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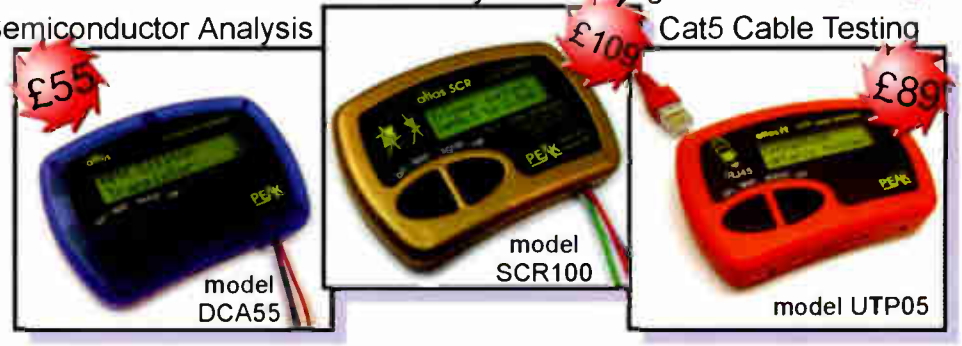

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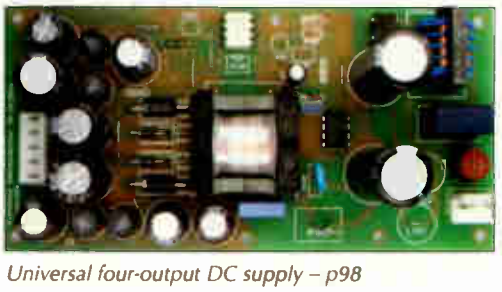

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Editor
Boris Sedacca
BEng (Hons) MIEE
01322 611270
TVeditor@nexusmedia.com

Production Editor
Jane Massey

Production Executive
Dean Turner
01322 611206

Display Sales Executive
Reuben Gurunlian
01322 611 261
Fax 01322 616 339

Editorial Assistant
Caroline Fisher
01322 611 263

Managing Editor
Svetlana Josifovska
01322 611 250

Publishing Director
Tony Greville

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NEXUS
MEDIA COMMUNICATIONS

Thanks you guys!

As I take over as editor of Television, I am sure readers will join me in giving thanks to my predecessors, John Reddihough and Tessa Winford, for their years of sterling work in editing the journal.

Included among the many letters and emails paying tribute is one from Dave Stone, who has received every copy of Television, and all its previously named incarnations, since 1960.

He writes: "John was, (along with another famous name, Pat Hawker) also very much involved from 1959-1965, with editing the superb 'Radio & Television Servicing' books that were issued yearly, and that every service department eagerly awaited the next volume!

"John has always kept his finger firmly on the pulse of our industry, and ensured that 'Television' magazine has done the same," he adds.

Thanks to my readers too, for such for keeping such an active letters page. In the world of publishing, this is one to die for! Please keep them coming.

Licence to steal?

In early October, the BBC outlined proposals for an increase in the licence fee to £150 by 2013. The BBC says that it needs the extra funds to invest in new mobile and broadband services, HDTV access for all and improved local offerings.

This is based on RPI plus 2.3% per year from April 2007, corresponding to a fee of £150.50 per household in 2013. Currently the fee is set at £126.50.

The government will make a decision on the licence fee next year as part of the charter renewal process.

The reaction has been mixed. Some argue that the fee should have been increased earlier and this still represents the cheapest entertainment available. The weekly cost is less than a pint of beer, less than a packet of cigarettes and less than a gallon of petrol. They add that the tradition of providing good drama and comedy programmes will also disappear if the licence fee is not maintained.

Others say that BBC3 and 4 programmes seem to be endless repeats and question the cost of having a multiplicity of channels for repeats when most people have DVD machines, adding that it is a misuse of public money.

Some of the worst criticism, however has come from an influential cross-bench House of Lords committee.

In March 2005 the Government published a Green Paper entitled A strong BBC, independent of government. In October, The House of Lords published a report that says: "We do not believe that the Government has seized this opportunity to secure a strong BBC which is truly independent of Government."

Entitled The Review of the BBC's Royal Charter, the report concludes that the licence fee is the best way to fund the BBC over the next decade.

"However, we believe that the system for agreeing the cost of the licence fee should be more transparent and the BBC's bid should be subject to independent investigation.

"Negotiations on the level of the licence fee should no longer take place behind closed doors with Parliament expected to approve the Government's proposal without knowing its basis.

"Instead the National Audit Office should provide an independent assessment of the bid. This will insulate the BBC from potential political interference in its finances by providing an objective and non-political assessment.

"We do not believe that the BBC should expect automatic licence fee settlements above the rate of inflation. The BBC needs to demonstrate to the licence fee payer that it has taken every sensible action to contain costs and secure maximum value for money."

In the past, the BBC has been able to laugh off any such criticism. I wonder if this may not happen all over again?

BT and Philips sign set top-by-phone deal

BT and Philips have announced plans to launch television over telephone lines.

The set top box will include a hard disk storing 80 hours of television from the internet, and will include 30 Freeview channels.

BT hopes that viewers will want to download not only blockbuster movies and popular TV shows but also niche content made available by smaller content partners, from arthouse films to non-league football matches.

It also sees the service, due to launch in late summer or early autumn, as a customer retention tool.

BT broadband customers will access content on a pay per view basis rather than by subscription, and will need a 2Mb connection.

According to Ian Livingstone, BT Retail chief executive, there are 60 million televisions in the country and only 10m are connected to a pay TV service.

He claimed the box would cost less than the current going rate of around £160 for a Freeview box with a hard drive.

Rudy Provoost, CEO Philips Consumer Electronics said: "Philips is very excited to partner with BT to introduce this innovative new digital TV service to the UK market.

"This cooperation is important proof of our strategy of providing consumers access to information and entertainment anywhere anytime, while preparing the road for HDTV."

Meanwhile BT has poached James Soames, head of marketing BSkyB's direct-to-home service, to lead the marketing drive for its IPTV service. Soames will report to Andrew Burke, chief executive of BT Entertainment.

Meanwhile, BT is dropping its promotion of Sky following the broadcaster's purchase of BT rival Easynet.

Sky's latest purchase, which is viewed as the company positioning itself to compete with a stronger cable presence in the UK once NTL and Telewest merged, will also put it into direct competition with BT.

The purchase of Easynet will give Sky the ability to deliver TV not only via satellite but by broadband.

It seems likely that Sky will use the broadband offering to deliver services such as video on demand, which are currently being rolled out by NTL and Telewest.

Sky confirmed that it made an agreed offer for Easynet at 175 pence per share. This values Easynet at £211 million and represents a premium of 80% over the value of Easynet's shares prior to the offer period.

Provoost: "Proof of our strategy."

Sky recently raised around £1 billion from a bond issue. Easynet has an extensive local loop footprint and this will give Sky the opportunity over time to offer its 8 million customers Digital TV (via satellite or broadband), high speed broadband and phone as a single service.

ITV and Channel 4 join Freeview

ITV and Channel 4 have joined the Freeview consortium as equal shareholders.

The broadcasters announced their partnership with the BBC, BSkyB and Crown Castle in the venture.

Peter Abery, Chairman of Freeview, commented: "We're delighted to welcome ITV and Channel 4 to the consortium at a time when the Freeview service continues to go from strength to strength.

"ITV and Channel 4's involvement, both from a strategic and financial point of view, will further enable us to raise awareness of the Freeview service as we continue to drive digital terrestrial take-up in the UK.

"With the addition of more channels, including ITV4, More4 and Sky3 soon to be joining Freeview, the service offers an exciting channel line up for consumers looking to get digital TV."

Andy Duncan, Chief Executive of Channel 4, said: "Freeview has transformed the television industry since its launch 3 years ago.

"Building a powerful multi-channel presence is central to Channel 4's future strategy and developing a strong position on Freeview is a crucial part of this ambition.

"E4 has more than doubled its share of the multi-channel TV audience year-on-year this autumn following its launch on Freeview.

Charles Allen, Chief Executive of ITV pl, added: "The rapid growth of the DTT platform and the success of Freeview offer a great opportunity for ITV as a content provider, channel owner and multiplex licence holder.

"There are very real benefits for ITV in growing and developing Freeview, and the most effective way for us to do that is to be at the heart of the marketing effort.

"ITV's channels have already played an important role in driving the take up of Freeview - ITV2 and ITV3 are now the two most watched digital channels in Freeview homes, and ITV3 was the most successful launch in multi-channel history.

"ITV4 and our new children's channel will also be added to the Freeview offering in the coming months. Becoming a shareholder means we can play an even stronger part in driving the growth of Freeview."

Ally Pally celebrates TV's Platinum anniversary

Next year Alexandra Palace will be celebrating the 70th anniversary of the first ever TV broadcast which came direct from the historic venue.

In 1936 Elizabeth Cowell uttered the immortal words, "This is direct television from Alexandra Palace."

Since then television has become one of modern society's most significant technological breakthroughs and the BBC's occupation of the Palace in the 1930s for early experiments and actual production was key to its development.

Alexandra Palace is truly the birthplace of television and its anniversary will be celebrated throughout 2006.

Ally Pally is currently one of the UK's most popular and versatile venues, hosting dozens of exhibitions from The Knitting and Stitching Show to the London Motorcycle Exhibition.

The Palace has in recent times leapt into prominence as London's busiest major music venue, with Rock acts including Razorlite, Kasabian, Franz Ferdinand, The White Stripes, Stereophonics, Faithless, The Pixies, Embrace, Nic Cave and Paul Weller all featuring in this year's schedule.

News round-up

by John Reddihough

Bush has launched a plug-and-play Freeview adaptor that simply plugs into a TV set's scart socket.

The unit is about the size of a pack of cards, just 75 x 26 x 100mm. So it hides behind the set, with an accompanying infra-red sensor for remote control on top of the set.

The adaptor, which is expected to sell for about £60, includes a seven-day electronic programme guide and has an easy-to-use menu system. For further details check at: www.bushdigital.co.uk

✦

Roadstar has launched a 10 inch Real Flat CRT IDTV, Model CTV1042D, that includes analogue and digital terrestrial tuners and a scart socket.

The analogue tuner is multi-standard (PAL I and B/G, and Secam B/G and DK). No price details have been announced.

✦

Humax has launched a twin-tuner personal video recorder, Model PVR-9200T, for digital terrestrial TV.

It has a 160GB hard-disk drive able to record up to 100 hours of programme material.

The USB port provided for connection to a PC enables MP3 and image files to be downloaded and stored, then played back through a TV set and surround sound system.

✦

The European Telecommunications Standards Institute (**ETSI**) has approved the DMB (digital multimedia broadcasting) standards for TV, video and data transmissions to mobile handsets.

The standards, TS 102 427 and TS 102 428, operate in parallel with DAB.

It should be relatively easy to integrate DMB into the existing DAB infrastructure, which already covers 80 per cent of Europe, bandwidth limitations permitting.

Trial DMB transmissions have been carried out in a number of countries and the system has been adopted in Korea.

LG, Perstel and Samsung are expected to launch DMB-enabled devices in the UK before the end of the year.

Details of the standards are available at www.etsi.org

✦

Toshiba has developed a system that enables 3D images to be viewed on a flatbed display without any need for special glasses.

When the display is viewed from an angle, the viewer sees 3D images that stand out several centimetres from the surface.

The company expects to introduce products that use it within two years. 3D displays that don't require aids such as glasses work by projecting slightly different images to each eye, a form of visual stereo.

Toshiba's new display uses an integral imaging system that produces light beams similar to those experienced with a real object, not a visual representation.

This, Toshiba points out, overcomes the main problem with a flatbed display, distance.

The distance difference from the eye to the centre of the display and to the edges and corners of the display is greater with a flatbed than a standard upright display.

Mac Expo attracts the

After five successful years in Islington, the UK's largest annual event for the Mac community, MacExpo 2005, took place at Olympia's National Hall in Kensington, London on Thursday 27th to Saturday 29th October

Exhibitors included Adobe, AM Micro, Bose, Canon, Computers Unlimited, Computer Warehouse, Extensis, HP, Konica Minolta, MacWarehouse, Microsoft, Quark, Rapid Group and Sony.

MacExpo 2005 covers creative disciplines from digital photography and imaging, digital music and video to design and publishing.

The move to Olympia allowed MacExpo to define dedicated 'Experiences' or zones on the show floor, each with its own theatre as a focal point within that Experience: Design, Print & Publishing; Digital Audio & Video; Digital Imaging; Business Solutions.

One session covered How to set up a Final Cut Pro workgroup. If you are looking for a Final Cut Pro workgroup solution, you will most probably decide to set up an Xsan storage area network, and Mac OS X Server based collaboration environment.

In this session André Aulich and Björn Adamski introduced the basic concepts of shared storage, server-based user management and specific Final Cut Pro settings.

Both speakers also work as Xsan and Final Cut Pro consultants and provided comprehensive practical insight and otherwise unavailable information (like optimized Xsan block size and stripe breadth combinations for HD and SD.)

After the session they were also available at the Video & Server Pro Lab to answer questions.

Final Cut Studio combines the industry-standard Final Cut Pro 5 - including powerful SD, DV and HD editing capability - with the real-time design engine of Motion 2 for stunning motion graphics, the flexible audio creation and control tools of Soundtrack Pro and the sophisticated SD and HD DVD authoring features of DVD Studio Pro 4.

Final Cut Studio includes Final Cut Pro 5, Soundtrack Pro, Motion 2 and DVD Studio Pro 4. You'll also get several applications designed to round out the production workflow: Compressor 2, Cinema Tools 3, Apple Qmaster 2, LiveType 2 and QuickTime Pro 7. In addition, Final Cut Studio includes professionally designed templates, audio loops and other content that will help you in the creative process.

The products in Final Cut Studio are identical to what you receive if you buy the products separately. In addition to considerable savings, Final Cut Studio features an integrated tutorial book, a DVD Video tutorial and an intelligent multi-disk installation experience for Mac OS X v10.4 that dramatically improves the installation process.

Sony was a key exhibitor of interest to *Television's* readers. Sony's HDV camcorders are a perfect fit with Apple's Final Cut Studio software suite, which can handle native HDV.

Launched in September 2004, the HDR-FX1E camera brings high quality digital video technology, previously only available to the professional market, to the home user. It is a 3CCD camera with 1.12 megapixels (effective 1.07 megapixels) x3, fitted with a Carl Zeiss Vario-Sonnar T* lens that delivers very high optical performance, reduces chromatic aberration and ensures high resolution.

And the camera can record HDV picture quality onto current DV tapes. The HDV video camera is ideal not only for home moviemakers looking for the best picture quality, but also for film editors and journalists.

With HD-ready televisions already available on the market, it was not long before consumers started asking Sony to design a digital video camera able to

professionals

record HD picture quality. The result is a top-of-the-range HDV video camera, designed specifically with the home-user in mind, able to shoot and playback with the best picture quality available.

HDR-FX1E is compatible with the HDV1080i specification. 1080i is one of the standard formats in broadcasting that ensures smooth transition picture quality. The picture quality is such that it can even playback on TV screens bigger than 50 inches - and the resolution is 4 times greater than that of the digital video format.

The new CCD is a wide megapixel configuration making a 16:9 aspect possible. 16:9 is very close to the performance of the human eye, so the picture quality gives a truly realistic impression. It features a 1/3" 1.12 megapixel (effective 1.07 megapixels) x3 CCD. Each CCD captures RGB (Red/Green/Blue) luminance, so the colour reproduction is much stronger than a single CCD chip.

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Sony has produced a new "HD Codec Engine" to capture and process four times more information than the standard digital video format. The exclusive real-time MPEG encoding/decoding system can achieve a high compression ratio with high picture quality.

With this system, the HDV format can record and playback at a high bit rate. The HDR-FX1E is equipped with a 72mm filter diameter new Carl Zeiss Vario-Sonnar T* lens, which is ideal for detailed high definition shooting. This lens delivers very high optical performance, reduces chromatic aberration and ensures excellent resolution.

Its T* coating eliminates unnecessary light reflection, and reduces flare and ghost effects. It delivers high contrast and excellent colour reproduction, as well as capturing real light quality. It is also possible to make wide-angle shots – a function often required by users of high-end equipment, such as the DCR-VX2100E. In addition, the lens has a 12x optical zoom and an optical image stabiliser, ensuring the kind of consistently high picture quality expected by a professional user.

The lens is versatile enough to deliver the best results in all filming situations.

A further advantage of the HDR-FX1E is that users can use the same tape as they would use with their standard DV camera and have the same recording time available on it.

As a next step and in response to further consumer demand, in May 2005, Sony announced the launch of a new ultra portable, light weight high definition camcorder – the HDR-HC1E, allowing recording of videos in high definition quality.

HD recording provides a perfect cinematic picture quality.

HDTV has recently hit the headlines with many celebrities concerned that the new improved quality of HD recording will result in every blemish and imperfection being highlighted on the big screen. HD recordings really make viewers feel as though they are part of the action.

HDTV is high-resolution digital television combined with Dolby Digital surround sound and the highest DTV resolution in the new set of industry standards.

Its higher resolution picture provides 1080 lines of resolution compared to the 525 lines people are used to with standard analogue recordings and transmissions.

The Sony HDR-HC1E is styled in the same way as the popular Sony Handycam range – combining small light weight design with state of the art professional recording technology to produce the ideal high definition camcorder for amateur home users.

Sony's HDR-HC1E features a Carl Zeiss Vario-Sonnar T* lens, 10 x Optical Zoom, 2.97 Megapixel CMOS Sensor, a full size 2.7" LCD display and an easy to use touch screen Active Menu system.

LETTERS

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

The Days of 405-line TV

I have read with interest the article by Keith Hamer and Garry Smith on the above subject (*Television* October 2005), and I would like to add one correction, and a few additions.

Firstly the correction: this regards the BBC1 transmissions on spare band 111 channels which his list on page 717 refers, but Caradon Hill Ch.12 was the ITV channel for Westward Television (TSW), and Caradon Hill never carried a BBC1 band 111 service.

Now for the additions, I note with great interest on Photo 5 the ITA tuning caption - ITA London. Prior to this regional caption, ITV Transmitters and stations used the Transmitter name, for example, ITA Croydon, ITA Chillerton Down (IOW) and so on.

I have a full set of these original slides made by Marconi Wireless Telegraph London Ref WZ13761. They were on Glass and not a photo film. I also have a full set of the regional slides as your photo 5 including London and all 14 regions, after a perion of regional slides tuning captions the various companies then used a similar pattern slide but with the company name, for example ITA Thames Television, ITA Southern Television, and so on, and again all 15 companies including London Weekend Television.

The final set of tuning captions came in at the start of Colour television in 1969 and these tuning captions were in a different format and in colour but again with the company name, as by then the transmitter numbers had grown too much to put on a tuning slide.

I also have the very first ITA London caption and the very first ITA Black Hill caption for Scotland. These were the very first test card slides transmitted in the London and central scotland area respectivily. They were actually broadcast before ITV started, as they were the test transmittion slides.

The sets are full and complete, and must be worth a bit - afterall it is the history of ITV, which is now 50 years old, so these slides are about that age.

I also have some test card 'C' slides with the transmitter name on and some test card 'D' slides again with the transmitter name.

Finally I have a complete set of the opening music and announcements on tape (open reel) and cassette of all ITV stations, Reddifusion London, and even some long lost ones from many years ago, TWW (South Wales) 1958-1968, Teledu Cymru (Wales) 1962-1968, ATV London & Midlands and ABC Television.

These slides and test cards were not generally available.

KV Cunliffe,
Stottesdon,
Kidderminster.

P.S. I would be interest to hear from anyone with similar interest.

Although the article The Days of 405 line TV in the October 2005 edition of Television, was interesting I noted some inaccuracies as follows:

1) To improve reception from North Hessary Tor in the South West on Channel B2. To my knowledge, and archive, there was no relays of this station in Band III and the stations mentioned are therefore wrong in that Caradon Hill on Channel B12 was only used for the ITA Station in the South West and Wenvoe on Channel B13 was for BBC Wales, which although it was the main station for Welsh Language in South Wales, did not come on air until 1964.

2) ITV in South Wales. This has always been a dual region, that is, South Wales and the West of England based in Cardiff for Wales, and Bristol, for the West of England. The ITV station mentioned, Harlech Television, did not take over the franchise for this ITV region until 1968 and before that it was Television South Wales and the West (TSWW) from 1958 and Television Wales and the West (TWW) from 1964 following TWW's merger with Teledu Cymru in 1964. The Channel B7 Transmitter, the main Welsh Language Transmitter for South Wales, did not come on air until 1965.

3) HTV (Harlech) from Huntshaw Cross or Caradon Hill. Again on checking my archive, I cannot find any record of HTV ever using these stations. In fact all records show that both Huntshaw Cross and Caradon Hill where only used by the ITA Station in the South West which was either Westward Television or much later, when the franchise changed, by Television South West (TSW).

I hope the above is of help and in closing I am very surprised that two people who I regard as an authority on such matters should make such errors. Therefore I can only conclude that the gremlins got into the final edit.

Richard Reynolds,
Guildford, Surrey.

Insight by serendipity

Sometimes we obtain an insight by serendipity.

A Pace DTVA on Heathfield transmitter had locked-up on the programme guide - not an infrequent occurrence - and I was attempting to get out of it by random button-pressing.

Suddenly the screen blanked and an unfamiliar but typically Pace screen came up on the display.

It listed several satellite stations with frequency and polarity - 1 Arte FR2 11060(V) Hotbird and 602MHz, 2 Arte FR2 11060(V) Hotbird and 666Mhz, 3 BKTV 12220 (H) Hotbird and 602Mhz, 4 BKTV 12220(H) Hotbird and 666Mhz, 5 Arte FR2 11060(V) Hotbird and 212MHz. Also each said SIR 6510, IFFT 8K, QAM 64 and IG: 1/8.

The next screen headed FUNCTION TEST gave 1 Front Panel Test (this gave "key") 2 Smart card test (none) 3 A/V Output test (this gave outputs), 4 Scrambled Channels Test (this gave BBC Prime 111131(V) 602MHz.

Is this The Shape Of Things To Come?

CR Stephens,
Uckfield, East Sussex.

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The testing of portable appliances

You do not have to use a portable appliance tester (PAT) for testing televisions, videos and the like, but it can make life a lot easier, says **Boris Sedacca.**

More people get injured from faulty appliances than from faults occurring from the electrical installation itself. PAT testing is a repetitive and time consuming task, it consists of uniquely identifying appliances, testing, documenting results, taking care of any remedial actions and marking the appliance with the next test due date.

It is essential therefore, to be well organised and use modern well designed PAT testers such as the Fluke 6200 and 6500, to help improve the efficiency.

Which Class?

Class I equipment utilises basic insulation of electrical parts and provides a means of connecting any metal parts that could become live, should the basic insulation fail, to the main protective earth of the building.

The flexible mains cable of such equipment consists of three wires - a live, neutral and earth conductor.

PAT testing of class I appliances confirms the integrity of this protective earth connection and that it is of low enough resistance to ensure the removal of any dangerous voltages.

It also confirms the quality of the basic insulation to ensure that it is higher than minimum levels.

Class II equipment does not rely on the protective earth of the installation but provides double or reinforced insulation to the user.

These appliances are identified by the double square symbol. They are usually supplied with a mains cable that consists of two conductors - a live and neutral. However some manufacturers supply cables with three conductors so the number of conductors is not a means to identify the class of equipment.

PAT testing will measure the quality of the double insulation to ensure that it meets minimum standards.

Testing sequence

The correct sequence of testing is important and should a fault be found it should be rectified before continuing with the rest of the testing sequence. The sequence is as follows:

- Visual inspection
- Earth continuity testing (class I)
- Insulation testing
- Functional tests Load/leakage or touch current testing

The first task is the important visual check. The purpose of this is to check for any damage to the casing, mains cable and plug for, signs of misuse, over heating, correct connections in the plug, frayed leads, a safe working environment is present, correct rating of fuses and correct anchorage on leads.

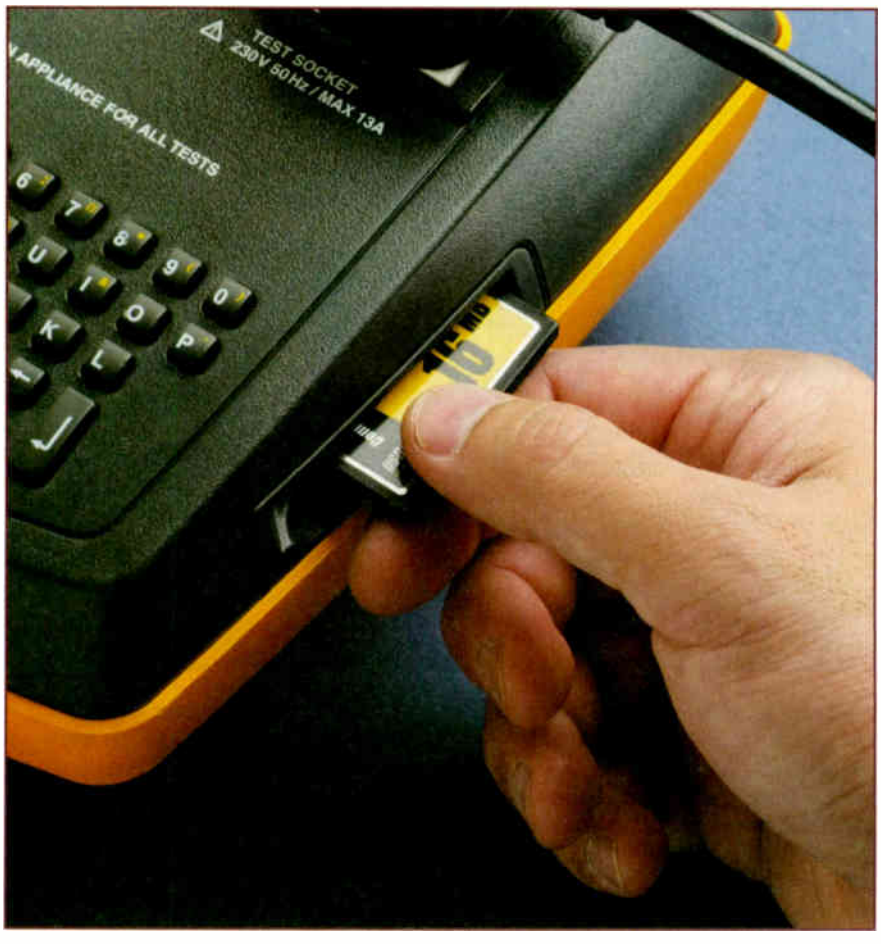
The importance of the visual check must not be underestimated as many problems can be detected before the appliance fails the electrical safety checks.

For instance it is important to change a fraying lead before further damage becomes a hazard and starts shorting to earth.

For class I appliances the earth bond test comes next. Fluke testers offer users the choice of a high current 25A test or a 200mA test.

The latter is for equipment that is sensitive to a high current test such as IT equipment. If there is a problem with this test the fault should be rectified before continuing with any further testing.

The option of the probe is of particular assistance when there is only, perhaps, a screw head that provides a metal surface.



The Fluke 6500 has a unique compact flash card memory facility that can be used as a memory back up.

A popular feature of the Fluke PAT testers is the earth bond lead that is detachable. This eliminates the requirement of the instrument being returned to a service department for replacement as well as offering a speedy solution for packing the instrument away. The resistance of this test lead can be regularly tested and automatically removed from the test result.

After the earth bond test for class I and the first electrical test for class II appliances, comes the insulation resistance test.

For class I appliances the live and neutral are combined and the resistance measured between the two conductors and the protective earth.

For class II appliances the live and neutral conductors are again combined together and the insulation probe or crocodile clip is connected to any exposed metal surface on the appliance.

The option of the probe is of particular assistance when there is only, perhaps, a screw head that provides a metal surface.

In both cases the appliance must be switched on for this test. It is also important to wait for the test to complete to ensure that all capacitances have discharged.

Insulation resistance testing applies a voltage to stress the insulation; it should not be regularly applied to IT equipment that does not comply with the standard BS EN 60950.

This test can also not be successfully used on certain heating and cooking appliances where the elements of such equipment have high leakage paths.

Some appliances have a low insulation reading by design. For these type appliances or where an insulation test cannot be carried out, it is possible to conduct a protective earth conductor current test for class 1 and a touch current test for class II equipment.

In many cases it is good practice to run these tests anyway to monitor the ongoing condition of the appliance. During these tests the appliance is powered up with mains voltage so the user must make sure that the appliance is properly secured and that they stand clear of dangerous equipment.

For protective earth conductor current, Fluke testers actually measure three parameters at the same time. These are load current, power consumption and protective earth conductor current. This test function can be used on class II appliances to determine their power consumption and load current.

Touch current for class II appliances is sometimes confused for the above protective earth conductor current test.

It is also a live test so precautions must also be made to ensure the safety of the user. However this test is conducted using a probe which is placed onto external metal parts of the appliance.

IEC lead testing

IEC leads are considered as appliances themselves and can be tested quickly and easily by the use of the IEC socket on the front panel.

Extension leads can also be tested. On pressing the IEC lead test function the tester checks for earth bond resistance, insulation resistance and polarity.

Sometimes it is necessary to run a continuous test, for example, when running an earth bond test on an extension lead. The tester can be set in continuous mode while the user uses both hands to flex the cable through its length.

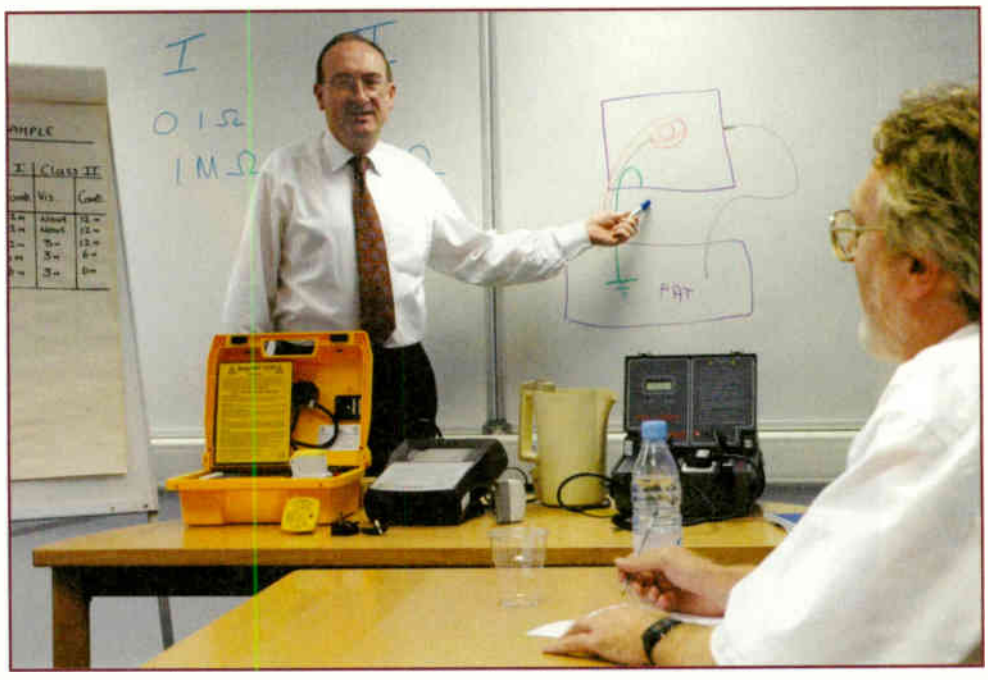
Continuous mode is also essential when conducting a protective earth conductor current/load test on appliances with long start up periods like computers or appliances where tests have to be made in several switch positions.

Manual or Auto-mode

Fluke offers the choice of a manual tester, Fluke 6200, where each test is started manually or an automated tester, Fluke 6500, which incorporates automatic test sequences and a memory with the ability to include descriptive text for fast documentation.

Both testers offer swift systems to the user and the tester of choice will depend on the amount of testing required, type of testing and the skill of the operator.

The Fluke 6200 manual tester provides 'one touch testing' for six test functions as well as an IEC lead test, it also provides for a basic memory and



Peter O'Hara: A masterful performance.

printing capabilities. One touch testing enables the user to initiate any test by pressing just on button.

The Fluke 6500 downloading tester increases the speed of testing and documentation over the manual tester in two ways - the first is in its ability to run automatic test routines, and the second in its fast documenting systems for data entry.

This allows for appliances to be referenced with ID numbers, descriptions, location, the test results and any relevant comment.

After testing, this data can be downloaded to PC software for recording and certificate generation.

The Fluke 6500 has several factory-set auto-test routines for class I and class II appliances, and allows users to program their own routines.

The user activates an auto-test by pressing the 'auto' key. He is then prompted on screen to enter an auto test number, the instrument remembers the last one used so in many cases only an acknowledgement is required.

Documenting

The Fluke 6200 manual tester can be used in conjunction with an appliance register such as the Fluke IRP1, which is offered as an optional accessory.

The Fluke 6500 tester provides a comprehensive capability for portable appliance testing data capture.

The tester has a large graphical display and after testing the user can press the Memory key to save the test results.

The user is then shown a single screen that prompts him for an appliance number, the location, the appliance description and any note or comment that applies.

The appliance number automatically increments by one after each saving operation.

The Fluke 6500 has contextual help screens that are available to the user at the touch of the help button.

The Fluke 6200 has a printed label on the front panel that details pass and fail levels for quick reference.

Both instruments have pre-programmed pass fail limits. In the case of the 6500 the responsible person can change these.

For the 6200 these are fixed, in case of the measurement exceeding these, a limit warning is displayed and the user can make reference to the front panel label for the most appropriate limit.

The Fluke 6500 has a unique compact flash card memory facility that can be used as a memory back up and as a medium to enable testing data to be returned to the office whilst the tester remains in the field.

These new Fluke testers use techniques that eliminate parallel earth paths from insulation and earth bond tests therefore giving a true reflection of the state of the appliance.

Without these techniques any parallel earth connection, for instance a washing machine that is connected by copper pipe or an appliance on a metal work bench, would show a lower earth bond resistance and insulation resistance measurement.

Staying ahead

A future development of portable appliance standards may utilise the substitute leakage test as an alternative to the protective conductor current measurement. The Fluke testers conduct this test at low voltage and then calculate and display the value at full mains voltage. This offers the benefit of not having to power up the appliance at full mains voltage.

It is common practice to give a unique identification number, a pass/fail status and the next test due date on tested appliances. Fluke offer a comprehensive range of labels to do this. Barcode labels are offered for appliance ID as well as for auto-code number. The usage of these increases the speed of testing for repeat years. Pass and fail labels are available some utilise tick boxes for the next testing due date which reduces writing time.

Training

I recently attended Instrotech's multi-vendor PAT training course and concluded that it was a day well spent.

The course is prepared from The Health & Safety Executive booklet 'Maintaining Portable and Transportable Electrical Equipment', The Institute of Electrical Engineers 'Code of Practice for In-service Inspection and Testing of Electrical Equipment', and The Federation of Electronic Industries 'Recommendations for Periodic Checks for Business Equipment.'

Instrotech has provided PAT training since the 1990s. Director Peter O'Hara turns in a masterful performance, and is obviously well versed in his subject, the result of many years of experience distributing test equipment from multiple vendors.

The entry requirement for anyone taking the course is that they should have basic electrical knowledge, such as how to wire a plug, although even this is covered in detail.

The course covers the regulatory background, the electrical basics behind the testing and includes a wealth of practical tips as well as a hands on session where each attendee carries out

Bluetooth technology enables the wireless connection of bar code scanners, label printers and other accessories

tests under supervision.

Throughout the practical session you are not just testing for a pass or fail, but also understanding what the readings mean. This approach is beneficial for all trainees as you begin to appreciate what you are likely to come across in the field and how to make the right decisions.

The training emphasises both the need for speed and efficiency while testing, but also an understanding of what the results mean.

This ensures participants are able to safely interpret results and takes them beyond a simplistic pass/fail approach.

A combination of video presentation, classroom teaching, discussions, practical demonstrations, questions and answers followed by individual hands on practice under supervision ensure the training is easily remembered and always interesting.

Apart from the need for persons who will conduct the test and inspection of appliances (referred to in the Regulation as Competent Persons) to be trained there are other categories of persons who require training or to be made aware of responsibility.

Records of all maintenance activities should be kept, including:

- Formal visual inspection
- Testing
- Repairs
- A register of all equipment

The standard tests conducted by testers are earth bond test (Class 1 appliance only), insulation test (both Class 1 and Class 2), functional or run test (on some testers), and earth leakage test (on some testers).

Tests such as touch leakage and substitute leakage are not required but may give additional information in circumstances when you would not wish to carry out the standard tests.

The day ends with a safety quiz, which allows delegates to assess how much they have taken in during the course of the day.

The quiz is not as easy as it sounds, although PAT Testing is not rocket science. Any uncertainties are clarified at this point and at the end of the course any individual's questions or queries can be raised.

Course delegates are given a handbook containing the course notes, along with details of the free technical support line, ensuring they always have continued support when out in the field. Along with this the delegates are offered discounts on PAT equipment and accessories.

The course provides an essential, real world view of PAT testing and many experienced testers would benefit from such a refresher.

Market leader

Established over 20 years ago, Seaward Electronic based in County Durham is the market leader in the field of electrical safety test instrumentation.

The company provides total test solutions to enable companies and organisations to comply with the demands of all types of electrical safety legislation including portable appliance testing, installation, medical, and machinery testing.

Seaward is renowned for its commitment to continuous product development, innovation, and is the global market leader in portable appliance test (PAT) instruments and associated accessories.

Seaward offer a range of courses, which emphasise practical issues with a 'workshop style'. The courses have been designed to provide added value and a positive contribution to business performance. Faster testing techniques, the adoption of best practice and the effective use of ancillary equipment can all combine to provide more efficient testing.

The courses cover the more advanced PAT testers from the range, all of which feature a short introduction to PAT testing encompassing the latest requirements under the IEE regulations.

Seaward's PAT testing software course on PATGuard Plus gives a comprehensive overview of the software from the database structure to download and upload to a PAT tester.

The training can be conducted at Seaward's facility in County Durham or at the customer's premises. Course notes are included and most courses last for one day.

Primetest 100

The new PrimeTest 100 is a new hand held tester that is designed for the fast and effective safety checking of Class I and Class II electrical equipment, including IT and business equipment.

The unit has been designed for electrical servicing and safety testing

applications and also enables tests to be carried out on IEC leads, extension leads and the power sockets that electrical equipment might be connected to.

The fundamental portable appliance testing capabilities of the new instrument include earth continuity, insulation resistance and Class I/Class II leakage. Tests are carried out against pre-set pass/fail limits and a large LCD gives a clear pass or fail indication.

In addition, the PrimeTest 100 carries out IEC lead polarity tests and checks the socket is wired correctly.

Universal graphics on the case of the instrument guides the user through the tests available and a single push button operation establishes the appropriate sequences for the selected tests.

The robust, ergonomically designed unit incorporates an integral rubber bumper for rugged use in the field.

PrimeTest 200

PrimeTest 200 is the first ever hand-held tester to combine the function of three separate testers into one instrument: PAT Tester plus Installation Checker plus digital multimeter (DMM).

The ergonomically designed hand-held unit with integral rubber bumpers has the ability to perform 10 tests including temperature (via a module) and is capable of testing all 230V portable electrical appliances and IT equipment.

It is suitable for those working in the service and repair industry for vending, white goods, audio visual, office equipment, catering and for electricians and electrical contractors.

Features include:

- Rotary switch test selection
- Single Test button action
- Tests Class I and Class II equipment including IT and business equipment
- Extension and IEC Lead tests
- Insulation, Continuity, Socket polarity and RCD tests
- Loop resistance indication without RCD trip
- Voltage (AC and DC)
- Temperature Measurement (with optional accessory module using a type K thermocouple)
- LCD display with analogue bar graph and back light
- Battery life indicator
- Lead compensation up to 10ø for Earth continuity & low resistance measurement
- Continuity buzzer
- Lock to hold a measurement on the display
- Auto power off when not in use
- Supplied with batteries, lead set, IEC lead, instruction manual and deluxe carry case with shoulder strap

Primetest 300

Seaward Electronic's innovative new PrimeTest 300 has been specifically designed to boost the test productivity of electrical contractors and service engineers by making portable appliance testing faster and easier.

The comprehensive tester performs all tests needed for compliance with the Electricity at Work Regulations.

The instrument can also record electrical test results and equipment safety details as part of safety audits and traceable record keeping systems.

The lightweight hand held tester incorporates all Class I and Class II required electrical safety tests in a compact user-friendly design.

Long life battery power eliminates the reliance on mains supply, reduces downtime between tests and makes the instrument totally practical and portable to use anywhere.

In addition, new Bluetooth technology enables the wireless connection of bar code scanners, label printers and other accessories, allowing totally cable-free testing without the cumbersome and constant plugging and unplugging of leads and cords.

It enables all information stored in the tester's internal memory to be downloaded directly to a PC or PDA immediately and without physical connection.

An intuitive and fast user interface supports straightforward operation and test control in either manual or automatic test modes.

Operating features also include fast start up and a large white backlit graphics display, which is supported by a full alphanumeric keypad, including programmable soft keys for customised test routines.

The PrimeTest 300's large internal memory facilitates the storage of test results for safety audit and traceability purposes.

In addition, as well as test results, the tester can also record other details and descriptions of the equipment under test.

Wireless connection means that stored data can be transferred immediately and directly from the tester to PC-based record keeping systems at the touch of a button.

The PrimeTest 300 can also be used with the special Test 'n' Tag system for fast and automatic printing of appliance test labels direct from the test instrument.

Own logos and details can be incorporated directly onto the test labels. Application of the labels to equipment at the time of test provides an immediate indication that appliances are safe to use.

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Please allow up to 28 days for delivery

Seen on sale for £20 *each*, these high-quality oscilloscope probe sets comprise:

- two x1, x10 switchable probe bodies
- two insulating tips
- two IC tips and two sprung hooks
- trimming tools

There's also two BNC adaptors for using the cables as 1.5m-long BNC-to-BNC links. Each probe has its own storage wallet.

To order your pair of probes, send the coupon together with £21.74 UK/Europe to

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Specifications

Switch position 1	
Bandwidth	DC to 10MHz
Input resistance	1MΩ – i.e. oscilloscope i/p
Input capacitance	40pF+oscilloscope capacitance
Working voltage	600V DC or pk-pk AC
Switch position 2	
Bandwidth	DC to 150MHz
Rise time	2.4ns
Input resistance	10MΩ ±1% if oscilloscope i/p is 1MΩ
Input capacitance	12pF if oscilloscope i/p is 20pF
Compensation range	10-60pF
Working voltage	600V DC or pk-pk AC

Switch position 'Ref'
Probe tip grounded via 9MΩ, scope i/p grounded

Could you use a

Purchasing a spectrum analyser can be a costly exercise so it is important to evaluate requirements and expectations before placing an order, says Bryan Harber, *product manager at Aeroflex.*

Aeroflex 2399a spectrum analyser

Historically, spectrum analysers were very expensive units and the province of a few 'expert' users. But today, spectrum analysers operating up to 4GHz are relatively inexpensive and nearly as commonplace as digital multimeters.

However, an analysis of the key parameters and architecture of spectrum analysers will help to ensure that the purchaser gets the right product at the right price.

Let us start with the simplest definition of a spectrum analyser: "A radio receiver with a swept local oscillator that displays frequency against amplitude on a Cartesian display".

Key parameters

The important parameters are listed here in a sensible order that can be applied to most cases; some will argue for other ways to rank the parameters. Also discussed is how spectrum analyser architectures affect some of the parameters and therefore the decision process.

Frequency. The frequency range parameter is top of the list because this probably has the greatest effect on a key decision-making point – price!

First, consider the lowest frequency of operation required and compare it to typical spectrum analyser frequency range specifications. Usually, the lowest specified frequency of operation will be between 9kHz and 100kHz, exceptionally 100Hz or even 'DC'.

At the high frequency end, the range is limited by the mixing system and the need to provide adequate filtering.

There are three types of architecture employed in most spectrum analysers that are in current use:

The up/down-converter with multiple IFs – the most common low frequency system operating from a few kHz to maybe 3GHz or 4GHz. The harmonic mixer – employed almost exclusively for microwave spectrum analysers. Two versions, preselected and non-preselected, are available for operation up to 100GHz, although the highest frequency preselected mixers are limited to around 60GHz by coaxial connector systems. The highest frequency types are in waveguide.

Level range. This will be specified by the manufacturer as "maximum input power handling, normally that of the input attenuator". Typically this is between 100mW (+20dBm) and 1W (+30dBm). The minimum level will usually be specified as the noise floor; occasionally, the minimum settable top of screen reference level will be stated.

Noise floor. The spectrum analyser noise floor is normally described in product data sheets as "Displayed Average Noise Level" or DANL and it is the on-screen lowest noise level that can be obtained under a specified set of conditions.

For example: "DANL is -115dBm between two frequencies with resolution bandwidth (RBW) set to 1kHz and a video bandwidth (VBW) of 10Hz with 0dB input attenuation at 25 degrees centigrade."

The RBW is particularly important here since we know that thermal noise is given by kTB where, k is Boltzman's constant, T is operating temperature and B is the detection bandwidth (RBW in a spectrum analyser).

In a 1kHz RBW at 25 degrees this equates to 144dBm and implies that the noise figure of the spectrum analyser in the above example is 29dB. This is quite normal for spectrum analysers that are usually optimised for signal handling rather than sensitivity.

When comparing spectrum analysers from different manufacturers, care should be taken to compare DANL specifications on a normalised basis.

Naturally, manufacturers want to show their lowest noise floor and will often specify DANL in the narrowest filter available.

For example, if the spectrum analyser above has a 10Hz analogue filter then the DANL could be quoted as -135dBm in 10Hz. Other manufacturers normalise to a 1Hz bandwidth showing this as -145dBm.

All three values used in the above example result in the same normalised value so it is necessary to carefully extract the conditions specified.

Display range. This is simply a statement of the product of the vertical scale range and the graticule size, normally either eight or 10 graticule steps and 10dB/division, although exceptionally, some analysers with only eight graticule steps offer 20dB/div which implies

spectrum analyser?

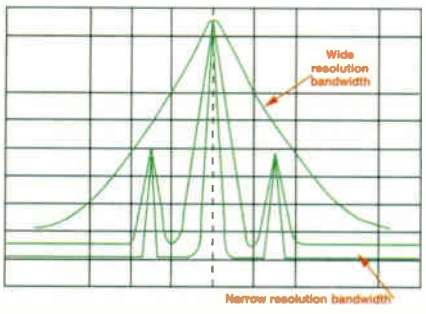


Figure 1: Resolution bandwidth

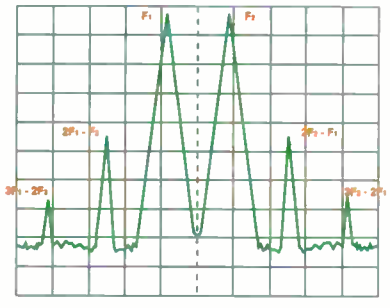


Figure 2: Two tone intermodulation analysis

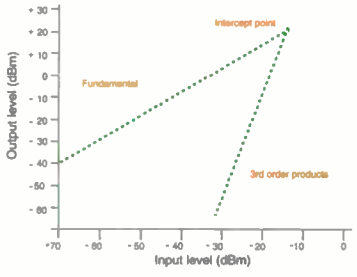


Figure 3: Intermodulation intercept point

160dB of display range. This may appear to be of benefit but see dynamic range below.

Dynamic range. It is this parameter that causes most confusion for users; this is probably due to a misunderstanding of the accepted definition for dynamic range.

The commonly accepted definition states "the ratio of the largest signal that can be handled without distortion and the analyser noise floor".

This was originally a definition for high performance radio receivers and can equally well be applied to spectrum analysers. The problem is that this definition is often corrupted to make the analyser appear better than is actually the case.

Both parts of the definition should apply at the same instant in time but often the large signal part of the definition is taken to be at some more favourable (higher) point so that the total range appears greater.

Alternatively, with the input attenuator set for large signal handling, the noise floor definition is moved to that with no attenuator, again creating a larger ratio than is really possible.

Resolution bandwidth (RBW)

Resolution bandwidth is the bandwidth of the IF filter, which determines the selectivity of a spectrum analyser.

A wide resolution bandwidth is required for wide sweeps whilst a narrow filter is used for narrow sweeps. By using narrower resolution bandwidths the instrument can resolve the sidebands.

The penalty for high resolution is a slower sweep speed. Wide filters are thus used when the display needs to be updated rapidly or when wide modulation bandwidths are to be displayed.

The minimum resolution bandwidth of a spectrum analyser is a key measure of ability to measure low level signals adjacent to high level signals and also to provide the lowest displayed noise floor.

Frequency accuracy

There are three related frequency accuracy specifications within a spectrum analyser: reference frequency accuracy, centre frequency accuracy and span accuracy.

The reference frequency accuracy is that of the internal standard frequency oscillator (or external standard, if selected). A spectrum analyser has a swept local oscillator and there are potentially three modes of operation and each has a different frequency accuracy specification:

1) Free run mode is an analogue sweep used for wide spans with probably little better accuracy than ±5 to 10% of total span.

2) "Lock and roll" mode is the more commonly employed mode for wide spans in a modern spectrum analyser. As its name implies, the swept oscillator is locked to the reference at the start of the sweep to accurately set the start frequency, the oscillator is then swept in analogue mode to the stop frequency. An accuracy of ±3% or better of span is typical in this mode.

3) Lock or "Lock-Lock" or stepped sweep mode is the most accurate mode of operation where each frequency point in a stepped sweep is close to the "in-lock" condition.

The mode is usually only employed for small spans of between a few MHz out to a few tens of MHz. In this mode the accuracy is normally written as that of the frequency standard in proportion to the actual frequency or in ppm (parts per million) at the centre frequency.

Level accuracy

Most modern spectrum analysers employ an internal calibration signal to correct for changes in the gain of the IF amplifiers with the objective of maintaining a constant level accuracy.

During factory calibration of the spectrum analyser, the manufacturer will usually connect a signal source and power meter system to characterise the input level and frequency response characteristics, assuming that these do not change subsequently.

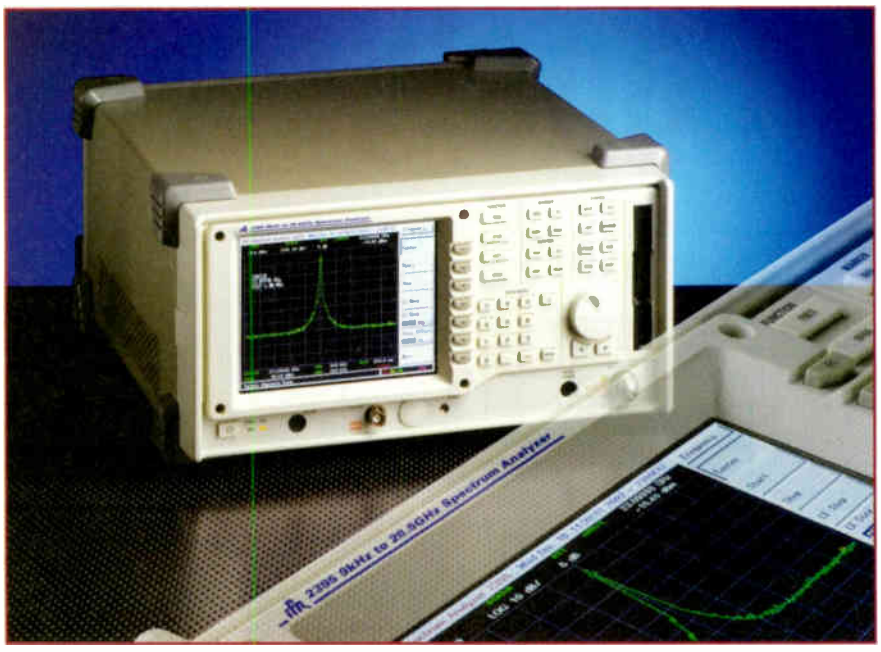
Even with this type of system used over 50 or 60dB of input range, the input level accuracy of a spectrum analyser remains dominated by the input match.

A typical input voltage standing wave ratio (VSWR) for a low frequency spectrum analyser at the highest frequency is around 1.5:1 and for a microwave spectrum analyser can be greater than 3:1.

Distortion and spurious signals

Residual signals. A spectrum analyser can display a signal on the screen even though no signal is present at the input. Instrument designers endeavour to eliminate this undesirable phenomenon but these residual responses as they are known are present in all spectrum analysers to a greater or lesser extent.

Residual responses occur because within a spectrum analyser there are a number of local oscillator frequencies whose frequencies and harmonics mix with each other to produce signals which can fall within the IF bandwidth. These then appear as apparently real signals on the display.



Aeroflex 2395 spectrum analyser

Residual responses can create significant measurement problems so it is important to purchase an instrument with a very good specification.

Residual responses of a quality instrument are typically less than -110dBm. Some instruments can have inferior specifications or, in some cases, the residual responses are not even quoted at all.

Input related spurious signals. Active RF and microwave systems frequently generate non-harmonically related signals that need to be identified and measured.

Tracking down and then reducing the level of unwanted spurious signals is a very common application of a spectrum analyser. Unwary spectrum analyser users can experience problems with such a measurement if they are unaware of the limitations of the instrument.

The problem of internally generated harmonically related distortion products has been described but the spectrum analyser itself can produce spurious responses.

It is essential to ensure that the instrument itself does not generate a signal seen on the screen. Instrument-generated spurious signals can either be residual responses that are an inherent limitation of the design or they can be caused inadvertently by the operator if the instrument is overloaded.

Image responses and multiple responses are also encountered in microwave spectrum analysers if a preselector is not used. Modern spectrum analysers have a spurious response specification of typically 120dBm to -110dBm.

To be absolutely certain that a signal is not internally generated, it may sometimes be necessary to replace the signal being analysed with a known pure signal and to study the difference.

Second harmonic distortion. A spectrum analyser can be used to measure the amplitudes of the fundamental and even very low-level harmonics.

Sometimes, however, it is necessary not only to quote the level of the harmonic distortion products, but also to give the total harmonic distortion; this can be calculated from the following equation:

THD (%) = 100 x ÷(A2)2 + (A3) 2 + .. + (An) 2 /A1

Where:

THD = Total Harmonic Distortion

A1, A2, A3 and An = Amplitudes of fundamental, 2nd, 3rd and nth harmonics.

Intermodulation distortion. Measuring the harmonic distortion caused by a device is not a very discriminating measurement.

A more searching method is to use two or more test signals and to measure the intermodulation products that are generated at the output of the device under test.

By using more than one test signal the device is receiving signals that are closer to the more complex signals that are generally encountered in practical systems. Two separate signal generators are needed, the signals are combined together and fed through the device under test.

Great care must be taken when making measurements or they may be invalid. Both signal generators must have low harmonic content.

If this is not possible then a low pass filter should be inserted at the output of the generator. The combiner should be a linear device with good matching.

Another problem is that any non-linearity in the output amplifiers of the signal generators can produce intermodulation.

Further problems can arise if the ALC detector at the output of one signal generator also detects the signal from the other signal generator.

For these two reasons, it is good practice to insert an attenuator between the signal generator output and the combiner.

In some circumstances, this may not be practical because the signal level may then be too low. For higher frequency measurements an isolator is recommended to improve measurement integrity.

A typical spectrum analyser display of a two-tone intermodulation test is shown in Figure 2, annotation has been added to explain the origin of the intermodulation products.

Signal generator 1 has a fundamental frequency of F1 and signal generator 2 has a fundamental frequency of F2. Nonlinearity in the device under test will cause harmonic distortion products of frequency 2F1, 2F2, 3F1, 3F2 etc to be generated.

The spectrum analyser will record these harmonic products but the significance of the intermodulation test is that the non-linearity causes the harmonic products to mix together to generate additional signals.

Numerous intermodulation products can be generated but the most commonly encountered ones are known as the third order and fifth order products.

Third order products have frequencies of 2F1 - F2 and 2F2 - F1. Fifth order products have frequencies of 3F1 - 2F2 and 3F2 - 2F1 etc. Even order products such as F1 + F2 and F2 - F1 are also encountered but are generally less significant since the intermodulation products are widely separated from the two frequencies (F1 and F2) and usually

can be readily filtered out.

The amplitudes of intermodulation products change according to the amplitudes of the test signals applied and it is therefore necessary to specify the level of the test signals.

It can be difficult to compare the performance of different devices however, if they were measured at different levels. The solution is to use the concept of an intermodulation intercept point.

An intercept point is the theoretical point at which the amplitudes of the intermodulation products equals the amplitudes of the test signals, Figure 3 shows the concept.

There are two lines on the graph. The fundamental line shows a linear relationship between the input and output signals but the line has been extrapolated beyond the output level of +5dBm since at such levels the response becomes non-linear.

Input and output signal levels have also been plotted for the 3rd order products and the line is extrapolated. The two lines meet at the intermodulation intercept point.

The slope of the intermodulation product line is equal to the order, that is the 2nd order lines have a slope of 2:1, the 3rd order lines have a slope of 3:1.

Practically, this means that as the level of the test signal is reduced by 10dB then the 3rd order product will theoretically drop by 30dB, provided that the device is operating in a linear mode.

Sweep speeds

A spectrum analyser must be swept sufficiently slowly to allow the signal level in the narrow resolution filters to settle.

Two difference responses are shown, the errors produced when sweeping too fast are clearly illustrated.

Modern instruments incorporate microprocessor control to always give the correct speed. Under certain conditions, where high resolution is required, the sweep speed may need to be as slow as 100 seconds, digital storage is thus essential.

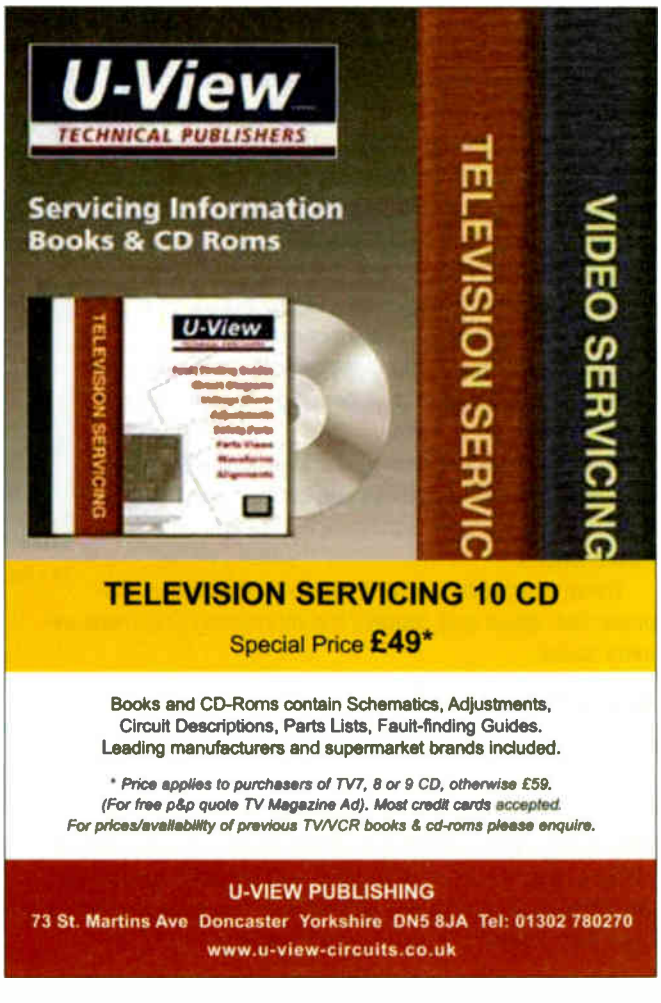
Manual sweep speed controls are provided on modern instruments to override the automatic selection. Sweeping faster than the optimum can be useful to carry out a rapid uncalibrated search for spurious signals or to study the effects of rapidly changing transient signals. The operator must however be aware of the errors that can be generated.

Other features and facilities

Perhaps the most common optional feature offered with most spectrum analysers up to 3-4GHz is that of a tracking generator.

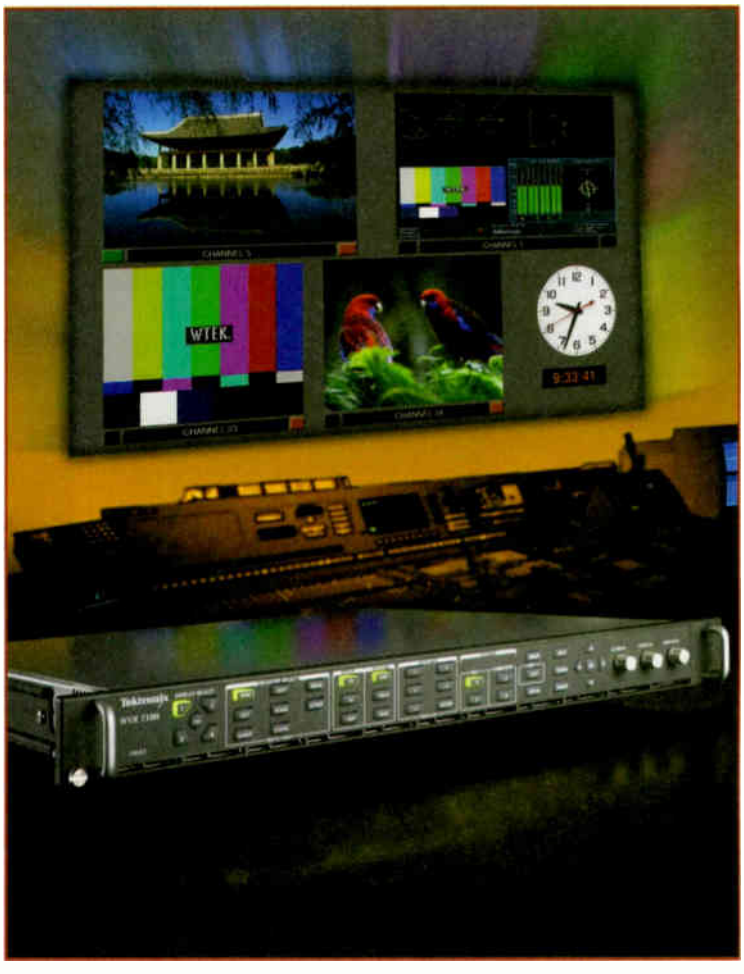
This allows the spectrum analyser to be used as a selective scalar network analyser. Other possible uses include a fault location or time domain reflectometer (TDR) facility for cable testing in cell site maintenance applications.

Microwave spectrum analysers generally either only offer a tracking generator over a limited lower frequency range or do not have the facility at all. An optional tracking generator on a spectrum analyser usually adds 25% to the price.



Raster ferry-ing waveforms

A waveform monitor is a special type of oscilloscope used in television applications. It is typically used to measure and display the level, or voltage, of a video signal with respect to time.



The Tektronix WVR7100 waveform rateriser

Tektronix's WVR7100 supports HD monitoring applications with the options to add SD and/or composite analogue video monitoring capabilities. The WVR6100 comes standard with the SD monitoring capability, with the option to add composite analogue video monitoring capability.

Both WVR7100 and WVR6100 can add options for Analogue audio, Digital AES and embedded audio, as well as Dolby Digital (AC-3) and/or Dolby E decode and monitoring (including Metadata) capabilities. You can now monitor HD, SD and Analogue Composite video, as well as Analogue and Digital audio, all from a single, convenient 1 RU instrument.

A high resolution, tiled display design lets users customise presentation of information for each operation they wish to perform.

Waveform, vector, gamut, audio (optional), status and picture monitor displays can be combined with line select, gain and magnification in nearly unlimited combinations.

These instruments offer a number of exclusive displays that speed and simplify the monitoring and measurement tasks.

Waveform Displays

Display options lets users choose between parade and overlay presentation of SDI signals in RGB, YPbPr, YRGB or composite formats. Full horizontal timing flexibility is provided with 1Line, 2Line, 1Field and 2Field sweep modes, with or without magnification. Both fixed and variable vertical gain are offered, each with the outstanding accuracy and repeatability that comes from a fully digital design.

A variety of filtering options allows optimised presentation of information. The vector display is offered with selectable 75% and 100% targets. Each display automatically selects the appropriate graticule based on the input format.

The lightning display provides unique insight not available in traditional vector displays – allowing users to visualise both luma and chroma amplitudes, as well as quantify inter-channel timing, without taking the equipment out of service.

Diamond and Split Diamond displays enable colorists, editors and operators to visualise whether the content is RGB gamut compliant with a single glance. Plus, they are

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1459T	PSU	ONWAKIT
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1799Y	STANDBY	MODKIT37
2002	PSU	ONWAKIT
2009B	PSU	ONWAKIT
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2152T	PSU	ONWAKIT
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BTV17	STANDBY	MODKIT37
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CT2162UNT	PSU	ONWAKIT
CT2863UNT	PSU	ONWAKIT
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2029TA	PSU	ONWAKIT
COMPACT 11	PSU	MODKIT47

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F16 CHASSIS	LINE	GOODKIT1
F16	PSU	GOODKIT1
F16	VIDEO	GOODKIT1
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CUC 2051	PSU	MODKIT48
CUC 2058	PSU	MODKIT48
CUC 2059	PSU	MODKIT48
CUC 2080	PSU	MODKIT48
CUC 7350		GRUNDIGKIT1
CUC 7301/3 (BUZ90)	PSU	GRUNDIGKIT2
CUC 7301/3 (MJF18004)	PSU	GRUNDIGKIT3
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HITACHI		
C28W440N	PSU	MODKIT54
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AV29SX1EN	FIELD O/P	JVCKIT1
AV29SX1EN1	FIELD O/P	JVCKIT1
AV29SX1PF	FIELD O/P	JVCKIT1
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C14T1EK	PSU	ONWAKIT
C21ET1EK	PSU	ONWAKIT
CS21M3EK	PSU	ONWAKIT
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1496R/T (BUZ90)	PSU	MODKIT44
1498	PSU	ONWAKIT
2086	PSU	ONWAKIT
2096R/T (H3N90)	PSU	MODKIT43
2096R/T (BUZ90)	PSU	MODKIT44
2098	PSU	ONWAKIT
21V1N (BUZ90)	PSU	GRUNDIGKIT2
21V1T(MJF18004)	PSU	GRUNDIGKIT3
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CT25M5BT	PSU	MITSKIT3
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CT21AV1BS	PSU	MITSKIT3
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CT29A4	TDA 8178S	MITSKIT2
CT29A6	TDA 8178S	MITSKIT2
CT29B2	TDA 8178S	MITSKIT2
CT29B3	TDA 8178S	MITSKIT2
CT29B6	TDA 8178S	MITSKIT2
CT33B3	TDA 8178S	MITSKIT2
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TC28XD60	VERT OUTPUT	PANKIT2
TX28XD70	VERT OUTPUT	PANKIT2
TX29XD70	VERT OUTPUT	PANKIT2
TX-W26D3	VERT OUTPUT	PANKIT2
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28PW6006/05	PSU	MODKIT50
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310.62264		PHILKIT1
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G110 CHASSIS	SOPS	PHILKIT3
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GR2.2 CHASSIS	SOPS	PHILKIT1
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KSM VIDEO	SOPS	PHILKIT9
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CI6844	FRAME	SAMKIT2
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VI395	PSU	SAMSUNGKIT
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51CS03H	PSU	SHARPKIT1
51CS05H	PSU	SHARPKIT1

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59DS03H	PSU	SHARPKIT3
59FW53H	PSU & EW	MODKIT49
28HW53H	PSU + EW	MODKIT53
56FW53H	PSU + EW	MODKIT53
66CS03H	PSU	SHARPKIT2
66CS05H	PSU	SHARPKIT2
66CSD8H	PSU	SHARPKIT2
66EW53H	PSU + EW	MODKIT53
66FW53H	PSU + EW	MODKIT53
66FW53H	PSU & DOLBY	MODKIT45
66FW53H	PSU & EW	MODKIT49
66FW54H	PSU & DOLBY	MODKIT45
66FW54H	PSU & EW	MODKIT49
66FW63H	PSU + EW	MODKIT53
76FW53H	PSU & DOLBY	MODKIT45
76FW53H	PSU & EW	MODKIT49
76FW54H	PSU & DOLBY	MODKIT45
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76FW53H	PSU + EW	MODKIT53
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2.50mm	1.6m	WICKS4	£ 1.00 + vat
0.80mm	3.0m	WICKM1	£ 1.00 + vat
1.50mm	3.0m	WICKM2	£ 1.20 + vat
2.00mm	3.0m	WICKM3	£ 1.30 + vat
2.50mm	3.0m	WICKM4	£ 1.40 + vat
2.50mm	15m	WICKL4	£ 6.00 + vat
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3 1/2 digits LCD Display
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Transistor Testing Socket
Audible continuity

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AC Voltage: 200mV, 2V, 20V, 200V, 750V
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Transistor Testing Socket
Audible continuity

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AC Voltage: 200mV, 2V, 20V, 200V, 750V
DC Current:20uA,200uA,2mA,20mA,200mA,2A,10A
AC Current: 200uA, 2mA, 20mA, 200mA, 2A, 10A
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3 1/2 digits LCD Display
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Transistor Testing Socket
Audible continuity

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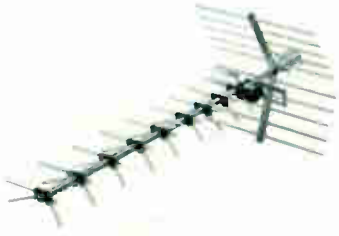

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From Wikipedia, the free encyclopedia:

The level of a video signal usually corresponds to the brightness, or luminance, of the part of the image being drawn onto a regular video screen at the same point in time. A waveform monitor can be used to display the overall brightness of a television picture, or it can zoom in to show one or two individual lines of the video signal. It can also be used to visualise and observe special signals in the vertical blanking interval of a video signal, as well as the colorburst between each line of video.

Waveform monitors are used for the following purposes:

1) To assist with the calibration of television cameras, and to "line up" multiple cameras being used at the same location in order to ensure that the same scene shot under the same conditions will produce the same results.
2) As a tool to assist in telecine (film-to-tape transfer), color correction, and other video production activities
3) To monitor video signals to make sure that neither the color gamut, nor the analogueue transmission limits, are violated.
4) To diagnose and troubleshoot a television studio, or the equipment located therein.
5) To assist with installation of equipment into a television facility, or with the commissioning or certification of a facility.

A waveform monitor is often used in conjunction with a vectorscope in manufacturing test and research and development applications. Originally, these were separate devices; however modern waveform monitors include vectorscope functionality as a separate mode.

Originally, waveform monitors were entirely analogue devices; the incoming (analogue) video signal was filtered and amplified, and the resulting voltage was used to drive the vertical axis of a cathode ray tube.

A sync stripper circuit was used to isolate the sync pulses and colorburst from the video signal; the recovered sync information was fed to a sweep circuit which drove the horizontal axis.

Early waveform monitors differed little from oscilloscopes, except for the specialised video trigger circuitry. Waveform monitors also permit the use of external reference; in this mode the sync and burst signals are taken from a separate input (thus allowing all devices in a facility to be synchronised to the same timing source).

With the advent of digital television and digital signal processing, the waveform monitor acquired many new features and capabilities.

Modern waveform monitors contain many additional modes of operation, including picture mode (where the video picture is simply presented on the screen, much like a television), various modes optimised for color gamut checking, support for the audio portion of a television program (either embedded with the video, or on separate inputs), eye pattern and jitter displays for measuring the physical layer parameters of serial-digital television formats, modes for examing the serial digital protocol layer, support for anciliary data and television-related metadata such as timecode, closed captions and the v-chip rating systems.

Modern waveform monitors have largely abandoned old-style CRT technology as well. All new waveform monitors are based on one of two display technologies: either feature a flat-panel liquid crystal display (using specialised graphics hardware to duplicate the behavior of a CRT), or else are sold without a display - the user is expected to connect a VGA monitor to the output. The latter type of device is commonly known as a rasteriser.

Manufacturers

Tektronix (http://www.tektronix.com)
Leader Instruments (http://www.leaderusa.com)
Videotek (http://www.videotek.com)
DK Audio (http://www.dk-audio.com)
Magni Systems (http://www.magnisystems.com)
OmniTek (http://www.omnitek.tv)

Retrieved from:

"http://en.wikipedia.org/wiki/Waveform_monitor"

Tektronix's WVR7100 supports HD monitoring applications with the options to add SD and/or composite analogue video monitoring capabilities. The WVR6100 comes standard with the SD monitoring capability, with the option to add composite analogue video monitoring capability.

Both WVR7100 and WVR6100 can add options for Analogue audio, Digital AES and embedded audio, as well as Dolby Digital (AC-3) and/or Dolby E decode and monitoring (including Metadata) capabilities. You can now monitor HD, SD and Analogue Composite video, as well as Analogue and Digital audio, all from a single, convenient 1 RU instrument.

A high resolution, tiled display design lets users customise presentation of information for each operation they wish to perform.

Waveform, vector, gamut, audio (optional), status and picture monitor displays can be combined with line select, gain and magnification in nearly unlimited combinations.

These instruments offer a number of exclusive displays that speed and simplify the monitoring and measurement tasks.

Waveform Displays

Display options lets users choose between parade and overlay presentation of SDI signals in RGB, YPbPr, YRGB or composite formats. Full horizontal timing flexibility is provided with 1Line, 2Line, 1Field and 2Field sweep modes, with or without magnification. Both fixed and variable vertical gain are offered, each with the outstanding accuracy and repeatability that comes from a fully digital design.

A variety of filtering options allows optimised presentation of information. The vector display is offered with selectable 75% and 100% targets. Each display automatically selects the appropriate graticule based on the input format.

The lightning display provides unique insight not available in traditional vector displays – allowing users to visualise both luma and chroma amplitudes, as well as quantify inter-channel timing, without taking the equipment out of service.

Diamond and Split Diamond displays enable colorists, editors and operators to visualise whether the content is RGB gamut compliant with a single glance. Plus, they are designed to help isolate the out-of-gamut component just as easily.

For SDI component content that is destined for broadcast in composite systems, the Arrowhead display can be used to monitor composite gamut compliance without the need for a separate encoder. Within this display, a separate upper and lower luma-only gamut limit can be applied. The FlexVu display lets you monitor the Diamond and Arrowhead displays

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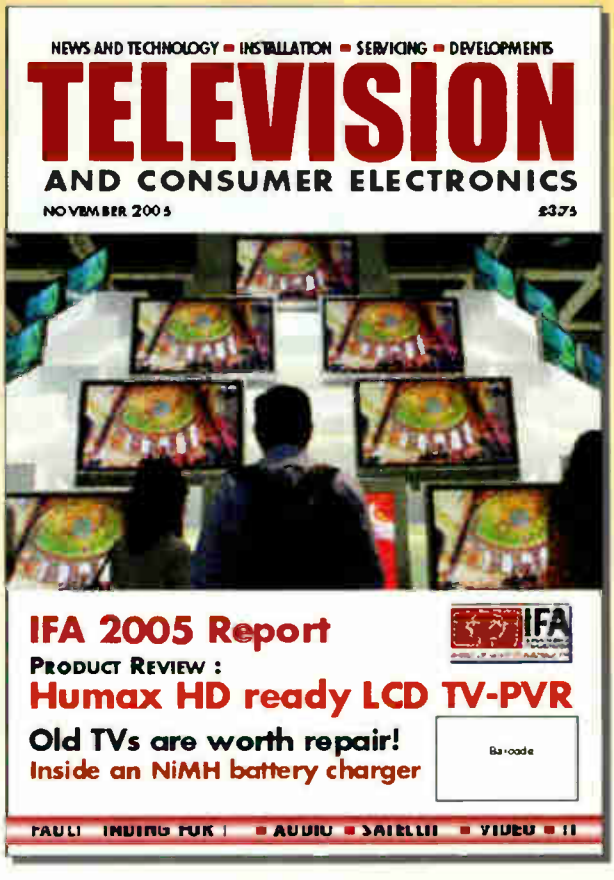


Freedom from the

Sometimes you may want to go out into the field to do some test and measurement. Nowadays, you do not have to be tied to a bench oscilloscope. With a hand-held scope, you can take it out and about with you. Here we look at two products from Fluke and Chauvin arnoux.

For the more demanding applications, the ScopeMeter 190 Series high-performance oscilloscopes offer specifications usually found on top-end bench instruments.

With up to 200 MHz bandwidth, 2.5 GS/s real-time sampling and a deep memory of 27,500 points per input they are suitable for engineers who need the full capabilities of a high-performance oscilloscope in a handheld, battery powered instrument.

With a maximum real-time sampling rate of 2.5 GS/s per input, you can see what really happens, with 400 ps resolution.

Both inputs have their own digitiser, so you can simultaneously acquire two waveforms and analyse them with the highest resolution and detail. If an anomaly flashes by on the screen, just press the Replay button to see it again.

Thanks to the wider screen, you will always see a 12 divisions time-window, giving a far better overview of what is happening both before and after the trigger event.

The waveform memory of all oscilloscopes in both the 190B and 190C Series has been enlarged to allow as many as 3000 samples per channel to be acquired.

You can use the zoom function to find tiny details in a long waveform, for example, the color burst in a video signal or a single impulse in a complex data-stream.

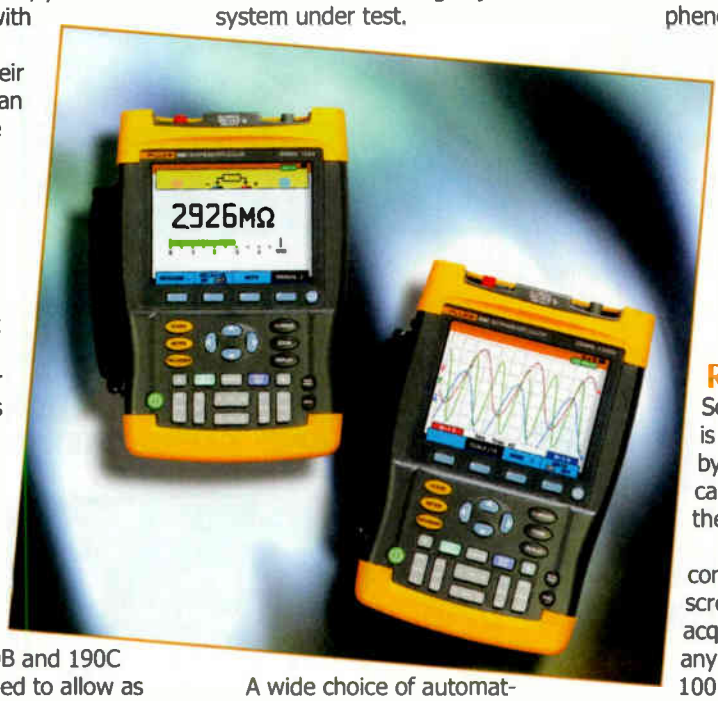
All models also allow the high-resolution waveforms to be transferred to a PC for later detailed analysis using FlukeView ScopeMeter software.

Full-color display makes identification of individual waveforms easier, particularly when displaying large amplitude or multiple overlapping waveforms on screen. On-screen color labels, measurements and warnings are clearly linked to specific waveforms.

Digital Persistence

The Digital Persistence uses multiple intensity levels and user selectable decay time as if you're looking at the display of an analog, real time oscilloscope.

The fast display update rate that is a standard on all models reveals signal changes instantaneously - useful for instance when making adjustments to a system under test.



Fluke's 196C and 199C ScopeMeters allow the high-resolution waveforms to be transferred to a PC for later detailed analysis using FlukeView ScopeMeter software

A wide choice of automatic and manual trigger modes gives you the flexibility to capture just about any signal you will encounter. Connect-and-View triggering is ideal for fast and easy checking of multiple test-points.

The manual modes include time delay, video and pulse-width triggering. A fully isolated external trigger input is included for troubleshooting time relationships between two input signals synchronised to a third signal.

Two new modes – 'n-cycle triggering' and 'dual-slope triggering' – have been added to the Fluke 190C Series to help you isolate the phenomena of interest.

N-cycle triggering ensures you get a stable 'live' image of a signal, for example, in frequency dividers and clocked (synchronous) digital systems, or to synchronise on bursts of pulses.

Dual-slope triggering enables the oscilloscopes to trigger on both rising and falling edges alike.

This means that any edge in the signal will act as trigger event and initiate a new waveform acquisition, a most useful capability when making eye-patterns from digital data-streams, or in conjunction with single-shot phenomena.

Replay button

Scope users know how frustrating it is to see a one-time anomaly flash by, never to be seen again. Now you can look back in time with a touch of the replay button.

In normal use, the instrument continuously memorises the last 100 screens. Each time a new screen is acquired, the oldest is discarded. At any moment you can freeze the last 100 screens and scroll through picture-by-picture or replay as a live animation.

Cursors can be used for further analysis. Or you can use the advanced trigger capabilities to capture up to 100 specific events. Two sets of 100 captured screens with individual time stamps can be stored for later recall or download to a PC.

The ScopeRecord memory stores 27,500 points per input or more, for high resolution recording of events up to 48 hours, and captures fast intermittents and glitches as short as 50 ns.

This continuous roll mode stores, for example, events like motion profiles,

bench

UPS-, power supply- and motor start-ups. All models also have a 'Stop-on-Trigger' in the ScopeRecord mode.

This allows the ScopeMeter to store waveform data until the instrument is triggered or until a repetitive trigger signal is interrupted.

This way, the instrument will, for example, automatically recognise a power failure and store the waveform data preceding it.

And with 100 x zoom, you can look at the smallest details, like individual power cycles. Two of these 27,500 point recordings can be stored for later analysis.

Floating isolated inputs

The ScopeMeter 190 Series have three independently floating isolated inputs. While conventional oscilloscopes can only make measurements referenced to the line power ground, measurements on each of the Fluke ScopeMeter 190 Series inputs can be referenced to a different low level.

This enables measurements in mixed circuits having different ground references, and also eliminates the risk of accidental ground short circuits.

All inputs are safety certified for measurements in 1000 V CAT II and 600 V CAT III environments. And the standard probes cover a wide application range from mV to kV, making the ScopeMeter 190 Series ideal for micro-electronics to electrical power applications.

For analysis of waveforms, ScopeRecord and TrendPlot recordings, the ScopeMeter 190 Series feature 30 automatic measurements, plus cursors, zoom and a real-time clock. The analysis can be made directly or later when back in the office. Up to 2 recordings and 10 scope screens can be stored for analysis, print-out or download to a PC.

All 190C Color ScopeMeters now include Frequency Spectrum Analysis functionality based on Fast Fourier Transformation (FFT) analysis as a standard feature.

This makes it possible for you to identify the individual frequency components contained in a signal. The spectrum analysis function is also handy to reveal the effects of vibration, signal interference or crosstalk.

An automatic window function assures optimal windowing, although you may manually select your preferred time window.

'Waveform reference' allows an acquired trace to be stored and designated 'reference trace' for visual comparisons, or it can be used as the reference for automatic 'Pass/Fail' testing (190C).

Up to 100 individually matching ('Pass') or non-matching ('Fail') waveforms can be stored in the replay memory, allowing you to monitor your system's behavior over a long period of time, without the need for you to attend.

Automatic power and rms measurements can now be performed on a specific, user identified portion of the waveform using the cursors of the Fluke 190C to define the time-window of interest. In this way, the Color ScopeMeter can measure the power within a specified time span, or the rms-value of a voltage during a dedicated period of time.

The toughest faults to find are intermittent. They can be caused by bad connections, dust, dirt, corrosion or simply broken wiring or connectors. You may not be around to see it - your Fluke ScopeMeter will.

In this "paperless recorder" mode, you can plot the minimum and maximum peak values and average over time, up to 22 days. The two inputs can plot any combination of voltage, current, temperature, frequency and phase, with time and date stamp, to help lead you to the cause of those faults quickly.

600V Cat III insulated

Chauvin Arnoux is introducing a line of Metrix digital oscilloscopes - 40 MHz for industrial maintenance and 100 MHz for electronic maintenance - that it claims includes the first 600V Cat III insulated self-contained portable oscilloscope on the market.

These oscilloscopes combine five complementary devices in one and provide original functions, outstanding readability, and great performance, thanks in particular to their 12-bit, 1GS/s converter.

With 33 direct control keys and Windows-like menus on screen, OX 7000s can also be controlled from their touch pads. On-line help in five languages is available at all times.

Chauvin Arnoux is introducing a line of Metrix digital oscilloscopes

Oscilloscopes, multimeters, real-time FFT analyzers with calculation functions on the channels (standard); harmonic analyzers and recorders (optional); they go where you go.

In addition to their advanced triggering functions (pulse duration, counting, delay, TV), these scopes have math functions that let you define a mathematical function for each trace, scale vertically, and specify the true physical unit.

A must for diagnostics, the 8000-point, 50kHz, multi-channel multimeter measures amplitudes, resistance, continuity, capacitance, frequency, and temperatures and runs tests on components.

In the harmonic analyser function (optional), the instrument can display the first 32 orders of signals having fundamental frequencies between 40-450Hz.

The digital recorder (optional) allows acquisition rates of 500 µs between two measurements, for records that can extend over one month, starting from the surveillance of tolerance thresholds, in particular.

With the FFT function, qualitative analyses of harmonics, of signal distortion, and of impulse responses, and searches for noise sources in logical circuits, lead to effective diagnostics.

The autoset feature makes it easier to obtain an optimal spectral representation on which a graphic zoom can be applied and precise measurements made with the help of the cursors.

Smart probes and sensors

The patented Probix system of plug-and-play accessories is your assurance of fast and, more particularly, error-free setting up of the instrument.

The coefficients, scales, and units of the sensors and the configurations of the channels are managed automatically, and the probes and adapters are recognized as soon as they are connected.

Television test & measurement

Whether analogue or digital, terrestrial cable or satellite, a television signal has to leave the broadcaster within tightly defined specifications. Up to that point there are plenty of opportunities for the process to go wrong. Steve Nunney of professional test and measurement specialist manufacturer Hamlet looks at the specifications and talks about the ways in which it is checked.

In the beginning was black and white television. The developers of the first systems, for simplicity's sake, determined that the peak level of a video signal – white – should be one volt, a nice easy number to remember. By making black 0.3V there was room below it for a synchronisation signals – a short length of 0V marked the beginning of each television line.

So the first television test device was born: the waveform monitor. This is a display, locked by the synchronising pulse, showing the level across a line, as shown in figure 1. By putting graticule lines at 0V, 0.3V and 1.0V you can instantly see that the signal is in specification; a vertical scale will show that the blanking, sync pulse and active picture information fall in the right parts of the 64µs line period.

Figure 1: Luminance waveform display

Then along came colour television. Superficially, this is just like three black and white signals in parallel: one each corresponding to the red, green and blue signals, from the detectors in the camera to the guns in the CRT display.

In analogue days there were separate co-ax cables for red, green and blue (plus a fourth to ensure they remained in synchronisation) between each piece of equipment.

Such a parallel RGB system could still be maintained using a waveform display, although it would take rather more care. A black and white image is going to look reasonably good provided the black is black and the white is white.

If something serious was going wrong in the mid-range then a quick look at a grey scale – a continuous sweep from black to white which should show up as a straight diagonal line on the waveform monitor – would identify the problem.

Non-linearity

With an RGB colour system the three channels have to track levels precisely or very visible colour shifts will take place. Any non-linearity in one of the channels will be obvious on the screen.

This is why the familiar colour bar test signal was created: 0%, 50% and 100% values for each channel, giving you black, the three primary (red, green and blue) and secondary (yellow, cyan and magenta) colours, and white.

A combination of graded video monitor and waveform display gives a quick reassurance that all is well, or a clear indication of any problem.

If the colour television was RGB from camera to home this would be fine, but it is not. As you are aware, the analogue

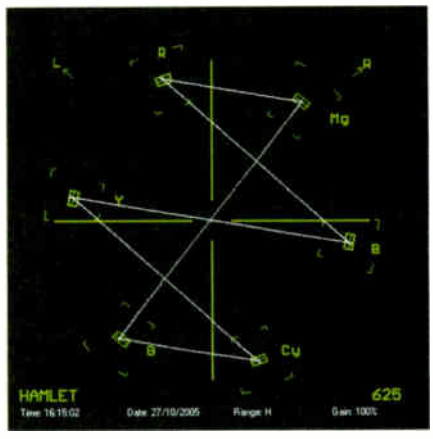


Figure 2: Vector scope trace

transmission system used "composite video", that is to say the luminance signal plus a burst of colour information in the blanking interval.

The conversion from RGB to composite imposes some restrictions on what colours can be broadcast: shades which fall outside the defined colour space will either be distorted by the conversion process or will attempt to create signals greater than the peak 1V so would cause problems of over-modulation at the transmitter.

This is called the colour gamut: the gamut of colours which can be accepted for transmission. Colours which fall outside the colour gamut are called illegal.

Obviously, whatever the production and post production processes the signal goes through, it makes sense to avoid colours which would be illegal in composite video. That actually means placing some restrictions on the RGB signal.

So now we need a second critical test device, to evaluate colour space. The universally accepted solution is the vectorscope, as shown in figure 2, which represents the colour information as vectors around the "colour wheel". It shows the engineer that the colour is within gamut, or identifies problem areas.

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There is one more level of complication in the studio infrastructure. Although cameras and displays use RGB, it is pretty impractical for all the rest of the equipment. In particular, it requires a lot of bandwidth to record.

A trick was developed which creates first a luminance signal by adding weighted values for all three colours (known as Y), then two colour difference channels: blue minus Y and red minus Y.

A moment's algebra will reveal that the original RGB values can be obtained from these three numbers. The advantage is that the two colour difference values (U and V) can be much smaller and still achieve a good looking picture.

The significance of this is that in the simplest case a picture will leave the camera in RGB, get converted to YUV for recording and processing, then get converted to composite video for broadcast.

The colour gamut for RGB, YUV and composite are all different, and the conversion processes introduce errors, so there is plenty of scope for colour to go out of alignment. In practice most signals go through editing and graphics systems on the way, some of which might involve an RGB/YUV conversion and vice versa.

Analogue drift

Remember, too, that each of these pieces of equipment would have involved analogue electronics prone to drift. Accurate colour depends on precise tracking of the levels of the signals, so this drift was a major problem.

It was traditional, therefore, for just about every stage of the broadcast chain to be supervised by an engineer looking at a waveform monitor and a vectorscope. The twin devices were built into desks everywhere: the standard form factor was that each would be a half width, 3U high rack cabinet.

The experienced eye would use these tools to determine if a signal was within specification or, if not, where the problem lay, either in equipment out of alignment or operator error.

Then along came digital electronics, which transformed the broadcast workflow. The conversion is virtually complete, certainly in Europe: you would be pressed to find much in the way of analogue electronics left in a studio centre now.

Digital electronics means digital stability. That is its core benefit: provided you can see the signal you can see a perfect signal. At a stroke all those trim pots were eliminated – when Cintel introduced its first all-digital telecine it eliminated 365 daily adjustments.

The Flexiscope is like a pda for digital television test engineers.

Add to this virtual elimination of routine alignment the general increase in reliability of modern electronics, and it meant there was little for engineers to do. The accountants who run broadcasting saw these engineers sitting around twiddling their thumbs and immediately sent them off for retraining.

In truth, there is no longer much need for engineers to make routine checks of signal levels flowing from device to device down the broadcast chain, although the need has not completely disappeared, as I will describe later. But that is not to say there is no need for checks on signal levels and colour legality. That is as important as ever.

First, a lot of content broadcast today is actually made elsewhere and delivered to the broadcaster. Commercials, bought-in programming, even trailers and promotions made by external facilities: all these go first to a quality control room, because you do not know that the supplier has the same good standards as you do.

These tend to be the last bastion of the old-fashioned desk with the waveform monitor and vectorscope.

Second, and even more important, the growth of relatively low-cost digital equipment has delivered a lot of tools to affect the look of the picture and, as we all know, when you put such tools in the hands of creative people, their first instinct is to push the limits, to see how far they can go.

Take colour processing. In the early days this was called colour correction, and it was applied to film on a telecine to correct imperfections in the chemical processing.

The colorist

Then the makers of commercials realised they could use the same tools to create startling looks for their clients, and a new hero of the post production industry was born: the colorist (always spelt in American because the name was invented over there).

Add colour processing tools to digital video, and now half the programmes you see on television credit a colorist, and the other half should.

Watch a holiday programme and the sky is always a rich cerulean blue, the sand golden, the bikinis scarlet. No, this is not what it looks like: it is what happens when a colorist is told to make the destination look like a great place for a vacation.

Increases in digital power has made us all colorists. If you have a consumer digital editor like Final Cut Pro, Pinnacle Liquid Edition or Avid XPress, you will know that colour processing is built in. You can create the holiday look, or the sepia look, or whatever wild and wonderful look you want.

This is fine, but of course in the

broadcast context we have to stay within colour gamut. It is so easy to create illegal colours, but the colorist is an artist not an engineer, so is unlikely to take much notice of the vectorscope off to one side.

This is a typical area which needs a new breed of measurement devices, one which is triggered by out of specification signals. It might do it by highlighting the problem area on screen, or even by sounding an alarm, but it needs to ensure that what leaves the colorist is capable of being delivered to the viewer unscathed.

Colour processing is just one example of the risk of creating out of specification signals. Multiple layers of graphics can cause problems, too, and there is the perpetual risk of problems from multiple RGB/YUV conversions.

So if we are designing test devices simple enough for creative operators to understand, what is the engineer doing? While digital equipment is much more stable and reliable than ever, it does still go wrong, and so the engineer will be spending time fault-finding.

Tracing a problem means portable equipment, which used to mean a trolley with a large oscilloscope, its CRT getting ever further out of alignment with every bump and knock it took around the facility.

We realised that the engineer needed something accurate, flexible, reliable and, most important, to hand. The Flexiscope is like a pda for digital television test engineers. It fits in the palm of the hand, and generates test signals and measures them.

It has a high resolution TFT screen which can be used as a confidence monitor (showing the picture) as well as a vectorscope and waveform monitor. It also includes a speaker and an earpiece socket: we have not talked about audio in this article, but the move from mono through stereo to 5.1 Dolby and DTS has also needed a change in attitude.

No realignment

Internally the Flexiscope is built around an all digital platform which we designed ourselves to be completely stable so never needs realignment. It accepts personality modules: the first modules include the ability to monitor HD and SD, or SD and composite video. Future modules will include specialist test functionality like eye patterns.

The other important thing the engineer is doing, of course, is planning for high definition television. This is a major challenge as HD signals require massive bandwidth: the equivalent of almost 1.5GHz.

That makes even a length of co-ax cable perform in strange ways. If you try to bend the cable too tight then the signal will just go straight on; cinch the cable tie too much and the change in internal capacitance will cause reflections and phase cancellations.

Engineers will spend a lot of time walking around facilities chasing problems like these, and will need a portable, precise and reliable piece of equipment like Flexiscope with them at all times.

HD is the future of television broadcasting. Experience in the USA suggests that once people see it they want it. When European mainstream broadcasts start in earnest in 2006 it is likely to build an audience quickly.

HD is all about delivering excellent quality. That means supporting the creative people in building looks (and sounds) that can be delivered, and maintaining the highest technical standards throughout the broadcast facility.

Either way, professional test and measurement is most definitely still vital.

Test Case 516

Todd, our man-on-wheels, would much rather attend a TV breakdown than a set-top-box problem. The latter never seem to be straightforward, in their hook-up and selection for viewing, or in the problems they develop.

He was less than pleased, then, when Pam gave him two job cards relating to digiboxes, one a Freeview type and the other a Sky satellite receiver.

Well, they have to be attended to, and the advent, maybe next spring, of high-definition TV services from Sky is certainly not going to make things any easier for the likes of Todd.

The first one he got to was the Sky outfit, which turned out to be a Panasonic model TU-DSB31. Its nasty habit took the form of spasmodically shutting down by itself, after which normal working could only be resumed by a mains-power reset, and even then there could be a long wait for it to actually perk up and produce vision and sound.

When it finally did, the quality of both were fine. Todd didn't have time to wait for it to act out its tricks, so he carried out a forced software download and left it for the customer to telephone if the problem had not been cured.

Of course it hadn't, and Todd was very soon back on site with a loan receiver. That seemed to work OK, so off went the Panasonic into the workshop.

On the bench the fault was reluctant to show itself with the top cover off for instant access, as it were. With the lid back on, the fault soon appeared, exactly as the customer had described.

Like the wizards who contribute to our fault-finding pages, having found solutions without the benefit of service manuals or help from the manufacturers, the workshop lads managed to cure this one; the repair job had two aspects. Can you guess what they were?

Meanwhile Todd had gone on to the second service call: Mr Hanson and his Philips DTR1500 Freeview box. Now this gentleman was no ordinary TV viewer or customer.

Determined not to submit to what he sees as the iniquity of BSkyB, he had made up his mind to go for Freeview, and had carried out his own aerial upgrade.

He had bought himself a super high-gain aerial and lined it up on his local transmitter, not far away and quite powerful. That he had a good signal he could demonstrate by hooking the feed to an analogue TV, which certainly showed a noise-free picture.

He contended, then, that reception problems could not possibly be the cause of his problem. The symptom was in fact irregular and spasmodic picture freezing and break-up, worse on some channels and multiplexes than others, and not affected by moving the box from the lounge to the bedroom: Mr Hanson had fixed up a UHF distribution amplifier, bought from the local DIY store.

Maybe Todd should have took another Freeview box with him to provide a substitution test and to loan to this customer if necessary. He got on the phone to Sage and described the problem.

Armed with some good advice Todd was able to provide a solution to this one on site. What was it, and did it necessitate dismantling the Philips box?

Speaking of dismantling, how did you do with the Panasonic puzzle?

All is revealed on page 125.

Digital media recording to Infinity

Thomson has announced a new line of acquisition, recording and storage devices that give broadcasters and videographers the power of choice – in recording media, formats, compression codecs, and connectivity.

The Infinity Series is suitable for newsgathering, documentaries, magazine shows, independent videography, field production, and more.

The Infinity Series is a new approach to electronic news gathering (ENG) and electronic field production (EFP) digital workflows. It includes a digital media camcorder, a digital media recorder, and a new line of media and peripheral devices.

It uses IT-based recording media, IT connectivity, and compression. The Infinity Digital Media Camcorder and the Infinity Digital Media Recorder provide for plug-and-play addition into existing networks given its ability to connect to external storage devices or PCs via USB or FireWire or to networks via Gigabit Ethernet.

It also uses low-cost, IT-based disk drives and IT-based storage solutions, including removable hard disk-based Iomega products as well as Pro-grade CompactFlash, instead proprietary media that are more expensive to use.

"We give customers their choice in formats, media, compression, and workflows and at substantially lower costs," said Marc Valentin, president of the Grass Valley business within Thomson."

Infinity camcorder features 14-bit digital imaging

The Infinity Digital Media Recorder (DMR) works like a tape machine, but accepts removable media instead.

Camcorder

The company claims that Infinity camcorder signifies a revolutionary step in ENG and EFP acquisition, combining the best of Grass Valley's multiple Emmy award winning camera engineering with leading IT recording and connectivity technologies.

It features 14-bit digital imaging for crystal-clear quality with advanced video processing for image control and in-camera digital effects filers.

Open media provides video professionals workflow efficiencies, such as nonlinear random access to video files, simultaneous playback while recording, and long-term archival storage.

For multi-format acquisition as well as migration from SD to HD, the Infinity camcorder provides a choice of video formats and standards selectable within the camera: 525i60, 625i50, 1080i50, 1080i60, 720p50, or 720p60. SD formats are selectable in either 16:9, 4:3 or letterbox aspect ratios.

Infinity camcorders also provide a wide choice of compression schemes as well as assignable compression via the camera's user interface. It is configured as a professional-grade, multi-format 2/3-inch, three-imager SD/HD camcorder.

Recording technology

The Infinity Digital Media Recorder (DMR) works like a tape machine, but accepts removable media instead. This low-cost VTR replacement can be used anywhere a traditional VTR is used: as a field recorder, preview station, playout machine, or for ingesting material into editing environments.

REV or CompactFlash media can be used to replace videotape in the field, in preview rooms, in edit bays, and in control rooms. In addition, the DMR can be connected directly to a nonlinear editing workstation or, for greater accessibility; it can be attached to a file server for immediate enterprise-wide use.

With multi-stream capabilities, the DMR can transfer SD video data while another source is being recorded. The extremely durable REV removable disks provide the portability and cost-effectiveness of videotape with the availabili-

ty, speed, flexibility and ease of use of true nonlinear media such as hard disks.

The compact REV disks store 35 GB, enough to record more than two hours of SD or 45 minutes of HD video.

Professional grade CompactFlash media memory is a readily-available solid-state technology that delivers the high level of performance needed for demanding professional applications. Small, lightweight, and extremely durable, the CompactFlash cards hold up to 8GB of memory today, sufficient for both SD and HD recording.

Jointly developed by Grass Valley and Iomega, Grass Valley REV Pro Digital Media Drive and REV Pro removable media offer an unprecedented price/performance ratio for video recording, playback and storage. Based on Iomega REV removable storage systems, REV Pro drives and disks are specifically engineered for video professionals.

REV Pro uses standard laptop hard drive components but is engineered to provide the added benefits of removability, portability and archivability.

For the video professional, REV Pro offers many advantages over standard REV, including enhanced bandwidth capacity (110Mb/s real time record/playback for throughput for HD video up to 100MB/s) along with the needed overhead support for audio, timecode, and metadata tracks.

It also offers simultaneous record/playback capability and faster rendering speeds for non-linear editing systems. On-board applications include reverse, stop and forward, and browsing, logging and trimming.

Choice of Codecs

The Infinity Series offers broadcasters or videographers a choice of standard and high definition video formats, as well as a wide range of options in compression.

For SD, Infinity includes the DV codec for DVCAm and DVCPRO. For both HD and SD, MPEG-2 compression is available with support for I-frame and Long GOP.

As an additional choice of compression, the next-generation JPEG2000 codec is also included. JPEG 2000 offers special advantages over other compression codes: it offers higher-quality compression with better efficiency, delivers superb images without blocking artifacts at low bit rates, and, with its scalability, allows broadcasters to encode a master file and then decode different resolutions as necessary.

JPEG20000 delivers 10-bit 4:2:2 resolution images, is frame accurate, and synchronizes better with digital audio than other approaches.

ITN implements new compliance recording

ITN is to implement the automated digital recording and storage solution to retain its transmitted programmes for 90 days, in accordance with Ofcom regulations.

ITN is to use ContentProbe from IdeasUnlimited.tv for compliance recording. ContentProbe automatically records broadcast programmes in real time and stores them digitally to reduce the time spent manually labelling and archiving VHS tapes.

Storing up to 180 days' content in a single RU device, it also eliminates the space wasted on housing typically 540 tapes.

The solution uses internal RAID 5 storage and hot-swappable drives for extra reliability.

"ITN produces news programmes for ITV1, the ITV news channel and Channel 4 and so generates vast quantities of content to record to comply with Ofcom regulations," says ITN's head of broadcast engineering Paul Flook.

"ContentProbe gives us the most cost-effective and space-efficient storage, improves quality and saves significant time when compared to using VHS."

"ITN enjoys a strong reputation for the efficient use of technology and continues to lead the industry by spearheading use of ContentProbe," says founder and MD of IdeasUnlimited.tv Glyn Powell-Evans.

ITN makes full use of its IP to drive expansion in the fast-growing new business areas of ITN Archive, one of the world's largest archives with over 680,000 hours of footage and containing some of the world's most iconic imagery; and ITN Multimedia, streaming news and entertainment content to 3G phones; and through producing factual documentaries and programming.

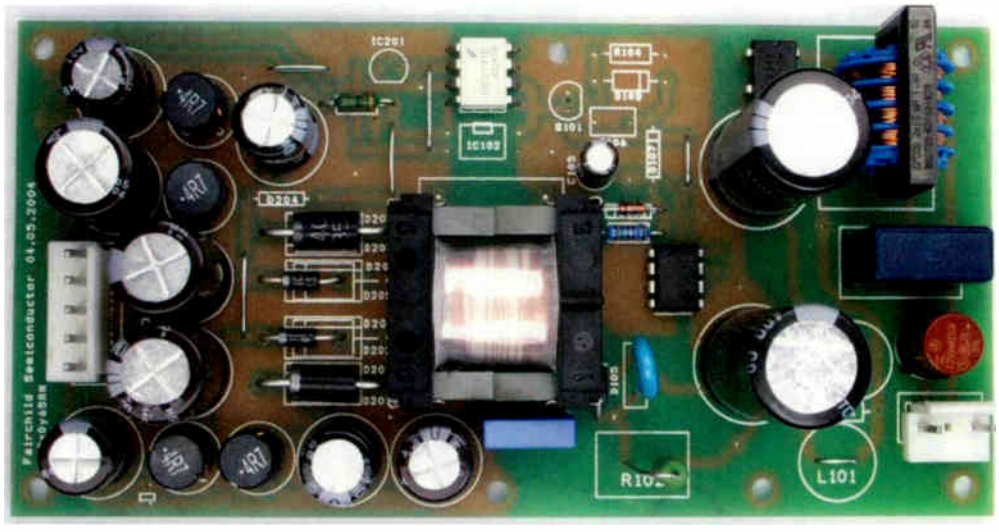
Universal four-output DC supply

Dr Michael Weirich of Fairchild Semiconductor describes a 25W Power Supply using the FSDM0365RN Fairchild Power Switch (FPS). The input voltage range is 85–265V RMS and there are four outputs with 3.3V/1A, 5V/1A, 12V/0.5A and 24V/0.5A.

The PSU is a continuous conduction mode (CCM) flyback converter using the FSDM0365RN Fairchild Power Switch (FPS) and the FOD2741BTV Optically Isolated Error Amplifier.

The Fairchild Power Switch contains a pulse-width modulated (PWM) controller and a sense MOSFET integrated into one package.

The optically isolated error amplifier combines the functionality of a standard KA431 reference and an optocoupler.



The board size is 138.0mm x 68.7mm x 37.9mm (L x W x H)

The input voltage is rectified and filtered by D101, C101 and C102 to generate a DC voltage for the input of the flyback converter.

The common-mode choke LF101 together with the X-Cap C100 and the Y-Cap C104 act as EMI filter.

Clamping network

R102, C103 and D105 form a clamping network that limits the voltage spike due to the energy trapped in the leakage inductance of the transformer.

The FPS has an internal start-up circuitry that charges C105 to the start voltage. As soon as the FPS begins to operate, the device loads C105 and starts to discharge it.

Electrical Specification	
Minimum Line Voltage	85V rms
Maximum Line Voltage	265V rms
Line Frequency	50-60Hz
Outputs	3.3V/1A, 5V/1A, 12V/0.5A and 24V/0.5A

However the switching action of the FPS will cause the voltage on pin 4 of the transformer to increase and recharges C105 after a certain time.

The voltage at pin 4 normally increases with the load at the output. The level of increase is determined by R103. At start-up the electrolytic capacitors at the secondary are discharged and behave like a short circuit.

Therefore the voltage of pin 4 instantly drives V_{cc} of the FPS in overvoltage protection mode. If this happens (i.e. the PSU does not start up under full load), R103 has to be increased.

The transformed voltages are rectified by D201, D202, D203 and D205. The rectified voltages are first filtered by an electrolytic capacitor (CC201, C203, C205, C208) and an additional low pass filter (L201/C202, L202/C204, L203/C206 and L204/C209) that lowers the spikes caused by the high output d_i/d_t when the FPS switches off flowing into the equivalent series resistance (ESR) of the output electrolytic capacitors.

Feedback

Feedback is taken from the 5V and the 12V output. If only one of these outputs was regulated, this regulated output would be better regulated than the non-regulated output.

If feedback is taken from two outputs these two outputs have a better output regulation than unregulated outputs but worse regulation than a single regulated output.

The regulation of the 3.3V and 24V is nearly not influenced by this. R208, C207 and C107 are for frequency compensation. The output voltages are determined by R203, R204 and R205.

Sense FETs

The FSDx0365RN(x stands for L, M) are integrated Pulse Width Modulators (PWM) and Sense FETs specifically designed for high performance offline Switch Mode Power Supplies (SMPS) with minimal external components.

Both devices are integrated high voltage power switching regulators which combine an avalanche rugged

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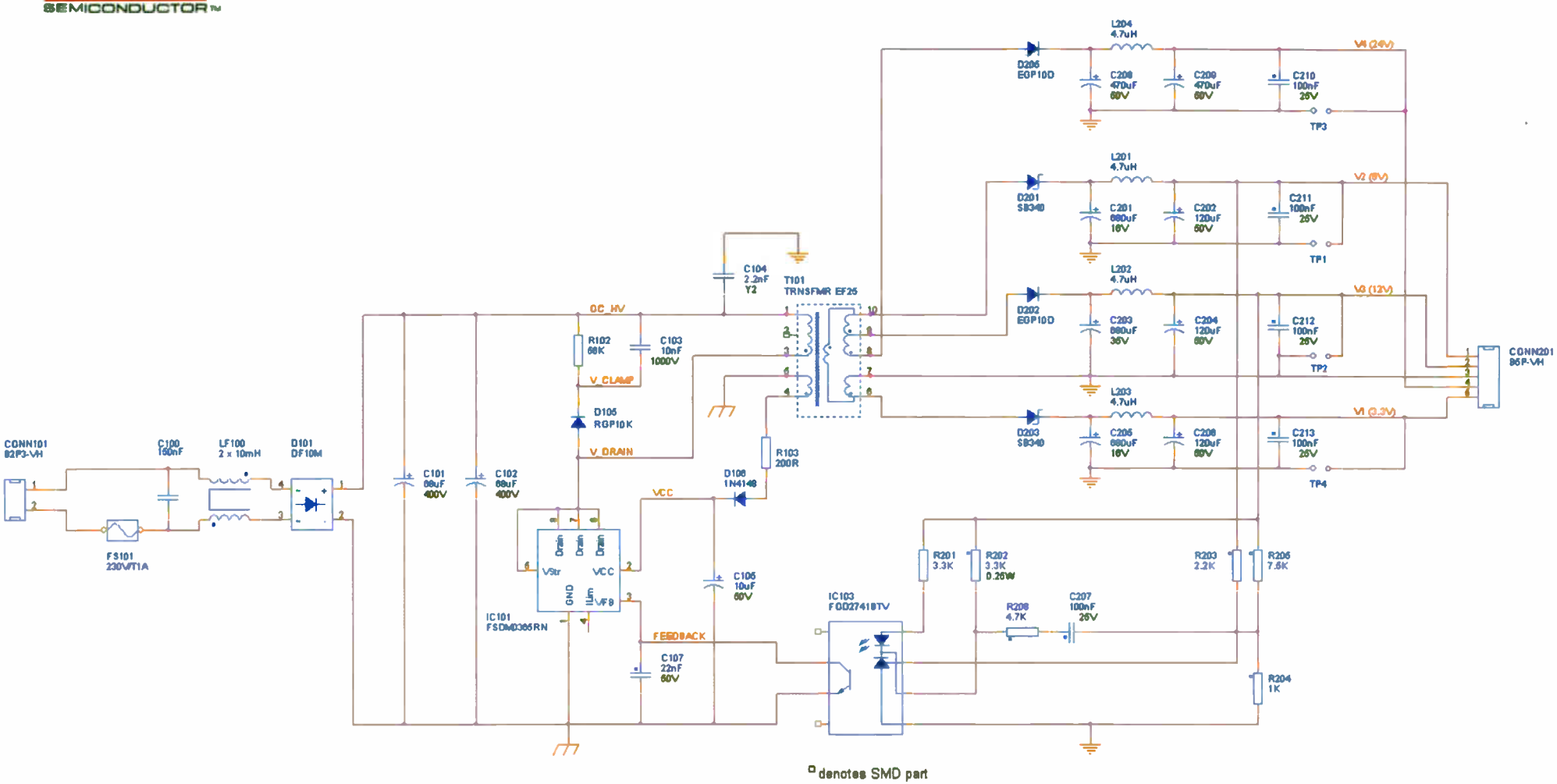


Schematic diagram

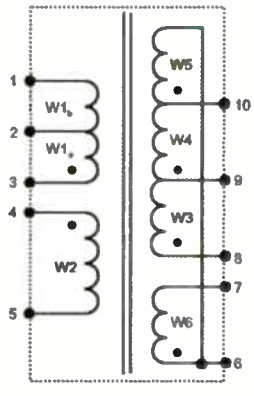
Sense FET with a current mode PWM control block.

The integrated PWM controller features include: a fixed oscillator with frequency modulation for reduced EMI, Under Voltage Lock Out (UVLO) protection, Leading Edge Blanking (LEB), optimized gate turn-on/turn-off driver, Thermal Shut Down (TSD) protection, Abnormal Over Current Protection (AOCP) and temperature compensated precision current sources for loop compensation and fault protection circuitry.

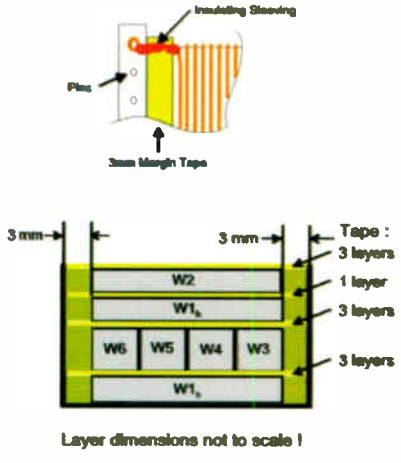
When compared to a discrete MOSFET and controller or RCC switching converter solution, the FSDx0365RN reduce total component count, design size, weight and at the same time increase efficiency, productivity, and system reliability.

Both devices are a basic platform well suited for cost effective designs of flyback converters.

Transformer



Schematic



Construction

Core and Bobbin

Core: EE 25/13/7 (EF 25)
Material: N87 (Epcos) or equivalent
Bobbin: EF 25 horizontal / 10 pins
Gap in center leg: approx. 0.25 mm for A_L of 240nH/Turns^2

Bill of Materials

Item	Qty	Reference	Part	Manufacturer / Type
1	1	CONN101	B2P3-VH	JST, VH series
2	1	CONN201	B5P-VH	JST, VH series
3	1	C100 1	50nF/275V	Okaya, LE series, X2 capacitor
4	2	C101,C102	68uF/400V	Rubycon, AXW series
5	1	C103	10nF/1000V	Murata, DE series
6	1	C104	2.2nF/Y2	BC, MKP 336 6 series, Y2 capacitor
7	1	C105	10uF/50V	Nichicon, PS series
8	1	C107	22nF/50V	AVX, dielectric X73, size 0805
9	2	C201,C205	680uF/16V	Nichicon, HM series
10	2	C202,C206	120uF/50V	Nichicon, PW series
11	1	C203	680uF/35V	Nichicon, PW series
12	1	C204	120uF/50V	Nichicon, PW series
13	5	C207,C210, C211,C212, C213	100nF/25V	AVX, dielectric X73, size 0805
14	2	C208,C209	470uF/50V	Nichicon, PW series
15	1	D101	DF10M	Fairchild Semiconductor
16	1	D105	RGP10K	Fairchild Semiconductor
17	1	D106	1N4148	Fairchild Semiconductor
18	2	D201,D203	SB340	Fairchild Semiconductor
19	2	D202,D205	EGP10D	Fairchild Semiconductor
20	1	FS101	230V/T1A	Wickmann, TR5 series, No. 372
21	1	IC101	FSDM0365RN	Fairchild Semiconductor
22	1	IC103	FOD2741BTV	Fairchild Semiconductor
23	1	LF100	2x10mH/1.4A	Epcos, B82732-R2142-B30
24	4	L201,L202, L203,L204	4.7uH/4A	Würth Elektronik, WE-TI series, type L
25	1	R102	56K/2W/2%	Yageo, PO series, size 0414
26	1	R103	200R/0.6W/1%	BC, MBB 0207 series, size 0207
27	1	R201	3.3K/0.6W/1%	BC, MBB 0207 series, size 0207
28	1	R202	3.3K/0.125W/1%	BC, DCU 0805 series, size 0805
29	1	R203	2.2K/0.125W/1%	BC, DCU 0805 series, size 0805
30	1	R204	1K/0.125W/1%	BC, DCU 0805 series, size 0805
31	1	R205	7.5K/0.125W/1%	BC, DCU 0805 series, size 0805
32	1	R208	4.7K/0.125W/1%	BC, DCU 0805 series, size 0805
33	1	T101	Transformer	Bobbin: Epcos, EF25, horizontal Core: Epcos, N87

Winding details

Name	Pins (Start → End)	Layers	Strands x Wire ø	Turns	Construction	Material
W1a	3 →2	1	1 x 0.22 mm	40	perfect solenoid winding	CuLL
W3	8 →9	*	1 x 0.5 mm	9	perfect solenoid winding	CuLL
W4	9 →10	*	1 x 0.5 mm	6	perfect solenoid winding	CuLL
W5	10 →6	*	1 x 0.5 mm	1	perfect solenoid winding	CuLL
W6	6 →7	*	1 x 0.5 mm	3	perfect solenoid winding	CuLL
W1b	2 →1	1	1 x 0.22 mm	55	perfect solenoid winding	CuLL
W2	4 →5	1	1 x 0.15 mm	11	spaced winding	CuLL

* W3, W4, W5 and W6 form one layer

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BU508D	X 5	89p ea	S2000AF	X 5	84p ea
BUT11A	X 5	29p ea	TDA3653B	X 5	55p ea
BUT11AF	X 5	47p ea	TDA3654	X 5	82p ea
Philips type 1.2 volt Back up battery				X 5	59p ea
Philips type 2.4 volt Back up battery				X 5	120p ea
Scart - Scart lead 1.5m Fully wired				X 2	89p ea
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Bench Notes Adrian Gardener

Concluding the discussion on getting and maintaining your PC into tip-top condition

Beware of Spy's!

Spyware is one of the most common nuisances that plagues computer users everywhere. If your computer is connected to the internet, then it is almost certain that it is infected with spyware of some description. Although they refer to certain types of infection, spyware is also known as adware, malware and scumware. A good general description is as follows.

'Spyware - A general term for a class of software that monitors the actions of a computer user. This software falls into a number of categories: Software that may be installed legitimately to provide security or workplace monitoring, software with relatively benign purposes that may be associated with marketing data collection and software that is maliciously installed, either as a general violation of a user's privacy or to collect information to allow further attacks on their computer or online.'

Unlike viruses, spyware programs do not usually cause damage to your machine or software, although some particularly malicious variants do 'hijack' your web browser, changing settings such as your start page, search engine and security settings. They do however 'clutter up' your machine, slowing it down and causing various random behaviour. Worse still, spyware programs by their nature attract more spyware as they profile your activities and internet habits. As your machine becomes more and more infected, so it gets slower and slower until eventually it becomes almost impossible to connect to the internet at all, and other programs may stop running as the system runs out of resources.

There are literally hundreds of applications designed to check for and remove spyware from your machine, and many of the well known antivirus providers now offer fully integrated solutions. Over the past 18 months, I have tested a number of different removal programs, and as a result can recommend any of the following three as the best of the bunch.

Lavasoft – Ad-Aware

Lavasoft offer a comprehensive range of spyware tools. Their most popular product, 'Ad-Aware SE' is completely free. It offers comprehensive scanning and removal of most unwanted nasties, and is very easy to use. The software keeps itself up to date by checking for and downloading new definition files each time you run it. It does however require you to be disciplined in running the program from time to time, as it does not detect spyware as it arrives.

To get your free copy, key the following web address into your internet browser: 'www.lavasoft.com'. At the bottom of the page click on the box that says 'Ad-Aware Version' and on the page that appears you can download the installer.

Once downloaded, installation is very straightforward and includes updating the software and performing an initial scan of your PC. After the scan is complete, Ad-Aware displays a list of objects that it has found which can be removed. Select the objects and click the remove button to clean your machine. That's it, just make sure you run the program about every other week.

Lavasoft offer more comprehensive versions of the program, including ones which monitor activity on your system in an attempt to trap spyware as it arrives. In practice, this 'real time monitoring' option can be a nuisance, as each time it detects something suspicious it pops up a box asking you how to proceed. If you would like to take the route of prevention in the first place, then the next program is far more sophisticated.

Webroot – Spy Sweeper

Spy Sweeper is very comprehensive, and like Ad Aware, is very easy to use. It has a nice, straightforward user interface and offers a fully automated background monitor in order to trap spyware as it arrives. It also boasts a powerful suite of tools to correct problems created by malicious spyware, such as correcting your internet settings etc.

Spy Sweeper costs £24.95, which includes a year of updates. However a free 30 day trial is available. The full version is available for immediate download once you have paid. To download the free trial or purchase the full product, key the following web address into your browser: www.webroot.com/uk/ Click on the 'Learn More' button in the Spy Sweeper box, and from here you can choose to subscribe or download the free trial. Once installed, operation is fairly self explanatory.

Spy Ferret – SpyFerret

The third application I recommend is SpyFerret. This is perhaps the most powerful of the three programs, correcting more problems than either of the other two. It is also the only program that I have found that corrects the damage caused by the 'About Blank' hijacker, also known as 'Cool Web Search'.

Unlike either of the other two, the program is first of all downloaded for free, but payment is required in order to remove the found objects once the scan is complete. However, payment is for an annual subscription and the software is activated immediately so that the cleaning process can be completed. The current cost is $24.95 which at the time of writing is about £14.

Installation and operation is straightforward and you can learn more and download your copy from www.spyferret.com. As with Ad Aware, you need to run the program periodically in order to keep your system clean.

Notice Board

Please Email Notices to – TVEditor@nexusmedia.com

WANTED
Has anyone a new or used video head for an M1000 Mitsubishi video.
It's also used in some of their cheaper models – marked SC 48901.
Also wanted a ribbon Connector PT No 1 – 694 – 003 for a Sony CDP – C325 Five Disc CD Player. A complete machine would be considered if cost is realistic
Colin Pearse, AES Electrics
01737 643 767 – 01737 217507

FOR SALE
Television Magazines from 1975 - 2004. Also Wireless World and Electronics World, some test instruments , service manuals, vintage radios, etc .
Spyros Jacovides – 020 7272 7139
Email: smj@freeuk.com

WANTED
Manual or copy for tele-equipment DM64 scope also mains plug.
Dave, 79 Orchard Grove, Eastwood Essex SS9 5TP

FOR SALE
264 copies of "Television" dated September 1975-December 2000. Not all years complete
J Hancock – 01329 286620W

WANTED
Unused belt kit and FWD/REV Idler Assy for Sanyo VTe5000 BETA VCR.
Alan Stubbings – 01522 702601

WANTED
MAB8441P/T001 Chip as fitted to 1071 Operating panel on the Phillips 2A Chassis (Text Version) Part no. 4822 209 11307. A scrap operating panel fitted with working chip would be ok. All costs will be met.
Frank Bailey, Virolles, 24700 Montpon-Menesterol, Dordogne, France. E-mail: F1VFG@ctacom.fr
Tel – 0033 5 53 82 62 67
UK address available if desired

FOR SALE
Television Magazines 1987 to 1992. Some copies missing (mainly 1992) 62 copies total.
Mike – 01758 613790

FOR SALE
Collections Items
GEC (McMichael) Circa 1970-80.
CED Video Disc Player in good working order with discs. Please ring for details
John Stacey: Tel 01769 573 382

WANTED
Grundig Yacht Boy Radio.
Must be Model 210 from between 1970-1974. Must be in absolutely mint condition. Will pay top money for a set in absolutely mint condition.
Peter Tankard – 0114 231 6321
9am – 10pm

WANTED
Sanyo VPJ-06 or VPH-06 video output I.C.'s These are used in Barco Video projectors,some Sony projectors and also Mitsubishi P.C. monitors, or so I'm told.
I need about 5 of these. New, or re-claimed,working parts would be fine. Also if anyone knows of any other equipment that uses these, that would be a great help also!
Trevor – 0208 567 7464 or
Email telecine@trevorbrown.co.uk

WANTED
Switch mode transformer for Bush 1473T fitted with Vestel 14" 11AK08 chassis. Part number on the transformer is Telesan SMT 9402 03. A scrap chassis or reclaimed transformer would be ok.
Ian – 01482 887946
Email: livingston_ian@hotmail.com

FOR DISPOSAL
JVC CR-6000E U-matic video recorder, service manual and a 18 cassettes. Free to a good home. Due to the weight of this lot anybody interested will have to collect.
Terry – 01628 628140
(Maidenhead, Berkshire)

What a life!

Donald Bullock's servicing commentary

A day at Cheltenham ✎ The Avo drops on my foot ✎ A set that squeals like a pig ✎ An inch high forehead ✎

"I er... don't suppose you'd care to look after the shop for the day, whilst we pop over to Cheltenham, would you?" asked Steven. I looked at him. He was dressed up. So was Paul.

"Cheltenham?" I said. "Cheltenham races?" He pushed his tongue into his cheek and nodded...

"Look after the shop on my own?" I said. "Fighting to rake it in whilst you're smacking it out on losers and drink? Doing the repairs, suffering the callers, answering the phone, quoting, ordering? And the running about, collecting and delivering, and taking hammer at every turn? All on my own?"

"Gosh, thanks!" said Paul. "Knew we could count on you. Mum'll help. Oh... have a drink on us tonight!" And he made with a bottle of Bell's before they both pushed off.

Welsh midget

The moment they went, Walter Wingnut, the Welsh midget slid in.

"'Ello Mr. Bullock." he sang. "It looks like rain, don't they? It stays warm, though, can't it?" I looked at him. "What is it, Walter?" I asked.

"In the car!" he said. "Can you 'elp me in with it?" He slid out and I followed him. It was beginning to rain. He slid me past the cars on the front, then up the busy street to where he'd parked his car a hundred yards upwind, and caused a major traffic jam. Horns were blowing and fists were shaking. Not at the tiny Wingnut. At me.

It was now raining well. I fought his huge Panasonic set off the back seat and strode for the shop.

"Clever bit o' parking!" shouted a face through a car window. His passenger screwed his finger at his head and stabbed it at me. Thirty yards later I was wondering whether I'd make it. I started to count my paces.

"It packs up and squeals, see." sang Wingnut, who was trotting beside me.

"Get a dog instead, mate!" called a passing wag on a bike. I mouthed him an obscenity. By the time we reached the shop I'd counted to a hundred and fourteen paces, and I wasn't sure who or where I was. Once inside I scrawled 'Wingnut' onto a job-card, waved him out, sat panting for ten minutes, then got the set, a Panasonic TX21M2T/B onto the bench. I plugged it in, and a normal picture came, then disappeared, and the set squealed like a pig. As I began to fault-find in the power stages, a voice like a saw cutting tin cut split the air.

"Ah! Mr Bullock! Just the chap! I need a Little Squirt!" As I spun round I dragged the Avo off the bench, and it crashed onto my foot.

Our caller was Mrs. Rabble. She was twirling the volume control of an ancient Perdio radio, which was producing crackling sounds. And she had her Three Angels with her. One was spinning the battery rack round at supersonic speed and cleverly dodging the flying batteries; another was kicking at a repaired Technics Separates column, on the floor, and the third was at the sales counter, feeding a series of well-chewed caramels into the mouth of a new Hitachi video recorder.

I yanked open the back of her radio,squirted switch-cleaner everywhere, snapped it shut and waved her and her kids out of my sight, just as Greeneyes clopped in with my mug of tea.

"High time!" I snarled at her. I sipped at the tea. "Cold!" I bawled. "Stewed! And not enough milk!" She looked at me and clopped out. The telephone rang. I scooped it up.

"I want a twelve-inch one here by eight o'clock tonight?" blurted a voice. "With no sauce-stuff on 'im." I slammed the 'phone down. It immediately rang again. I scooped it up.

"Don't talk rubbish to me!" I yelled. "Beecham!" snarled a voice. "This set you were supposed to have fixed 'ave gone. It was just the picture last Monday and you charged me thirty quid. Now 'e's dead, and I wants 'im put right now, or I gets the Weights and Measures." He lived only across the road, so I decided to get it done at once to silence him.

"Greeneyes, dear," I called sweetly. "Would you watch the shop for a few minutes, my lovely?" She clopped in and looked at me coldly. "What were you saying your tea was like?" she asked. "Absolutely delicious, darling!" I said. "Pure nectar!"

Beecham's set, an ancient Tatung model, proved to be dead.

"I reckon you've got too old and mouthy for this job." he jibed. I wondered whether his nose would look better two inches up his face, but perished the thought and lifted the set from its tubular stand. But the stand rose too, and dangled an inch beneath it. I found that he'd drilled a hole in the top and threaded the mains lead through, along, down and across to its corner; and out with about four inches to his plug-top.

I looked at his forehead. An inch high. So I opened the plug-top and found that he'd wired the mains lead to its neutral and earth terminals. I pointed out his mistake.

"Wasn't me." he said. Back at the workshop I picked up the Avo and re-started work on Wingnut's Panasonic.

"Where was I?" I muttered. "Ah yes, the power circuits!" I could hardly believe it when I found that C2561, the 47 mfd 160V HT reservoir capacitor was the culprit. It had fallen to 33 mfd and a new one cured the trouble.

Careless beauty

Who should call next but Hyacinth Hunney, the peaches-and-cream vision who'd been bagged by Spotty Caleb Crepe. She greeted me with a friendly

smile, and I drank in her careless beauty. Her golden hair, sparkling like a thousand prisms, her perfect skin, her laughing blue eyes radiating their magic, and her pouting, rose-petal lips. As I looked, soft music rose on the gentle breeze, orange blossoms filled the air, the sun shot out, the sky slipped blue, the roadside trees flew into blossom, and chaffinches and lovebirds sang in them. I looked into her eyes and melted...

"What can I do for you?" I sighed. She smiled and spoke in a low, husky voice that promised mystery and unreleased romance.

"It's this silly Sony DVD player – er – Donald." she purred. "Oh, what a lovely, manly name." She'd called me Donald! I smiled happily. Manly, she'd said...

"Tell me, what's it doing to upset you?" I said, in the softest, silver-edged dark-brown tones I could muster.

"Er – I'm not sure!" she sighed. "Oh, aren't I a silly!"

"Of course you're not!" I purred. "Don't worry. Call in later, er... Hyacinth, and I'll have it ready," and I winked my eye, fetchingly.

The player was a DVP-NS355, and when she'd tripped out, I opened it, and immediately saw that the ribbon connector was askew in its socket. I pressed it back in, and it worked properly, so I put it together, tried it, marked the card No Charge, and placed it at the back of the counter. When, I wondered, would I see the heavenly vision – that lovely poetry-in-motion, again?

The afternoon wore on, but I she didn't come. Then, at closing time, I saw Spotty Caleb Crepe slouching towards the shop.

"Goll'im looked at, Mate?" he blurted. I found myself taking it from the back and putting it onto the counter.

"Oh, done, eh! An' no-charge! Huh! I said 'e oney needed a Little Squirt. Cheers, Mate," And he grabbed the player and slouched off.

I stood there reflecting.

Snivelling Wingnut

What with him, and his sly, loose-looking bird, and that snivelling Wingnut and the louts who'd accosted me in the street, not to mention the filthy Mrs. Rabble and her brats, and that sneering Beecham. And now the threat of several days filthy wet and windy weather to come, I'd had enough. At that point Greeneyes clopped in again with the tea.

"What d'you say we have a few days in Spain, dear, completely away from television pests?" I asked.

"A good idea, and away from this weather, too!" she said. "Just looking at the Spanish weather - 76 in the shade, and sunny. Er... I'll need a new dress to travel in."

"Of course you will, dear." I said. "And some new shoes and a new hat."

The next morning the latest *Television* magazine came as we were leaving the house for the airport, and I took it to read on the way. At the airport we made for the bar, and as I was flicking through the magazine, a nearby chap glanced over.

"Just had my telly done, Mate. Took 'em five minutes an' they had the nerve to charge me twenty quid. Huh! Nearly £250 an hour! An' I only gets five at the fat-works! Telly-men wants 'orse-whippin'!"

I picked up my beer and moved to another table, and after a few seconds Greeneyes followed.

"That was a bit sudden, wasn't it?" she said. At that a fat woman joined us. I flexed my legs.

"We had our set sixteen years with no trouble, yet our new one goes wrong every week." she said. "Why's that?" I upped and went to yet another table, with Greeneyes in tow.

"People are looking at you." she said.

When we got on the 'plane, it was a chap in the next seat.

"Eh, I see Argos are doing a DVD recorder at £79.99. Are they any good?" he asked. Across the aisle a woman shaped circles in the air with her head.

Tripe dresser

"My husband takes *Television* magazine. He's a tripe-dresser. But he's ever so clever! He built his own television set when he was ten! Just out of nails and things!" By now I was glancing at 'What a Life!'.

"My husband can't stand that Donald Billhook prat." she said. "Says if he ever meets him he'll bang him one."

"I think I can understand that." said Greeneyes, shooting me a false and icy smile. I looked around. Every seat was full. I stopped a passing steward.

"Two large whiskeys, please" I said.

"I don't want a whiskey." protested Greeneyes.

"They're for me." I said. "Get back to your new friend."

We landed into a thunder storm with lightning and gales. On the way back we called into a bar-restaurant where a Beko television set barked on the wall. It had a stretched frame. A Spaniard saw me looking at it, and told me, in Spanish, that it had line trouble.

"No, frame trouble." I said. He shouted over to the owner of the bar.

"Paco, here's a telly-man! if you buy him a drink he might fix that picture!" I quickly gulped my drink, flung some money down, and strode out. Greeneyes caught me up at the car.

"That was clever!" she said. "Are you mad?"

"Crazy!" I said. "And if I hear any more about television sets I'll be a murderer too! What with this terrible weather here and the pestering, it's no different to England!"

When we got back to the villa we bumped into Jack, the local builder.

"Eh, Don, we need a new telly." he said. "Are Philips any good?"

The moment we arrived at the villa, Hubert, our neighbour popped in.

"Don doesn't want to talk about television sets at the moment." Greeneyes warned.

"'Tenta telly, it's my video recorder, Don. Gobbled three tapes yesterday. Can you fix him for tonight?"

Spanish weatherman

By now the storm was horrific. 'This weather will go on for another week.' said the Spanish weatherman. Then a lightning strike and a blast of thunder, knocked off the mains. But the telephone still worked. It rang and as I fumbled in the dark to pick it up I knocked over a vase of flowers. It was Sam, from opposite.

"Hi Don. Old Mrs Hawker's left her telly's here for you to fix. By the way, ours went last week. Our DVD player groans every six hours and our Hi-Fi is humming. No rush. Tomorrow morning, eh?"

The next morning was terrible. Torrential rain, floods, thunder and lightning, no power, no heating, and no chance of anything being restored for at least a week. Greeneyes was shivering. Then the telephone rang. It was Paul.

"It's like summer here!" he said. "Weather-men can't understand it! I'm in just shorts!" As he spoke there was another flash and roar of thunder, and our telephone went dead...

The next day saw us heading back to the airport. When we'd bought our tickets the weather began to clear, and the sun was out as Greeneyes telephoned Steven to tell him we were coming back.

"Oh dear!" he said. "I wouldn't have bothered. The weather's turned terrible, icy-cold, with thunder, lightning, and snow is forecast...." I looked at Greeneyes.

"Oh - and your neighbour's just rang. Says one of your trees has smashed down through his fence into his greenhouse, and your aerial's blown down..."

As we settled into our aeroplane seats Greeneyes handed me my TELEVISION magazine.

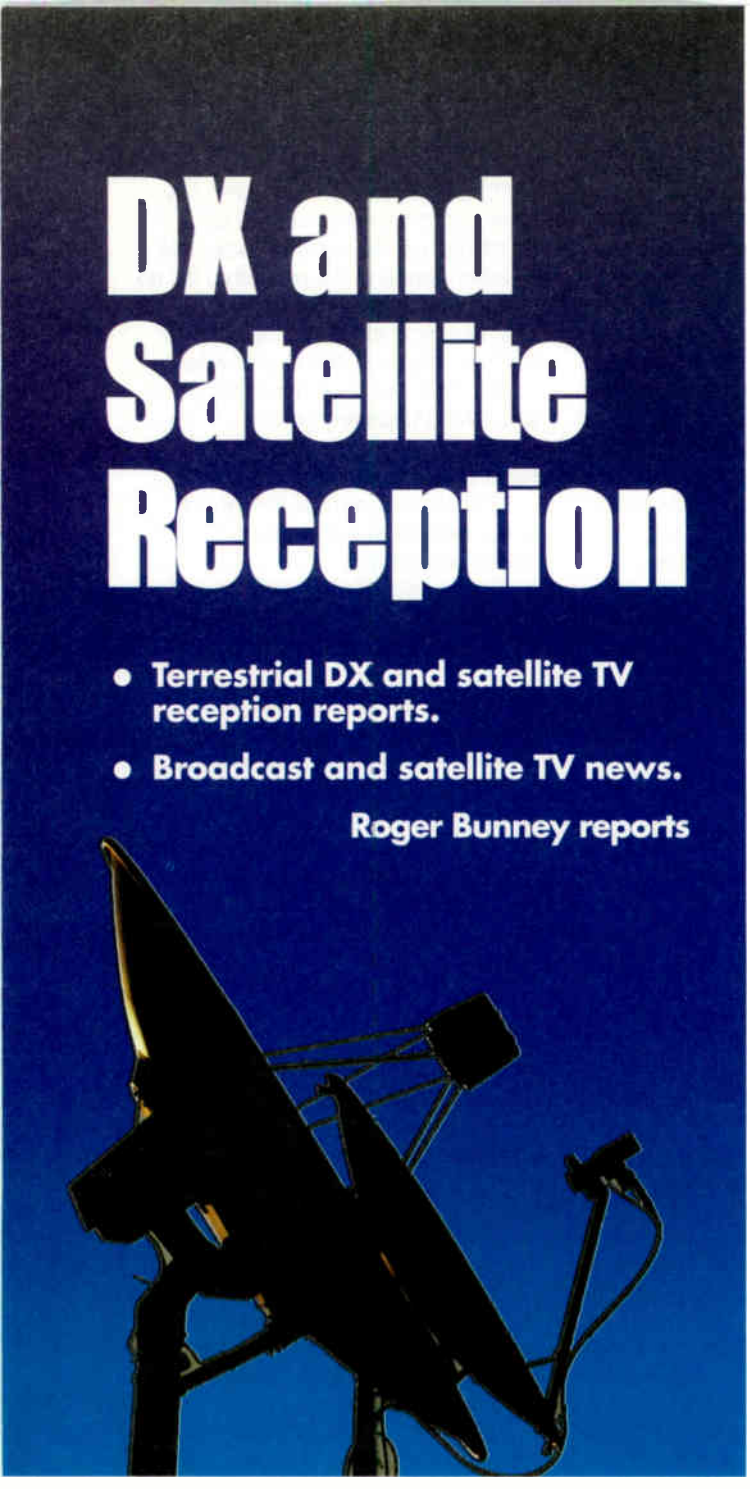
"Well, at least you've got a couple of hours of peace to read this." she said. I nodded glumly, and settled down. Until the chap in the next seat tapped my elbow.

"Ah, I see you're a telly man" he said. "Tell me, which is the best set?"

DX and Satellite Reception

- Terrestrial DX and satellite TV reception reports.
- Broadcast and satellite TV news.

Roger Bunney reports



The arrival of autumn brought a dramatic reduction in Sporadic E reception. It was a good season this year however, extending into August. On 2 September there was reception from the ch. E2 TVE Madrid transmitter, and again during the middle of the month when programming was seen during the early morning period (pre 0800 hours). Ukraine TV (YT) was also logged, on the 15th. There were no reports of SpE reception in Band III this year. From 2-6 September and again on the 21-23rd there was excellent tropospheric reception from Germany, Denmark (chs. E7 and E10) and the Benelux countries.

More important this month was news of the first DTT-DX reception in the UK, proving that long-distance reception of terrestrial digital TV signals is possible. During a DXing holiday at Sizewell, Suffolk between 1-24 September Cyril Willis received DTT-DX signals from across the North Sea as follows:

21/9/05 Germany chs. E40 and E59, also ch. E39 from an unidentified source.

22/9/05 Unidentified channels carrying WDR Dusseldorf, Wuppertal and NDR with listings only (no video); ch. E34 with a Dutch 7-channel multiplex including NED1, 2, 3 and C+; ch. E35 ZDF; ch. E37 unidentified source; ch. E40 with 11 Belgian radio channels; ch. E49 with a Dutch 4-channel multiplex; ch. E52 with 11 Dutch radio channels; ch. E57 with seven Dutch radio channels; ch. E59 with Belgian radio channels, same as ch. E40; and ch. E64 with eleven Dutch radio channels.

Cyril was using a Goodmans Freeview STB, a 14in. Thomson multi-standard TV set and a Televes X43 aerial.

There was transatlantic amateur radio communication in the 50MHz (6m) band via double/triple-hop SpE on eleven days during July. This year the signal paths were farther to the south, in the direction of Florida and the Caribbean rather than the usual US east coast and Canada. Two-way contact using SSB and CW included Puerto Rico, St. Lucia, Trinidad and the Netherlands Antilles. Contacts with the Middle East were common in the 6m band: one exotic contact was between the UK and the Democratic Republic of the Congo (9Q0AR). There were a few SpE openings in the 144MHz (2m) band, most at single-hop distances though there was one two-way contact with Russia. Amateur radio bandwidths are small of course, about 2kHz with SSB. A bandwidth of about 1MHz minimum is required for recognisable TV images.

Satellite sightings

As I type these lines at the end of September the APTN Atlantic news feeds are providing pictures of massive traffic queues as residents flee the coastal areas of Texas and Louisiana ahead of the arrival of hurricane Rita. The stateside switching centre cuts to a seaside resort, with the rollers crashing into the shore and the sea at the same level as the deck of a local pier, then show more flooding in New Orleans. These live pictures were received via Eutelsat W1 (10°E) at 10·972GHz V (SR 4,167, FEC 5/6), i.e. the UP4 feed.

At the end of August and in early September the main news related to hurricane Katrina and the devastation in New Orleans. Reuters WNS (World News Service) via NSS 7 (21·5°W) dropped its usual encryption to provide, in the clear, a few days of late-breaking and live news footage from above and around the flooded city, along with news from other parts of the Americas. This, whether intended or by default, was welcome. But the encryption was back after a few days.

Another source of Katrina news during the period was Miami News Net via Eutelsat W1 at 10·961GHz V (4,167, 5/6), with both live reporting and play-outs.

The relentless grim news from Iraq continued. On 19 September there were reports of the dramatic jail attack in Basra to recover UK soldiers. The reports came via Intelsat 10-02 (1°W), Eutelsat W3A (7°E), W1 (10°E) and W2 (16°E) at the usual frequencies. Additional British troops were sent to Afghanistan during September, and once again 'APTN Kabul Path 1' transmissions appeared. The best place to check initially is Eutelsat W1 at 10·972GHz V.

Charity gold tournament sponsored by Wendy's, seen via Atlantic Bird 1

A couple of unidentified signals were noted on 20 September. 'Asiaworks TH Path 1' via Eutelsat W1 suggested a feed from Thailand. Later that evening 'Magno Sound & Video' on colour bars appeared in channel 3 of the GlobeCast multiplex (11·016GHz V 20,145, 3/4) via Atlantic Bird 1 (12·5°W). This cut out with no further content. Earlier in the day the eight-channel GlobeCast multiplex had gone off air for a long period, returning in the late afternoon.

The strength of the APTN and other feeds via Eutelsat W1 was marginal on several days, far below the normal level, suggesting another fault condition or a 'pointing anomaly' as happened some weeks previously.

Alan Richards (Skegness) is still puzzling over a test card, 'Unita Mobile Asterna' via 'Video Piu', received from Eutelsat W1 at 11·128GHz H (4,485, 3/4).

Reception via Eutelsat W1. Reverse ITV video/audio feedback to Bucharest, seen via Eutelsat W1.

The satellite technician is heard singing Who wants to live forever, a Freddy Mercury composition here performed by the group Dune, before switching off the uplink equipment. Another unusual W1sighting reported by Alan was a GlobeCast feed, GCUK7, at 11·186GHz H (3,151, 3/4) with the identification 'Mayadeen Gaza'. Reoccupying Arabs were seen wandering amongst the deserted and mostly demolished Israeli buildings, seeking bits and pieces. There was also a "stunning 'Sawatel-Palestine (Gaza)' purple/violet test card with a satellite and the Earth and a day/night divider below". Some satellite enthusiasts devote a lot of time to the signals from W1. A listing from Alan for the week to mid-September includes feeds from Kabul, Turkey, Kurdistan, NAPSA, GlobeCast UK, Gaza, Ramattan, Bezeqsat, Genova, Biskek, Bucharest, Serbia, Armenia, Qatar, Iraq and the US.

The 25th anniversary of the Polish uprising at the Gdansk shipyards, with Lech Walesa then leader of the Solidarity movement, occurred in late August. Roy Carmen (Dorking) saw a celebratory concert via Eutelsat W3A at 11·147GHz V, with the EBU-favoured SR 13,333 and FEC 7/8. This was a Euro 1080 MPEG-2 HDTV transmission. Lech Walesa was present at the concert, which was given by Jean Michel Jarre and Solidamosc.

There were extremes of weather across Europe during the period. Forest fires out of control in Spain and Portugal were seen via Eutesat W3A at 10·995GHz H (6,666, 7/8), from the satellite facility Amp. There were mountainside scenes with fire fighters and helicopters dropping water bombs. Yet only a few hundred miles to the north east, in Germany and Switzerland, there were heavy rains, rivers out of control and severe flooding.

South African rugby was present via PAS 12 (45°E) on several Saturday afternoons, provided by GlobeCast Africa capacity at 11·525GHz V (5,632, 3/4). The 'M-NET OB1' identification within the data suggests that this company provided the coverage and uplinking. The Sharks v. Cheetahs game went smoothly but at the end of the Blue Bulls v. W. Province game on the 17th on-pitch fighting followed the final whistle. On the 24th it was the Blue Bulls v. Cheetahs, with Allied Bank of South Africa sponsorship details on the pitch and screen.

On 17-18 September 'UKI 818 Sislink SIS 44' reported the results of the German elections for Sky News, from Berlin though the colour-bar identification suggested Brussels. This was via Eutelsat W2 (16°E) at 12·562GHz H. Further coverage was provided by 'RTL Midi D320' and '8Mbit 4:2:0' at nearby frequencies, 12·541GHz and 12·548GHz, both with horizontal polarisation, SR 5,632 and 3/4 FEC.

There was a rare catch at 5 p.m. one mid-September afternoon, via Eutelsat W1 at 11·100GHz V, when an 'ITV London KRS 979 Reverse to Bucharest from South Bank' caption on colour bars appeared. KRS = King's Reach.

The Chinese services CCTV-4 and CCTV International are now available free via PAS 1R (43°W) at 11·513GHz H (26,687, 5/6), with Spanish, French and English sound.

Broadcast news

The Netherlands: Closure of all Nederland 1, 2 and 3 analogue transmitters from January 2006 has been announced by the Dutch Ministry of Economic Affairs. Some 77,000 households at present view the terrestrial analogue transmissions, the rest of the population receiving TV via cable, DTT or satellite. The future of the regional analogue stations is not known at present.

Solar cycle: The RSGB publication Radcom reports that a specific area of the sun has shown a reversal in magnetic polarity, suggesting a solar activity minimum between April and October 2006 after which a new cycle will commence.

Australia: The authorities have announced that analogue TV transmissions in the cities will be switched off at 31 December 2008. There will be a later switch-off for regional transmitters. Thus if the new solar cycle (see above) has a high sunspot count it will be too late for any of us to receive Australian ch. 0 transmissions via F2 propagation.

Dubai: A Skywaves member has checked out the source of the ch. E2 transmissions from the Dubai World Trade Centre. He found that there is no active Band I transmitter at the building, nor are there ch. E2 aerials in the vicinity. The transmitter is actually sited at Al Hassah, some 60km SW of Dubai city, next to the main road to Abu Dhabi. Transmitter power is 40kW but the aerial appears to have a gain of 10dB, giving an ERP of some 400kW. There are three beams, directed at Dubai, mainland Dubai and Abu Dhabi. None of the beams are directed towards Europe. Information from Cyril Willis and **www.sky-waves.info**


A replica of HMS Victory blazes in Plymouth Sound during Battle of Trafalgar celebrations

Italy: The situation with the various 'private' TV stations that operate across the country has always been changeable, with minimal regulation. The Benelux DX Club has provided the following list of Band I stations at present in operation, by way of guidance rather than as an official listing.

Ch. E2: Video (Naples) with 478P offset; Video (Mt. Penice) with 290M offset; Tele Alta Italia Rete (Genova); Antenna Blu TV (Granarolo). Note on offsets: the figure relates to a multiple of the line frequency, P = positive and M = negative.

Ch. IA: TVA (site not known).

Ch. IB/E4: RAM TV Militello (Val Di Catania); TV Quattro Mori (Perugia); Tele Trieste Mia (Trieste); Teleor (Oristano); Tele Flegrea (Naples); Teleperugia (Casalbruciato).

Ch. IC: Rete 7 Piemonte (Turin); Telelibera (Perugia); RTV (Altri); STV (V. Betti).

Amateur operation at 50MHz: The Spanish authorities have opened the 50-51MHz band to all radio amateurs with a class B licence, running at up to 100W and with at least four years' operating experience. The 50-50·2MHz segment is also in use in Spain. During August the Hungarian authorities allowed an experimental 30-day period for 65 amateurs to operate in the 50·05-50·5MHz band to assess possible interference to broadcast TV. Transmission levels were limited to 5W. It's likely that the band will eventually be assigned to amateur operation.

Vietnam: VTV (Vietnam Television) is expected to move to all-digital transmission by 2010.

LCD Technology

Part One

By Fawzi Ibrahim

The main elements of an LCD television receiver (Fig. 1) may be divided into three sections: Video Processing, Display Formatting and LCD Panel Assembly.

The Video Processing section and the Display Formatting sections perform the same functions as their counterparts in the plasma television receiver which have been discussed in detail in the August issue.

To summarise, video from different sources including tuner, SCART, S-Video and component RGB enter the video selector which select one input source for processing.

The colour decoder separates the luminance Y signal from the chrominance C signal using a comb filter to re-produce the original three primary colours, RGB.

This is followed by the analogue-to-digital A/D converter which encodes each primary as an 8-bit digital signal ready for processing by the Display Formatting section.

Analogue-to-digital conversion may take place before the colour decoding stage depending on the type of chip set used.

The display formatting section carries out the necessary conversion including interlace-to-progressive, and image conversion which may include refresh or scan conversion and image scaling to re-size the picture to suit the PDP pixel resolution.

The connection to the next stage is via a digital video interface, DVI (normally LVDS).

The LCD assembly provides all necessary drive signals for the panel to re-produce a moving picture.

The advantages of an LCD panel over the CRT type are very similar to those of a plasma display panel, namely:

- Slim unit
- Desktop space saver
- Good quality picture with no flicker
- Environmentally friendly
- Increased visible screen size. For instance a 15" flat panel gives the same viewable screen as a 17" CRT

The disadvantages are:

- Problems in producing black
- Relatively narrow viewing angle (normally 160°)
- A tendency to exhibit pixelation and screen-door effects when blown up to big screen sizes.

Chip count

Many of the functions illustrated in Fig. 1 may be integrated into a single chip. The actual number of chips used depends on the chip set.

The following are three examples of chip sets used by popular manufacturers for both plasma and LCD sets.

1 – Hercules (e.g. TDA 120x1) and a Genesis Scalar (e.g. GM1501) used by Philips (Fig. 2)

Functions – *Hercules:*
Source select
Video/audio processor
Sync separator
Colour decoder
Gamma correction
On-chip micro-controller
Embedded flash memory
GM Scalar:
Video processor
Format converter
LVDS transmitter/encoder

2 – GC3 chip set used by Panasonic including GC3FM, GC3i and GC3FS (Fig. 3).

Function – GC3FM (for main picture):
Sync separator
10-bit ADC
Colour decoder
3D comb filter
NTSC/PAL converter

GC3i:
Format converter
Image re-size
Gamma correction
LCD AI

GC3FS (for sub-picture):
8-bit ADC
NTSC/PAL converter
Colour decoder
Sync separator
2D comb filter

3 – HIP /PICNIC/HOP used by Philips

HIP(High-end video Input Processor):
Source select
Colour decoder
Luminance processor
Sync separator

PICNIC
Digital signal processing
Sync processor
ADC
Microcontroller
Histogram (picture improvement)
Noise reduction (NR)

HOP (High-end video Output processor):
Brightness control
Saturation control

Principles of LCD cell

Flat display units used for the purposes of moving picture reproduction invariably employ a matrix structure in which the active elements forming the pixel cells are located at the intersection of electrode buses.

Among the elements used are LEDs, plasma and liquid crystal. A liquid crystal is a substance that does not belong to any of solids, liquids or gases, but it falls in the category in the middle of solids and liquids.

Its appearance is a cloudy liquid, and the liquid substance itself has a finely long crystal structure.

Though liquid crystal is a natural material, the liquid crystal which is used for LC displays is a multi-component mixture that is artificially created by blending of biphenyl, cyclohexane, ester and the like.

The liquid crystal display consists of a liquid suspension between two glass or plastic panels.

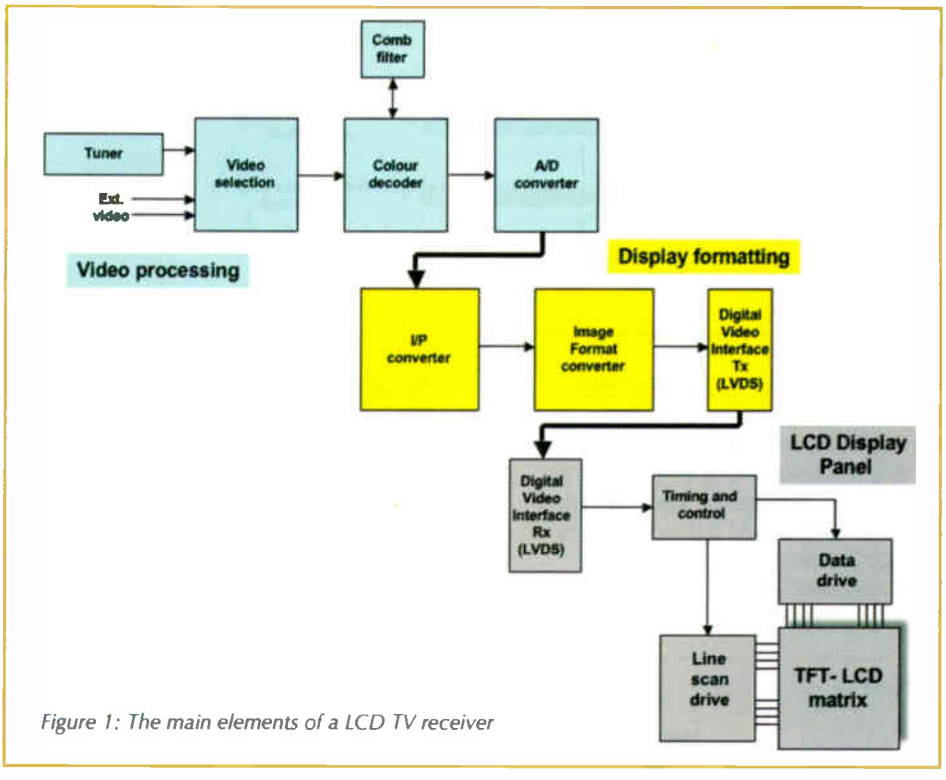


Figure 1: The main elements of a LCD TV receiver

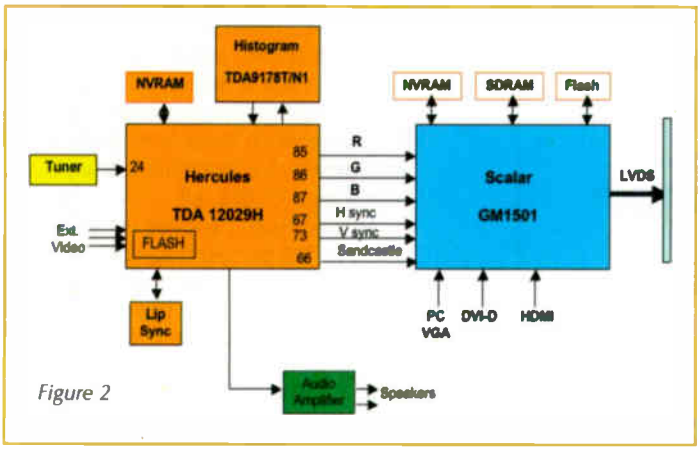


Figure 2

Crystals in this suspension are naturally aligned parallel with one another. However, the application of an electric field across the liquid crystal causes a change in the molecular structure.

This change affects the optical properties of the crystal in the way light is reflected of it or passes through it. There are thus two types of LCD panels: the reflective and the transmissive.

In the reflective type, the change in the molecular structure controls the amount of light reflected by the liquid crystal.

In the transmissive type it controls the light passing through the liquid crystal, hence the need for a back-light. In both cases, the applied voltage controls the luminance of the panel.

The most commonly used type is the transmissive because, unlike the reflective type, brightness does not depend on the ambient light.

The most popular type of liquid crystal is the Twisted-Nematic, TN in which the molecules arrange themselves in a helical form. The helix has the effect of twisting the polarisation of light passing through the LC by 900.

When an electric field is applied, the helical structure begins to break down and with it the polarisation of light. The voltage level determines the extent to which breakdown occurs.

Application of TN LCD

Consider two differently polarized glass plates placed opposite each other (Fig. 4). Plate A allowing only vertically polarized light through while Plate B permitting only horizontally polarized light.

The effect of the two glass plates is to block the light completely. If a liquid crystal is now placed between the two polarized glass plates (Fig. 5), the light passing through glass plate A would pass through the liquid crystal which without any voltage across it, forces a 900 twist and changes its polarisation from vertical to horizontal which would pass through the second glass plate B.

If a voltage is applied across the liquid crystal, the 900 twist would be removed and light would be blocked again. If a smaller voltage is applied, a twist angle less than 900 is introduced by the liquid crystal and low-intensity

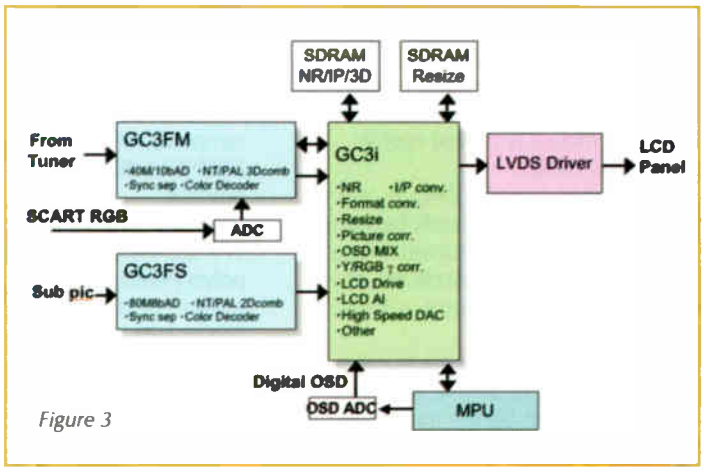
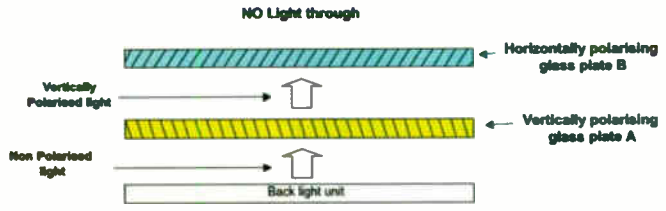


Figure 3

Figure 4



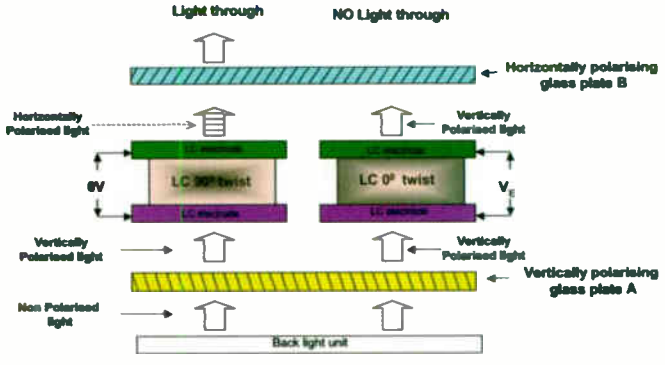
light would appear at the other end.

Since the applied voltage determines the twist angle of the liquid crystal, it follows that the voltage now controls the intensity of light appearing at the other end and a grayscale may thus be obtained by varying the voltage applied across the liquid crystal.

In the active-matrix LCDs (AMLCDs), on the other hand, a switching device is used to apply the voltage across the liquid crystal and hence an improved response time.

The active MLCDs present fewer cross-talk issues and thus no inherent limitation in the number of scan lines, and they

Figure 5



Matrix LCDs

There are two matrix LCD technologies: passive matrix LCD (PMLCD) and active matrix LCD (AMLCD). In the passive-matrix LCD, pixels are addressed directly with no switching devices involved in the process.

The effective voltage applied to the LC must average the signal voltage pulses over several frame times, which results in a slow response time of greater than 150 msec and a reduction of the maximum contrast ratio.

The effect of slow response may be illustrated by a trail on a PC monitor when the mouse is moved rapidly across the screen.

The addressing of a PMLCD also produces a kind of crosstalk between the pixels resulting in blurred images because non-selected pixels are driven through a secondary signal-voltage path.

This places a limit to the number of pixels that may be used in a display and with it a limit on the maximum resolution.

There are several kinds of AMLCD depending on the type of switching device used. Most use transistors made of deposited thin films, which are therefore called thin-film transistors (TFTs).

The most common TFT semiconductor material is made of amorphous silicon (a-Si). A-Si TFTs are amenable to large-area fabrication using glass substrates in a low-temperature (300°C to 400°C) process.

An alternative TFT technology, polycrystalline silicon - or polysilicon or p-Si is costly to produce and especially difficult to fabricate when manufacturing large-area displays. Nearly all TFT LCDs are made from a-Si because of the technology's economy and maturity, but the electron mobility of a p-Si TFT is one or two orders of magnitude greater than that of an a-Si TFT.

This makes the p-Si TFT a good candidate for a TFT array containing integrated drivers, which is likely to be an attractive choice for small, high definition displays such as view finders and projection displays.

TFT cell drive

Unlike the CRT in which the phosphor persistence allows for continued luminance of the picture between refresh cycles, in flat display applications, no such persistence exists and refreshing of pixels to produce natural moving pictures becomes difficult as the number of pixels increases.

Hence the need for a pixel cell 'memory'. A charge on a storage capacitor is used for this purpose as illustrated in Fig.6.

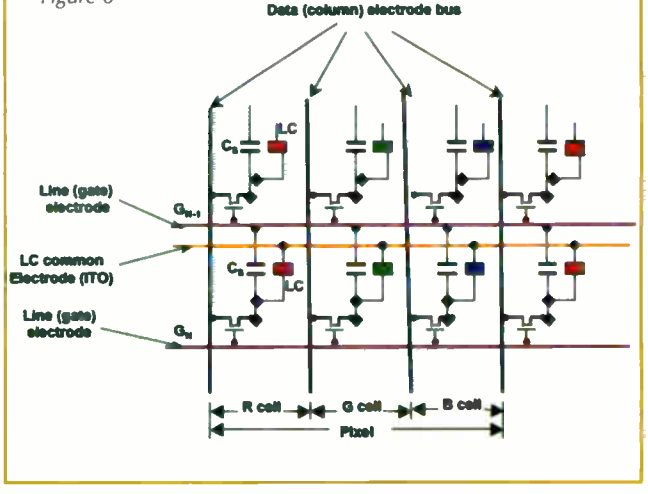
The TFT-LCD panel is scanned line by line. Each line is selected in turn by a 20V VSEL pulse fed to the line select electrode known as the gate bus line.

Once a line is selected, the pixel cells along that line are addressed and their luminance levels are set by a voltage which represents the luminance level of the cell.

This voltage is applied via a source driver to the corresponding data (also known as source) electrode. The source driver supplies the desired voltage level known as the grayscale voltage which represents the pixel value i.e. the luminance of the pixel cell.

The charge on storage capacitor, CS maintains the luminance level of the pixel cell while the other lines are being scanned. When all the lines

Figure 6



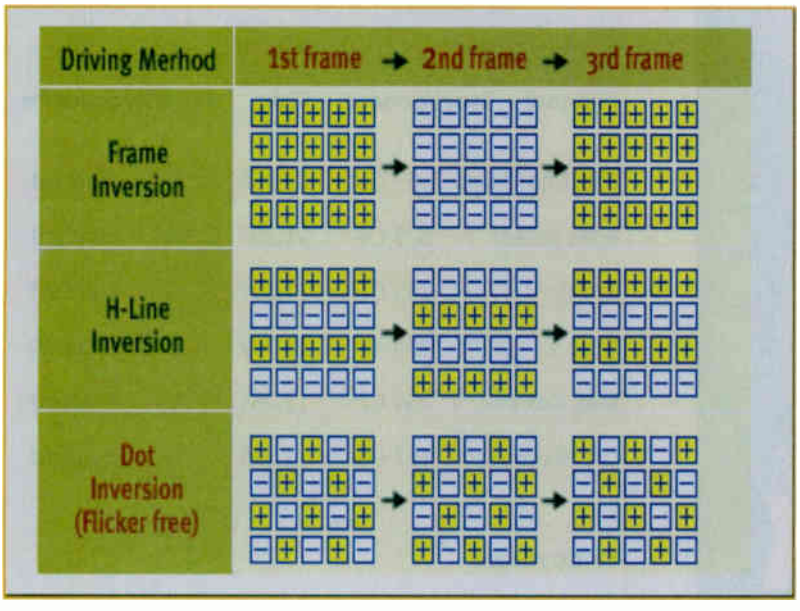


Figure 8

have been scanned and all the pixel cells addressed, the process is repeated for the next frame and the picture is refreshed.

Fig. 7 shows the operation of an active TFT cell where GN is the currently selected gate line and GN-1 is the immediately preceding gate line.

The TFT gate is connected to the line electrode bus and the drain is connected to the data (or column) electrode bus. Storage capacitor CS is connected between the current gate bus line GN and the immediately preceding gate line (GN-1).

For this reason, CS is known as CS-on-gate. It forms the drain load for the TFT. The TFT turns fully on when its gate voltage is 20 V and turns off when its gate goes to at least -5V.

To select the pixel cell, a 20V pulse, VSEL, is applied to the gate. At the same time, data in the form of an analogue positive voltage VDAT (0V for maximum brightness and maximum voltage for pitch black) is applied to the drain.

With the TFT on, the source goes up to the drain voltage applying a voltage across the liquid crystal and charging the storage capacitor, CS-on-gate. This charge is maintained even when the TFT is turned off.

This is then repeated for the next line and so on. The main function of CS is to maintain the voltage across the liquid crystal until the next line select voltage is applied when the picture is refreshed.

A large CS can improve the voltage holding ratio of the pixel cell and improve contrast and flicker. However, a large CS results in a higher TFT load and a lower aperture ratio. The aperture ratio is the ratio of the area of the pixel aperture to the total pixel area.

Polarity-inversion methods

A Liquid crystal must be driven with an alternating current to prevent any deterioration of image quality resulting from dc stress.

This is usually implemented with a frame-inversion drive method, in which the voltage applied to each pixel varies from frame to frame.

Other methods include line-inversion and pixel-inversion in which the voltage applied is inverted line by line and pixel by pixel respectively (Fig. 8).

Fawzi Ibrahim lectures at the College of North West London and delivers Plasma and TFT-LCD training courses

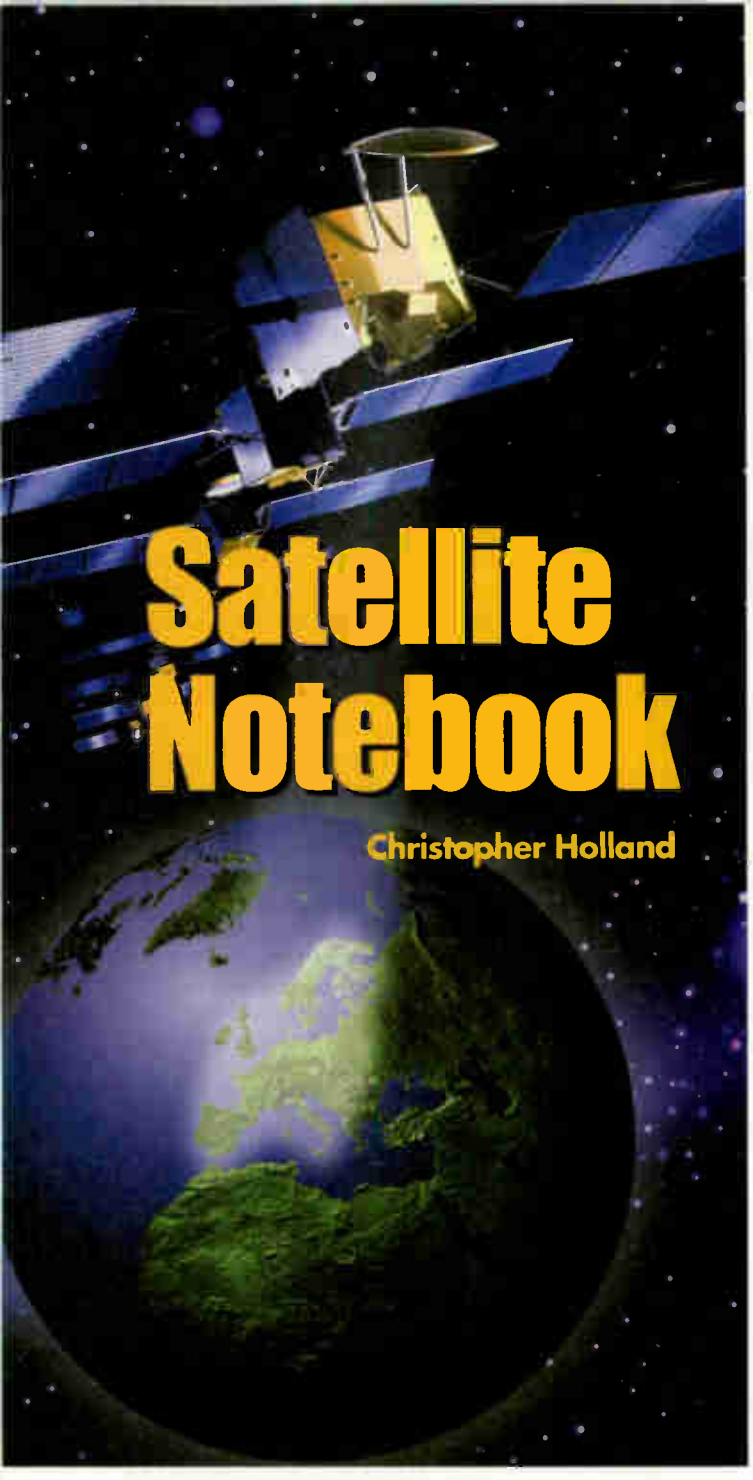
Plasma Road Show

The first stop of the Plasma Road Show in Malta was an unqualified success. The turnout for the 2-day Plasma and LCD technology course was far higher than expected and three separate courses had to be run to satisfy the demand.

Local service firms supplied the LCD and Plasma screens for the practical part. There must be more service engineers in Malta per square mile than anywhere else in the world and most of them attended the course.

The course covers both the theory and practical application including fault finding pf Plasma and LCD technology to television recovers.

The Road Show now moves to Cyprus (December, 2005), Barnsley (January, 2006 hosted by Barnsley College) and Dublin later. Those interested in joining any of the courses or hosting one in their area should contact Fawzi Ibrahim on 07976 350724 or email: Fawzi.Ibrahim@cnwl.ac.uk.



Satellite Notebook

Christopher Holland

Men and Motors TV (Ch 136) has moved from transponder 44 (10.757 GHz V) of Astra 2D to transponder 37 (12,422 GHz H) of Astra 2B

The BBC HDTV tests on 11,469 and 11,481 GHz Vertical via Eurobird have now ceased.

Transponder 32 of Astra 2B (12,324 GHz Vertical Polarisation) has been switched off and all its TV Channels have moved to transponder 25 (12,188 GHz Horizontal) these include: MUTV, Adventure One, Premierhip Plus, and Boomerang, CNBC which was also on transponder 32 has moved to Eurobird transponder C1 11,260 GHz Horizontal, all the radio stations that were on transponder 32 have.been divided up elsewhere on Astra 2B either migrating to transponder 34 (12,366 GHz Vertical Polarisation) or transponder 36 (12,402 GHz Vertical Polarisation).

The Gospel Channel listed as testing last month on transponder C2 of Eurobird has been assigned ch 261 in the EPG.

Channel Additions to Sky Digital

Channel	Transponder	Freq GHz	Polarity	Satellite
Christmas Shop	699 C2	11,265	V	Eurobird
Apna Bazaar	829 C4	11,307	H	Eurobird
Raj TV	283 C4	11,307	H	Eurobird
More 4	165 42	10,727	V	Astra 2D
Audi Channel	259 C2	11,265	V	Eurobird
Life Showcase	162 C4	11,345	H	Eurobird

TV Channels

Name	Frequency	Polarity	Symbol Rate	FEC
EDUSAT (Poland)	11,190	Vert	2140	3/4
Gospel Channel	11,559	Vert	3250	7/8
YLE 1 (Finland)	12,520	Vert	17,500	3/4
DR 1,DR 2 (Denmark) NRK 1 (Norway) (These TV channels all scrambled) 10 radio stations clear				
DIGI TV Romania 2 TV Channels Clear 2 Radio Channels Clear	2,527	Hor	27,500	3/4
Macedonian TV 3 Channels clear	12,572	Hor	10,127	3/4
DIGI TV Romania 2 TV Channels clear 2 Radio Channels Clear	12,643	Hor	27,500	3/4
DIGI TV Romania 2 TV Channels Clear	12,687	Hor	27,500	3/4
DIGI TV Romania All Scrambled – (see photo below)	12,723	Ver	27,500	3/4

Digi TV Romania 12,72 3– all scrambled

Intelsat 10-02 1 Degree West

This month we're going to look at the 11-12 GHz output of Intelsat 10-02 located at 1 degree West.
We looked at the C band output of this bird's predecessor Intelsat 707 a while ago.

The satellite has three Ku band spot beams,two of which cover Western/Eastern Europe and both give coverage in the UK,the third spot beam covers the Near/Middle East using the 10.95 to 11.2 GHz transmission segment with horizontal polarisation which we won't cover as virtually no signal is available from this beam away from the Middle East. See table above.

Feeds

The satellite is very busy with feeds coming and going.I found the following over a period of monitoring the satellite for a few days. Frequency in GHz All Vertical Polarisation,symbol rate 6,111 FEC 3/4 unless otherwise stated.

Danish TV 11,463, 11,472, 11,481, 11,490, 11,499, 11,508, 11,517, 11,526, 11535, 11,544

NDR Germany 10,987, 11,499 (see photo)

NRK Norway 11,526, 11,535, 11,544.(see photo)

BBC 11,173, 11,472, 11,481 (see photos)

Swedish TV 11,513, 11,540 Symbol Rate 13,333 FEC 7/8

ABC Baghdad 11,672 Symbol Rate 5632 SR 3/4, normally on an exterior camera shot (see photo)

Irish Dog Racing 2 Channels 11,496 GHz SR 3200 FEC 3/4, 11,500 GHz SR 3250 FEC 2/3 (PHOTO B)

I've seen the "DR Dish" satellite feed transmitted on 11,535 GHz Vertical (see photo) which is aimed at satellite enthusiasts using a symbol rate of 5632 with an FEC of 3/4,this appears approximately on the last Monday of each month transmitted from around 20.00 BST,for more information on the next transmission date go to the website www.drdish.tv

Top left: NDR Germany
Top right: NRK Norway
Middle: BBC
Bottom: DR Dish

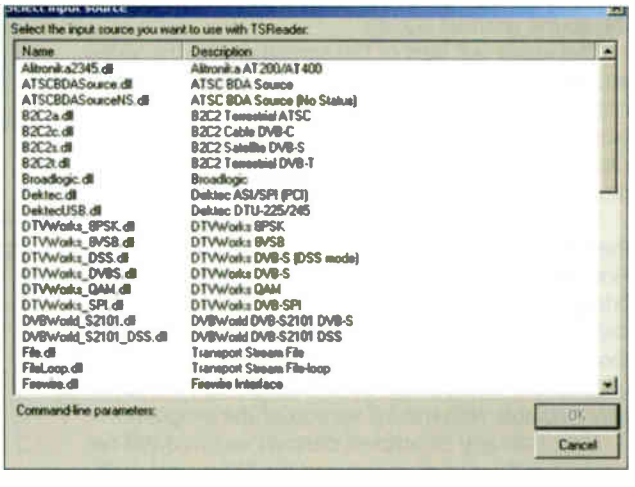
TS reader installation

We mentioned the TS Reader satellite multiplex transport stream reader computer program in the October issue of the magazine intended for use with a PC satellite receiver card such as the Skystar 2. Installation of the program can initially be a little confusing,the notes below should help.

A free version of the program called Tsreaderlite can be downloaded from **www.coolstf.com/tsreader**, whilst the the full version costs $99 the free version has most of the features of the full version including being able to display mpeg 2 and the new high compression h264 thumbnail images of transport streams received by the program.

The photo above, shows a screen image of the LNB selection,as the program is intended for worldwide use it doesn't automatically default to the standard European Ku band universal LNB standard on installation.As indicated in the picture to use a universal LNB Select LNB type Multiband, lowband local oscillator 9,750 GHz,highband local oscillator 10,600 GHz and LNB switch frequency 11700.

The tone option must select "band" whilst "voltage" option selects polarity,leave everything else in these two rows unselected.At the top of the screen select input D1 and tick "auto select LNB between 10700 and 12750 MHz". If a skystar 2 PC card is used select the input source as a "B2C2 Satellite DVB S card" (see below).



Typical symptoms of incorrect LNB selection in the program are reception only on low or highband/or reception just on one polarisation,note that this can also be a symptom of a faulty Skystar card but if normal results are obtained with a viewing program for the card such as DVB Viewer then the problem is almost certainly in the LNB selection menu of TS Reader.

Once the LNB selection has been made it's useful to close the program down again and then reopen it to see if

the LNB settings have been stored correctly. The screen resolution of the PC must be set to 1024 x 768 or higher,if a lower resolution than this such as 640 x 480 is used the thumbnail images may be partly shifted off the right hand edge of the screen.

Tuning to a channel

The program comes with preloaded satellite lists but a frequency can be entered manually and the same frequency will be remembered the next time that the program is started.

New frequencies cannot be stored in the frequency lists though an up to date list of satellite frequencies can be imported from a program such as DVB Viewer where each satellite list is stored as an "ini" file copy the ini file required from the DVB viewer program directory and paste it into the TSReader's satellite lists within TS Reader's program directory,when doing this you may be prompted as to whether you want to overwrite theexisting old list for the same satellite,if you want to keep the old list for any reason rename it ".old" or ".bak"prior to pasting in the new list.

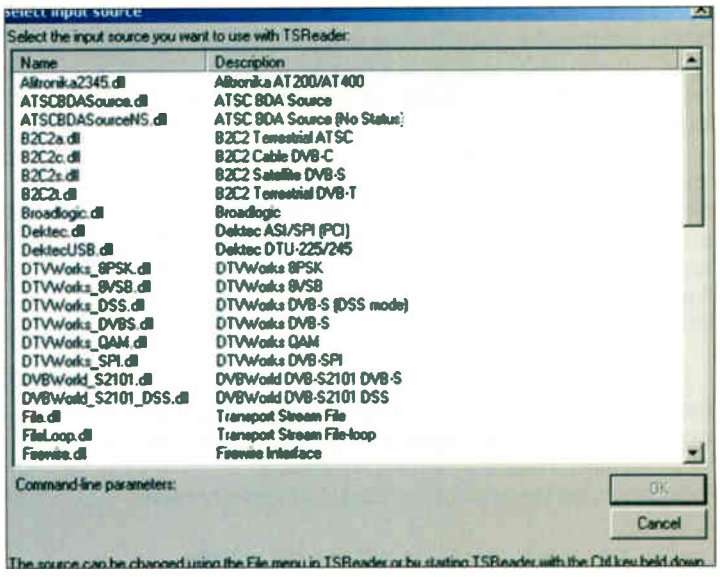
Opening the program once the LNB settings have been made should immediately display the satellite lists as in the photo (top right), where a channel can be selected from any satellite list or just enter the frequency Polarity and Symbol Rate manually (Forward Error Correction selection is automatic).and then click on the "tune" option,the photo also shows the characteristics of the Macedonian signal multiplex on Intelsat 10-02 having been entered. Once "Tune" has been clicked on the program should get to work,tuning the Skystar card and producing a display similar to the photo (centre right).

Three thumbnail images are shown for each TV channel within the multiplex(The refresh rate of the thumbnails can be altered within the program). The large green horizontal bars in the middle of the screen essentially indicate the bitrates for each video stream and as can be seen the third channel within the multiplex is transmitted at a lower bitrate than the other two.The smaller green bars below each larger one show the sound channel bitrate.

The upper left part of the screen shows the Video and Audio PID (Packet Identifiers) numbers for each channel.The first Video PID green bar is highlighted in blue because Elementary stream PID 33 has been clicked on at the top left of the screen,this then gives a description of the video in the top centre of the screen.

The photo (bottom right) is the TSR program tuned to the BBC's transponder 45 on Astra 2D (10773 GHz Horizontal),clicking on "NIT" at the top left of the screen brings up the Network Identification Table for Sky,it shows all the active transponders and right clicking the mouse over any of them immediately retunes the program to the transponder concerned though this facility is only available with the full version of the program.

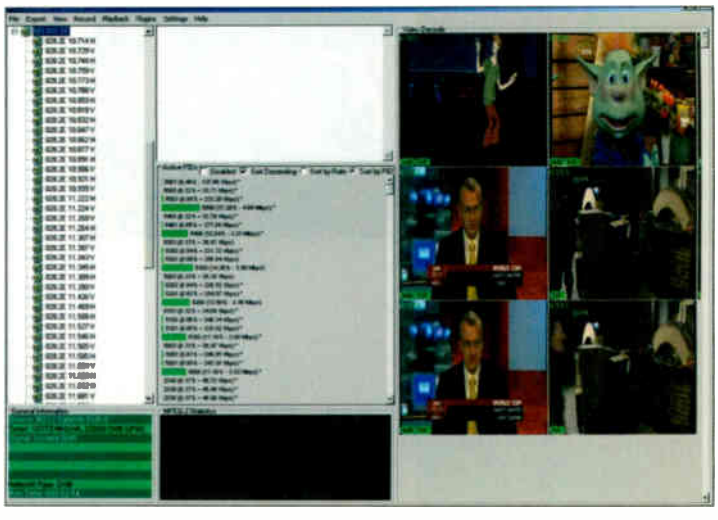
Note that any scrambled channel received will not produce a thumbnail image and the Video and Audio PID bars at the bottom of the program are shown in red instead of green,allowing video and audio bitrates of scrambled channels still to be seen.I've noticed sometimes if the program doesn't produce thumbnail images from an unscrambled channel,closing it down and reopening it can rectify the problem,don't just try retuning to another channel without closing the program down or no thumbnails images may again.result possibly with no Video and Audio PID readout also.



Above: Opening the program once the LNB settings have been made should immediately display the satellite lists above

Below:The program tuning the Skystar card

Below:The TSR program tuned to the BBC's transponder 45 on Astra 2D



Christopher Bowers

HCD-S500

There was no eject, or operation in DVD mode. A look inside the unit on the DVD board using a multi-meter soon revealed the cause of the fault to be, (Q002) on side B of the board, which had become defective. A ring to technical soon revealed that a modification would be needed.

Remove old (Q002) and replace, with "House Assy", part number (X-4954-896-1) I was told don't forget to solder the three wires correctly. If the the-B side is, face up and (Q001) is upside down in front of you. Connect the blue wire to the collector (Top). The white wire which is Base, (bottom left), and the red wire which is the Emitter (bottom right hand side) next to the Q002 print, and replace (R011) a 1k chip resistor, with a 470 ohm chip resistor part number (1-218-949-1). Which is the (chip) resistor just below the (white Base wire).

Plus when replacing the board back in to the unit, screw the housing (Q002) assembly, to the (Amp board) using the screw next to the flexible connectors being careful not to touch any part of the DVD board and power board. A replacement of the two parts should soon restore the normal DVD operation again.

Sony DVP-NS305

This unit had no power. A look inside on the Power Board soon revealed the fault to be caused by a blown Fuse F202. All that was needed to restore the normal operation again was to replace P/N (1-533-593-11).

Sony DVP-NS305

This unit had no sound through the Scart connector. A look inside the unit on the AV61 Board soon revealed the fault to be caused by poor solder contacts on CN203 all that was needed to restore the normal operation again was to re-solder.

Sony DVP-NS305

This unit would power up, then go back to standby straight away, (Plus when the unit was in test mode the picture was green). A look inside the unit on the MB 103 Board soon revealed the fault to be IC403 a replacement P/N (8-752-416-45) was all that was needed to restore the normal operation again.

Sony HCD-S300

This unit had distorted sound coming from all of the speakers and the headphone output but the line-out was ok. A look inside the unit on the DVD board using a multi-meter soon revealed the fault to be caused by (IC507) a defective volume IC a replacement soon restored the normal sound.

Sony HCD-S300

This unit would show no disc in CD and DVD mode. A look inside the unit with an Oscilloscope soon revealed the fault to be caused by (IC001) a defective oscillator generator P/N (8-795-949-1) and all that was needed to restore the normal operation again was to replace it.

Sony SLV-D950E

This unit's DVD picture would freeze (with block noise). A look inside the unit on the DVD mechanism assembly soon revealed a faulty (H210) motor feed Assembly P/N (9-885-037-22) and it was just a case of replacing the faulty motor to restore normal playback again.

Sony HCD-SB100

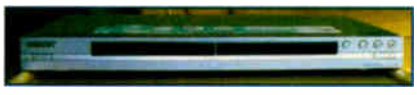
This new unit after powering up, would suddenly power off after ten minutes. A close look inside the unit on the Power Board, soon revealed the fault to be caused by (IC901) which had become defective P/N (9-719-947-79).

A call to technical soon revealed that a ZD955 Zener diode P/N (8-719-947-79) would need to be added over (C907) Cathode to the positive side, and the Anode to the negative terminal of (C907) to restore the normal power operation again.

Sony DVP-NS300

This unit would show No Disc on the display when trying to play DVD and CD's. A look inside the unit, revealed the fault to be the (CN) Connector on the small (KPC-K-H) board on the KHM2SOAAA Optical Block Assembly, that connects to the MB-98 board Via (CN201). All that was needed to restored normal DVD operation was to resolder the connector again.

Sony DVP-NS355



This unit would show no-disc on the display after loading the disc into the DVD player. A look inside soon revealed a faulty KHM-3lOAAA/C2RP Optical pick-up, base assembly. ref (104) P/N (8-820-237-06). A replacement was all that was needed to restore the normal DVD play-back again.

Sony DVD HCD-S800

There was no DVD operation, a quick voltage check on CN008 connector, on the DVD board revealed no 12v supply. The fault was soon traced back to a defective 10uH Inductor L904 part number (1-414-398-11) on the power board. A replacement of this part soon restored the 12 volts supply and the normal operation again.

Sony HCD-SC5

This units would not switch off into standby. A look inside the unit on the (Control PWB) using a multi-meter soon revealed the fault to be (S803) Play button which had collapsed causing a constant contact, a replacement of the push contact switch soon restored the normal play and standby operation again.

Sony DVP-S9000ES

Sometimes the tray would not be loaded completely on this DVD unit. A look inside the unit, revealed the fault to be the "loading assy"(104) and the "tray assy" (101). A ring to the technical department soon revealed that improved replacements, of the two parts would be needed to restore normal operation of the tray loading. P/N (A-6062-471-F) and P/N (X-3950-950-6) these soon restored the normal operation again, and for future references (If the number printed on the MD cover contains the letter F or higher the new loading assembly is already fitted).

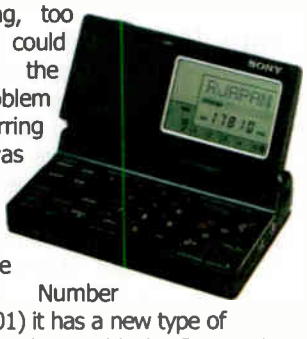
Christopher Bowers

Sony ZS-D50

This portable unit had a tape stuck in the tape deck. A quick look inside the unit revealed the cause of the problem, the capstan belt had slipped of the motor pulley, and having seen this problem several times before, a quick ring to technical was in order. The solution came in the form of a new improved belt, part number (3-229-349-01) and also a guide belt assembly part number (X-3380-302-1) with a note to change the collar (#152) and "(gold) screw"(#151) As soon as this was done, the tape deck player was restored back to normal again.

Sony ICF-SW100E

This unit only showed the Clock Display, and would Not turn (On) a quick look inside, the small world band radio showed, (a hair line crack) on both the PCB (Signal wire) part Number (1-651-256-11) and the flexible PCB (Key wire) part Number, (1-651-257-11) had developed between the Display panel, and the main board (but before ordering the two flat wires) I gave Sony technical a quick ring, too ask how I could help stop the same problem from reoccurring again, I was told the answer, "Order this MCB Flexible Kit", part Number (X-337-234-01) it has a new type of front display cabinet with the flat wire's. This solved the Power-up problem, and No sound problem, straight away.



Sony ST-S370

This unit had an incorrect tuner frequency range (76-90 MHZ). A look inside the unit around IC602 soon revealed a Faulty E-EPROM and all that would be needed to restore normal operation again would be to replace P/N (8-759-720-89).

Sony ST-S570ES

When you switched between the preset memories, the RDS station name of one preset would become over-written by another preset station. A look inside the unit around the micro controller and call to technical revealed the fault to be caused by a faulty Micro and an improved version uPD75512GF-117-3B9 would be needed PIN (8-759-053-74).

Sony STR-DB940B

On this unit, A clicking noise could be heard just before the unit would switch off (intermittently). A look inside the unit using the (bottom) service plate, on the Main Amp PWB revealed the fault to be dry joints on both audio output relays (RY601) and (RY701) and all that was needed to restore the intermittent fault was to re-solder the relays.

Sony ZS-D10

This unit (brought in with a 10V mains adaptor which was split on the wire) was off dead. A look inside the unit by first removing the six screws from the back of the unit, then the screws hidden behind the (hand removable) front silver mesh. Soon revealed that the T2.5mA fuse had just blown inside the unit. A replacement of the fuse and a repair on the split adaptor wire was all that was needed.

Sony HCD-BEI

This units Power/standby button would intermittently flicker green with no audio output. A look inside the unit on the Main PWB revealed the fault to be (C914) a 47uf 50V Electrolytic Capacitor which had gone faulty. All that was needed to restore the normal operation again was to replace the Capacitor.

Sony HCD-GPS

This units would stop playing CDs after only after a few tracks into the disc. A look inside the unit on the CD block assembly revealed the fault to be the (16 core) flat wire (173) that connects the optical pick-up to the BD board P!N (1-757-O55-11) and a replacement of the flat wire soon restored the normal playback operation of the CD again.

Sony HCD-RX90

When switching off the unit, all the tuner preset memories are lost. A look inside the unit, around the Micro (IC701) the Main board using a multi-meter, and a call to technical soon revealed that a New type of Micro would need to be fitted P/N (8-759-532-08) to restore the normal memory operation again.

Sony HCD-RX80

This unit had no CD playback and "No Disc" would appear on the display. A look inside the unit, using a multi-meter soon revealed the fault to be caused by a short between the BD board flexible cable (#104) and 5801 on the Motor slide board, and all that was needed was to protect the ffexible cable with some isolation tape or to re-arran~e the flexible cable so that it runs in front of the TCB Board to restore the normal CD playback.

Sony HCD-XB6

This unit would lose its preset memory after a power failure (but only when the timer was set). A look inside the unit, around the Micro (IC301)on the Main board using a multi-meter, and a call to technical soon revealed that a New type of Micro would need to be fitted P/N (8-759-499-02) to restore the normal memory operation again.

Sony HCD-MDX10 (1)

This unit had no audio output. A look inside the unit on the main transformer board revealed that the two (T6.3A) fuses had blow. A replacement of the fuses and a test, soon showed a short that lead back to the Power Amp IC (IC801) on the Main board P/N (8-749-O15-45) All that was needed to restore the normal audio output was to replace the Amp IC and fuses.

Sony HCD-MDX10 (2)

This unit had no audio tape operation. A look inside the unit on the tape deck assembly soon revealed the fault to be the (MI) capstan motor P/N (A-2004-628-A) and drive Transistor (Q336) P/N (8-729-118-00). A quick replacement of the parts soon restored the normal tape playback operation again.

Sony CDP-CE375

This (five disc) CD exchanger system looked totally dead. Cold checks inside the unit, around the transformer using a multi-meter soon revealed the cause of the problem, the main power transformer (T601) had gone O/C on the primary side. A quick replacement of the transformer, part number (1-435-3431-1) soon restored the normal operation of this five disc CD unit again.

David Packham

Sony HCD-CP101

This unit would do a number of faults, Skip on playing CDs, not read the discs or evenjump to the next track. A look inside the unit on the CD stage soon revealed a faulty Gear (A) on the base assembly, and all that was needed to restore the normal CD operation was to replace with a new type P/N (2-626-907-11).

Sony HCD-MD313

This unit would occasionally not load MD discs, the problem could sometimes be solved, by unplugging the power cable. A quick look inside reviled a possible micro fault a ring to technical soon give me the answer and the solution to this problem replace (IC316) with the new micro M30610MC-116FP part number (8-759-525-28) to restore the normal loading operation again.

Sony HCD-ED1

This unit had a fault of not reading disc's a close inspection of the optical pick up and spindle motor revealed the fault to be the spindle motor or M101 (Base outsert) part number X-4950-343-1 due to it developing a hair line crack on the black plastic disc plate, causing it to be pushed down on the motors shaft so the laser was unable to focus. A quick replacing of the spindle motor soon restored the normal operation of the unit again.

Sony CDP-K1.

This unit's CD draw would not close. A look inside the unit on CD mechanism using a multimeter, revealed the fault to be the open and close leaf switches which had become higher in resistance, located under the CD tray. All that was needed to restore the normal closing and loading operation again is to clean the leaf switches (lowering) the resistance to restore nornial operation again.

Sony CDP-211.

This unit's CD draw would not close after opening . A look inside the unit on CD mechanism using a multimeter, revealed the fault to be poor contacts on the limit switch on the BD board (this fault can also be interniittent). All that was needed to restore the normal closing and loading operation again is to replace the lirait switch P/N (1-572-085-11).

Sharp 51AT-15H

Intermittent picture, intermittent line sync and intermittent frame shifted down were the problems with this TV. I eventually traced the responsible item to R712 (560R) base resistor to the 8v regulator transistor Q803.

Sanyo 32WN5 (Chassis EB7)

I was called to this set with the reported fault of sound but no picture. EHT was present as was the 200 volt supply to the crt base and the heaters were lit. The three cathodes though had 180v on them. The frame circuit checked OK so that wasn't the problem. I eventually solved the problem with the tried and trusted tap with a screwdriver on the tube neck and the picture appeared. Oh dear, another one destined for the scrapheap.

Sharp 32LF92H (11AK45)

This TV was over-scanning and the E/W was bowing. I found that D611 (UF5407) was leaky, C622 (18n 1Kv but varies depending on set) was faulty and these had damaged Q201 and Q223 (Both BC848B sm transistors). Replacing these and a quick prayer resulted in a normal raster.

Sony KD28DX40U

This set was dead and the line output transistor was s/c. Now I am always suspicious when this transistor is faulty and look for reasons for its demise. I checked and resoldered around the line stage although the joints all looked OK. I replaced the transistor shut my eyes and switched on. I was right to have been suspicious as the line output transformer crackled and smoked and the new transistor said goodbye. A new transformer and a second transistor produced an excellent picture.

Sony KV25K5U

Intermittent no sound or picture was the complaint with this TV. On inspection I found that the line driver transistor was dry jointed.

Panasonic NV-HD640 VCR

For a while video recorders were not worth repairing but now as the supply of new ones dries up and people are left with racks of pre-recorded video tapes they are becoming more willing to have them repaired. This one was crinkling tapes and the customer was complaining of intermittent eject.
A new pinch roller sorted out the first problem and the second one was traced to a cracked loading motor pulley (VDP1660).

Proline 28N1

This set was dead and I diagnosed a short circuit line output transistor. On inspection I found that the buffer capacitor was dry jointed and the heat had caused it to bulge. Replacing these two items and re-soldering various suspect joints completed the repair.

Toshiba 2812DB

Sound but no picture was the reported fault with this machine but on arrival at the house the TV was working. On interrogation the customer said that the picture faded slowly and then would reappear over a period of time. I headed straight for the CRT heater circuit which had a number of poor connections on it. Re-soldering provided a complete cure.

Mitsubishi CT 33B3STX

This set suffered from intermittent sound and picture although the tube heaters were lit and there was EHT. I traced the problem to the IF panel which was dry jointed. You have to remove the panel which is soldered in before you can get into it to attempt a repair. Usually you will find the IF coils are dry jointed (a la T201/2 in Sony sets). After repairing the joints and refitting the panel you switch on and hope you haven't missed any otherwise you will have to repeat the operation.

Watson FA7040

Varying height and frame linearity were the problems with this Makro special. A cure was effected by replacing the frame flyback capacitor and re-soldering the frame output IC cured the faults.

John Coombes

Samsung model CZ21 A8VN /Toshiba 21 S04A chassis type KS3A

Power supply faults – Dead

If the set is dead but the red LED blinks check firstly for open circuit fuse FB802 (630 milli amp).

If the fuse is at fault and a replacement causes a second failure then suspect a faulty line output transformer (T 444) which has gone shorted turns.

If this proves to be alright then check the output voltage from the power supply if the output voltage proves to be high then check the resistor R821 (133 kilo ohms) for increase in value or open circuit.

If after plugging receiver into mains input circuitry there is no LED lit on front it is necessary to check the microprocessor circuitry.

The microprocessor IC901 check the supply volts are correct there is no short circuit the reset and crystal are functioning correctly then replace the processor IC90 1 (SIM806EW-AO 15).

If, however this all proves to be alright check that the input voltage is present on IC903 (78RM33) if the input is correct but no output then replace IC903 (78RM33).

If this is negative and the input voltage is incorrect or missing then check diode D801 (IN5397GP-600V) and /or diode D801 (IN4004) check by replacement as they may not read faulty.

If both diodes prove to be alright then check the input voltage to IC804 (KA7806) if this is alright replace IC804 (KA7806).

If the input voltage to IC804 is incorrect then check diode D806 (FM-G 125) if faulty then replace and be sure to check resistor R828 (1 ohm) for open circuit.

If this all proves to be negative then check IC801 S (KA3S 1265P) for short circuit and FP80 1 S (5amp) for open circuit. If this all proves to be functioning correctly then check if the LED is on check the the microprocessor L.T. line is the correct voltage.

If this is incorrect then trace the L.T.line back to source.If however there is voltage but it is low then check IC90 1 (SIM806EWA015) by replacement.

If the voltage varies normally on pin 50 of IC901901 when using the remote control check D,C, conditions on Q908 (KSC815) if incorrect then replace.

If Q908 proves to be alright then check IC803 (78R08) for incorrect D.C. conditions this may require replacement. If this IC803 is operating correctly check IC201S (VDP3112B) for line drive waveform from pin 50 if very low or no output then suspect IC20 1 S as being at fault.

If the waveform is however present on IC20 1 Spin 50 trace back to transistor Q204 (KSC815) check the D.C. conditions and if they are incorrect then replace fRuIty transistor.

If all this proves to be negative then trace back through Q402 (KSC2073) to the line driver transistor Q401 (KSC5703) back to the line transistor Q404.

In some cases if the power supply does not start-up check the resistors R802 (15 kilo ohms) R803 (15 kilo ohms) and or R804 (15 kilo ohms) check any of these for open circuit.

If the set is dead then check IC801S (3S1265R) has being at fault but once again before switching on always be sure to replace the zener diode DZ803 (MTZJ30D) this as usually gone short circuit if the I.C. is at fault.

On IC80 1 S it requires at lease 15 volts output voltage appears to be too high or unstable be sure to check resistor R821 (133 kilo ohms) for change in value.

If there is a noisy power supply or lines rolling down the screen check C803 (470uf) for low capacity.

if the soft start circuitry is not working this will blow the chip IC801S (KA3S1265A) to pieces the start-up circuitry uses C811 with the charging voltage being limited by zener diode DZ808 (MTZ7.5) check for short circuit in any of these components or check by replacement.

Line stage faults

The first check in the line stage is to check the line output transistor Q40 1 (KSC5703) check for short circuit or in some cases a leaky condition.

If the line output transistor as gone short circuit check or ensure there are no dry-joints on the line driver transformer (T401). If still in trouble then check that there are no dry-joints on the line driver transistor Q402 (KSC2073).

If, however this still proves to be negative then suspect that the Flyback transformer (T 444) as developed shorted turns in its windings.

Check the D.C conditions or resistance of coils. If in the line stage excessive width occurs then check capacitors C426 (270nf 400v) and if this is fitted be sure to change to (430nf 400v).

On the larger Samsung sets model WS28M64N if this set is dead and ticking and the line output transistor Q401 (2SD5703) is short circuit but the replacement overheats badly and then fails again this is due to shorted turns on the Flyback transformer (T 444).

This fault may also cause no results with the red LED blinking check the fusible protector FB802 (630 milli amp) for open circuit. If after replacement of protector FB802 it goes open circuit again then it is necessary to replace the Flyback transformer (T 444).

In some cases with these sets the unit does not come on the green LED is lit but there is no line drive then check for faulty capacitor C407 (1 nf2K v) check by replacement or in some cases you can see the bum mark on the side of the capacitor.

If the line output and line driver stages appear to be alright then check the D.C. conditions on IC20 1 (VDP3112B) if they all appear to be alright but there is no line drive waveform then replace IC20 1 (VDP3112B).

If, however there is a line drive waveform on pin 50 of IC90120 1 but not at the base of the line driver transistor Q402

(2sc2073) then check Q204 (KSC 1815) for short circuit. if the tuning capacitors C405 (6.3nf 1.6K v) and/or C406 (6.3NF 1.6K v) check for short circuit or leaky condition, if these capacitors prove to be faulty this can give excessive E.H.T. causing the set to trip.

If there is a intermittent operation or cutting out check the thick film type device HIC401 (KSD5703) check also that there is no dry-joints on HIC401 device.

If all proves to be negative then check IC20 1 S (VDP3112B) Video processor combination IC. Check for dry-joints. If there is a east/west faults then check IC40 1 (LM393) check D.C. conditions or check for dry-joints on all pins.

If there is intermittent bright picture or bright raster with flyback lines this can be due a dry-joint on the G2 screen control or it can be due to a faulty Flyback transformer (T 444) this can be proved by measuring the G2 screen volts which can be displayed on a multimeter showing a increase or decrease in volts.

In many cases a light tap on the G2 screen control can cause variation on the picture. A similar fault can also occur with the focus control also mounted on the Flyback transformer (T444) the only effective cure is to replace the Flyback transformer.

If there is line collapse or intermittent line collapse check the line scanning coils or there connections (GT 40 1/GT 402) for dry-joints.

Video faults

If there is video faults with the sound appearing to be alright. It is necessary firstly to check the G2 screen control is there a video picture be blank raster with possible flyback lines or is there line collapse or frame collapse.

If the deflection circuitry both line and frame scanning proves to be alright check the CRT tube base check carefully the cathodes red, blue and green.

If the cathode voltages are correct then check the CRT heater if not lit then check resistor R523 (1.5 ohms) for open circuit. If this still proves to be negative then check the connections from the main P.C.B. to the C.R.T. tube base.

If this all proves to be alright then check for faulty Flyback transformer (T 444) or if this proves to be operating correctly suspect a faulty C.R.T. with a open circuit heater.

If however when checking the G2 screen control the deflection is not correct then check the video processor IC20 1 S (VDP3112B) pin 31 vertical drive or pin 50 line drive.

If the frame drive pin 31 is incorrect then check DZ202 (MTZJ5.6B) by replacement. If however zener diode proves to be alright then suspect IC201S as being at fault. If the vertical drive on pin 31 is correct then trace back to frame output IC30 1.

Frame output faults

If there is a frame fault the most common being frame collapse check D.C. voltage on IC301 (LA7845), if there is no volts on pin 6 offtame output IC301 check 5resistor R425 (0.47 ohms) for open circuit or check diode D401 (RUZOA60V) open or short circuit.

If still at fault then check DZ302 (MTZJ24 B) zener diode for short circuit.

If this proves to be alright then check D.C. to IC803 (78R08) if incorrect trace back to source or replace IC803.

If this all proves to be alright then check for dry-joints on frame scanning coil connections GT30 1 IGT302.

Check the frame scanning coils for open circuit or may be the coils have arc across to create shorted turns.

If this all is working correctly then check capacitor C301 (1 uf50v) for short circuit. Check also the resistor R424 (0.47 ohms) for open circuit.

If this all proves to be negative then check the zener diode DZ303 (MTZJ24B) for short circuit.

No Sound

The first check for no sound is to ensure the loud speaker connections are correct and there is no dry-joints.

If this all proves to be alright then check that the 14 volts is present on pin 3 and pin 13 of IC901602 (TDA 7297) sound amp I.C. if the 14 volts is missing then check resistors R630 and/or R631 (2x 0.33 ohms) for open circuit.

If this proves to be alright then check F A803 (7 amp) circuit protector for open circuit. If the protector F A803 is open circuit however then it is necessary to check diode D807 (FM6125) for short circuit and /or capacitor C820 (3300uf) for short circuit.

If still at fault then check voltage on IC602 (TDA7297) pin7 if the pin appears to be in a low state then the sound is muted. If this is the case then check D816 (TVRI OG) and/or Q906 (KSC 1815) check D.C. conditions or by replacement. If IC602 pin7 proves to be correct then check IC601 (MSP34116-A2) pin 24 and pin 25 if the results are incorrect then replace the Sound amp IC602 (TDA7297).

If pins 24/25 on IC601 prove to be normal ensure the 5 volt and 8 volt lines to IC601 are present. If the L T lines are correct then check that the input to IC60 I from the tuner unit is correct, but if incorrect then replace tuner unit (TUOI5)

CRT/CRT tube base faults

If there is loss of one colour Red IC503, Green IC502 and Blue IC50 I (3x TDA61 0 1 Q) check the individual I.Cs.

This series of IC901 (TDA61 0 1 Q) can also give a bright colour raster which could be red, green or blue.

The same symptoms can also be caused by a faulty C.R.T. If there is no picture be sure to check that the C.R.T. heaters are are lit and not open circuit. If the C.R.T. heaters are not open circuit but are still not lit check resistors R523 and! or R522 (2x 0.68 ohms) for open circuit.

If there is only red colour parts on the picture which come up visibly has red streaks are due to resistor R503 (10 kilo ohms) on the C.R.T. P .C.B.

If there is no picture content at switch on but the sound is alright with E.H.T. present. The picture appears alright when the G2 screen control is changed. This can be traced to resistor R528 on C.R.T. tube base. If the set is dead then check capacitor C511 (10uf 50v) for short circuit.

Tuner/IF faults

The most common fault with the tuner unit is that the sound is alright but the picture is very)' snowy.

This can be caused by faulty aerial socket with the inner connection dry)'-jointed on the tuner unit P.C.B.

If this proves to be alright then check that the earth section of the aerial socket is not cracked causing snowy picture or may be intermittent snowy pictures.

In some cases the tuner/I.F. units can switch to SECAM which is caused by a faulty Sound IC601 (MSP3411G) check by replacement.

If there is tuning drift this can also be due to a faulty tuner unit (TUO 15) but before replacing the tuner unit check the 33 volt stabiliser diode ZD804 (TZP33A) check the D.C. condition or by replacement.

If there is a fault on the SCL/SDL series data lines this may cause the tuner unit to shut down giving no IF. output.

If you feed signal in on the scart socket and in a A V mode and it will give sound and pictures on the screen then this puts the fault in tuner or IF. units.

Remote Control faults.

The remote control for these models can be very)' reliable the battery)' connections can cause intermittent or no operation.

The robber sheet with the contacts on if badly worn can cause many different faults like one channel not being able to select.

In some cases if the remote control is not working at all check the LED for dry)'-joints this can also cause intermittent operation of remote control.

Extended Fault Reports

Geoff Darby

Audio Faults

Aiwa PX - E860K Phono Deck

If you get one of these with the complaint "No audio output", don't be fooled, as I once was...

The deck has a built in preamp, and this has an On/Off switch, cunningly hidden under the turntable. Its at the back of the deck, and accessible through one of the holes in the turntable, once these have been revealed by removing the mat, and one has been rotated to be over the switch.

This time, employing my elephantine (!) memory for such faults, I went straight there, and as expected, someone had set the switch to the " OFF " position. Normal output was restored as soon as this was reset to " ON "

Shanling SP-80

This beautifully presented, and very well made, monoblock amplifier – see photos - originates in China. It is a very high-end item, and carries a price tag that not so long ago, you would have expected to see on a decent second-hand car !

It uses a diverse mixture of technologies, having a solid state front end, employing two Burr-Brown top quality opamps, and a Burr-Brown electronic volume control IC, driving a power amplifier comprising a 6N9 and 6N8 double triode pair, and two EL34s in a classic push-pull configuration.

There are two huge transformers, one being for the various power supplies - there's a lot of them including +/-5v, +/-15v, 6.3v AC and + 6v DC for the valve heaters, + 350v for the valve HT rails, -60v for the output stage bias supply, another +5v rail for the control logic processor, and filament and negative supplies for the VFD fitted to the front panel. The other transformer is a beefy output type to match the valves' output impedance to that of the speaker, and to provide the coupling between the two valves, and from them to the speaker.

The described fault was " Whistles ". When powered, as the valves warmed up, it produced what can only be described as an air raid siren 'all clear' sound. I also noticed that the VFD was producing no display. It should produce a welcome message, followed by a dB display for the volume. If you have a pair of the amps for stereo use, they are coupled together by a thin data cable. One amp is then set to "master" and the other to "slave" by rear panel minature switches. The master receives infra red data via a sensor co-located with the VFD, and passes this to its own processor, and the remote processor in the slave amp. Both units' processors then send volume control data to their respective volume control ICs, and display data to their VFDs, causing them to track one another.

My first move was to check all of the supply voltages. This quickly led me to U10, a 7805 regulator IC, which had no output, and was very hot. Removing the volume control IC from its turned-pin socket, immediately restored the supply, and a cool regulator. The amp was also now quiet. A new PGA2311chip was ordered and fitted. This, however, still left the display problem, and no actual output from the amp.

The display has its own processor, connected via a flexiprint, back to the board with the main system control processor on it. Checks at the main processor showed that although remote control data was going in, there was no activity on the serial control bus going to the volume control IC, and its mute pin was being activated. Further, there was no activity on the parallel bus going out to the display processor.

Based on the fact that a number of pins on the previously faulty volume control chip, connect directly back to pins on the processor chip, I decided to swap it for one from a working unit. This immediately restored full normal operation of the unit, so a replacement was ordered and fitted, completing the job.

Thomson AM 1555

The complaint with this HiFi was "No volume". Commonly, these suffer from no output on one channel only, due to a failed output capacitor, so I was expecting the fault on this one, to be something different.

In fact, the problem was just that this time, both the output capacitors were open circuit. The originals are 2200uF @ 16v working, and are mounted upright on the pcb, immediately under the output heatsink (what is it about designers, electrolytic capacitors, and heat sources...?)

I always replace them both anyway, using 25v rated, low ESR 105 degree types, laid over on their sides to keep them away from the heatsink. This action restored audio to both channels, as expected.

It's curious that both caps seemed to have failed together. I think that it is more likely that one channel had been down for some time, and the owner only saw fit to put it in for repair, or possibly only noticed a problem , when the remaining channel had faded away, as well.

Sony TA EX70/ST EX100

These two items, part of a four-piece stack system, both had their displays missing. They are VFD types, and at a first glance, I thought that maybe the 'TA' unit, being the amplifier, and main

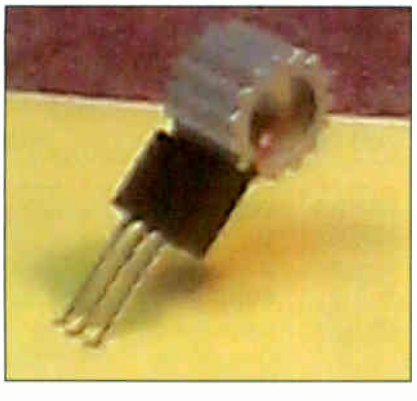
power unit, supplied power for both displays, giving a common cause for the failure. However, a more detailed evaluation of the problem, revealed that the CD player, which shares the same bus, had a correct display when it was selected as the source.

The first thing to check with dark VFD faults, is that the negative ' high ' voltage supply (typically -25v to -35v) is present. In both cases here, it was. The next most likely cause, is filament supply failure. This supply is normally derived from a dedicated winding on the mains transformer, and is usually of the order of 1.5v to 3v ac. In the cases of these two items, however, the filament supply was derived from completely different sources.

In the tuner, it was derived from the main AC input, which is supplied by the mains tx in the TA unit, and in the amplifier, from a similarly high voltage transformer winding. In both cases, there was a 100uF 40v capacitor in each leg and, additionally, four parallel-connected 470 resistors in each leg.

The resistors were all very distressed looking, and the caps were on their last legs. Replacement of all of these items, restored both displays. The locations for the caps in the tuner, were C161 and C162, and in the amplifier, the corresponding devices were C971 and C972. The resistors were R971-R978, inclusive.

Goodmans System 4212



Failure of the CD to operate in this budget Hi Fi, with the laser not even homing, was caused by a defective 8v regulator transistor, Q701. Its type was completely unrecognisable, even to www.datasheetarchive.com and it's very rare to beat this excellent free-to-use web resource.

One of the transistor's junctions was still intact, and this indicated that it was an NPN device, so I fitted a BD239 with a small heatsink of the TO39 type. This heatsinking technique (see photo) is one that I have learnt recently, from some commercial boards that I repair. The gap in the circular 'crinkly' heatsink is pushed down over the transistor's metal tab, until it contacts the device's plastic body. The spring tension created by flexing the gap open, maintains a firm mechanical contact between the tab and the heatsink. Although the actual contact area between the two pieces of metal is small, the heat transference is remarkably good.

Whilst on the subject of web resources, its worth mentioning a site that I have used for a long time, to help with identifying surface mount transistors and diodes. It can be found at www.marsport.demon.co.uk/smd/mainframe.htm

Goodmans GCE5002DVD Personal DVD Player

The job ticket with this one said: "Screen in black and white only, but picture perfect. Sound OK. Same on external screen – owner thinks it will be BER."

I wondered why the owner thought that it was likely to be beyond economic repair.

I was pretty sure that it was just going to be a menu setting causing the trouble, and so it turned out to be.

In the basic setup menu, was an item 'Screen Type', and this was selectable for PAL or NTSC. It had, of course, been set for NTSC. Once this had been reset to PAL, all was back in glorious colour.

The only other thing which had me wondering, was when I phoned the shop which had taken in the repair, to give them the good news for their customer. "Oh great," they said. "He will be pleased – although maybe not, because he did originally bring it in for an insurance report." Hmmm...

LG LH - C62351

The complaint with this DVD/VCR combination was that it kept going back to standby. When powered, this seemed to be the case. Sometimes, it would stay on long enough to open the DVD tray, but never long enough to play a disc.

On the power supply section of the audio output board, are a number of regulator devices, on individual finned heat sinks. One of these, IC705, was so hot that it burnt your eyeballs just to look at it!

Once the board was out, I was able to examine what the device was – a standard 7805 regulator. What I was then amazed to discover, was that it was leg-for-leg, paralleled up with another identical device, IC706. This is a practice that I have never seen done with monolithic shunt regulators, and not one that I would personally condone. Presumably, it is in an effort to double up the regulator's supply current capability. If there is any imbalance between the two devices, they will fight with each other, and I am not quite sure what exactly the results of that may be - but probably the sorts of problems that this machine was suffering.

As a next move, I unsoldered the 'out' legs of both devices to check what voltages they were producing.

The one which had been very hot, had an output of exactly 5V, whilst the other, produced only about 1V. I replaced them both, with two from the same batch, and repowered. This time, everything worked, and a long soak test proved that there were no further issues.

Marantz DV110/N1S

This unit would play absolutely fine, until it got to about the middle of the disc. It would then start freezing, and jumping back, while making distressed mechanical noises.

I removed the deck, followed by the main sled drive gear, such that the sled was now free to move up and down the slide rod. At around the middle of its travel, it became slightly tight - enough for the drive gears to have slipped, causing the mechanical noise.

No amount of polishing or lubricating would improve the situation, so I adopted a rather more radical approach, and slightly 'eased' the plastic yoke part of the laser body moulding, with a very fine rat-tail file, until it slid easily from one end of the shaft to the other, consistent with not being a 'sloppy' fit at any point.

Once the deck was all reassembled and refitted to the unit, a long soak test proved that all was now ok.

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S W Amos; R S Amos

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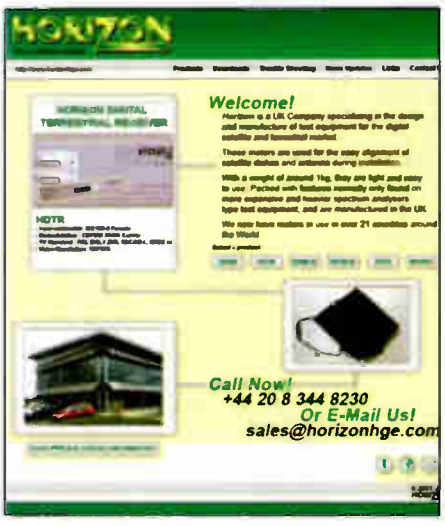

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Solution to Test Case 516

– see page 95 –

Digital receiver boxes can give their share of troubles of the types Todd encountered, and it's seldom that solving them provides much profit or joy for the dealer or technician.

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Mr Hanson had no truck with professional aerial people, and that in fact was the root of his problems. In an area where the field strength of digital TV signals is high he had gone for a high-gain UHF aerial and then passed the signal through a distribution amplifier.

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11 Somebody's Coming To My House, Walter Van Brunt, 1913
12 Bonny Scotland Medley, Xylophone solo, Charles Daab with orchestra, 1914
13 Doin' the Raccoon, Billy Murray, 1929
14 Luce Mia! Francesco Daddi, 1913
15 The Olio Minstrel, 2nd part, 1913
16 Peg O' My Heart, Walter Van Brunt, 1913
17 Auf Dem Mississippi, Johann Strauss orchestra, 1913
18 I'm Looking For A Sweetheart And I Think You'll Do, Ada Jones & Billy Murray, 1913
19 Intermezzo, Violin solo, Stroud Haxton, 1910
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Digifusion	FVRT100	IRC83107	Philips	DTX6372	IRC83087
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Dijam	32VU DVB-T	IRC83082	Sagem	ITD58	IRC83105
Ferguson	FDT2000	IRC83077	Sagem	ITD59	IRC83105
Ferguson	FDT500	IRC83077	Sagem	ITD60	IRC83105
Ferguson	FDT600	IRC83077	Sagem	ITD601	IRC83105
Ferguson	FDTT2500	IRC83115	Sagem	ITD602	IRC83105
Fusion	FRT100	IRC83108	Sagem	ITD61	IRC83105
Fusion	FRT101	IRC83108	Sagem	ITD611	IRC83105
Fusion	FRT101T	IRC83114	Sagem	ITD62	IRC83105
Fusion	FVRT100	IRC83107	Sagem	ITD64	IRC83105
Fusion	FVRT150	IRC83107	Sagem	ITD66	IRC83105
Goodmans	GDB1	IRC83079	Sagem	ITD68	IRC83105
Goodmans	GDB2	IRC83079	Sagem	ITD72	IRC83105
Goodmans	GDB3	IRC83079	Sony	VTX-D800U	IRC83112
Goodmans	GDB4	IRC83079	Tatung	TFR100G	IRC83108
Goodmans	GDB5	IRC83104	Technosonic	STB2014T	IRC83101
Grundig	GDT1000	IRC83081	Techwood	TWDFV1	IRC83079
Grundig	GDT1500	IRC83081	Tevion	STB714	IRC83101
Grundig	GDT2000	IRC83077	Thomson	DHD4000	IRC83086
Hitachi	HDB60	IRC83079	Thomson	DTI1000	IRC83080
Humax	MG-TU1	IRC83115	Thomson	DTI1002	IRC83080
Labgear	DTT100	IRC83082	Thomson	DTI2300	IRC83086
Lodos	DVB-T3	IRC83079	Thomson	DTI2305	IRC83086
Logik	LDR1	IRC83079	Thomson	DTI550	IRC83080
Matsui	DTAR10	IRC83104	Triax	DVB2000T	IRC83082

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Technical helpline 01635 278678

All products listed are available from your usual Classic distributor. For more information on the complete Classic range visit www.classic-serviceparts.com, phone us on 01635 278678 or email us at uksales@classic-serviceparts.com

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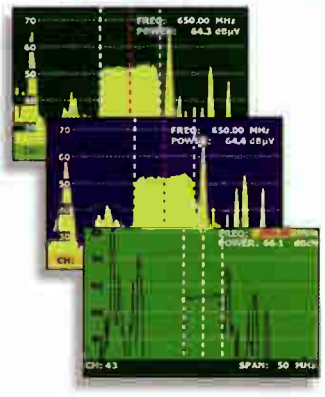
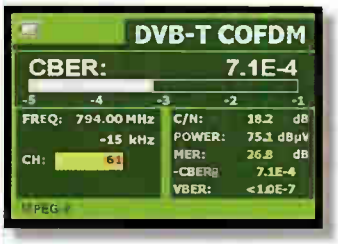
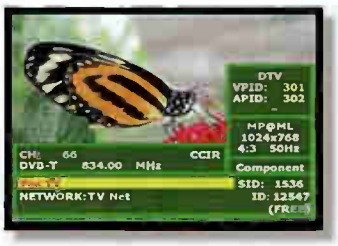
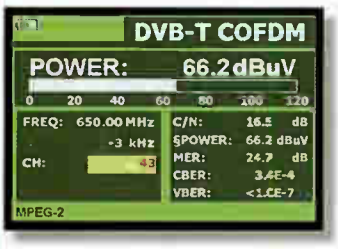
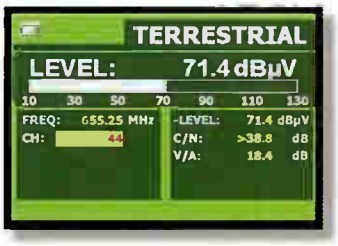








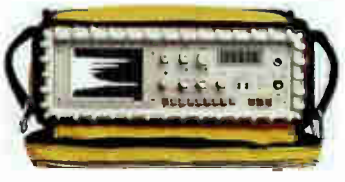


PROLINK 4C PREMIUM

PROLINK 3C PREMIUM

PRODIG 1+

PRODIG 2



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ALBAN ELECTRONICS LIMITED

THE PROMAX SERVICE CENTRE

6 Caxton Centre, Porters Wood, St. Albans, Herts, AL3 6XT.

TEL : 01727 832266 FAX : 01727 810546

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