## The right course of action

CEDIA runs a whole series of courses at the annual CEDIA Expo and conducts regional training sessions specifically designed to equip businesses with everything they need to get them started in the world of custom installation. Specifically, the CEDIA Foundation Course is a broad overview of all the things businesses will need to equip themselves with to make the move into custom installation. Other courses then take the time to examine different requirements in fine detail: how to communicate with wealthy clients, how to document jobs, how to behave on a building site with all the essential health and safety requirements. For more information, visit **www.cedia.co.uk** or call +44 (0) 1480 213744 to find out more about the training courses available.

Custom installation is about delivering promised results into the hands of the client (installation: Beyond The Invisible)

# 50 YEARS AGO

*By Keith Wilson*

My recollection of magazines from fifty years ago is that the December issues usually included at least a modicum of festive fun, but this certainly wasn't the case with the December 1956 issue of Practical Television. In fact, the only concession to Christmas was a tiny standardised greeting on the title page.

Nearby, however, was a fascinating fact. The editor remarks that by the time the issue was printed, the number of television licences would, for the first time ever, be greater than the number of sound-only licences. Since the post-war television service had only been in operation for a little over ten years, that's a remarkable achievement, especially when the price of sets is taken into account.

The main theme of the issue was outside broadcasts, illustrated by a cover picture which looks distinctly unseasonable for December. Also, why would anyone in their right mind choose to operate what looks rather like a Cossor dual-beam oscilloscope while perched uncomfortably on the steps of the OB van?

The accompanying article gives a detailed description of the complexities involved in setting up outside broadcasts in that era. Today, when we're used to satellite links and instant live pictures from almost anywhere in the world, it's easy to forget that it was once a considerable challenge just to get TV pictures from one end of the country to the other.

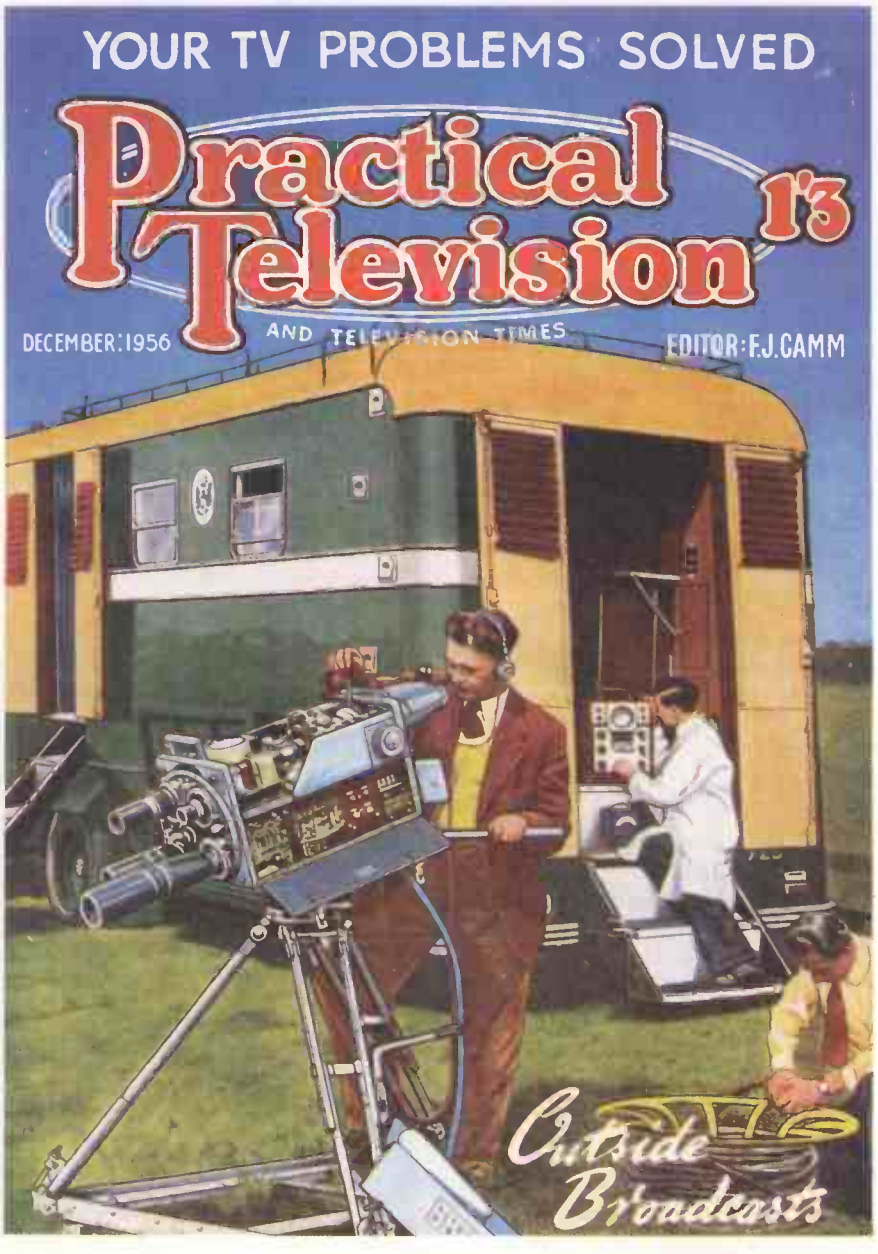
The magnitude of this challenge is shown clearly by the line diagram illustrating the arrangements used for televising the Blackpool Illuminations. A remarkable technical feat, no doubt, but I can't help wondering whether it was really worthwhile, given that the pictures were monochrome and the illuminations rely on colour for much of their impact.

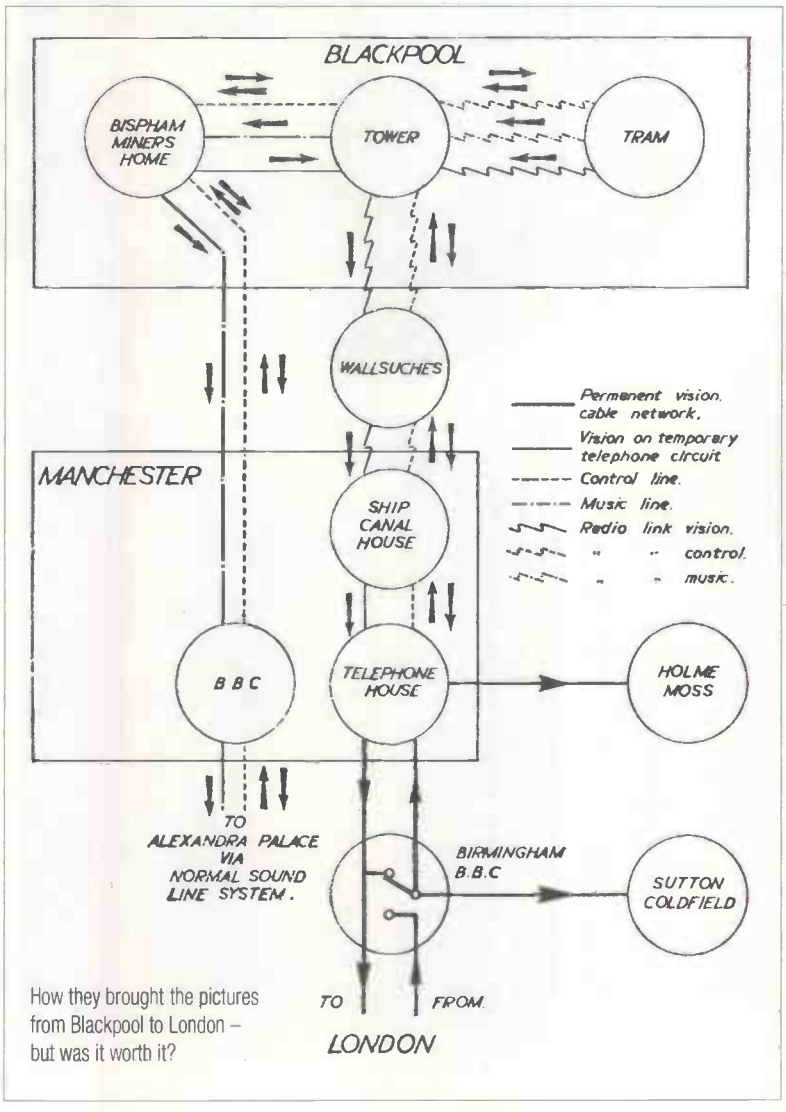
Still loosely related to outside broadcasts, or at least to television on the move, is a picture of a television installation on the Glasgow to Oban train. The caption states that coaches have been wired for TV, and passengers are able to see top-line variety shows. Unfortunately, the caption is the only source of information, as the picture isn't even mentioned in the accompanying article.

As true today as it was in 1956!

The Editor and Staff
Join in Wishing
Every Reader a
Very Happy Xmas

Hmm, I wonder what this pot does!

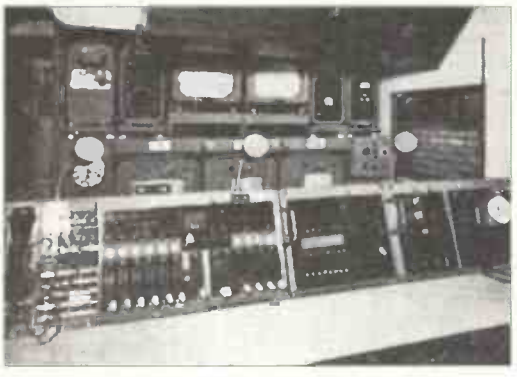





How they brought the pictures from Blackpool to London – but was it worth it?

The mystery of television on the Oban train

Plenty of knobs to twiddle on the Marconiphone VT69DA



The sound and vision desk in the BBC mobile control room

The question that immediately comes to mind, however, is exactly how were the passengers able to watch those variety shows? There were no videotape recorders in 1956 – at least, none that would fit into a train – and I would have thought that even a telecine machine of the period would have been rather too bulky and fragile for the job.

That only leaves off-air reception, but would that really have been possible from a moving train in the Highlands? If anyone has any ideas, I'd be interested to hear them.

In fairness, a clue might be a comment in the previous month's issue, where the editor mentioned the on-train TV service, but said that a miniature industrial camera was used to televise the Highland scenery. Perhaps this is nearer the truth, but it's not quite the same as a top-flight variety show, especially when the passengers could presumably see the same scenery in colour and 3D, simply by looking out of the window!

## Closer to home

After these excursions into the great outdoors, lets come back into the home and take a look at the first in a new series of Practical Television data sheets, which dealt with Marconiphone VT68 series and HMV 1840 series sets.

These sets were fitted with incremental tuners rather than the more common turret types. The claimed benefit was that it was unnecessary to trim each channel individually, adjustments only being needed at the top and bottom end of each band. As might be expected, the tuners covered 13 channels, but these units also had a 14th position, to allow for future connection of a UHF tuner.

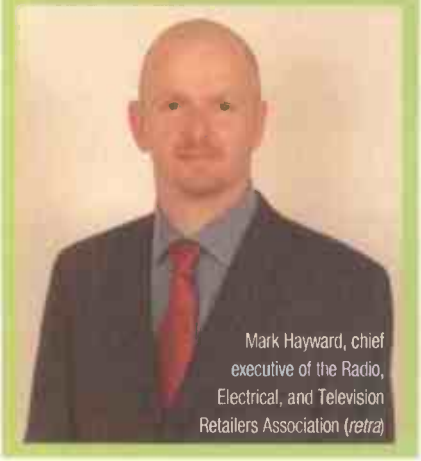
I hadn't even realised that UHF transmissions were under consideration in 1956. Of course, when they did arrive, the change in picture standard from 405 to 625 lines meant that converting a set by fitting an additional tuner was hardly a realistic option.

While progressive in their tuner design, I was surprised to note that the sets covered by this data sheet had electrostatically focussed CRTs which gave "fine centre focus". The corners aren't mentioned! The article also notes that the focus control is in a convenient position on the front of the set, but reassures readers that "it will rarely need adjustment". So why put it there?

With that thought, I wish you all a Merry Christmas and a very Happy New Year – I'm sure 1957 is going to bring some really exciting television developments!

**Mark Hayward**, chief executive of the Radio, Electrical and Television Retailers Association (retra) puts forward a small retailer's perspective in connection with the UK implementation of the European directive on Waste Electrical and Electronic Equipment Directive

# WEEE . . . a small electrical retailer's perspective



Mark Hayward, chief executive of the Radio, Electrical, and Television Retailers Association (*retra*)

As *Television* has previously indicated (October 2006 edition), the Government is now moving to implement the European directive on Waste Electrical and Electronic Equipment (WEEE directive). This is not before time. The WEEE directive should have been implemented in the UK by no later than August 2005. The UK is the last EU country to get to grips with this important legislation.

It is important to note this article was written in the brief hiatus between the end of the Department of Trade and Industry's (DTI) consultation on the UK implementation of the WEEE directive – October 17 2006 – and the DTI announcing publicly its 'next steps'.

What is likely to happen next? As experienced WEEE directive watchers will know, safe predictions regarding implementation have, to date, been few and far between. The following, however, is likely

## The immediate future

First, and given the UK Government's unwanted and unusual status this time as a tardy enforcer of EU legislation, there will not be any further implementation delay. July 1 2007 will remain the date on which the WEEE directive comes into force in the UK.

Second, and with much pain, cursing and effort, both producers and retailers will be in a position to take up their respective WEEE directive responsibilities in connection with waste.

These are my views on behalf of *retra*. But if you do not like them, I have others. It should be remembered, for example, that the process of drafting legislation, securing agreement to the legislation (as drafted, or amended) and subsequently implementing the agreed legislation is, always, about 'politics'. The DTI is currently being lobbied by a vast array of producer, retailer and broader opinion that is most certainly not in agreement about fundamentals. It remains to be seen which way(s), if at all, the DTI will bend. There is also, it must be said, an 'end of term' feel about the Blair-led Labour Government. This is now starting to impact upon the progression of Government business. As WEEE directive implementation is part of that business, the implementation process may yet be affected.

The DTI, as it ponders its 'next steps', should be focussed on ensuring that the path is smoothed for both producers and retailers. On behalf of its members – small, independent electrical retailers - *retra* made an early submission to the DTI WEEE implementation consultation exercise in order to better influence the debate, and to help the DTI focus on what we think is important. *retra* has two key concerns at present. These are with the operation of the envisaged Distributor Take-Back Scheme (DTS) and the need for an Environmental Recycling Charge (ERC) for Electrical and Electronic Waste.

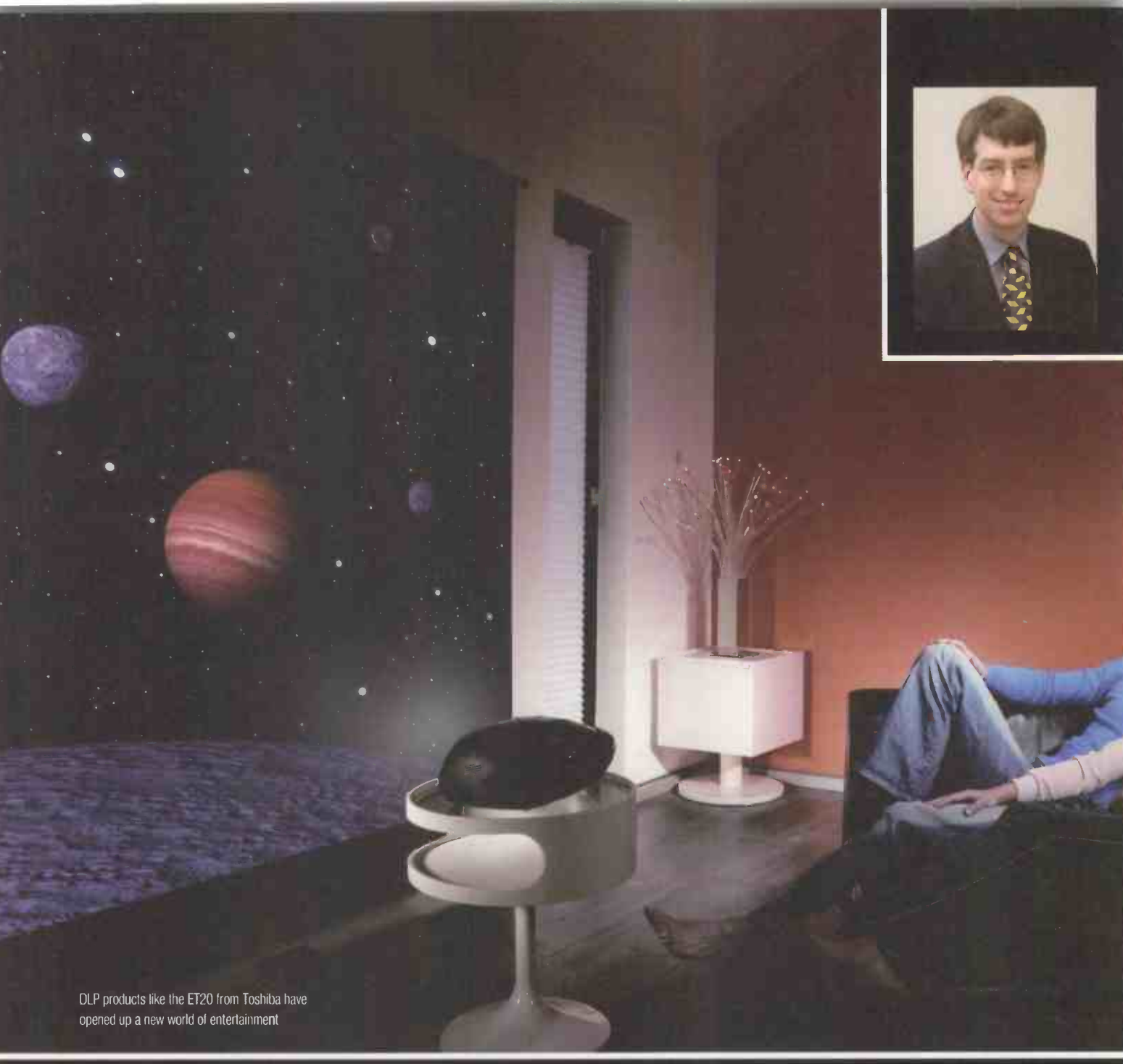
## Distributor take back scheme

The DTS (formerly known as the "Retail Compliance Scheme") is an offset arrangement for the benefit of those retailers who do not want to take back WEEE, as defined by the directive, 'in-store'. These retailers – who include the great majority of *retra* members – will, by joining the DTS, make a financial contribution to meet the costs of upgrading local civic amenity sites to become Designated Collection `Facilities (DCFs) for WEEE. *retra*, together with the British Retail Consortium (BRC), has supported a tender bid by Valpak to be appointed as the designated DTS operator. Following the appointment of the DTS operator, there are a number of matters that will still need to be addressed if the DTS is to be successfully established. First, the costs to retailers of joining the DTS should not be prohibitive. Second, an adequate and local network of DCFs must be put in place. Failure in either regard will impact adversely upon the ability of the DTS to successfully recruit retail members, particularly the smaller retailers that are *retra*'s constituency. Third, the DTI should actively sponsor the negotiations between the local authorities on the one hand and the appointed DTS operator on the other, to ensure that there is in place an adequate network of DCFs. The DTI, to date, has shown a marked disinclination to get involved in these negotiations. But it is not the sole responsibility of the appointed DTS operator to create the required DCF network. As the WEE Directive makes clear, this is a Member State obligation. The DTI cannot, therefore, continue to sit on its hands if it wants this Member State obligation to be fulfilled. The fourth and final area where the DTI still has much to do is that of enforcement. It is essential to the operation and membership of the DTS that 'in-store' WEEE obligations are strictly monitored and enforced. Specifically, those retailers who do not join the DTS must be subject to appropriate monitoring/enforcement arrangements so that they do not evade their legal WEEE responsibilities.

## Environmental Recycling Charge (ERC)

*retra* has lined up with AMDEA (representing the major producers and suppliers of refrigerators, washing machines and other large appliances), the Intellect Consumer Electronics Council (which includes Sony, Phillips and Toshiba) to make the case to the DTI for an ERC be placed on WEEE goods at the point of sale. In practice we believe the ERC should operate as a voluntary, enforceable charge. Each producer of WEEE should decide whether or not to apply the charge to its new products to offset the costs of treating the historic WEEE charged by the Producer Compliance Scheme to which it belongs. Where the producer does decide to charge, the retailer or distributor should be required to display the charge at the point of sale.

*retra* has supported the ERC for a number of reasons. First, it is transparent for consumers and means that costs cannot be added to WEEE goods as these pass down the supply chain prior to their being retailed to consumers. It is good news for consumers if prices are kept down. Second, it will ensure a level playing field for large and small retailers alike by preventing those larger retailers, who might otherwise be tempted to do so, from using their buying power to bully producers into not passing on to them their historic WEEE costs. Third, and legally speaking, the ERC as proposed is permitted by the WEEE directive (though Government lawyers, to date, have taken a different view). The ERC is working elsewhere in Europe. Why not, therefore, learn from the custom and practice of our EU partners? Fourth, and finally, the ERC is consistent with the 'green' objectives of the Directive. The UK's record to date in educating consumers that there are costs associated with the disposal of waste in today's throw away consumer society is truly lamentable. Here is one way in which this education deficit can be addressed.



DLP products like the ET20 from Toshiba have opened up a new world of entertainment

# The evolution of

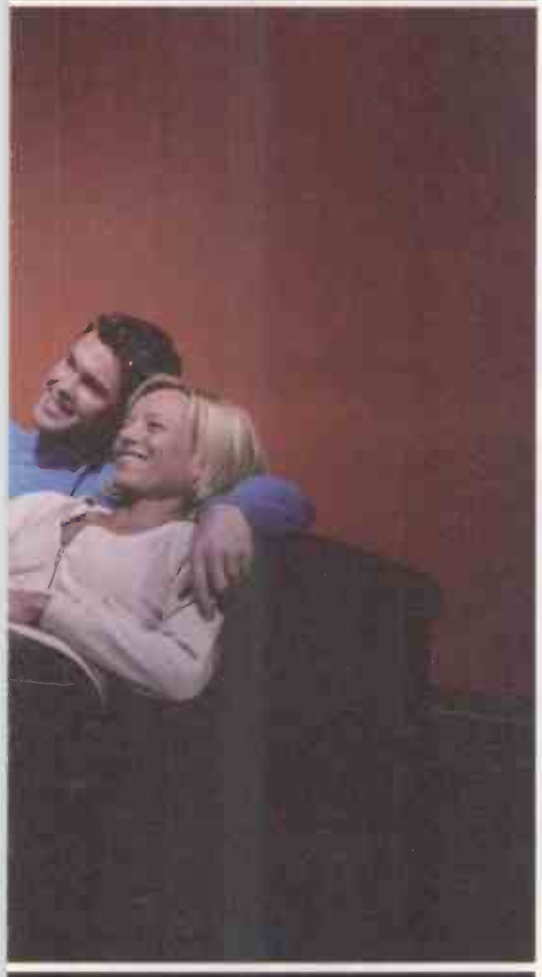
The story behind DLP technology is one of evolution and innovation. The DLP chip at the heart of today's televisions, HDTVs and front projection displays, was in fact originally conceived for use in airline ticket printing machines back in 1977. In those days the DLP chip was a deformable mirror device which used micro-mechanical, analogue, light modulators to create the text for print.

Controlling the mirror operation of light in an analogue way wasn't easy and, after a number of trials, it was considered that this would be much more effective if the signal was digital. Ten years later, the DLP chip that we know today - the digital micromirror device (DMD) - was created by its inventor Dr Larry Hornbeck in 1987.

The step from a micro-mechanical to a micro-electromechanical system (MEMS) device was the first leap forward for DLP and acted as the corner stone on which future progress was built. Now it was possible to combine the chip with image processing, memory, a light source and optics to form a DLP system capable of projecting digital images.

We projected our first digital images in 1992 and our product roadmap began four years later with

*Adam Kunzman, business manager DLP HDTV, Texas Instruments (TI), charts the rise of Digital Light Processing Technology (DLP)*




the shipment of our first business projectors. At VGA resolutions, weighing in at a mighty 27lbs and with an output of 400 lumens, it is easy to see how far the industry has come today. However, at the time, a market forecast of around 250,000 units per year was an attractive proposition and was fuelled by the removal of transparency projectors from classrooms. SVGA and XGA projection products soon followed.

## On the road to high definition

While TI was building its commercial proposition, behind the scenes our R&D teams, sponsored in part by the Defence Advanced Research Projects Agency (DARPA), were working to create a high-definition (HD) display technology. With this backing we developed the first prototype of a HD display using DLP technology. This projector was even bigger than DLP's first 27lb business projectors, but it was able to create an image of 100" at a contrast ratio of 100:1. This development was timely as it coincided with the creation of the US HD standard and kick started our efforts to develop our own HDTV technology.

In 2000 the first DLP HDTV product was shipped. Priced at $10,000 we'd achieved a breakthrough contrast ratio of 1000:1 at 720p resolution. Despite the superior picture quality in comparison to CRT, the price tag was just too high to generate significant business. With this in mind our R&D teams set a $3000 target price point and produced the first table top HDTV, half the size and weight of a CRT, which was demonstrated to Samsung at CES (technology expo) in 2002.

Samsung is one of our long-term development partners and at the time was searching for a way to boost its market share in the US. Samsung considered DLP to be the unique solution to do just that. A year after we showed them our first table-top HDTV, the company launched a 50" HDTV with a contrast ratio of 3000:1. Priced at $4000, sales exceeded everyone's expectations and has led to successive generations of products and innovations.

## Survival of the fittest

The display market has always been about survival of the fittest and over the years our displays have got brighter and our contrast ratios better. We were operating in an extremely price competitive marketplace and we had to look at ways to help our customers see price points drop without compromising on quality.

We looked at a number of avenues in which this could be achieved and developed a technology - SmoothPicture - which allowed us to reduce the size of the DLP chip. Doubling the switching speed of the mirror gave us a fast way to shrink the DLP chip, making the chips and system design cheaper to manufacture. Introduced in 2005, SmoothPicture allowed full 1080p HD technology to be supported cost effectively and we were the first to market with 1080p micro display technology.

Our ability to adapt to our environment has meant that in TV we now own 20% share of the US market at 40" plus and more than 50% of the world wide front projection market. However, the market still remains competitive, if not more so today, and DLP technology continues to change.

In the last few years a number of Asian companies have invested heavily in flat panel infrastructure and made aggressive price moves to reduce the price advantage that we had obtained. In response we initiated an effort to create a slim DLP optical architecture that reduced the depth of DLP televisions by over 30%. This led to the introduction of the first DLP slim televisions from Samsung.

We have also been investigating the use of solid state illumination and were the first to use LEDs as a light source in both projectors and HDTVs. Our first LED DLP HDTV was introduced by Samsung earlier this year and Samsung, Mitsubishi and Toshiba introduced pocket projectors at the end of last. In both, the conventional lamp and colour wheel are replaced by coloured LEDs to generate the image.

LEDs have much deeper and more vibrant colours and have a much longer lifetime than lamps. We're continuing to develop this technology and as products containing LEDs reach greater volumes, the price gap between LED and lamps will shrink over time.

We're just scratching the surface of the solid state's potential, you haven't heard the last from DLP in this area. We've been the first to market in a number of different areas, our innovation has served us and our customers well and I'm in no doubt we'll continue to do so in the future.

## How it all works: TI explains the DMD

At the heart of every DLP projection system is an optical semiconductor known as the Digital Micromirror Device, or DLP chip.

The DLP chip is probably the world's most sophisticated light

switch. It contains a rectangular array of up to 2 million hinge-mounted microscopic mirrors. Each of these micromirrors measures less than one-fifth the width of a human hair.

When a DLP chip is co-ordinated with a digital video or graphic signal, a light source, and a projection lens, its mirrors can reflect an all-digital image onto a screen or other surface.

## Step one: DLP – The greyscale image

A DLP chip's micromirrors are mounted on tiny hinges that enable them to tilt either toward the light source in a DLP projection system (ON) or away from it (OFF) creating a light or dark pixel on the projection surface.

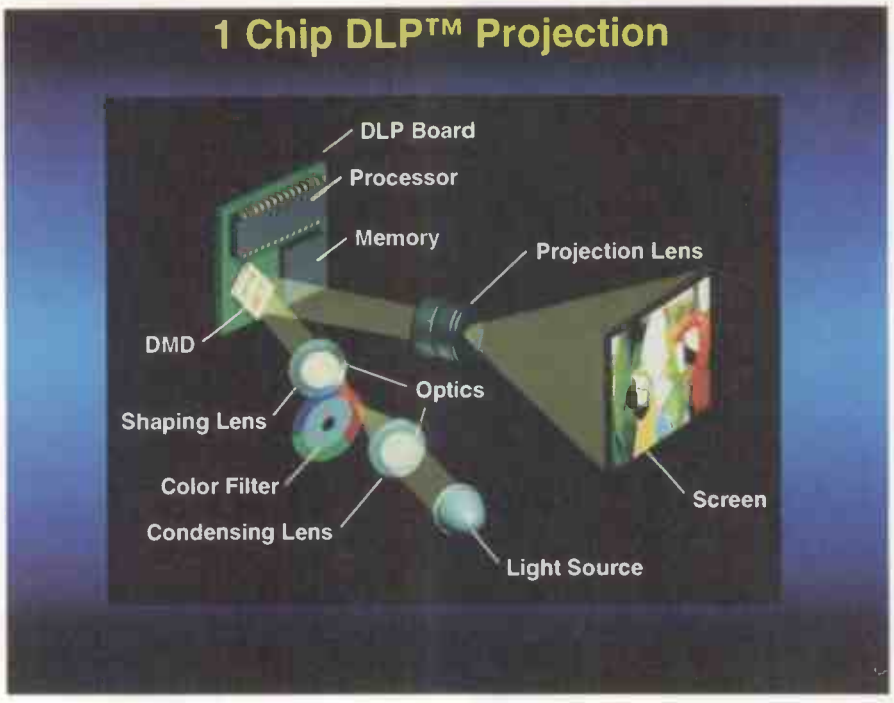
The bit-streamed image code entering the semiconductor directs each mirror to switch on and off several thousand times per second. When a mirror is switched on more frequently than off, it reflects a light grey pixel. A mirror that's switched off more frequently reflects a darker grey pixel.

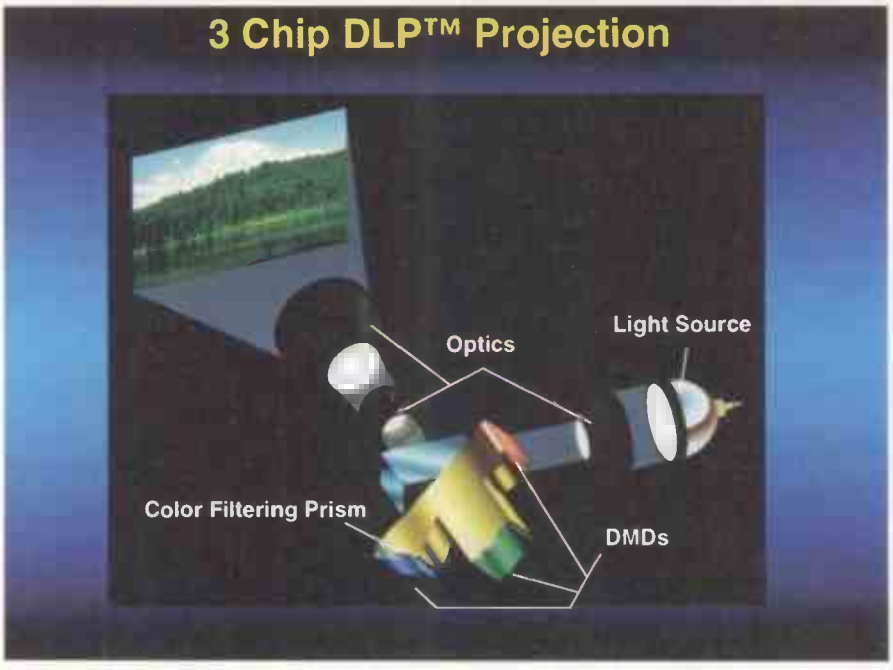
In this way, the mirrors in a DLP projection system can reflect pixels in up to 1,024 shades of grey to convert the video or graphic signal entering the DLP chip into a highly detailed 'greyscale' image.

## Step two: Adding colour

The white light generated by the lamp in a DLP projection system passes through a colour wheel as it travels to the surface of the DLP chip. The colour wheel filters the light into red, green and blue, from which a single-chip DLP projection system can create at least 16.7 million colours. The 3-chip system found in DLP cinema projection systems is capable of producing no fewer than 35 trillion colours.

The on and off states of each micromirror are coordinated with these three basic building blocks of colour. For example, a mirror responsible for projecting a purple pixel will only reflect red and blue light to the projection surface. The eyes then blend these rapidly alternating flashes to see the intended hue in a projected image.




## Applications and configurations

### 1-chip DLP projection system

Televisions, home theatre systems and business projectors using DLP technology rely on a single chip configuration like the one described above.

White light passes through a colour wheel filter, causing red, green and blue light to be shone in sequence on the surface of the DLP chip. The switching of the mirrors, and the proportion of time they are 'on' or 'off' is coordinated according to the colour shining on them. The human visual system integrates the sequential colour and sees a full-colour image.

### 3-chip DLP projection system

DLP technology-enabled projectors for very high image quality or very high brightness applications (such as cinema and large venue displays) rely on a 3-chip configuration to produce high quality images, whether moving or still.

In a 3-chip system, the white light generated by the lamp passes through a prism that divides it into red, green and blue. Each DLP chip is dedicated to one of these three colours; the coloured light that the micromirrors reflect is then combined and passed through the projection lens to form an image.

# PLEASE ENSURE YOU TELEPHONE TO CHECK AVAILABILITY OF EQUIPMENT BEFORE ORDERING OR CALLING.

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PHILIPS PM5132 Function Gen 0.1Hz-2MHz ..... £95
PHILIPS PM5131 Function Gen 0.1Hz-2MHz ..... £75
FEEDBACK FG601 Func Gen 0.001Hz-1MHz ..... £60
HP 8112A Pulse Gen 50MHz ..... £750
HP 8111A Pulse Generator 20MHz ..... £400
LYONS PG73N Pulse Gen 20MHz ..... £50
LEADER LAG120B Sine/Sq Audio Generator 10Hz-1MHz ..... £60
FARNELL LFM4 Sine/Sq Osc. 10Hz-1MHz Low Distortion. TTL Output, Amplitude Meter ..... £60
GOULD J3B Sine/Sq Osc 10Hz-100kHz Low Distortion ..... £50-£75
FARNELL LF1 Sine/Sq Oscillator 10Hz-1MHz ..... £50
MARCONI SANDERS 6055C Signal Source 850-2000MHz ..... £125
MARCONI SANDERS 6055B Signal Source 850-2150MHz ..... £125
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MARCONI SANDERS 6057B Signal Source 4.5-8.5GHz ..... £125
MARCONI SANDERS 6059A Signal Source 12-18GHz ..... £125
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THURLBY PL330 0-32V 0-3A Digital (Kenwood badged) ..... £75
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# Letters

## English patience

"Sometimes e' works and sometimes e' just don't work," said the red faced gentleman as he placed his Panasonic TX21V2 down onto the front bench. "I was watching snooker with me missus last night when pop! off he went and I turned to her and said I think it must be something electrical. Do you think I'm right mate. Do you think it could be electrical?"

"I would say that's probably a fairly safe bet," I said. My attempt at humour sailed straight over the customer's head, so I settled for taking his details and inspection fee. I put the set on the soak test bench, and waited for the picture to go wrong.

Meanwhile I picked up a job card for a 28" Beko TV and all it said on the card was 'picture goes'. Now we have had a number of Beko sets in with dry joints on the heater resistor causing the picture to fade. This one seemed OK though and no amount of heating, freezing or tapping could make the picture 'go' so it joined the Panasonic on the soak test bench.

The telephone rang: "Hello Visiontech can I help."

"Ah, yes is that the Telly menders place?"

"Yes it is, what can I do for you."

"Right listen to this."

There then followed about thirty seconds of crackling and what I can only describe as white noise, which nearly pierced my eardrums, followed by the gentleman shouting over the noise:

"How much will that cost me then?"

Having not yet developed the ability to diagnose TV faults down the phone line, I had absolutely no idea what he was talking about. However, after a brief chat it transpired that the sound had vanished on his Television and been replaced by a hissing sound. I still had trouble convincing this perspective customer that waving his phone near the set was not going to give me the information I needed to deliver a diagnoses, bringing the set in or a home visit would be necessary.

I picked-up the next job ticket, it was a Toshiba VCR. This should be easy I thought to myself. 'Dead' said the ticket. I plugged in the VCR and it went through the usual shuffle motions. I popped in a tape and it played away quite happily. Blast! I thought, today is not going to be a good day, not good at all.

Three days later the Panasonic TX21V2 was still working without so much as a glitch, so I thought I would phone the customer to see if I could get any more details.

I asked how often the set switched off. "Now and then," came the unhelpful reply.

I also asked whether, when the picture disappeared, did it shrink in from the edges or down from the top. I also enquired whether anything strange appeared on the picture, such as loss of colour. "No, even when it goes off the picture is perfect," he said.

"Pardon," I enquired, "How can the picture be perfect even when it goes off?"

"Don't ask me mate I'm not the electrical man am I. You tell me, all I can say is when e' goes pop the pictures normal. I still think it's something electric, have you looked at the electrics?"

It then dawned on me, 'when e goes pop,' meant that the speakers popped and that, 'then e goes off' meant the sound was disappearing.

Of course! I was running it on the soak test bench with the sound down. In fact when I turned it up there was no sound at all.

It turned out to be an easy fix, just dry joints on the sound o/p IC's. Hours had been wasted because of a misleading fault description yes, but I also had to admit that I hadn't asked the right questions when the set had been booked in.

I suspect that the seasoned campaigners among you may have already guessed what was waiting for me in regard to the other faults that had, as yet, refused to give up their secretes.

The Beko job card said 'picture goes' and it meant precisely that: the picture goes, or the picture is ok, to put it in plain English, the picture was working fine!

I still don't understand why the customer told us what was not wrong with the set, rather than describing the actual fault, which was no sound. However, again, when the correct fault symptom was discovered the repair again was easy, dry joints on the sound o/p IC once again.

The Toshiba VCR was much the same. Turns out the customer knew it played a tape, but as far as he was concerned it was dead because the clock display was not functioning. In fact he had put the unit into Eco mode so the display was turned off.

As for the gent with the white noise, when I arrived at the house he had the TV on. Believe it or not, the sound was not the only problem, there was hardly any picture either just snow. Any guesses? Yes, you're right, the aerial lead had come adrift at the back of the set. All I had to do was plug it back in again and things were fine.

The English language is indeed a wonderful thing, but its complexities can catch us all out at times.

**A.D Lyon, Visiontech**

## The shocking truth

We should be very clear that the effects, (tingling, small sparks) sometimes experienced when connecting some equipment, without following the clear instructions to 'disconnect from the mains,' are not an 'electrical safety issue'. The products are quite safe, as shown by the fact that your correspondents survived their experiences! (see *Television* letters August, September, October).

The point here is that capacitance between conducting objects is unavoidable, and if an alternating voltage is applied to a capacitor, current flows. This was just as much evident in the days of valve radios

**Please send letters to:** Television, Nexus Media Communications Ltd, Media House, Azalea Drive, Swanley, Kent BR8 8HU

**Email:** TVeditor@nexusmedia.com, using subject heading 'Television letters'

with 2-core mains leads and a fat mains transformer, having high internal capacitance from primary to core, as it is today.

The response from Panasonic is quite correct, (John Westmoreland letter October *Television*) although the Class I (earthed)/Class II (not earthed) story is actually quite complicated.

Class II products can be sold and used safely all over Europe, but Class I products can't, because in some countries, earthed wall-sockets aren't available. And in some mountainous parts of Norway, Sweden and France, ground conductivity is too low for 'earthing' to be used as a safety measure.

The case of the Panasonic VCR is interesting (John Westmoreland letter October, *Television*). Clearly, the SECAM version is specific to France (and some eastern European countries may still have SECAM, I suppose). The common-mode choke and two capacitors is the industry-standard EMC filter; the 'three capacitors in series' is strange, and it's difficult to understand why one would do that. These EMC capacitors are, as is widely known, a special 'Y-type', which have to undergo very stringent testing to the standard IEC/EN 60384-14, and are designed to self-clear any internal short-circuit provoked by high-voltage spikes on the mains supply.

I'm surprised that anyone connects a karaoke machine to a TV; I wonder why (Kevin Edwards letter October, *Television*). But one could only get a 'tingle', not a real shock, from the microphone, and only then if it had a metal body, which is perhaps unusual for a karaoke machine. If you draw out the path for a mains leakage current, you can see why.

The earthing of equipment via a mixing desk is an absolute no-no! (Kevin Edwards letter October, *Television*). That is commandeering audio cables to act as protective earth conductors, and they don't meet the requirements. Furthermore, in the case of a fault, mains voltage could exist between a cable connector and the connector you are trying to plug it into. If a product needs supplementary earthing because the system in which it's used creates high leakage currents, it must be done directly from the product to the mains earth.

Then if you get hum-loops, the products aren't actually suitable for the application, and you have to add isolating transformers or unbalanced-to-balanced converters to suppress the hum. This is what happens when you try to use low-cost consumer electronics products where you should be using professional products designed with these issues in mind.

The prison situation is obviously a serious case of 'not understanding' (Kevin Edwards letter October, *Television*)

What is safe in the context of one TV leaking the permitted 0.7mA is clearly not safe if 100 TVs are leaking 70mA!

Ideally, the contractors responsible should now be sampling the delights of the system they wrongly installed, at Her Majesty's expense.

Finally, if one wants to understand how brown-goods products are designed to be safe, spend some of your lottery winnings on the British (and European, and International) Standard BS EN 60065. It's not great literature, and the plot is a bit thin, but it's a world-wide best-seller and all the information you need is in there.

**J M Woodgate BSc(Eng) CEng MIEE FAES FInstSCE, Essex**

## Life expectancy

I've read various articles in the magazine (*Television)* giving highly detailed info on LCD Screens, but have not been able to answer this question. How does the average life expectancy of an LCD screen differ from a CRT?

Extended warranty insurers make no premium loading for TVs with LCD screens, so I would presume around five years plus in normal use?

I think that I've seen a statement that it is the backlight that is most likely to fail and that they are rated at around 50,000 hours to mean failure time.

I have a Bush LCD where the backlight has failed in about 12 months of 'light' use as a monitor run from a VCR by direct composite line input.

Any opinion over averages would be appreciated, many thanks

**Clifford Parrish**

*(Ed. Any ideas on this one? I have contacted some manufacturers and hope to publish their reply's in the near future)*

A reader wants to know what lasts longer, an LCD or a CRT?

# Letters

A Marconi (no. 6) on the list and a Murphy (no. 7) on list.

On top is the Ferranti S47 cream/brown (no.11 on list)

### Treasure trove

The family has recently lost an avid television/radio/receivers enthusiast. Sorting through his collection and ancient pieces I have been unable to find an equal enthusiast who may be interested in all this equipment, some of which dates well back.

I wonder if you are able to help. I am informed it must be worth something if I can find the right person. I have included here a list of all the items.

### Old TV's that do not work:

1. Sobell 12" x 10" screen Wood Veneer
2. McMichael M14T 11" x 8" screen
3. GEC BT5146 12" x 10" screen
4. Kolster-Brandes 12" x 10"
5. Name unknown, TV with louvered/possibly vented section under and screen 14" x 10"
6. Marconi 9" x 7"
7. Murphy 11" x 14"
8. Pye Brown Wood Veneer 33" high with speaker underneath TV, on wheels 11" x 81/2"
9. Loads of extras like valves, bits and pieces etc. for ancient TV's.

### I am also in possesion of many old radios, list as follows:

10. HMV Brown bacolite/cream fronted.
11. Ferranti S47 cream/brown metal
12. Cossor brown wood with speedo type indicator for worldwide marked stations
13. Radiogram brown wood possibly Philips

### Also in the collection are several unknown receivers and ancient equipment:

14. Collaro Type AC47 Turnstyle 10" diameter
15. Unknown 12" turnstyle on wood base
16. APW7336 CR Unit Design RA with serial no. (dated 1943)
17. Airwave Oscillator very ancient black
18. Black Metal Box - Ref. No. 100/10310 Serial no. 766?
19. Marine Communications Metal Box Type 3943 No. 3661?
20. War Siren - TEL LS No.2 Cat No. VA2504
21. Various extra bits of TV's, radio bits and odd metal ancient boxes
22. Silver Metal, no name slightly arched box with old plug with canvan cover - possible an old press or iron.

Anyone that is interested can contact me at **jamesbell@talk21.com**

# Fault REPORTS

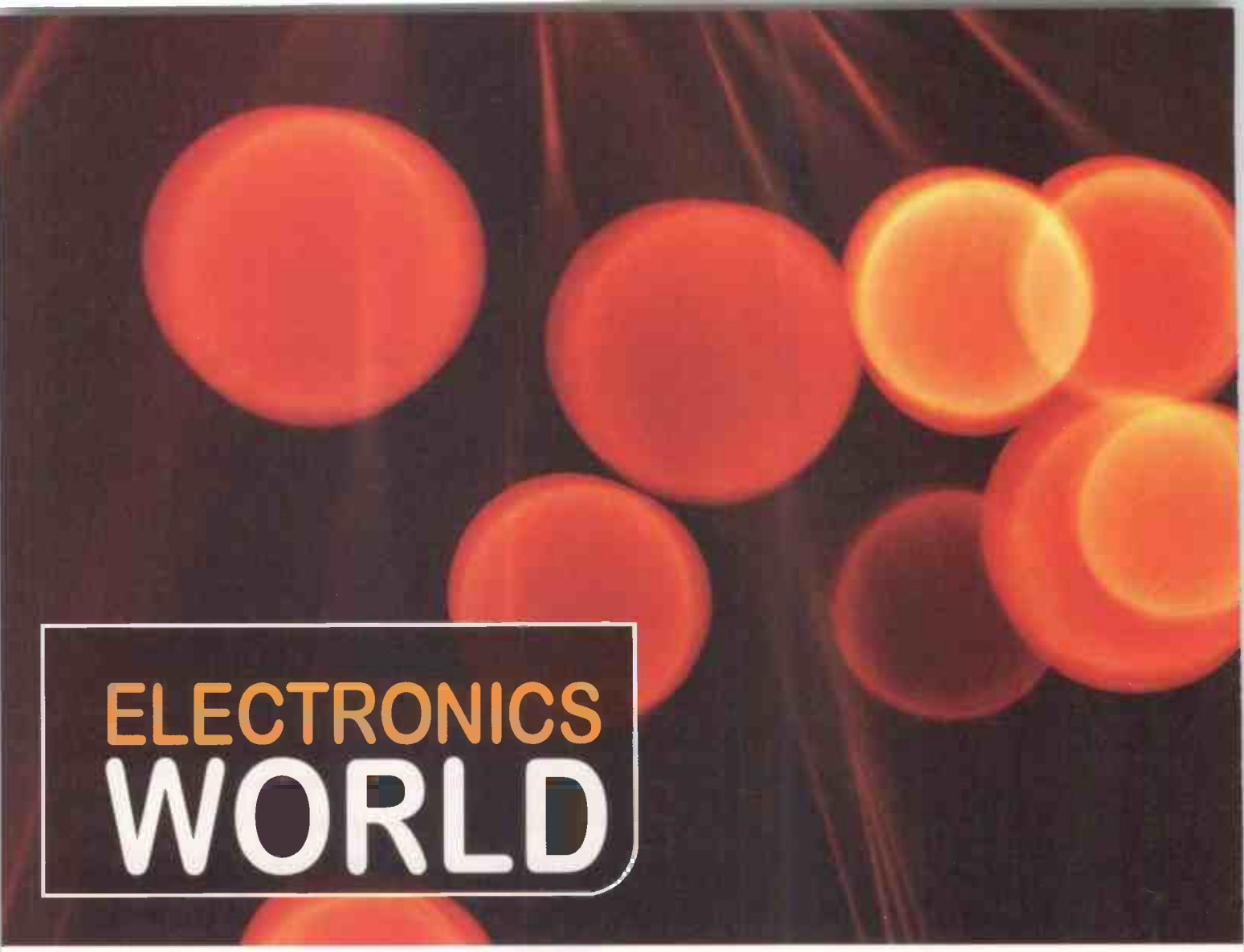
## TV/Satellite/DVD/VCR Faults

## Test Case 528

Ivan Levy
John Coombes
Philip Salkeld
Bernie Storey

## Solution to Test Case 528

Philips HTS3500 DVD player
Samsung DVD/VCR -R320
Matsui DVD recorder DVDR100
Hitachi XM130 hi-fi system
Panasonic TX28PS500 (Euro 10 chassis)
Toshiba 28YT56-AK49
Sony KV28LS36U (FE2 chassis)
Matsui 28N03 (Pro 4400 chassis)
Grundig MW70-2700 (CUC2059 chassis)
Ferguson FTV 28FW2 (AK49 chassis)
Philips model 28PW6505/05 Fault Guide (chassis L01.1E)
Toshiba model 28N33B
Beko model 28422NDS (142 chassis)
Alba model CTV6683 (chassis 11AK19)
Pro-line model 1485R (chassis CP185)
Alba model CTV6683 (chassis 11AK19)
Toshiba model 32YT56
Sharp model LC32GA6E LCD
Tatung model T28W441
Sharp model 28LF92H
Philips model 17PT1666/05 (chassis L01.2E)
JVC model DR-MV1SEKP/DVDR/VCR
Hitachi model CP28WD2TAN
Panasonic model TX32PS12
JVC model AV28ED5B chassis 11AK52
Philips model 14PT1686
Sharp 32JW73H (GA20 Chassis)
Bush WS6674 (PT92 Chassis)
Hitachi 32 LD6200 LCD
Bush BTV170TBLK Combi
Grundig ST70-700NIC/FT CUC2030 Chassis
Philips 21PT136A/05 (Anubis A.AC chassis)
Sony KV-28FX20u (BE-3E chassis)
Sony KV-16WT1U (BE4 chassis)
MATSUI VXA1100.

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IVAN LEVY

## Philips HTS3500 DVD player

This DVD player was dead. The fuse in the power supply had blown. The cause of its demise was IC101 (an STRN-W6856) which was short circuit on its supply pin 5. Also, resistor R154 (0.47Ω) was open circuit and Zener diode D104 was short circuit. I had to get these parts from a scrap panel as the power supply is only available as a module. Once the above parts were changed I soak tested the unit proving all was now OK.

## Samsung DVD/VCR –R320

This DVD player was dead. I found diode D1535 to be short circuit on the secondary of the chopper transformer. It is a HT feed diode and replacing it brought the DVD player back to life.

Recently I have repaired several of these DVD/VCR recorders, on two occasions the DVD recorder would not record DVD-RW discs. Replacing the laser drive cured the fault, although I did try cleaning the lasers first.

I have also had another two of these combi-recorders come in with no picture via the SCART. Before you get the circuit diagram out, try pushing and holding the PSCAN (progressive scan) button. After about 30 seconds an install menu appears, tune in and you will find all will be well again.

## Matsui DVD recorder DVDR100

The customer had complained of poor sound and the disc not ejecting properly. When I looked at the unit, I found it to be dead. I found capacitors C14 and C14A (both 2200µF) to be open circuit. This was pretty obvious as the tops had burned. Replacing these capacitors got the DVD recorder working. Next came the problem of no eject. After removal of the metal plate which encloses the disc in the mechanism and manually manipulating the gears to get the CD tray out, I found the loading belt had stretched. Replacing this small belt cured the eject problem and a clean of the laser and a thorough soak test showed all was now well.

## Hitachi XM130 hi-fi system

The customer complained of no radio reception and no display on the radio tuner module of this component system. After removing the cover I found the 5V rail at connector CN1807 was missing. The 9V rail was present at the regulator mounted on the chassis. However, a careful examination showed the connector lead from CN1807 and the regulator mounted on the chassis was not fitted correctly, re-fitting cured fault.

## Panasonic TX28PS500 (Euro 10 chassis)

This set had normal sound but there was no picture just a blank raster, but I found teletext was working. Studying the block and circuit diagram, I found the video signal entered IC601 VDP3130Y video processor, but did not appear at its outputs. I checked the supply rails to this IC and clock and data were all present and correct, so I replaced IC601. This cured the fault.

## Toshiba 28YT56-AK49

At switch-on the set would make a thumping noise as if there was an overload. I checked for any short circuits or any overloads in the secondary side, but could not find any obvious faults. Next I removed the line transistor and used a bulb as a dummy load across the HT rail. I switched on and the HT rails came up, but I could smell burning. A visual search showed the source of the burning to be coming from the primary of the power supply. A resistance check in the primary side of the power supply showed that D816 was short circuit. Replacing this diode

# TEST CASE 528

The advent of big flat-screen TVs does not yet seem to have had much effect on the rate at which CRT sets are coming in for repair, though there's no doubt that those which do not get repaired are mostly being replaced by LCD and plasma panels. Perhaps by coincidence, many of the TVs which have come into the Test Case workshop lately have been huge and heavy Philips sets with horrible intermittent faults, not all of which stem from failure of the notorious painter chip.

Perhaps the worst example was a model 32W6006/25, fitted with the L01·1 chassis, usually quite easy to troubleshoot and repair. Its power supply was pumping and chirrping to indicate a heavy overload somewhere. That somewhere turned out – as usual – to be the line output transistor, short-circuit from collector to both base and emitter. The workshop lads are now wise to the usual cause of this: a faulty capacitor in the line drive circuit, specifically C2455, 47µF 25V. The test result on this one, both in and out of circuit, was 'In circuit, ESR >10Ω' on the digital meter. This capacitor and the line deflection transistor were replaced by Television Ted, who then refitted the back cover and sent the set on its way with a Jack Horner remark. Pride before a fall, as before in these pages!

The customer got the set back on a Friday, and the phone was ringing when they opened up the workshop at 8-30 on the following Monday morning. The Philips had failed again, and was pumping once more! Back into the workshop it came, and soon the new line output transistor Tr7460 was found to be short circuit, just like its predecessor. The newly-fitted electrolytic capacitor, checked on the wonder-tester, declared itself OK, and with another line output transistor fitted there was no discernible problem with the line drive waveform. With the new line output transistor in place, indeed, the whole set declared itself innocent: it ran for several days with no issues or incidents, as TV Ted put it. Maybe the replacement transistor had been faulty? Examination showed that it was from the same manufacturer and production batch as the one that had just taken its place. Scrutiny of the underside of the printed circuit board with a magnifying glass showed a couple of suspect joints at the lead-outs of the EW coil 5400. Ted unsoldered them, anointed both with liquid flux, then reflowed them with lead-free solder. Two more days' test running was deemed a sufficient trial, and so the set was sent back to its owner once again.

This time the set stayed out a little longer than before: four days in fact! Upon its return the line deflection transistor had failed once more. Obviously there were many possible causes for its demise – the problem was in getting a diagnosis. Our most skilled communicator, Workshop Sage, went to see the customer. He came away with a couple of clues to the cause of the trouble; one of them was that there was some 'grumbling' and crackling from the TV on site. Sage briefed TV Ted on his return to the workshop, and between them they finally solved the problem. What was its cause? It wasn't the flyback transformer.....

got the set up and running. However, there was a second fault, I had a bright white raster. I found the 200V HT rail was missing to the video driver IC on the tube base. This was due to resistor R906 being open circuit on the tube base. I could not find any other issues which could have caused this fault, so a long soak test showed all was now OK.

## Sony KV28LS36U (FE2 chassis)

When I switched on this set there were three lines at the top of the screen with four flashes of the standby LED (error code 4, no vertical sync). I also had no graphics. I scoped the frame waveform at pin 5 of IC501 (an STV9379A), this was distorted and I decided to change IC501, however this did not cure the fault. I could not find any obvious faults around the frame IC, so I decided to change the EEPROM. This made a slight difference, as a number 4 now appeared on the display, but no main graphics. I next decided to change the main jungle chip IC001 (TDA9394H/N1/5/1031) and the EEPROM together, this brought the graphics menu back. I was now able to tune in all the TV channels, but the picture was shifted approximately 9" upwards with severe trapezium distortion. I attempted to adjust this in the service mode with little effect. Studying the diagram I could not see an obvious cause of the fault. I did notice the vertical sync pulse went to the velocity modulation board to connector CN1701. Removing this plug cured the fault. I was now able to set-up the picture correctly to a test pattern, so a fault existed on the velocity modulation board. The vertical sync pulse goes to pin 1 of IC1902 and un-soldering pin1 cured the fault. I then re-soldered pin 1 and the fault had completely gone, strange. I put the set on a long soak test (4 days) with no re-occurrence. I can only assume either a solder splash was present or component legs might have been touching. It is also possible a very intermittent fault exists in IC1902 if the customer returns it I may have to change this IC.

## Matsui 28N03 (Pro 4400 chassis)

This set went bang according to the customer. On internal investigation the input fuse FP1 was black. I found TP2 (chopper mosfet STP4NA80) was short circuit, along with diodes DP1 to DP4. I replaced the chopper IC (a TEA2262). I checked all the associated resistors and capacitors and eventually found the cause of the blow up. Capacitor CP19 (a 680pF cap) which is connected to pin 1 of the chopper transformer was very leaky. In fact it had a whole in its side. Replacement and adjustment of the HT showed all was well. I soak tested the set for a couple of days to be certain all was OK.

## Grundig MW70-2700 (CUC2059 chassis)

This set came in with a bright white raster with flyback lines. The 200V was present at the CRT drive panel, but not at pin 6 of IC24000, 24030 and 24070 (all are TDA6106Q). I found IC24030 to be low resistance between its supply pin 6 and its output pin 8. Replacing this IC, re-soldering the main chassis plus and a long soak test showed all was now well, I cannot help but thinking there may be a fault in the CRT and this set may well bounce back to me.

## Ferguson FTV 28FW2 (AK49 chassis)

This set was dead. The standby light was on but the set would not come out of standby. The 3V standby voltage was present and correct going to the micro. I initially decided to check for any short circuits on the secondary supply lines. None were found so a more detailed check was required. The micro (TDA12020H a Hercules type IC) was receiving remote control signals at pin 32. However, there was no clock or 1.8V rail. According to the manual the 1.8V line is switched on via Q114 from a control line called DECDIG coming directly from the micro. This control line was not present. I decided to try and force the 1.8V line to come on by short circuiting the base emitter of Q110. Unfortunately this had little effect. I decided to do a resistance check on the 1.8V rail, this showed a direct short circuit existed on the 1.8V rail. Isolating various links brought me to the conclusion that the micro IC100 was short circuit. Unfortunately if you do change this IC, the set will not come on as they are not currently programmed, so a new chassis is required.

## JOHN COOMBES

## Philips model 28PW6505/05 Fault Guide (chassis L01.1E)

**Power supply faults.**

If the power supply is dead, but there is a slight ticking noise, check the FET transistor Q7521 (STP7NB60F) also Q7522 (BC847B) and replace diode D6526 (BZX384C22). If the set is still dead, then check under line stage faults. If the fault is proved to be in the power supply by isolating the line stage, check IC 7520 (TEA1507) and check resistor R3523 (47Ω) by replacement or resistance reading. If still in trouble then check the diode D6523 (IN4148) for short circuit. If the set switches to protection mode check for faulty VDR 3345, check by replacement. If there are problems within the power supply then it may be necessary to use a power supply kit (312278590600) for the L01.1E chassis. The kit contains:

3523 470Ω resistor
3527 0.22Ω resistor
3532 2.2kΩ fusible resistor
6500 Bridge rectifier GBU4JL-7002
6523 IN4148 diode
7520 TEA1507P/N1
7522 BC847B
7521 STP10NK80ZFP FET transistor
6526 BZX384-C22 diode
7515 Opto coupler TCET1104(G)
3526 0.15Ω 1W with sets with 3/5W amplifier only
3526 0.22Ω 1W with sets with 10W amplifier only

The replacement power supply kit can be used to overcome a dead set which also has a ticking noise. In some cases if the set just goes off after operating for a short time, it is necessary to enter the service mode. To do this, check service manual, then press standby to clear corruption on data line in the error buffer. If however the set is dead and the red LED is not lit, check the driver pulse on pin 6 of the control IC7520 (TEA1507). At this point, if the pulse is correct, check the voltage on pin1 VCC this should be 11V or above. If the voltage is lower than 11V suspect capacitor C2526 (470nF 16V) check by replacement. If the set just switches to standby after a few seconds, check for faulty capacitor C2563 (100nF). If this all proves negative, check the voltage on transistor 7561 (PDTC143T). If there is no volts on the base were there should be 3.2V, check transistor by replacement. In a few cases the set will switch to protection mode for what would appear no reason. If this is the case, replace voltage dependant resistor (VDR) 3345. Many of the faults that occur may look like power supply faults, but the line stage with a short circuit will also shut down the power supply. This may mask the true fault area.

**Line stage faults**

One of the most common problems from the line stage to cause the set to go into protection mode is the incorrect setting of the G2 screen control (VG2) on the line transformer (5445). This fault can also be very intermittent making it difficult to find. This can be due to incorrect setting from an earlier service investigation or the screen control (VG2) itself can be faulty. This can very often be proved by setting up correctly, then lightly tapping the screen control and watching for brightness variation or monitor to (VG2) voltage for variations. If this is the case, then replace the LOPT (5445). If however, the set will not start-up and the relay clicks but the set stays in the standby mode, replace the LOPT (5445). If the LOPT proves to be alright, but the set is dead with a ticking noise, check the line output transistor 7460 (BU4508DX) for short circuit. If after replacing 7460 it goes short circuit again, then check and replace 7461 (BC337/25), 7463 (BC337/25 ), 7462 (PDTC143ZT) and capacitor C2455 (47µF). On rare occasions the relay may trip due to a faulty line driver transistor 7461 (BC337/25) check by replacement. If with this fault you check the error codes, do not be confused by the readings because the 12V line can drop to 9V and the error code will not relate to the fault. If the line stage is whistling and the line output transistor 7460 (BU4508DX) gets hot very fast, then replace the complete power supply kit (see above). If the line transistor 7460 repeatedly fails, check the line drive circuit and replace capacitor C2455 (47µF, 25V) check by replacement.

If the width of the picture varies or switches to protection mode intermittently, check the supply voltage to the line stage. If the voltage to the line stage is varying, then replace the control IC7520 (TEA1507). If the set is dead with the standby LED lit, check the line driver transistor 7461 (BC337/25) for open circuit and replace capacitor C2455 (47µF).

If the set just switches to off when the picture appears, suspect and replace 7443 (BC557B) for normal operation. If the set trips almost immediately after switch on, then check and replace transistor 7480 (BD135). If still in trouble then check transistor 7441 (BC857B), check the DC conditions or just replace, because it is not always possible to read a fault on the transistor. If this all proves to be negative, but there is a East/West fault, lack of height or the set just switches off after a few seconds, then check for a faulty EEPROM 7602 (M24C08). If this proves to be negative and there are strange happenings like the microprocessor 7200 being destroyed, check for faulty 3.2V regulator 7560 (L78L33) check by replacement to avoid further destruction of 7200 microprocessor. If there are any more intermittent faults within the line output stage, then check for dry-joints on the capacitors and the line output transformer (5445). If still in trouble then check the line driver transformer (5461) also for dry-joints. If there is excessive width, then check capacitor C2467 (15nF 400V) for short circuit.

**Error code faults**

Error codes

0 - No error
1 - X ray over voltage protection
2 - High beam protection
3 - Vertical guard protection
4 - I2C error while communicating with the sound processor
5 - Power on reset (POR lit) 3.3V protection +8V protection
6 - General I2C error
7 - Power good (over current) protection.
8 - East/West protection (large screen only)
9 - I2C error EEPROM error
10 - I2C error PLC tuner
11 - Black current loop instability protection

The error codes are all listed in the power supply fault section, but these are some of the problems giving error codes on the display and the components at fault.

The first error code which is (0) indicates no fault. The next is error code (1) and this is not used in the UK. Error code (2) this is the line protection, check 7460 (BU4508DX), 7461 (BC337/25), 7462 (PDTC143ZT), 7463 (BC337/25) and 6467 (BAV70). If unable to locate a fault on these components, then just check by replacement to avoid further problems. If error code (3) shows on the display this is vertical/line protection, check for faulty frame output IC7471 (TDA8359J) or check for dry-joints. A replacement will cure both faults.

Error code (4). This is showing that there is a communication error with the sound processor IC 7831 (MSP34X5) also check associate components. If this proves to be negative then check by replacement. Error code (5). This is a I2C data fault which can be due to a faulty microprocessor IC7200 (TDA 95XX) check by replacement. If this all proves to be alright, then check the 3.3V line and the 8V LT line. Be sure to check these before replacing the microprocessor IC7200. If the error code (6) is showing on the display, check the general I2C and the serial clock (SCL) and the serial data (SDL) lines. Check the resistors R3624 (100Ω) and/or R3625 (100Ω ) for open circuit. If still in trouble then check IC 7200 (TDA95XX) by replacement. If error code (7) shows then this means power supply protection is low, check for faulty transistors 7521 (STP7NB60FP) and/or 7522 (BC847B) also check by replacement. Error code (8) is East/West protection which is only shown on the large screen TVs, just check East/West components. If the error code (9) is shown, this is due to a faulty EEPROM IC7602 (M24C08). If this proves to be alright, check data on pin 6 7602 and if missing check resistor R3603 (100Ω) for open circuit. If there is still a fault, then check pin 5, if no data check resistor R3604 (100Ω) for open circuit.

If error code (10) shows then suspect faulty tuner unit (1000). But before replacing the tuner unit, check that the tuning volts is present on pin 9 of the tuner. Also check that the 5V is correct on pin 7. If this is present then replace the tuner unit (1000). Error code (11) is the black current loop protection, so check for faulty CRT or check the R.G.B. output IC7330 (TDA 6107/08) check the DC conditions or by replacement. There may be some faults which may display several error codes 5, 11, 6, 10 and 4, often indicates a fault where the set switches off and if left it will switch back on again. This can be the result of degauss relay (1515) switching, or in most cases it is due to the incorrect setting of the G2 screen control (see Line stage faults). If the error code (10) shows there is usually a faulty tuner unit, but beware, this can also be due to a faulty digital transistor 7482 (PDTC143ZT) in the line driver circuitry, check by replacement.

**Frame stage faults**

The frame stage on this set does not give many problems. However, the most common is that the set will go into standby mode shortly after switch on. This is due to a faulty frame output IC 7471 (TDA8359J) check for dry-joints or by replacement. If there is a slight vertical jitter noticeable on the bottom of the picture, check capacitor C2244 (100µF) by replacement. The last of the frame faults is excessive frame scan at the top of the picture. This may just be a faulty frame output IC7471 (TDA8359J). But if still at fault, check the decoupling capacitors C2252 and/or C2253 (2x1nF) in the frame drive circuitry from IC7200 pins 16/17, check both by replacement.

**Audio faults**

If the sound is missing then the first suspect must be the audio processor IC7831 (MSP3415). But before replacement, check DC conditions to the IC. If however there is intermittent loss of audio, check the power down signal into pin 69 of IC7200 (TDA95XX). If this is lower than 2.5V, check capacitor C2619 (1µF) by replacement. If there is no audio from the SCART then replace the audio processor IC7831 (MSP3415). If the audio is low via the SCART but alright on analogue reception, there may be no luminance in the picture on SCART AV2, check 7801 (HEF4052BT) and/or 7802 (HEF4053T) by replacement. If this all proves to be negative but still no audio, check the audio amplifier IC7901 (AN7522N) check the DC conditions before replacement.

**Remote control faults**

If the remote control is not working check the obvious first and replace the batteries. If this proves to be negative then check for corrosion on the battery terminals, if they are corroded then clean and readjust for good contact. If the remote appears to be working correctly, but is still not operating the set, check for dry-joints on the infra red receiver 6692 (TSOP183G). If all this proves to be OK, but the remote control will not work, check for dry-joints on the LED in the remote control. If after all this there is still a problem, then check capacitor C2619 (1µF) by replacement. If the capacitor C2619 is at fault it can also cause no front panel functions as well as no remote control operation.

**Miscellaneous faults**

In some cases when changing the TV channels the power supply will shutdown. This is due to a faulty control IC7200 (TDA95XX) so check by replacement and leave on soak test for a few hours.

If no sync or poor sync should occur, then this is also due to faulty control IC7200 (TDA95XX) with a replacement restoring normal operation. Note: This loss of sync will only usually occur after the set has got warm. This can be induced by using a hair dryer carefully to increase the working temperature of the TV, heating IC7200 to exhibit the fault.

Also if the set suddenly shows white flyback lines for a short time, this is due to a faulty control IC7200 (TDA95XX) and a replacement will cure the fault.

In a few cases it is necessary to check the option codes (check service manual or label on the back of the CRT). This can give incorrect East/West correction or wrong picture position. It can also give a snowy picture.

If there is no picture only a snowstorm, no audio, but the on screen display (OSD) is working, check resistors R3460 (3.9 kΩ) and/or R3488 (4.7Ω) for open circuit.

If just a white picture shows with no remote control operation and a red (F) letter shows up on the screen, press volume + and programme keys and hold for about 5 seconds this will restore normal operation.

In some cases you may get brightness variations or a ballooning effect due to faulty capacitor C2561 (47µf 160V) decoupling the 140V HT line.

On a few sets and only the ones fitted with East/West correction this may give a dark vertical band down the left-hand side of the picture. Check for faulty capacitor C2415, the value is dependant on model being repaired, check the service manual.

If a fault occurs with no picture on the upper half of the screen and the sound is alright, check the 13V and 50V LT supplies for low voltage or a ripple content.

## Toshiba model 28N33B

If the set is dead due to FET transistor Q801 (MTP6N60E) gone short circuit with the mains input fuse F801 (3.15A) blown and this becomes a repeated failure, this is due to dry-joints on posistor TH800 (PTC 9Ω). Beware, after re-soldering dry-joints on TH800 and replacing Q801, before switch on also replace IC800 (MC44608).

## Beko model 28422NDS (142 chassis)

If the set is dead and the mains input fuse F601 has blown, check the bridge rectifier diodes and FET transistor Q601 (2SC2545), IC601 (MC44668P40), C606 (100µF ), R606 (0.47Ω 0.25W), R607 (0.33Ω 1W ), R639 (15Ω 0.5W ), R605 (3.9kΩ 0.25W ) and opto coupler PH601 (ET1100). Check all components by replacement and be sure to up-rate F601 from 2A to 3.15A.

## Alba model CTV6683 (chassis 11AK19)

If the set is dead and the LED flashes, check resistor R867 (33Ω) for open circuit.

## Pro-line model 1485R (chassis CP185)

If the set fails to start up check resistor R802 (75kΩ) for open circuit in the power supply.

## Alba model CTV6683 (chassis 11AK19)

If the set is going into trip mode when switched on, check capacitor C829 (47µF 160V).

But if this proves to be alright, check resistor R816 (1.5MΩ) check for increase in resistance or by replacement.

## Toshiba model 32YT56

If there is frame collapse and the frame output IC appears to be alright, check firstly to see if the capacitor C609 (47nF) is not mis-shaped, which could be due to capacitor going open circuit. If this is the case then also check diode D609 (BA159) and D610 (BYW98-200) which often goes short circuit also causing resistor R629 (0.47Ω 1W) to go open circuit. If D609 is short circuit, then check resistor R627 (0.47Ω 1W) for open circuit.

## Sharp model LC32GA6E LCD.

Goes into standby mode after short operation.

This fault proved difficult to trace, but we finally located problems in the power supply where we found IC703 (TNY266P), bridge rectifier diode D763 (SIWBA60B) which were leaking.

As a precaution also check/replace the optical isolator PC702 and diode D756 (SR24) all these components can be located on (G) PWB.

## Tatung model T28W441.

If there is no picture but also no on screen OSD and only a blank raster, then this can be traced to transistor TP6 (BD441) or diode DC4 (IN4148) check by replacement.

## Sharp model 28LF92H.

If there is intermittent start-up on this set, check for dry-joints on resistor R130 (10kΩ). Re-soldering should restore normal operation.

## Philips model 17PT1666/05 (chassis L01.2E)

If the standby LED is not lit and there is a whistling sound from the chassis, check transistor 7402 (BUT11APX) for short circuit. Also be sure to check IC7471 (TDA9302H ) for overheating and producing dry-joints on the pins. Due to the overheating this may have

caused damage to the print which will require repair and replacement of IC7471.

## JVC model DR-MV1SEKP/DVDR/VCR.

If the unit works alright for a short time but then goes into a faulty state, replace the power regulator IC5101 (STR-G6653).

## Hitachi model CP28WD2TAN

If there is a intermittent bright picture which gives saturated white or in some cases the reverse extreme black level, check for poor connections on the wire links marked (J). They are located around the transformer and the video processor IC501. For a complete cure be sure to re-solder all these connections.

## Panasonic model TX32PS12

Shutdown after a few seconds: If the set shuts down, but momentarily the screen shows a rainbow effect, then this can indicate a frame fault. In this case it was not the frame output IC at fault or dry-jointed, but diode D558 (ERB93-02E) had gone short circuit and the feed resistor R578 (0.39Ω) which proved to be open circuit.

## JVC model AV28ED5B chassis 11AK52

If the set is dead and the power supply is ticking then check capacitors C821 and/or C822 both (2200µF 25V) check by replacement.

## Philips model 14PT1686

If the set is dead check the mains input fuse 1500 (4A) if blown, check FET transistor 7521 (STP7N60FP) for short circuit. Also check 7522 (BC847B) and resistor 3523 (47Ω). But before switching set back on, check and replace IC7520 (TEA1507) along with replacement capacitors 2523 (1.5nF 3KV) and 2527 (470pF 3KV). If however this all proves to be negative, then check diode D6561 (BYW76V) by replacement.

# PHILIP SALKED

## Sharp 32JW73H (GA20 chassis)

The customer told me he was watching the television when he heard a crack followed by the loss of sound and picture. Once on the bench I established that the HT was low and, remembering the crack, I removed the LOPT which in turn restored the 150V. I checked the price from Sharp Spares only to pass out with shock. So I settled for a compatible type, which turned out to be an HR8830. When replaced it brought the set up, but it had a dark picture and an East/West problem. Adjusting the boost control had no effect, removing the boost lead from the tube base and connecting the meter onto it, proved the boost control was working. Next step was to remove the tube socket from the base. There I noticed the socket was burnt. Another socket from a scrap chassis restored a nice bright picture.

Now for the lack of width and curvature. Looking around, C607 100nF 250V was split open, R611 a 10KΩ 1W was open circuit, as was R627 120KΩ 1/2W. However when tried again, there was no improvement in the fault. Time for more checking, which brought me to IC 501 UPC 358C, where two of the pins were short circuit on this East/West correction chip. Replacement of this brought a conclusion to the situation. All this bother from a LOPT.

## Bush WS6674 (PT92 chassis)

The customer complained that when the sent went off there was an awful smell of burning. On inspection the line stage was like charcoal, this is caused by the glue that is placed on the board which contaminates and becomes resistive. Not a problem, because I have changed a number of complete circuit boards in the past which were advertised in *Television*. Apart from minor adjustments, all the previous boards have been installed without any problem. However, on this occasion there was a reduction in the height. Going into the service menu, press – volume on front of set and the teletext sub page button on the remote at the same time. Selecting the height adjustment still left the height short. A phone call put me on the right lines, there are two resistors RD54 and RD55 that run down the side of the frame chip. Compare their colour codes on the board you have fitted with the original one. If the colours are different interchange them. They were and when interchanged, followed by re-adjustment of the height brought a conclusion to the job.

## Hitachi 32 LD6200 LCD

The customer had complained he had lost his teletext. To remove the back you must first remove the stand. Once the back was removed there was no obvious cause for the fault. A phone call to Hitachi technical was most helpful, he suggested that the cause would be either IC 32 or IC 33, which is on the tuner printed circuit board. Both integrated circuits did not look nice to change so I took the cowards ways out. The set was in warranty so I ordered a new board, part no. VE-20186762. You have probably realised by now that VE stands for Vestel. Replacement of the whole board put matters right.

## Bush BTV170TBLK Combi

This portable combi lived in a teenagers bedroom, you know the one, always clicking the remote control. Her father phoned me to report that there was no sound on the stations but there was sound on the tape. He brought the set to me where I also noticed teletext was missing. My immediate thought was micro corruption and I remembered Bush technical sending me a programme sheet to re-install the data. Before attempting to enter the service mode, make sure the set has been off a few hours. Press and hold - volume on the TV and press number 6 on the remote control at the same time. To move from address to data, press 'enter', and press 'play' to alter address. Press 'stop' to alter numbers on data. To store, switch off at 'power' button on set. There are about fifty addresses but only two will be wrong, one for the sound and one for the teletext. Once you get started it is quite straight forward. You will need to contact Bush technical and they will fax through the correct data figures.

## Grundig ST70-700NIC/FT CUC2030 Chassis

I wish the boss would stop selling second hand televisions, one service call and the profits gone. This was typical, the set was sold on the Saturday and the customer phoned on the Tuesday to say it was not working. The field engineer went out and brought it in and put a fault tag on it showing it was stuck in child lock. I was hoping somebody in the workshop knew how to remove it and come forward, but nobody did. Looking through endless service manuals, which were covered

in dust, eventually I found the answer. With the remote control, press vol+ and then switch on, press OK and auto tune appears, press text button, this stops auto tune. Enter 7038 which cancels the lock.

### Philips 21PT136A/05 (Anubis A.AC chassis)

This set lives in the spare room so I can watch the football in peace. Most faults in these models are down to power and time-base stages. However, over the last few weeks I have noticed the contrast level has been decreasing. When the set had been on for an hour it did slightly perk up. This suggested capacitor trouble, so a grab for the hairdryer was an option. Not quite knowing what area to heat, I gave it a general blast. When the contrast started to improve, use of the freezer brought me to C2448, 47µF, 250V which was very sensitive. This capacitor is situated next to the LOPT. Replacement of this component brought the contrast back to normal.

### Sony KV-28FX20u (BE-3E chassis)

The customer complained the colour was wrong. My immediate thought was purity errors and when you get this problem you know you are in for a hard time. I have no doubt you have moved the position of the set and found that the purity error moves. Now, having said that, this happens mainly on larger cathode ray tubes. When it was brought in the workshop, initially there was no problem, but as you were watching it, partial degausing occurred, which resulted in purity errors. A gentle tapping around in the degausing network in the power supply brought me to RY600, which momentarily corrected the fault. The relay part no. 1-755-018-11 when replaced solved the problem.

### Sony KV-16WT1U (BE4 chassis)

We do not often get small screen Sony sets into the workshop. The fault tag said, cannot hold the stations. When it was on the soak test bench it developed tuning drift. Cannot remember last time I had this fault, but I recalled the 33V Zenner diode which was associated with the tuning volts to the tuner. Looking at the circuit, the supply originates from the +B 118V from the power supply. Tracing this via R030 22KΩ and D002 regulator and then onto the tuner pin. D002 when frozen and heated was very sensitive. I replaced it with the conventional ZTK33 Zener diode which stabilised the tuning volts and cured the fault.

## BERNIE STOREY

### Matsui VXA1100.

I have two Matsui VCRs, one in common use and an older one (VXA 1100) used occasionally for copying tapes. A friend recently came from Kenya with a video diary of a house he is building and I asked if I could make him a copy. Hooking the two VCRs together revealed a problem with the VXA 1100. The tape would load O.K, carry out the required function, but then unload after 10 seconds and shut down.

My friend was going back to Kenya the next week so a quick repair was required. I managed to get a drawing and service tips (from http://www.eserviceinfo.com) and removed the cassette tray to start checking the main PCB. It was then necessary to override the BOT/EOT sensors by shorting TP1010 and TP1011.

To my surprise the tape now loaded and almost operated perfectly on all functions. This led me to check the BOT/EOT sensors and sure enough BOT had failed. Replacing it restored the machine to full working order and I copied my friend's diary.

## SOLUTION TO TEST CASE 528

Philips have had some rough rides with their large CRT TV sets lately. There have been problems with picture tubes and system-control chips amongst others. The root cause of the triple bouncing fault in the 32" job could not really be laid at their door, however. The owner described to Sage a fizzing, crackling, grumbling effect, and the atmosphere of the house was somewhat damp and cold, in spite of stand-alone space heaters in both the hall and the living room.

Now both Sage and Television Ted have been in the business long enough to have known corona discharge at high-voltage points in TV sets of many years ago. Typically initiated or aggravated by damp air (and especially by paraffin heaters) its effect is a blue glow around the high-voltage connector cap on the CRT bowl, sometimes breaking into a violent purple-blue spark, reaching out to the tube's outer conductive coating of graphite. Human breath is laden with moisture, so they breathed closely onto the tube bowl in the area of the EHT connector, then turned on the set. Sure enough there was a fizzing and sparkling effect which threatened to develop into a spark discharge.

They changed the 'flower' high-voltage connector, cleaned and polished the tube bowl around it, sent the set back, success!

## We welcome reader's fault reports

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# Faults DIRECT

## Daewoo TV faults

### Model No.GB2898ST CP775 chassis

**Symptom:** Repeated failure of line output transistor Q401.
**Reason:** Failure in line driver circuit.
**Cure:** Check/replace C401 10µF capacitor.
**NB:** Should LOPT have already been replaced by an equivalent, please replace with an original Daewoo LOPT

### Model/chassis No.DP42SP. SP115 chassis

**Symptom:** Video OSD inputs don't match input sockets on Jack Board, after replacing the video board.
**Reason:** Video inputs not set correctly in service mode.
**Cure:** Enter service mode and select the correct inputs in the MISC JACK menu. I.E Select VIDEO for the GB Jack board and MONITOR + for the Korean Jack board.
**NB:** The GB Jack board has two sets of Composite Video phono sockets and two sets of Component Video inputs, whilst the Korean jack board uses an AV jack and has bayonet sockets for Component/RGB Video inputs.

### Model/Chassis No.DSS3210 EGB AND DSC3220EGB CHASSIS SC140 AND SC150

**Symptom:** 4A Mains fuse blown open circuit when set switched on via the on -off switch, never by switching on from stand-by mode.
**Reason:** Degauss coil resistance too low, causing in-rush current to exceed 4A.
Model DSC3210 resistance can be as low as 9Ω, it should 24Ω.
Model DSC3220 resistance down to 17.5Ω should be 22Ω.
**Cure:** Replace Degauss coil by faxing our spares for the relevant coil by model number. Do not replace the fuse with a 4A anti-surge fuse type, you must fit a 4A fast blow fuse.

### Model/Chassis No.DP42SP. SP115 CHASSIS

**Symptom:** Set dead due to faulty Power module or "Y" Sustain or "X" Sustain board.
**Reason:** The Hybrid I/C's on "Y" or "X" Sustain boards gone S/C or several components on the power board burnt out.

The Hybrid I/C's are under the large black heat sinks, two on each board.

They can be checked by using a meter set to Ω connected across the top left and top right vertical rows of the pins of the I/C's, located on the reverse side of the board.

The burnt components on the power board are surface mount resistors on the top right corner of the board, and there are three more down near the first transistor mounted on the edge of the board.
**Cure:** Replace the relevant faulty board, but ensure you reset the voltages on each board according to those on the white label on the rear of the screen. NB: These voltages must be reset whilst producing a white raster in service mode (refer to the service manual for access). The first three voltages on the label relate to the power module and the forth and fifth to the "Y" Sustain and the sixth to the "X" Sustain board. You must use a good quality voltage meter otherwise you will get incorrect readings.

All voltage adjustments relate to loops of wire purposely attached to the boards for connection to your test meter, except for the forth voltage, which is the negative print connection of a missing capacitor CY10, on the "Y" Sustain board. The Ground connection for all adjustments is a loop on the Power module, marked (GND).

You must refer to the service manual for details of these adjustments as there are two other potentiometers on the "Y" Sustain board, which must be set by sight.

## Beko's frequently asked questions

Beko's service department answers some FAQs on chassis identification, production date and service modes.

### 1. BEKO TV chassis identification from model number.

Chassis are identified by the 3rd and 4th digit in the model number.

If the 3rd digit is a number, add 10 to complete the chassis number.

The first 2 digits are the CRT size and the last digits are the cabinet style and TV specification.

For example: 284248WNS = 28in / 14.2 chassis / 48 style cabinet / widescreen, nicam, silver. Or 32C727WNS = 32in / C7 chassis / 27 style cabinet / widescreen, nicam, silver.

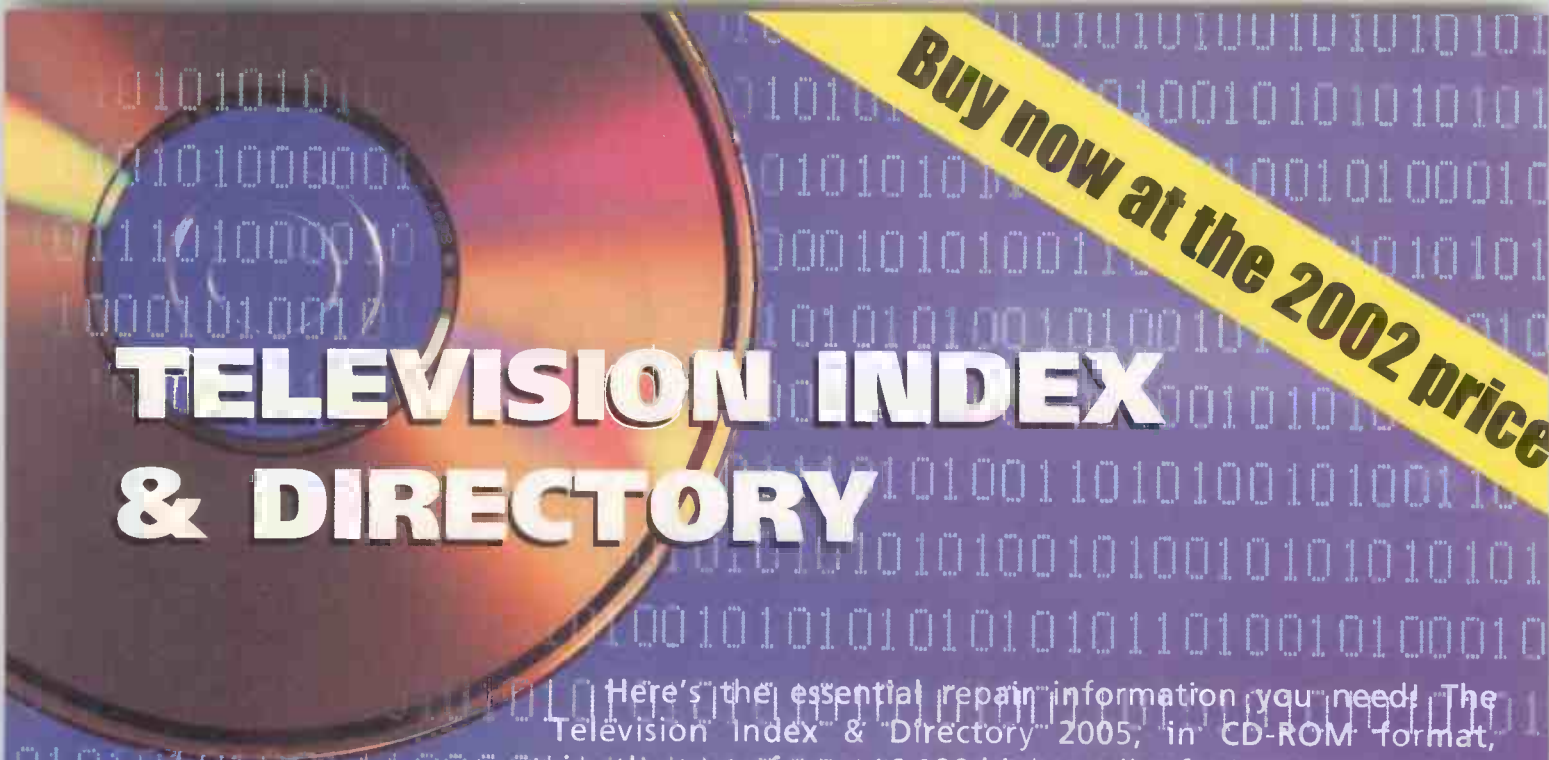
### 2. BEKO TV production date.

Production date is determined by the first 3 numbers of the serial numbers, 1ST number = year , 2nd number = month.

For example: 401123456 = January 2004 or 612123456 = December 2006.

### 3. Service mode.

Service Mode access falls into 2 categories.
**A.** Pre 2004 production. Service Remote control required.
**B.** After 2004 production. Customer Remote control is required:
**Method:** Select Menu, press 9301, use PR + / - to shift and VOL + / - to adjust.

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# Home coax metamorphosis: From TV distribution to content network

Steve Jenkins of Pace Micro Technologies takes a look at how coax might be one solution to home networking

In time, home networking will become the norm, but in order for this to happen, prices, installation time and reliance on specialists must reduce.

This paper recaps what a home network must provide from the perspective of designers and installers. It is assumed that the home has an existing coax distribution connected to a terrestrial antenna, and now must be upgraded to a full bi-directional home network to carry TV, data and voice between different 'infotainment' equipment.

A range of typical distribution components are characterised for home network use to determine their performance in the reverse direction and frequencies outside of their intended band of operation. The impact of some non-ideal installation techniques is also examined.

Downstream signals to Consumer Premises Equipment (CPE) are shown not to require any special attention since the requirements are the same for legacy purposes. Upstream signals require special consideration and predictions are made to show how data rates of 60Mb/s can be achieved without modification to a badly installed home distribution system, although in-line filters are required to protect legacy receivers from upstream signals.

## Setting the target

With the adoption of multiple personal computers and distributed audio and video and gaming, it is no surprise that consumers want to link all their devices and not have separate distributions for terrestrial, Pay TV and data. It is important that the PC can connect to the TV and that the security system is connected to both. It is also important that local communications are kept private from the delivery networks and neighbours.

The installation needs to be painless for the home owner, so the equipment must be inexpensive, quick to install, and leave the decorating intact.

Next generation home networking technologies must be able to deliver the same seamless distribution that analogue TV distribution has. This means they must be able to operate over any home network architecture where analogue TV was successfully distributed (with no modification to the infrastructure) as well as delivering return path signalling. All of this must be achieved without interfering with the legacy signals that the network was already carrying.

At some point in the coax distribution's life it may have been able to handle bi-directional digital signalling, but because systems grow over time it is likely to contain problems that can scupper a seamless upgrade.

In the oldest installations, the coax system may have started out as an antenna feed into the living room and the master bedroom. Over time, the coax was split to feed other bedrooms, the study, the kitchen and maybe even the back yard. With a professional installation this would have been designed as a star system or 'branch and tap' configuration, but in many cases a splitter is simply inserted in the nearest available coax.

**Figure 1** shows a substandard home-grown installation. One of the splitters was accidentally installed the wrong way round which resulted in

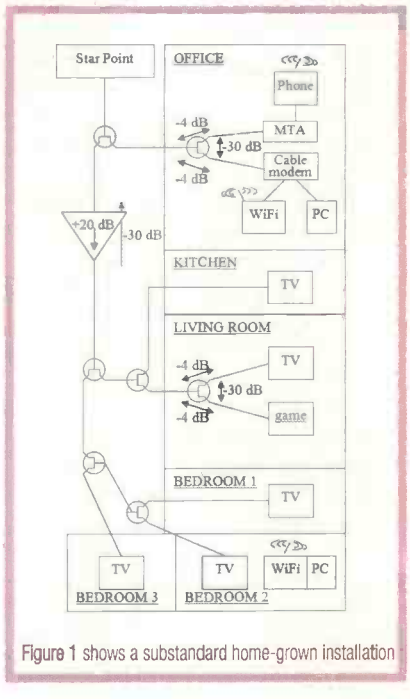



Figure 1 shows a substandard home-grown installation

# Home coax metamorphosis:
# From TV distribution to content network

| From star to: | Signal gain |
|---|---|
| Office MTA | -7 |
| Office CM | -7 |
| Kitchen TV | 6 |
| Living room STB | 9 |
| Living room games | 9 |
| Bedroom 1 TV | 5 |
| Bedroom 2 TV | 5 |
| Bedroom 3 TV | -13 |

Figure 2: Signal gain between star point and all outlets

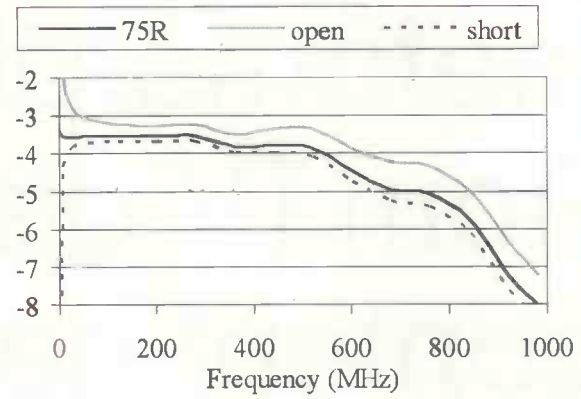



Figure 3: Insertion loss

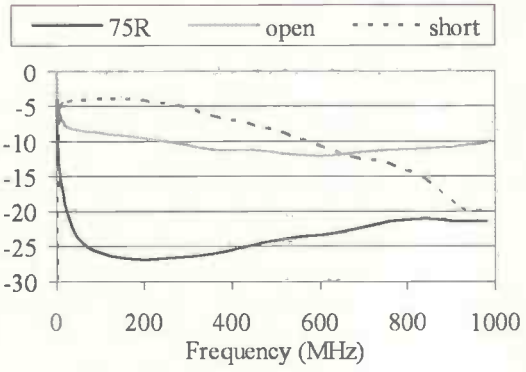



Figure 4: Transformer splitter, port isolation sample 1

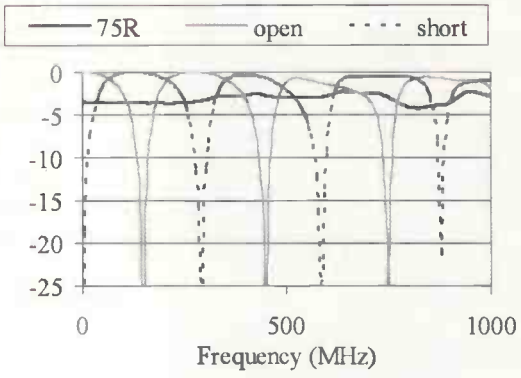



Figure 5: Daisy chain 17cm

no picture in bedroom 3, and lower signals in bedrooms 1 and 2. To resolve this, a 20dB amplifier was installed at the star point. The antenna feed has also been replaced by CATV and a cable modem was installed in the office.

At this time the network is carrying a full suite of analogue, digital TV and data signals which consumes the entire spectrum from 5 to 870MHz.

**Figure 2** shows the averaged signal gain at each outlet for every path in the distribution of the traditional downstream 54 to 870 MHz band. The distribution is adequate for distributing signals from the star point with all outlet levels within 14dB of each other, apart from bedroom 3 with the splitter installation fault which results in a grainy but acceptable picture.

The biggest step change in converting the distribution is the ability to send signals in other directions. This means that new high-loss paths are created across some splitter outputs and in the reverse direction across amplifiers.

The most common cable choices over recent years are CT100 and CF100. The impedance is matched for 75Ω and the attenuation is 10dB per 100 meters at 870MHz and 0.2dB at 5MHz. In general any other coax found in domestic installations will be of lower quality in terms of attenuation, frequency roll-off and impedance matches.

As this coax has been good enough to pass legacy signals, then the cabling will be suitable for digital communications that use the same frequencies or lower.

Almost all modern power splitters are the transformer type as these give minimum signal loss. When a signal is split, all the power is divided equally at each of the outputs and therefore the output signals are in theory 3dB lower than at the input. In practice there is some additional loss, typically between 0.5 and 1.5dB. The extent of this additional loss being indicative of the quality of the splitter.

The graph in **Figure 3** shows that when the unused port is correctly terminated in 75Ω, the insertion loss is between 3.5 and 5.5dB up to 800MHz, but then rapidly increases to more than 8dB at 1GHz. Again, high frequency loss impacts on the potential of this unused spectrum. When the unused port has nothing connected to it, then the insertion loss is reduced by 0.5 to 1dB. Similarly a short increases the loss slightly. If an un-terminated coax is connected to the unused port then these effects are reduced in proportion to the length of the coax.

High port isolation reduces the interference that is caused when two TV sets are tuned to the same channel. **Figure 4** shows that when the input (common) port is correctly loaded in 75Ω, then the port isolation is generally greater than 20dB. In practice it is unlikely that the common port will ever have a

# Home coax metamorphosis:
# From TV distribution to content network

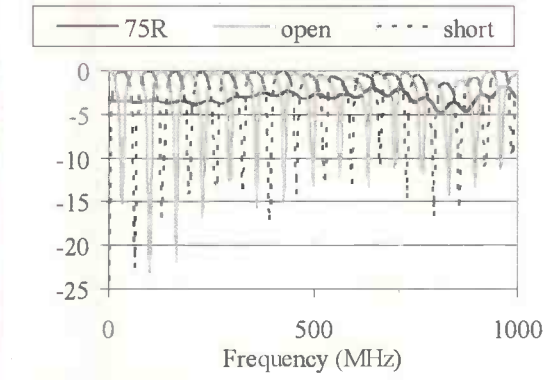


Figure 6: Daisy chain 300cm

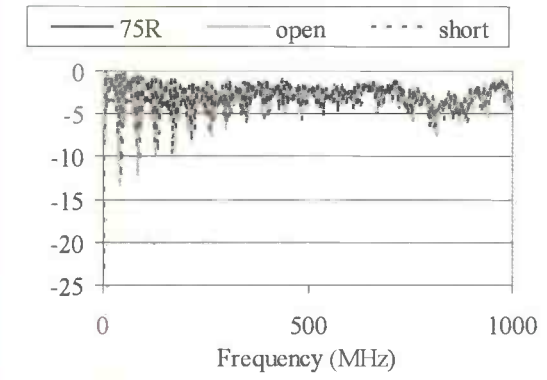


Figure 7: Daisy chain 900cm

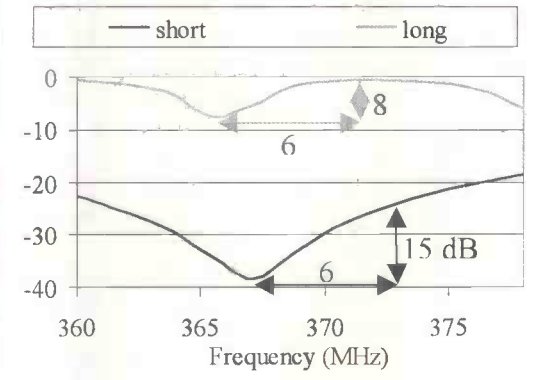


Figure 8: Un-terminated cable lengths

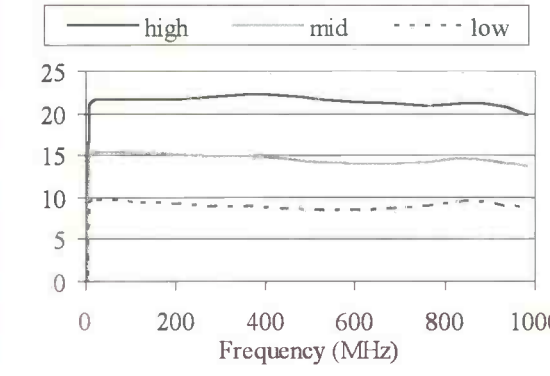


Figure 9: Flat gain response

significant impedance mismatch at the common port, as either an open or short here would result in no signals further down the distribution. However, the effects are shown here as they highlight a transformer-splitter's extreme sensitivity to common-port loading.

When using a distribution with splitters, consideration of the return path signalling must be taken. In this case a device transmitting across the output ports has the potential to saturate other receivers further up the distribution as a result of the low insertion loss in comparison to the port isolation.

## Daisy-Chain

A simple, though incorrect way, to install a new outlet is to run a spur from an existing outlet in a similar way to how a mains outlet might be wired.

**Figure 5** shows the frequency response between the incoming coax and the wall plate socket when there is a 17cm spur. This length is fairly typical when wall plates are mounted back-to-back either side of a wall. When the spur is loaded with 75Ω, the insertion loss is approximately 3dB as theory predicts. Problems occur when the spur is not correctly loaded, the most typical instance being an open circuit. In this case nulls are presented in the frequency response. **Figures 6** and **7** show that as the stub length increases then the effect is reduced.

The major problems caused by un-terminated spur outlets are loss of signal level, and channel tilt. **Figure 8** is a snap-shot of the frequency response for two different spur lengths.

Signal loss can be more than 40dB within the nulls at certain frequencies. This means that problems may have been masked in the past if legacy signals happened to avoid the nulls, leading to the potential for misdiagnosis of issues when the distribution is switched to network.

Of equal importance is the gradient of the nulls which can result in channel tilt. The choice of communication system must take this into account, either in its ability to avoid these frequencies, or simply to be robust enough to handle them.

The sample characterised is a variable gain device with a range from 10 to 20dB. The gain response is flat within ±2dB from 5MHz to 1GHz as shown in **Figure 9**.

The most important question is how a one-way amplifier handles upstream signals, that is, signals launched at high enough power to overcome the reverse isolation shown in **figure 10**.

The main concern is signal distortion in the reverse direction. For this measurement the amplifier is intentionally characterised in reverse, so the input and output are interchanged. **Figure 11** shows the third order intercept response measured at the output, i.e. the

# Home coax metamorphosis:
# From TV distribution to content network

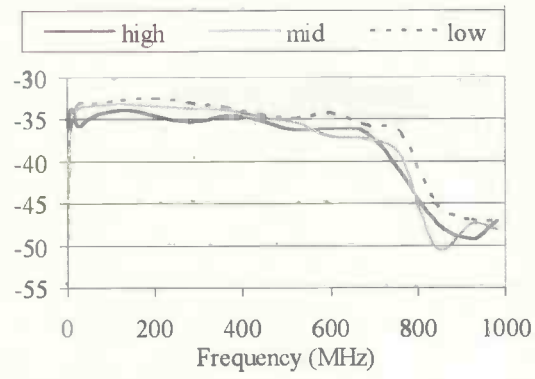



Figure 10: Amp reverse response

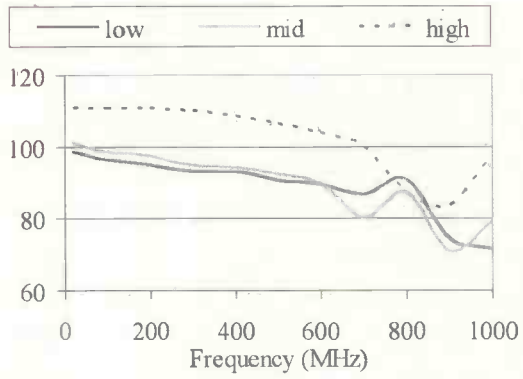



Figure 11: Amplifier IP3 response

distortion on the signal once it has passed backwards through the amplifier. This particular amplifier uses current starvation to vary the gain which is why the best results are achieved at the highest gain setting. The inter-modulation performance is also poor at the higher frequencies where signal levels have to be increased to overcome the amplifier's reverse isolation.

| Low band | | To: star | office MTA | office CM | Kitchen | Living TV | Living Games | Bed1 | Bed2 | Bed3 |
|---|---|---|---|---|---|---|---|---|---|---|
| From | star | - | -7 | -7 | 6 | 9 | 9 | 5 | 5 | -13 |
| | office MTA | -7 | - | -25 | -16 | -20 | -20 | -20 | -20 | -38 |
| | office CM | -7 | -25 | - | -16 | -20 | -20 | -20 | -20 | -38 |
| | Kitchen | -46 | -71 | -71 | - | -29 | -29 | -36 | -36 | -54 |
| | Living TV | -49 | -75 | -75 | -29 | - | -25 | -40 | -40 | -58 |
| | Living games | -49 | -75 | -75 | -29 | -25 | - | -40 | -40 | -58 |
| | Bed1 | -50 | -75 | -75 | -36 | -40 | -40 | - | -25 | -7 |
| | Bed2 | -50 | -75 | -75 | -36 | -40 | -40 | -25 | - | -7 |
| | Bed3 | -68 | -93 | -93 | -54 | -58 | -58 | -29 | -29 | - |

Table 1: Average signal gain for 0 to 50 MHz for all outlet routes

| Mid band | | To: star | office MTA | office CM | Kitchen | Living TV | Living Games | Bed1 | Bed2 | Bed3 |
|---|---|---|---|---|---|---|---|---|---|---|
| From | star | - | -8 | -8 | 2 | 6 | 6 | 2 | 1 | -15 |
| | office MTA | -8 | - | -25 | -19 | -24 | -24 | -25 | -25 | -42 |
| | office CM | -8 | -25 | - | -19 | -24 | -24 | -25 | -25 | -42 |
| | Kitchen | -49 | -74 | -74 | - | -30 | -30 | -39 | -39 | -56 |
| | Living TV | -53 | -79 | -79 | -30 | - | -25 | -43 | -43 | -60 |
| | Living games | -53 | -79 | -79 | -30 | -25 | - | -43 | -43 | -60 |
| | Bed1 | -53 | -80 | -80 | -39 | -43 | -43 | - | -26 | -10 |
| | Bed2 | -54 | -80 | -80 | -39 | -43 | -43 | -26 | - | -9 |
| | Bed3 | -70 | -97 | -97 | -56 | -60 | -60 | -31 | -30 | - |

Table 2: Average signal gain for 50 to 870 MHz for all outlet routes

| High band | | To: star | office MTA | office CM | Kitchen | Living TV | Living Games | Bed1 | Bed2 | Bed3 |
|---|---|---|---|---|---|---|---|---|---|---|
| From | star | - | -12 | -12 | -5 | 1 | 1 | -6 | -7 | -14 |
| | office MTA | -12 | - | -20 | -20 | -27 | -27 | -28 | -28 | -36 |
| | office CM | -12 | -20 | - | -20 | -27 | -27 | -28 | -28 | -36 |
| | Kitchen | -65 | -85 | -85 | - | -27 | -27 | -40 | -40 | -49 |
| | Living TV | -69 | -92 | -92 | -27 | - | -20 | -46 | -46 | -54 |
| | Living games | -69 | -92 | -92 | -27 | -20 | - | -46 | -46 | -54 |
| | Bed1 | -71 | -93 | -93 | -40 | -46 | -46 | - | -21 | -13 |
| | Bed2 | -72 | -93 | -93 | -40 | -46 | -46 | -21 | - | -12 |
| | Bed3 | -79 | -101 | -101 | -49 | -54 | -54 | -28 | -27 | - |

Table 3: Average signal gain for 870 MHz to 1 GHz for all outlet routes

There are three general frequency ranges to consider for upstream signalling, below 50MHz, 50 to 870MHz and above 870MHz.

Assuming that the downstream frequency range is fixed so that analogue signals can pass to legacy receivers, **Table 2** shows that the 50 to 870MHz band is not suitable for upstream. This is because the high launch levels required will saturate downstream tuners with signal levels potentially being over 70dB greater than the wanted downstream. For example, to transmit from bedroom 2 to the office there is 80dB of loss to overcome. However, a downstream signal from the star point loses 8dB, so for both signals to appear at the office at the same level, bedroom 2 must transmit 72dB higher than the downstream signals at the star point.

The gain between the star point and bedroom 2 is 2dB, so the power of the upstream signal it is transmitting will be 70dB higher than the downstream signal which will cause its tuner to saturate, this is self interference. Similarly interference is caused to other client devices such as in bedroom 1 where the transmit signal intended for the office will be 72 – 1 – 26 = 45dB more than its downstream signal in bedroom 1.

## Segregating the signal bands

Separating the upstream and downstream into two bands allows the downstream tuners to be protected from the high power upstream signals using band filters or diplexers, therefore tuner saturation is avoided.

**Tables 1** and **3** use the average characteristics of the distribution

# Home coax metamorphosis: From TV distribution to content network

network operating in the 0 to 50MHz and 870MHz to 1GHz bands respectively. The overall difference in the network's performance in these two bands is that, at higher frequencies, there is always greater signal loss to overcome. Signal loss impacts the carrier-to-noise ratio and thereby limits the efficiency of the modulation schemes available.

In addition to increased signal loss, it has also been shown that when a one-way amplifier is present, the reverse inter-modulation performance is also impaired at high frequencies. This limits the maximum transmit signal level which again affects the carrier-to-noise ratio thereby reducing the ability to use efficient modulation schemes.

Taking all of these system characteristics into account, the ideal frequency range for upstream signals is in the 0 to 50 MHz range to ensure adequate link quality through the non-idealities described, and to ensure that interference to downstream signalling can be prevented.

## Conclusions

There are three major factors to be understood in order to provide an ideal solution that can convert the home broadcast distribution networks as a bi-directional digital network. These factors are all regarding upstream as any downstream signals are assumed to work in line with legacy services.

1. Attenuation paths within the distribution mean that upstream and downstream channels must be separated into discrete bands of frequency, so that receiver tuners can be protected by filters from becoming saturated by return path signals.

2. Attenuation within the distribution is highest at higher frequencies, therefore the 0 to 50MHz region is the best choice for the return path since this allows the use of more efficient modulation schemes.

3. Upstream signalling can be blasted the wrong way across one-way amplifiers, but the levels are restricted by reverse inter-modulation performance. This is made worse when a variable-gain amplifier is set to low gain, but only becomes a significant when this event is in combination with another extraordinary case such as a splitter installed incorrectly, or an un-terminated spur.

Network technology equipment provisioned in this manner requires only a single piece of interface equipment at the star point to provide network conversion. This equipment allows legacy signals to pass through on to the network, switches in additional external services such as Pay TV, broadband and VoIP, and routes upstream traffic from CPE to either other CPE or out onto the external network.

By using the existing coax, the installation is rapid and non-disruptive, whereas running new cables would require furniture to be moved and either unsightly surface cabling or extensive disruption from installing concealed cabling.

# TOOLS of the trade

*Television* provides a round-up of the latest repair, service and testing kit

## Hamlet offers more power

Hamlet is offering a free upgrade to its WhichWire cable test device.

WhichWire is designed for installation and fault-finding work in multi-format environments. Plugging a cable into the device gives an immediate indication if the feed is analogue or digital and shows a confidence view on the built-in display which, Hamlet says, saves the engineer a huge amount of time in checking cables.

The detection is said to be fool proof for normal test signals like colour bars and most programme material. Hamlet says the new free upgrade allows the unit to be used at the same time as the most demanding pathological digital test signals, saving even more time for the engineer fault-finding a complex installation.

"Most users will not need this modification," said Steve Nunney, director of Hamlet. "WhichWire has proved popular with users simply because it meets their typical day to day needs. However, there are some installations which need to give their digital installations a thorough workout, and those users have asked us to extend the capabilities of WhichWire to help them.

"We are of course happy to do this, all they need do is return the unit to us and we will install the upgrade."


Hamlet is offering a free up grade for the WhichWire cable test device

## New test kit from Fluke

Fluke has introduced the new Fluke 8845A and 8846A precision Digital Multimeters (DMMs), featuring 6.5 digit resolution, a dual display that shows data in graphic or numeric formats, and multifunction measurement capability.

The company says these high-accuracy meters emulate several legacy bench DMMs, and are designed to provide industry-leading value for bench or systems applications including manufacturing test, research and development and service.

Both models have 14 measurement functions, which Fluke says extends the capability of a standard DMM with wider ranges and features to easily measure temperature, capacitance, period and frequency.

The company says the 2x4Ω function uses patented split terminal jacks that allow users to perform 4-wire measurements using only two leads instead of four. The company also says the meters deliver best-in-class analogue performance, measuring DC volts with an accuracy of up to 0.0024%, a voltage range of 100mV to 1000V with up to 100nV resolution, a current range of 100μA to 10A with up to 100pA resolution, and have a wide Ω measurement range from 10Ω to 1GΩ with up to 10μΩ resolution.

Fluke says both units also feature a large, bright dual display that enables users to measure two different parameters of the same signal from one test connection


The Fluke 8845A and 8846A offer a wide range of test and measurement capabilities


Fluke has up-dated its 110 range of multi-meters

and view the results in graphic or numeric format. With graphical display modes including TrendPlot paperless chart recording, statistics and histograms, Fluke says users can analyse data in real-time for efficient troubleshooting of signal quality issues such as drift, intermittent and stability.

Both meters also feature input terminals on both the front and rear of the instrument to simplify connections and both are equipped with serial, IEEE-488 and Ethernet interfaces, and provide multiple drivers to help ensure compatibility with existing or new standards.

The 8846A has a wider feature set, including higher throughput and accuracy, the ability to measure temperature and capacitance, and a USB device port allowing users to save measurement results to a USB memory drive for later analysis on a PC.

Fluke has also introduced an up-dated version of its 110 series compact DMMs with functions optimised for specific users. Most relevant are the Fluke 115, which has extra functions for field service testing and industrial applications and the Fluke 114, which is an electrical troubleshooting tool for residential and commercial applications. In more detail, the 115 DMM is ideal for technicians carrying out electrical and electronic testing in field service and industrial applications. Fluke says its complete function set (including measurement of AC/DC current) simplifies working.

The Fluke 114 DMM is a straightforward electrical troubleshooting tool that the company says is perfect for everyday use and 'go/no-go' testing in residential or commercial applications. In addition to a full set of basic DMM functions, it also has a special feature that eliminates inaccurate readings caused by ghost voltages.

Across the range, the backlit displays are 30% larger than the existing 110 Series, and feature big, easy-to-read digits. All models enable ergonomic one-handed operation and are CAT III 600V safety rated.

For more information about the whole Fluke range and where they can be purchased, visit the Fluke UK web site at www.fluke.co.uk.

## Mew multimedia cable kit

Ripley's Cablematic division has introduced a new Cat-multimedia tool kit directed at those looking for flexibility when it comes to stripping different types of coax cable and compressing connectors from different manufacturers without changing tools.

The kit contains a Cat-multimedia compression assembly tool, a DDT 596/MINI coaxial cable stripper, interchangeable plunger tips (IPTs), and a gauge block for calibrating the Cat-multimedia tool. The kit also comes with a connector/plunger tip guide, instructions and a carrying case.

The company says the new product is based on the field proven Cablematic CAT series and has a high-strength aluminium body and spring loaded split jaws that position the cable and connector for easy insertion and removal. Easily interchangeable IPTs allow the tool to assemble 59/6 "F", RCA, and BNC connectors from different manufacturers such as Corning Gilbert, Digicon, F-Conn, Holland, Liberty Wire & Cable, PPC and Thomas & Betts. Ripley should be consulted regarding other brands.

The company says the DDT 596/MINI provides one step cable preparation precisely exposing the centre conductor by 5/16" (7.93mm) and removes the proper length of jacket at $^1/_4$" (6.35mm) for 59, 6 and Mini coaxial cable without any adjustment of the blade or cassette change out. The built-in strip stop is designed to ensure precise and repeatable preparation each time. Ripley says the superior quality steel blades will perform 1500+ strips under normal use before needing replacement. (Full info www.ripley-tools.com).

# Testing Times for TELEVISIONS

The pattern generator is a very useful instrument for the correct alignment of the timing circuits of a television set. It produces horizontal and vertical bars on the TV screen that enable service personal to align the vertical and horizontal scanning synchronisation circuits of the receiver. PROMAX ELECTRONICA offers today's widest choice of TV and video state of the art generators providing support for TV, VCR and video monitor testing in all the PAL, NTSC and SECAM analogue or digital video standards.

The GV-198 being used on the production line or test bench

**The generators can be divided into two basic families - analogue and digitals.**

The GV-198 TV pattern generator has been designed with the latest trends in electronics technology in mind. Easy to use, compact and sturdy, it covers a wide range of applications, TV standards and formats, thus being ideal for service of TV sets, projectors and flat screens. The portability of the GV-198 makes it an efficient partner for service professionals both in the workshop and for on site diagnostics. Direct access keys to nine different patterns allows for quick essential tests on television receivers allowing easy identification of potential technical problems through visual picture examination. The GV-198 features 4:3 and 16:9 format patterns and it covers PAL / SECAM /NTSC colour systems and B / G / D / K / L / I / M / N standards. A comfortable rotary knob gives access to the various functions available. The built-in frequency synthesised RF modulator can be tuned from 37MHz to 865 in 50KHz steps. Tuning can also be performed per channel using CCIR, OIRT or FCC channel tables. RF modulated signal level can be adjusted in the 50dB range at 10dB steps. GV-198 settings are displayed in a large and bright 2 x 16 character display and it has 10 memories for storing 10 different test configurations.

The GV-198 video generator has nine pattern charts available allowing essential settings to be made in any television receiver, as well as the ability to detect abnormalities via a visual picture examination. The charts can be in 4:3 and 16:9 formats. It has a 'Euroconnector' with a controlled commutation signal, as well as a composite synchronism output. A micro controller carries out the interaction with the user, showing at any moment the settings of the generator on the 2 x 16 characters display and by the luminous indicator lit next to the function keys.

**Complete features implemented in the GV-698+ TV pattern generator.**

This model has 23 patterns and excellent performance ratio which is especially suitable for servicing of all kinds of TV receivers. This pattern generator has features usually found only in professional units, such the NICAM sound, the teletext, or the 16:9 patterns. There are 32 memories available to store your most common test configurations. It is also possible to turn ON or OFF the colour burst, the sound

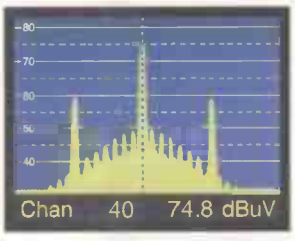
The GV-698+ has 32 memories available to store the most common test configurations

sub-carrier, the colour sub-carrier, etc. The GV-698+ also has a DSB modulated RF output, with level adjustable in 10dB steps.

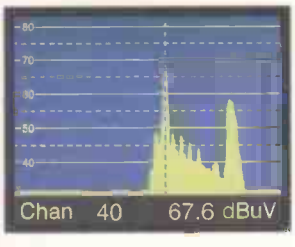
## Professional features for GV-898+ and GV-798+.

The GV-798+ TV generator is capable of up to 37 different test patterns

These analogue TV generators are capable of up to 37 different test patterns, 16:9 and 4:3 formats, VITS & WSS, teletext, VPS and PDC which enable exhaustive diagnostic tests of any TV receiver, video or home theatre system. In addition to conventional common interface connectors such as RGB, SCART or S-VHS outputs, these TV signal generators have the widest selection of functions for an instrument of this type, including the possibility to generate YPbPr which is becoming increasingly popular for large format TFT screens, plasma and TV projectors. The RS-232 interface is especially useful being bi-directional to control the instrument and for data exchange. They have 32 memories to store operating configurations that you want to access quickly. The only difference between the GV-798+ and GV-898+ models is the RF modulator. The GV-798+ uses a double sideband (DSB) type




Double Sideband GV-798+




Vestigal Side band GV-898+

while the GV-898+ uses a vestigial sideband (VSB) approach, similar to the ones used for broadcast television signals. The output level is up to 80dBmV with a progressive attenuation in steps of 1dB. This generator is especially suitable for those applications where the highest quality signal is required, such as adjustment and verification lines, production studios, industrial applications, quality assurance investigation centres and so on.

## The digital generators are the most novel devices, capable of generating both analogue and digital signals.

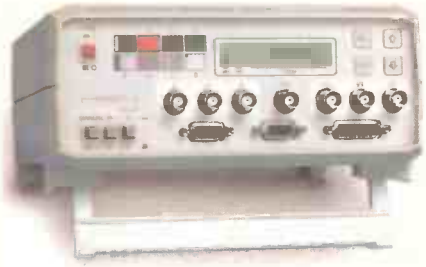
Test generator GV-998 provides ASI signals for COFDM modualtor MO-170

The GV-998 is a multi-standard and multi-system generator of analogue and digital television signals, able to generate the necessary signals to verify the most common anomalies that can occur in Digital TV receivers. In analogue mode, it is a very flexible multi-standard, multi-system instrument with the same performance as the GV-898+. In digital mode, thanks to its TS outputs (Transport Stream) in MPEG-2 format, it is perfect for manufacturing, verifying and maintaining all kinds of digital TV receivers. The instrument's output signal meets the DVB (DVB-PI) specifications and can be applied to QAM, QPSK and COFDM digital modulators. The system has external audio/video analogue inputs. These are converted to CCIR 656 and I2S format and multiplexed with standard patterns. They are then applied to the MPEG-2 encoder to generate the TS output. The instrument is microprocessor controlled, handling both the user interface and internal circuitry. Among other features, it is capable of altering the transmitted data stream format and can be controlled with a personal computer. The system has an analogue external input of audio and video.

## With the advances of the technology, new fields for application of the pattern generators are discovered.

The wide range of different models in the computer monitor field drives demand for versatile instruments.

The GV-241 is a universal multimedia generator for the testing of computer monitors, which greatly facilitates



GV-241 is a universal multimedia generator for the testing of computer monitor

their adjustment, control and repair. It provides up to 29 possible graphics systems, which are divided into two groups in order to facilitate their selection. It has 8 pattern charts: Colour bars, Purity (Red, Green, Blue), Gray-scale bars, Crosshatch, Multiburst, White 100% and the following outputs - 2 x D9, D15, RGB, Composite sync., Horizontal sync., Vertical sync. and Video without sync. The signals obtained with this generator are truly reliable in terms of synchronism periods, and both line and frame blanking periods.

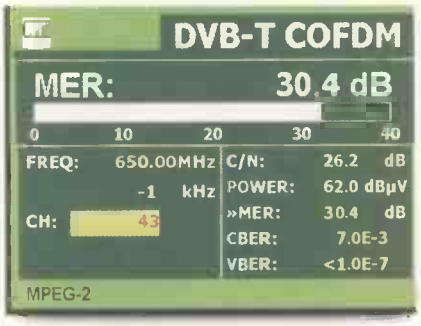
The MO-170 is the top product in the Promax TV Generator family

## The jewel in the crown within the Promax TV Generator family is the MO-170 multi-purpose DTT modulator.

This unit provides a complete test suite which can be used to perform measurements at different points on the DVB-T signal chain. The wide selection of test options available in the MO-170 makes it the perfect companion for anybody interested in checking and validating a variety of critical aspects throughout the DVB-T system. The MO-170 is a general purpose DVB-T modulator contained in a 19" 1U chassis, fully compliant with the DVB-T specification ETSI EN 300 744 v1.5.1. The unit has three selectable MPEG-2 TS inputs (two serial ASI inputs and one parallel SPI input). The input to the

modulator is an MPEG-2 Transport Stream (TS) in DVB-SPI or DVB-ASI formats. The outputs from the unit are the COFDM modulated DVB-T signal up-converted to IF and RF. The modulator has been designed to achieve the maximum performance yet at an affordable price. The MO-170 supports 2k and 8k modes, hierarchical transmission and it can operate in Multi Frequency Networks (MFN). The digital coding and modulation process is implemented with programmable logic devices using PROMAX proprietary IP. This makes the design highly flexible, allowing it to be tailored it to any particular application.

When "out-of-service" tests are required the MO-170 can be used standalone, internally generating a test Transport Stream consisting of NULL packets filled up with PRBS payload data. If the tests do not involve displaying a picture on a monitor, no external transport stream input is needed. The MO-170 automatically synthesises the bit rate needed to operate the modulator depending on the DVB-T parameters in use. Blanking a set of contiguous carriers within the COFDM spectrum can help in measuring the levels of in-band noise (inter-modulation products, Gaussian noise). The MO-170 allows the user to vary the width of the spectrum slot as well as its location within the channel. COFDM signal power is measured by taking the average of the power within the channel. To simplify the process of aligning signal levels across a transmission or reception chain, the MO-170 can generate a single central carrier whose peak power is 3dB above the average power of the DTT signal. A unique feature of the MO-170 is the insertion of bit errors in different stages of the DVB-T modulation chain. This can help to check the accuracy of the BER estimation algorithms implemented in high-end professional receivers. A Channel BER (CBER or BER before the Viterbi decoder) ranging between $7.6x10^{-6}$ and $1.25x10^{-1}$ is generated by modifying the sequence of bits at the input to the constellation mapper. Analogously, the MO-170 is able to generate a Viterbi BER (VBER or BER after Viterbi) going from $3.7x10^{-9}$ to $6.2x10^{-2}$ by properly processing the bits at the output of the Reed-Solomon encoder. The main advantage of this technique when compared with varying the C/N to get the desired CBER or VBER, is its high resolution and unparalleled accuracy.



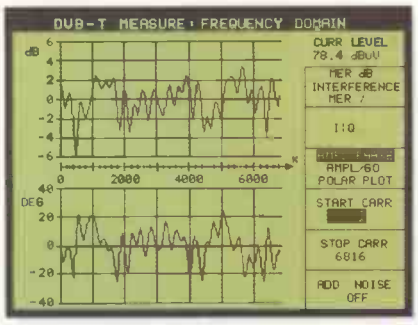

DTT test signal from MO-170 with controlled errors injected into payload

A traditional set-up for measuring DVB-T performance versus C/N typically includes a source of wideband white Gaussian noise, an RF power meter plus selective channel filter or a spectrum analyser, and a varying number of high-precision variable attenuators and directional couplers. The C/N generation function available in the MO-170 makes this kit no longer required and allows a much simpler configuration. In the MO-170, white Gaussian noise with twice the bandwidth of the DVB-T signal is digitally added to the COFDM signal. C/Ns between 3 and 40dB in steps of 0.1dB can be selected. In addition, the RF signal level (COFDM and noise combined) can be further attenuated from 0 to 60dB in 1dB steps. This provides the means to either keep the signal power constant whilst varying the C/N (e.g. to plot the BER vs. C/N of a demodulator), or to keep the C/N constant whilst varying the signal power (e.g. to find the sensitivity of a receiver). The DVB-T signal may be switched off while the noise is still on, and vice versa. This way, noise and signal average powers can be measured externally using the appropriate equipment so as to verify the selected C/N reading. The fact that both noise and signal are digitally synthesised has the added benefit of generating C/Ns with a precision that is difficult to achieve in a traditional assorted test set-up.

COFDM was the modulation chosen for digital terrestrial TV broadcasting because of its superior performance in dynamic and static multi-path channels. A novel feature in the MO-170 is the possibility of simulating channels with up to 5 echoes (plus the main path) of variable attenuation (0 to 40dBc in 0.1dB steps), delay (0 to 445ms), phase (0° to 359.9° with resolution of 0.1°) and Doppler frequency (zero for fixed channels and ranging between -830Hz and +830Hz in 0.1Hz steps for mobile channels).

Among other applications, the channel simulator can be successfully used to simulate the following scenarios:

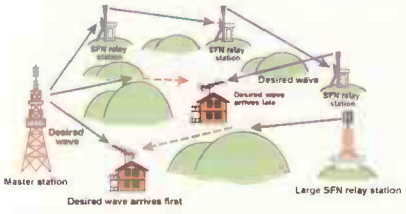
**a)** Pre-echoes in a SFN or, in general, any power delay profile found in practice in single (SFN) & multiple transmitter (MFN) networks.




Amplitude and phase of fixed Ricean channel F1 simulated by MO-170

**b)** Static channels corresponding to roof-top fixed and portable reception. In particular, good 6-ray approximations can be generated for the F1 and P1 channels defined in Appendix B of document ETSI EN 300 744. Other 6-path profiles are those defined in Appendix K.2 of document ETSI TR 101 290.

**c)** Mobile channels with pure Doppler shift. An example of this is the 0dB echo profile proposed in Appendix K.3 of document ETSI TR 101 290.




Multipath interference outside the guard interval in digital terrestrial broadcasting

The channel simulator may be used in conjunction with the C/N generator to evaluate the performance of a DVB-T system for a predefined multipath channel as a function of the amount of additive noise present in the channel.

The MO-170 can be used in conjunction with our Audio / Video Encoder, Model MX-100. This unit accepts analogue signals and converts them into a transport stream which can then be injected into the MO-170 Modulator. The result is to simulate "live" DTT transmissions carrying one to six quality television programmes with their associated audio channels.

To sum up, the wide selection of test options available in the MO-170 makes it the perfect companion for anybody interested in checking and validating a variety of critical aspects throughout the DVB-T system, such as in-band noise measurements, power budgeting, receiver performance, test and verification of DVB-T measuring systems, or simulation of real-word channel impairments.

*More details can be found on our web site www.promax.es or by contacting Don Stoddart*
*don.stoddart@albanelectronics.co.uk*

# Notice Board

**WANTED:**
Been trying to get a IC for the switch mode power supply for Panasonic DVD recorder, DMR E55EB-5 type number STR-G6353 or STRG-6353. It is a TO220 package with 5 legs, would require two (one for spare). All costs met, thank you. Contact Harold at 01977 795092 or lucan4me@aol.co.uk.

**WANTED:**
Viewfinder eyepiece-assembly for the Panasonic camcorder model NV-RX14B. New or second hand would be fine.
Michael on 01773 813569 or mick@mickash.fsnet.co.uk

**WANTED:**
Does anyone have a teletext chip (I think that the Nicam decoder is in the chip as well) for my Grundig television set; Model ST 55-725a FT/GB the CUC 2020 chassis. If so, will you sell it to me or, tell me where I can get one from. CPC did not have one. Can you give me the chip number please. Contact Mr A Fox through Television, at daniel.sait@nexusmedia.com

**FOR DISPOSAL:**
A Calscope Super6 Portable Oscilloscope.
FREE TO A GOOD HOME
Phone Don Clarke Tel: 01474 325910

**FOR DISPOSAL:**
I have for disposal two Grundig A8400 26" TV's of early 1980's vintage with teletext in perfect working order. I have some parts and service/circuit diagram sheets. One set was a backup for the other which never failed and is totally original. The other has had a re-gunned tube and Nicam stereo audio out properly fitted suitable to feed an external audio system whilst retaining the standard internal audio.
Richard Schroder - tel: 01509 505272 pam-richard@schroder6.freeserve.co.uk

**WANTED:**
Old half inch ferrite rods.
Must be half inch 12.7mm in diameter and be six inches long or more.
Will pay very good money for the rods.
Contact Peter Tankard on: 0114 231 6321 between 9am and 10pm.

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# An Aerial View . . .

The familiar sight of the contract aerial

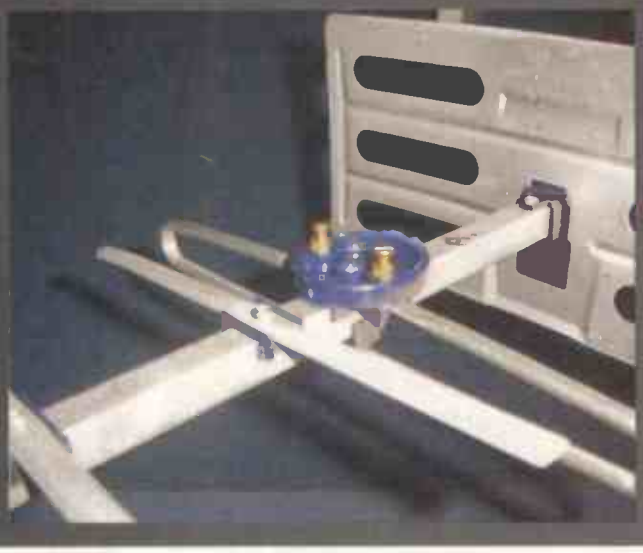


Figure 2: Class bits of brass

## . . . it's in the design

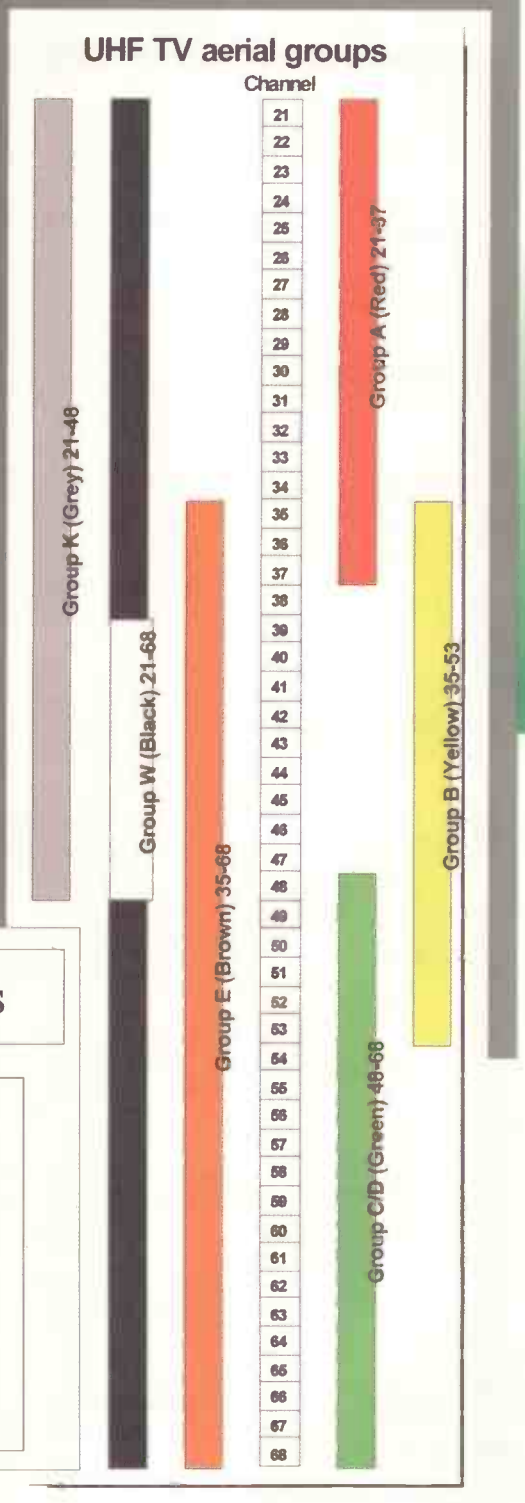
**Tim Jenks**, senior executive at the Confederation of Aerial Industries Ltd (CAI) looks at how digital has changed aerial design

There are many learned sages out there conversant with UHF antenna design, so I do not intend to embarrass myself by pretending to know all the science attached to TV reception and the complexity of antenna theory. However, as a colleague of mine once said: "I need to know just enough so I can make it work." Which if you think about it, is all we have to know in order to enable reliable pictures on our customer's TV.

For the beginners amongst us, Figure 1. (opposite) shows the channel spread we need to know about when it comes to recognising the type of aerials allocated to different sections of the UHF frequency bandwidth.

The commonly used groups from the 1970's up to the early 1980's were A, B and C/D. A newcomer was group E with the famous allocation of channels on the Hannington transmitter in south of England. Here, there is one of only two main transmitters listing 'E' as the aerial group, this is due to the difficulty of establishing Channel 4 in some space that did not interfere with nearby existing broadcasts of BBC and ITV. The other variation on the theme was Bluebell Hill, again Channel 4 was allocated channel 65 well away from the other group B channels. Nevertheless, the skyline scenery of the UK was painted during the 1970's and 1980's as over 20 million households across the UK decorated chimneys and gable ends with the familiar sight of the 'contract aerial'. The 4 channel network of transmitters forgave aerial installers - equipped with van, ladders, a power drill (and maybe a cheap meter) - a million sins. The contract aerial was born and the price of an install reflected in the price of the total rig. With high levels of signal covering all the metropolitan areas, pictures were pretty good and where they were not, they were tolerated.

Figure 1:




**The block chart here helps us understand where UHF theory is based and where it has ended up today with the advent of digital across our UK transmitter network. The question of which came first – the aerial design or the transmitter network plan – is academic. The position for the last 50 years has simply been that an economic design of antenna was achievable. This allowed the original concept of 4 channels to be grouped together within the band, broadcast at high levels from over a 1000 transmitters and cheaply received by 99% of the UK population. Couple this with the cheapest coaxial cable the market demanded and we have a skyline across the UK that is only now changing to more sophisticated arrays. That owes much to the CAI's very own benchmarks, which we will discuss later. However, this 'aerial group' concept has become legendary in worldwide broadcast engineering circles and made the UK famous in UHF TV transmission. The squeezing in of latecomer masts in the UK transmitter network as 'in-fills' or more commonly known, 'relays', saw the emergence of a much larger market for 'wideband' antennas.**

## Aerial Groups

| | |
|---|---|
| **Red** | **= 21-37** |
| **Yellow** | **= 35-53** |
| **Green** | **= 48-68** |
| **Grey** | **= 21-48** |
| **Brown** | **= 35-68** |
| **Black** | **= 21-68** |

### An era is born

Then came a new word in TV broadcast that was to also make public an old word no one really understood or cared about. The new word was 'digital' and the old word we started to use frequently in conjunction with it was 'analogue'. Somehow, the situation became very confused with people asking for 'digital aerials' as opposed to 'analogue aerials'. To the educated in quality UHF design, there is actually no difference. The upgrading of commonly available product occurred when the 'sins of the fathers' were revealed as many lousy contract aerials were found to have polar response patterns similar to mapping an explosion!

To understand the changes that had to occur in design, it helps to see how the UHF spectrum map has changed. For simplicity of diagrammatic representation, it is best to take an example transmitter. A good sample area is the Midlands where a bit of everything is going on transmitter plan-wise

### The Midlands layout

Table 1. (overleaf) lays out all the channels being used for existing analogue and the present allocation of the digital multiplexes across the Midlands. This has influenced the marketing of higher-grade product for reliable digital reception, but we have to bear in mind the market may shift again once analogue switch-off occurs and the analogue slots are swapped for a digital multiplex. Many of the UHF channel slots will become redundant, some are being reclaimed by government and in the interim, some channel slots will be 'parking spaces' for existing analogues that are in reclaimed frequency spread. This applies to channels 63 to 68. These cannot be re-used in a 'swap-out' plan as they are being given back to the government in a sell-off.

Table 1:

| Station | Channel Number and Service | Aerial Group A | Aerial Group A+D |
|---|---|---|---|
| Sutton Coldfield | 40 41 43 44 46 47 50 51 52 55<br>A2 D1 A3 D2 A1 D3 A4 D4 D5 D6 | B | B/W |
| Brierley Hill | 53 56 57 59 60 62 63 65 66 68<br>A4 D3 A1 D4 A3 D6 A2 D2 D5 D1 | C/D | C/D |
| Bromsgrove | 21 23 24 26 27 29 30 31 33 34<br>A4 D4 A3 D5 A2 D2 D6 A1 D3 D1 | A | A |
| Malvern | 39 41 44 47 51 52 56 62 66 68<br>D2 D6 D4 D3 D5 D1 A1 A2 A3 A4 | C/D | W |
| Larkstoke | 21 23 24 26 27 29 31 33 57 60<br>D1 A3 D3 A2 D4 A4 D2 A1 D5 D6 | A | W |
| Fenton | 21 22 24 25 27 28 30 31 32 34 35<br>A4 D3 A3 D4 A2 D5 D2 A1 D6 D1 A5 | A | A |
| The Wrekin A | 21 23 24 26 27 29 31 33 35 53 57<br>D1 A3 D3 A1 D4 A4 D2 A2 A5 D5 D6 | A | W |
| The Wrekin B | 23 26 29 33 35 39 42 45 49<br>A3 A1 A4 A2 A5 D1 D3 D4 D2 | A | W |
| Ridge Hill | 22 25 28 32 35 42 45 53 57 60 63<br>A1 A3 A2 A4 A5 D5 D6 D1 D2 D3 D4 | A | W |
| Oxford | 29 34 48 49 51 52 53 57 60 63 68<br>D6 D1 D5 A5 D3 D4 A4 A1 A3 A2 D2 | C/D | W |
| Waltham | 23 26 33 35 42 45 49 54 58 61 64<br>D2 D3 D4 A5 D6 D5 D1 A4 A1 A3 A2 | C/D | W |
| Nottingham | 21 24 27 29 31 34 39 53 59 63 67<br>A1 A3 A2 D5 A4 A5 D1 D3 D6 D4 D2 | A | W |

**Channel numbers have A for analogue or D for digital and a number underneath. Under the aerial group, column A refers to the old analogue channel group, the following letter the new required group to enable a full spread of digital muxes to be received.**

- **A1 is BBC1, A2 is BBC2, A3 is ITV1, A4 is Channel 4 and A5 is Five.**
- **D1 is Mux 1, D2 is Mux 2, D3 is Mux A, D4 is Mux B, D5 is Mux C and D6 is Mux D.**

DMX05 from Blake UK: Standard 2 CAI Benchmark

A more complex appraoch

## Where have we ended-up

Table 1. shows where the bandwidth of the aerial needs to be greater in order to accommodate two services running side by side. Where digital multiplexes cannot be shoe-horned in between analogues, they are located somewhere else in the spectrum.

In the 'old world', to cover 4 channels and build a product for primary service areas, the aerial manufacturers satisfying the UHF boom in the 1970's, were able to create a budget aerial that had few component parts and required little sophisticated tooling.

The common result is what we see in Figure 2. The dipole connection housing is a simple plastic extrusion. This model could be described in the old days as somewhat 'classy' in that the terminals were brass! The worst of the breed had plated self-tapping screws into the plastic, under which the coaxial centre core was secured under one side and the braid twisted up and secured under the other. The mismatch was nothing short of wretched and only the 'swamp' of signal overcame the evil that actually resulted.

Figure 3. shows the result of testing towards establishing a benchmark. The coaxial connection mismatch was the start point. The CAI and DTG (Digital Television Group) had already worked on a coaxial cable standard. This resulted in benchmarked feeder cables that demonstrated the necessary screening factor for reliable digital.

The next move was to identify the weaknesses at point of reception. The theory was that these were related to unwanted impulse noise and one point of entry would be at the aerial connection to feeder. The mismatch itself would create a problem so a matching balun was made mandatory in the physical build on the termination. Note here also, a more complex reflector build (the elements behind the dipole).

The digital plans encompass the use of the same channels in adjacent transmitter regions, a concept never possible under the parameters of analogue broadcast plans. In order to combat the arrival of unwanted signal from the rear, a more robust reflector is required. At the same time more directivity is required to reject signals from the side. This explains the more sophistication we see in the designs that pass the CAI benchmark tests.

I will delve more into aerials next time when we discuss necessary installation parameters. Meanwhile for details of CAI Benchmarked Products log onto, www.cai.org.uk and click on the 'Benchmark Aerials' under 'Key Areas'. Here you find an explanation of all the reasoning behind what was supported by government in an effort to raise the standard of UHF aerial reception techniques for digital switchover.

# DX and Satellite TV

## By Roger Bunney

As the seasons move into autumn, so DXing conditions have moved into the usual quiet period of the year. News however from Hugh Cocks (Algarve) that ch.E2 in Band 1 was active for 11 days in September early evening (1700-1900hrs BST) from a SSE direction. This was likely to be weak signals from the Cameroons and with much TE (Trans Equatorial Skip) back-scatter activity from his nearby TVE (Spain) and RTP (Portugal) transmitters, Madrid is still on the air! RTP being the last transmitter to fade out on a lower offset @ 48.242MHz. Some days would produce ch.E2 back-scatter + tropical lightning crashes to 51MHz and on September 26 the back-scatter MUF rose to ch.E4 (62.25MHz) with a French speaking FM radio station – 56.25MHz – possibly Niger and most likely a studio to transmitter link (STL).

The Cameroon's Spectrum TV is the strongest signal just a fraction below 48.250MHz, but there are two other transmitters @ 48.249 and 48.297MHz.

And in the crystal ball department, Hugh suspects that both Ghana and Nigeria have closed down Band 1 transmissions. His local RTP TV service is likely to continue with analogue in Band 1 for some years as there's no sign of DTT in the country.

### Satellite sightings

A potential high-rise fire drama unfolded on the evening of October 11, when an aircraft hit a tall residential block in Manhattan. Fears of another 9/11 terrorism attack were quickly dispelled when it was established that a light aircraft was responsible for the impact and resulting fire. Only four persons died in the incident, the footage of which appeared live on the UP4/'AP Direct' carrier on Eutelsat W1, at the Reuters $21^1/_2°$ West WNS circuit. (UP4 = 10.972GHz-Vertical; Symbol Rate 4167 + Forward Error Correction 5/6). Equally dramatic and tragic were the live heli-cam pictures from Montreal on September 30 showing a motorway and a section of overhead concrete bridge section (3 carriageways wide) that had collapsed onto the motorway underneath, crushing several cars and their occupants. Once again the UP4 feed transmitted pictures of the rescue services assembling with two large cranes to attempt the recovery operation and it seemed so painfully slow.

These past few weeks have also seen three school shooting episodes. October 2 and the Amish community at Nickel Mines, Penn, USA suffered four little girls shot before the perpetrator took his own life. Backtrack to September 27, and at Deer Creek, Colorado by Highway 285 at Bailey, more shootings, though none were killed - a convoy of school buses quickly moved escaping kids as the SWAT team surrounded the school building complex. Backtrack again to earlier in September in Columbine, Colorado and another school shooting. Pictures from these incidents were carried live mainly from over-flying heli-cams from the local network TV station and transmitted nation [and world] wide – satellite enthusiasts monitoring UP4 shared in the live drama as these tragic incidents were played out.

Europe has also shared tragedy when on September 22 the driverless 'Transrapid' magnetic train on the elevated test track on the German/Dutch border [at Lathen] hit a truck across the rails, the truck was pushed nearly $^1/_2$ a mile and the train itself disintegrated into large chunks with twenty three passengers flung to their deaths. 'SERVICE 1' was quickly on the scene providing live pictures of the night time recovery operation through Eutelsat W1, 16° East – 12.557GHz-Horizontal ($5632+^3/_4$). The German ZDF network were also on the scene using W1, 10.999GHz-V ($6111+^3/_4$) from their ENG sat truck 'ZDF-DSNG-5H-M'.

Meanwhile that same evening, the crowds in Hungary continued to protest about the government – they seemed to be protesting for at least a week over this period. 'TANDBERG SERVICE' were in a large central Budapest square waving banners and being entertained by several large bands – live pictures over Atlantic

Motorway bridge collapse across carriageway crushing cars (W1)

BBC VTR clock from SNG truck during Lebanon Invasion


Thai TV presenter announces the military coup in Thailand, (W1) 19/9/06

Bird-1 (AB-1), 11.075GHz-H (4500+$^{3}/_{4}$). Just below this frequency were two other Budapest protest transmissions – 11.063 and 11.069GHz-H with similar parameters both identified as 'TV', all carried for a 'Channel 5' TV service.

Meanwhile out in the Middle East, a lone USA TV crew were found on the Pakistan/Afghanistan border, like the military, seeking news of the well being – or otherwise - of Osama Bin Laden. PAS-12, 45° East carried several reports late in September from remote mountainous sites updating the networks back home over their lack of Bin Laden news. Likely to be an ABC crew, the feed back into Europe was found @ 11.540GHz-V (5632+$^{3}/_{4}$).

For several evenings in mid October the BBC-2 network transmitted 'Autumn watch', a nature programme about country and animal life as we plunge back into winter. Bill Oddie, Kate Humble and Simon King featured in this nightly, hour long programme, carried over Intelsat 10-02, 1° West, the strong downlink signal at 11.467GHz-V (6076+7/8) but in MPEG-4:2:2 – appearing as moving colour squares at best or a black screen on the average MPEG-2 receiver! Equally gentle was a show jumping outside broadcast [OB] carried over Intelsat 801, 31$^{1}/_{2}$° West for Sky Sport-2 on October 7. This event was from the 'Horse of the Year Show 2006' held at the NEC and the Sky crew were noted both rehearsing and then on-air from 1900hrs. Another 4:2:2 sports programme seen @ 11.007GHz-V (1333+7/8). Sky Sports has been the salvation of the UK's OB industry providing work and cash for broadcast technicians, more on-the-road vehicles from facility companies and the saviour of many sports venues.

For late Saturday night entertainment, I suggest readers check out 'VIDEO CAIRO' from about 2200GMT which has been carried over W1, 11.009GHz-V (5632+$^{3}/_{4}$). If this programme continues airing then you will enjoy live Arabic music, bands and attractive female singers in a bright and colourful setting. I didn't understand the language but the pictures were fantastic!

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**Universal LCD / Plasma Brackets / HDMI Cables**

## Flat Wall Mount Universal LCD Bracket



Basic but robust wall bracket for mounting LCD screens upto 30" in one fixed position.

Display size : 10"-30"

Max. display weight : 20kg

VESA standard : 50/75/100

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Max. display weight 15kg

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Max. display weight : 40 Kg

VESA standard : 75/100/200

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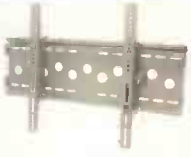
## Tiltable Wall Mount Universal Plasma Bracket



Universal tiltable ( +15% / -15% ) wall support for large plasma and LCDs.

Tiltable : +15° / -15°

Display size : 30"-63"

Max. display weight : 75kg

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**Order Code : PLASBKT1S**
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## Twist Arm for PLASBKT1S

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Max.weight : 75Kg

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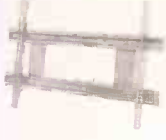
## Universal Wall Mount Plasma Bracket



This plasma bracket can be used with most plasma and LCDs, due to its universal mounting possibilities.

Display size : max. 61"

Max. display weight : 80kg

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Display Size : 30"-50"

Max. weight : 60 kg

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| 3 m 19 pin HDMI to 19 pin HDMI | HDMI3 | £ 17.00 + vat |
| 5 m 19 pin HDMI to 19 pin HDMI | HDMI4 | £ 20.00 + vat |
| 7.5 m 19 pin HDMI to 19 pin HDMI | HDMI5 | £ 25.00 + vat |
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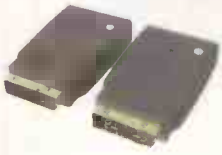

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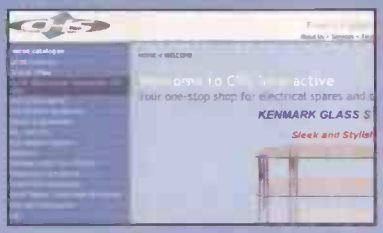


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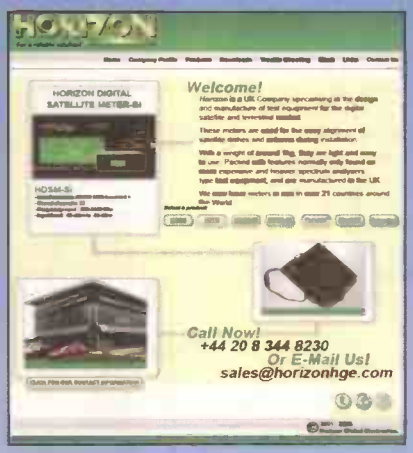


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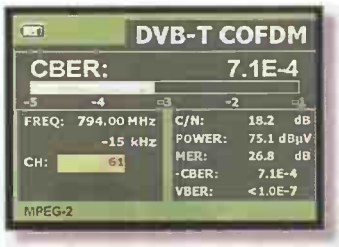


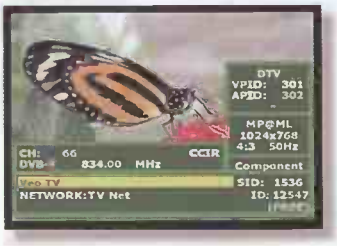


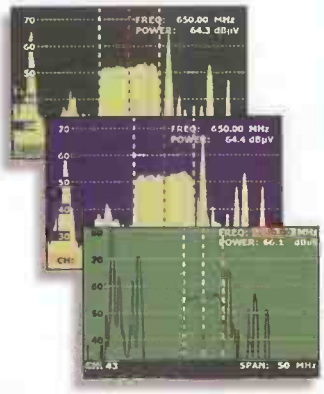


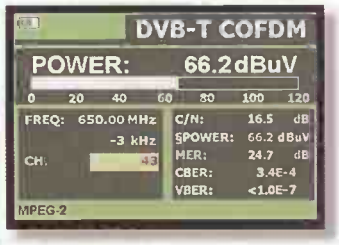


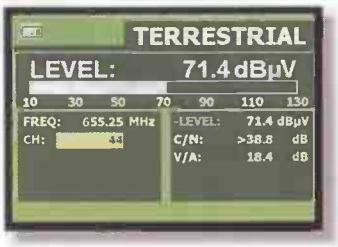


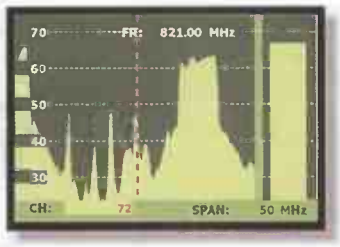


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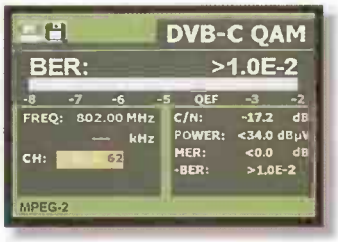


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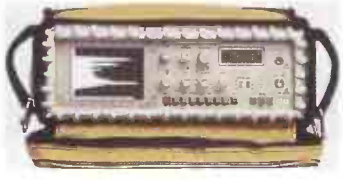

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