Ti

TELEVISION

PLQ ! JUE ! ! ! !

! ! cl PLQ

elevisions and electronic equipment

SION

AND HOME ELECTRONICS REPAIR

APRIL 2002 £3.10

9 770032 647122 04

FREE:

Satellite kit supplement

New technology at CES 2002

Servicing the Mitsubishi TFS6705K monitor

Logo burn – a new peril

Satellite, PC, Monitor, TV, VCR and DVD faults

Thanks to our distribution network, we've got you covered...

One call to any of our UK distributors gives you access to the entire Classic range of components, from Remote controls and Mains switches to Transformers and Video parts. With superb technical and product knowledge they'll help you to quickly find the component you're after.

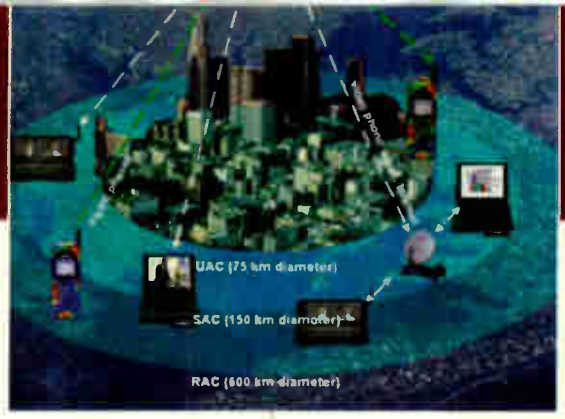
For more information on the Classic range, contact your nearest distributor, call 01635 278678, visit us on the web at; www.classic-electronics.co.uk or email us at sales@classic-electronics.co.uk

classic

Technical helpline 01635 278678

CONTENTS

April 2002 **Vol. 52, No. 6**



Editor
Martin Eccles

Consultant Editor
John A. Reddihough

Advertisement Sales
0208 722 6028
Fax 0208 770 2016

Editorial Office
01782 870684
Fax 01782 878233

Note that we are unable to answer technical queries over the telephone and cannot provide information on spares other than that given in our Spares Guide.

Next issue, dated May, on sale April 17th.

The pay-TV problem

If broadcasters are to offer something special, which in practice largely means exclusive transmission of wide-appeal sports events, they have to invest heavily in acquiring the rights to broadcast such material.

For a broadcaster the problem with pay-TV is, of course, how to make it pay. To date there has been little success with this. To start with, there's the attitude of the prospective audience. People are not happy about the idea of paying for their TV programmes. They expect either public broadcasting, which is free apart from the need to pay for a reception licence, or commercial broadcasting, which derives its revenue from advertising. Why should they be asked to pay? Well, if there was something exceptional on offer, maybe. So broadcasters have to come up with something special if they want people to open their wallets and pay extra. But this, for the broadcaster, leads to a further problem: organising a viable business plan. If broadcasters are to offer something special, which in practice largely means exclusive transmission of wide-appeal sports events, they have to invest heavily in acquiring the rights to broadcast such material. This tends to be expensive, as there is tough competition for such rights. The broadcaster thus has the problem of figuring out whether he will have enough paying viewers to cover his costs and leave him with a profit. It might work out, but so far it hasn't. When substantial investments have been made and inadequate revue is being generated, the broadcaster is in trouble. Recently two examples of this problem have been in the news, ITV Digital in the UK and the Kirch Gruppe in Germany.

The facts about ITV Digital are well known. It has some 1·26m subscribers, whereas its main competitor, Sky Digital, has over 5·7m. Yet many of their costs, in particular in acquiring rights to broadcast particular programmes and in paying to carry various channels, are much the same. Despite it's success in gaining a substantial number of subscribers, Sky Digital itself has not, to date, managed to make a profit. For ITV Digital the situation is proportionately worse. It might, if it holds out long enough, manage to break even – or even make a profit. But such an outcome looks a long way off. Meanwhile ITV Digital's owners, Granada and Carlton Communications, are suffering badly, to the extent that their willingness to persevere with ITV Digital is in some doubt.

The two companies are doing what they can to alleviate the situation at ITV Digital. First, there have been staff cuts – 25 per cent have gone. Secondly, there have been efforts to reduce the cost of acquiring subscribers. Those free digiboxes don't help the business plan one bit. And thirdly, efforts are being made to reduce programme costs, which in practice means renegotiating the terms of contracts entered into. Those who have such agreements with ITV Digital, in particular the Football League, are none too pleased about this. But Sky Digital has just managed to reduce by ten per cent the charge it has to pay to broadcast thirteen channels, owned by Flextech and UKTV, including UK Gold, UK Style, Bravo and Living, which proves that this sort of thing can be done.

Kirch Gruppe's problem is basically the same as ITV Digital's, a failed business plan. There are questions about the future of the company, which has repayments in excess of its assets due this year. Kirch is said to be Germany's largest media group and broadcaster, but its extremely complex organisation makes it difficult to assess the exact situation. Kirch Gruppe is privately owned and has borrowed, with largely short-term debt, to build the business. That's an elementary mistake for a start: you don't borrow short to invest long. The company's business is based on ownership of film and other rights, for which it is reputed to have overpaid excessively, and stakes in various other companies. It has a 52·5 per cent stake (but 89 per cent of voting rights) in ProSiebenSAT.1, Germany's largest TV broadcaster. It has a 58 per cent interest in SLEC, the trust that owns the rights to Formula 1 events. And it has a 69·7 per cent stake in the pay-TV operation Premiere, which is loosing something like 80m euros a month at present because it has about half the number of subscribers envisaged in the business plan. So, debts due beyond its means to repay them and a pay-TV disaster have led to a crisis that calls into question the future of Kirch Gruppe.

Pay-TV business-plan failure is not specific to any particular mode of transmission. ITV Digital is a terrestrial TV broadcaster, whereas Kirch's Premiere service is satellite based. The cable operators are suffering just as badly. NTL and Telewest are both loosing money and could fail or have to be 'restructured', which means that loans or bonds due for repayment would be exchanged for equity – if the lenders or bondholders could be persuaded to accept it.

But the terrestrial pay-TV business seems to be particularly precarious. To date, it hasn't succeeded anywhere. Spain's only digital terrestrial pay-TV broadcaster, Quiero TV, has just been put up for sale. The situation there has uncanny similarities to that of ITV Digital. Since its launch in 2000, Quiero TV has signed up only 130,000 subscribers: satellite pay-TV broadcasters have 2·7m subscribers in Spain. Quiero TV is paying more than it can afford for content, and is loosing 15-18m euros a month, with a debt burden of 450m euros. Oh, and Carlton has a 7·5 per cent stake in Quiero TV. ■

CORRESPONDENCE

All correspondence regarding advertisements should be addressed to the Advertisement Manager, Television, Cumulus Business Media, Anne Boleyn House, 9-13 Ewell Road, Cheam, Surrey, SM3 8BZ. Editorial correspondence should be addressed to Television, Editorial Department, Cumulus Business Media, Anne Boleyn House, 9-13 Ewell Road, Cheam, Surrey, SM3 8BZ.

INDEXES AND BINDERS

Indexes for Vols. 38 to 50 are available at £3.50 each from SoftCopy Ltd., who can also supply an thirteen-year consolidated index on computer disc. For further details see page 375.

Binders that hold twelve issues of *Television* are available for £6.50 each from Television Binders, Pringle, Street Blackburn, BB1 1SA. Make cheques payable to "Television Binders".

BACK NUMBERS

Some back issues are available at £3.50 each.

SUBSCRIPTION ENQUIRIES

Telephone:	01444 445 566
Fax:	01444 445 447
Credit card orders:	01622 778 000

Address: Television, Subscriptions Dept, PO Box 302, Haywards Heath, West Sussex RH16 3YY, UK.

Make cheques payable to:	Television
Subscription rates:	
UK	£32.00 per year
Airmail Eire	£36.00 per year
Airmail Europe	£46.00 per year
Airmail Rest of World	£59.00 per year

NEWSTRADE ENQUIRIES

Distributed by COMAG

Telephone: 01895 444055

ISSN 0032-647X

cumulus BUSINESS MEDIA

TELETOPICS

Digital TV adapter from Pace

Nine major consumer electronics companies have announced the specification for a next-generation, large-capacity laser-scanned video disc. The new format will be known as Blu-ray Disc. It provides recording, rewriting and playback of up to 27GB (gigabytes) of data on a single-sided, single-layer 12cm CD-sized disc using a 405nm blue-violet light laser. This data capacity is almost six times greater than that of a single-sided, single-layer DVD disc. Phase-change record technology is used, each disc being able to store over two hours of high-definition digital video recorded at a data rate of 36Mbits/sec, or approximately thirteen hours of standard-TV broadcast video (VHS/standard-definition picture quality) at a data rate of 3·8Mbits/sec. As with DVD-RAM, the discs will be held inside a standard protective cartridge. The companies that have established the Blu-Ray Disc specification are Hitachi, LG, Matsushita, Pioneer, Philips, Samsung, Sharp, Sony and Thomson Multimedia. The nine companies plan to license the new format to others as soon as the specification is finalised – licensing is expected to start this spring.

Use of a short-wavelength (blue-violet) laser enables the beam spot size to be minimised – the numerical aperture of the field lens that converges the laser beam is 0·85. The disc's structure has an 0·1mm optical transmittance protection layer, diminishing the aberration caused by disc tilt. As a result, there is better disc readout with an increased recording density. The tracking pitch is 0·32μm, almost half that of a regular DVD disc. Thus up to 27GB can be recorded at a high density on a single-sided disc.

Both standard- and high-definition pictures are recorded using MPEG-2 compression. The system also uses copy-protection technology. But the consortium that has devised the system intends to develop higher-capacity discs which store over 30GB on a single-sided, single-layer disc and over 50GB on a single-sided, double-layer disc. Other applications, such as PC data storage and high-definition video software, are being considered. According to Sony the first Blu-ray products could be launched in Japan next year.

Table 1 shows the main specification details.

Table 1: Basic Blu-ray Disc specification

Recording capacity	23·3/25/27GB
Laser wavelength	405nm (blue-violet)
Lens numerical aperture	0·85
Data transfer rate	36Mbits/sec
Disc diameter/thickness	120/1·2mm
Optical transmittance protection layer	0·1mm
Recording system	Phase change
Tracking system	Groove recording
Tracking pitch	0·32μm
Shortest pit length	0·160/0·149/0·138μm
Recording phase density	16·8/18·0/19·5Gbits/square inch
Video compression system	MPEG-2
Audio compression system	AC3, MPEG-1 layer 2, etc.
Video/audio multiplex	MPEG-2 transport stream
Cartridge size	Approximately 129 x 131 x 7mm

Microwave leakage checker

A pocket-sized device, called the Microwave-Guard, that checks for microwave leakage from ovens has been introduced by Link Instruments, 12 Greenway Lane, Buriton, Petersfield, Hants GU31 5SX (phone 01730 269 609). It gives an indication should microwave leakage from a microwave oven exceed a level of 5mW/cm^2. The checker is intended for use by the public and is expected to be on sale at about £15.

This colourful new test-card pattern has been adopted by ITV Digital. It's a modified version of the original Test Card F, with comedian Johnny Vegas and Monkey in the centre instead of Carol and her doll.

ITV Digital and Sky Digital report

The number of ITV Digital subscribers increased by 46,000 during the final three months of 2001, bringing the total number to over 1·26m. The annualised average revenue per user (ARPU) was £225 – price increases implemented in January should increase the average by £25. The churn rate during the three-month period was 24·9 per cent.

Sky Digital now has over 5·7m subscribers, adding 263,000 during the second half of 2001. During the six-month period Sky Digital made a loss before taxation of £61·5m, about half that sustained during the same period in 2000. The ARPU was £318. Interactive revenues increased by 149 per cent to £91m, of which £49m related to betting – the remaining £42m represented Sky Digital's share of revenues generated by Sky Active and third parties. At the end of December there were 17,000 Sky+ digibox subscribers.

Digital radio

Trials are being held on the Isle of Man to test the possibilities of converging 3G and DAB. A network has been developed by MM02, Virgin Radio and Crowncastle International, while Unique Interactive and XY Networks have supplied data facilities for 3G/DAB and DAB-only systems. A carefully-selected, closed user group on the island has been provided with 3G handsets and Psion WaveFinders to enable public reaction to audio and data services via both DAB and 3G to be assessed. Six services are currently available, five from Virgin Radio and the local Manx Radio. An additional Manx audio service is to be added to the trial.

Semiconductor company Frontier Silicon has announced the availability of the Frontier Chorus FS1010, a single-chip DAB/audio processor based on the META DBX1 design from Digital One and Imagination Technologies. Frontier expect a sub-£100 digital radio using the chip to be available in the second half of the year.

New from JVC

A number of new products have been introduced by JVC. The following are of particular interest. Model HM-VDR10EK is a DVD-RAM recorder that can also use DVD-R discs and is compatible with DVD-Audio discs. It offers simultaneous record and playback, enabling a programme to be watched from the beginning while the rest is still being recorded. Model HR-XV1EK is a combined DVD-Video player and VHS recorder. Model XV-NA7 is a DVD-Audio machine that's also compatible with DVD-Video, CD, VCD and CD-R/RW discs. It can also read MP3 files. Other features include integrated Dolby Digital, DTS and MPEG decoders. There are two MiniDV camcorders, Models GR-DVP5 and GR-DVP7, with a 1·02 Megapixel CCD image sensor, a web cam function and an MPEG-4 e-mail video clip facility. MiniDV camcorder Model GR-DV3000 has a 1·33 Megapixel CCD image sensor.

Samsung's new 42in., 16:9 aspect ratio plasma TV Model SPL4225 was on display at CES 2002 in Las Vegas. For further details from the show see page 326.

Wireless internet gateway

Pace Micro Technology is testing, with cable operators NTL and Telewest, a wireless method of connecting a domestic PC to the internet. It uses a variant of DECT, the technology used for digital cordless phones. A tiny transmitter attached to the side of the STB delivers data at 552Mbits/sec, fast enough for most internet services, to a receiver at the side of the PC. Pace is using DECT instead of Bluetooth because its spectrum is clean and secure – Bluetooth's spectrum is subject to interference from microwave ovens and burglar alarms.

The advantage of the system is that it provides an always-on service that can be networked to PCs around the house. The cost is likely to be in the region of £100-£200.

Harry Todd on the web

Harry Todd, who has for many years campaigned to help those suffering from back injury as a result of handling TV sets, has established a website where you can find information on such injuries, how they can be avoided, and the legal steps open to sufferers. Go to www.harrytodd.co.uk

Business news

Thomson Multimedia had a successful though "very difficult" year in 2001. Revenues increased by 15·4 per cent and operating profit margins by 6·1 per cent. Thomson Multimedia paid tax for the first time since it was bailed out by the French government in 1996 and was on the point of being sold to Daewoo for a symbolic FFr1. The company is now expanding through acquisitions – recent purchases include the Technicolour film processing business bought from Carlton Communications, a 67 per cent interest in Philips' professional broadcast division, and Matsushita's optical disc business. Thomson has become less reliant on retail activities, which represented 48 per cent of sales in 2001 compared with 68 per cent in 1997. This summer the company will reduce production costs when it regroups all its video, design and manufacturing operations in China, where it already has 20,000 employees.

In contrast Philips recorded a loss of 2·6bn euros during 2001, down from a record 9·6bn euros profit in 2000. Sales were down 15 per cent. The company's consumer electronics division performed better than some other sectors but still suffered a downturn. Sales of components and semiconductor devices fell severely during the last quarter of the year, by 54 and 44 per cent respectively.

Matsushita Electric suffered record losses in the year to March. A group pre-tax loss of Y585bn ($4·35bn) is expected for the year, Matsushita's first loss since 1995 when it booked a loss on the sale of Universal Studios. Matsushita has suffered in particular from reduced sales of PCs, PC peripherals, components and mobile phone handsets.

Amstrad has reported a sharply reduced interim pre-tax profit of £923,000, down from £1·51m. The company's hopes of a better outcome lie with its recently launched Em@iler Plus, which adds internet access and computer games to e-mailing plus a fixed-line telephone. Amstrad plans to sell 250,000 of these units during the present financial year.

This new measuring receiver for digital/analogue satellite, cable and terrestrial TV, Model MSK33, has been introduced by Vann Draper Electronics Ltd. It's a multi-standard receiver with coverage of 88-108MHz (FM band), 47-867MHz and 920-2,150MHz (satellite IF band). Several retrofitable options can expand its range of applications.

The MSK33 is a battery/mains unit with a 5·5in. LCD colour monitor screen that displays pictures, levels, parameters and menu screens for easy setting up and operation. An integral printer provides a record of measured values and spectrum analyses. A teletext decoder and Nicam are included, with bit error ratio measurement (BER) and a loudspeaker for sound monitoring. There's a tuning memory for up to 100 stations. Direct measurement of QPSK and QAM is available, also return-path measurement and an MPEG decoder. The latest option is for BER measurement with digital terrestrial TV signals.

There are six basic versions. The MSK33 with basic functions; the /G version which has a graphics board and provides real-time spectrum analysis and signal-to-noise measurement; the /Q version with a digital board that includes QPSK/QAM BER measurement for digital satellite and cable signals and constellation analysis; the /M version with an MPEG decoder; the /TM version with COFDM BER measurement; and the /MR version with return-path measurement.

For further details contact Vann Draper Electronics Ltd., Stenson House, Stenson, Derby DE73 1HL. Phone 01283 704 706 or e-mail sales@vanndraper.co.uk

CES 2002 at Las Vegas

George Cole reports on the latest consumer electronics technology presented at the 2002 Las Vegas Consumer Electronics Show. New flat-screen, digital and interactive TV, DVD recording, consumer hard-disk and audio developments were on display

The annual Consumer Electronics Show, held in Las Vegas in early January, is an industry highlight that sees the launch of new products, new formats and new services. This year's show, covering over 1·3 million square feet of floor space, attracted over 100,000 visitors from around the world during its four days (January 8-11th). Many new and interesting developments were on display, with much of the focus on TV and DVD technology.

TV developments

Two technologies dominated the TV displays, digital TV and flat-screens. The digital TV roll out in the US started in 1998. While there are many HDTV programmes and products, take-up has been slow. HDTV, using the US ATSC standard, provides much higher picture quality than with the standard-definition system, but hardware prices reflect this. The first HDTV offerings were up-market sets that cost thousands of dollars. Prices have since fallen, but they are still expensive in comparison with standard-definition sets. Nevertheless manufacturers have been rolling out HDTV-compatible models that provide 480-line or 720-line progressive-scan displays or 1,081-line interlaced displays. According to the US Consumer Electronics Association, some 1·46 million HDTV products were sold last year, including 970,000 IDTVs. The rest were monitors and set-top boxes. The forecast for this year is 2·1m, rising to 10·5m in 2006 when the FCC hopes to switch off the analogue TV transmissions.

US consumers like big screens, so much emphasis has been placed on the development of flat-screen technology. Three formats were much in evidence this year, plasma, LCD and DLP (Digital Light Processing). Hitachi's Ultravision HDT20 series plasma sets include 42 and 32in. NTSC models which incorporate Virtual High Definition circuits to up-convert NTSC to HDTV. These are Hitachi's first NTSC plasma offerings, which feature a split-screen display and an AV control centre. The latter is a box of electronics that includes a TV tuner and AV input/output sockets, with a single cable to connect to the display. The Ultravision technology has been developed in conjunction with Fujitsu.

Sharp has been at the forefront of LCD technology, so it was no surprise to find that the company had a wide range of LCD products on show including the Aquos range. There are two 16:9 aspect-ratio models, with 20 and 30in. screens, priced at £2,020 and £7,030 respectively (all prices are approximate UK equivalents). Both are HDTV compatible, with a 500:1 contrast ratio and 170° viewing angle. There are sockets for component, S-video and composite video signals. The range also features 13, 15 and 20in. 4:3 models.

In addition Sharp showed a couple of interesting pieces of technology the company plans to launch in the US later this year. SmartLink is a wireless connection system that enables users to transmit audio and video around the home. Signals can be sent from one room to another by plugging a video source into the transmitter and a receiver into a TV set. Sharp also plans to launch a TV set with a built-in PC card slot for easy display of images from a digital still camera. This product is already on sale in Japan.

The development of several flat-screen TV technologies led many industry observers to believe that there would be yet another 'systems battle', with one technology emerging as the winner. It has since become clear, particularly at CES, that the market will be able to accommodate several different display technologies. Sharp showed plasma and CRT products as well as its LCD ones. The company had on display 43 and 50in. 16:9

plasma sets with twin NTSC tuners and HDTV compatibility, both just three inches deep. Sharp's Flat Tube sets come in 27, 32 and 36in. screen sizes and include V-chip technology to enable parents to control the TV broadcast content their children watch. Parental control is obviously a big selling feature in the US: these sets also include a View Timer system that enables parents to control how much TV their children watch, by imposing half-hour viewing slots. In addition Sharp had on display two rear-projection TV sets, with 55 and 61in. screens.

Samsung's range also used several different display technologies, including a set with a DynaFlat CRT. This 30in. model's tube has an ATOM (advanced tension optimal mask) shadowmask that increases the accuracy of the beam landing. The company also showed 42 and 50in. plasma sets and LCD TVs with screen sizes from 15 to 40in. The highlight here was the 40in. Model LT405W, which is to be launched in the US this autumn. Samsung sees this set as a competitor to plasma, suggesting that the 40in. screen size will represent a crossover point between LCD and plasma displays.

Samsung was also one of the many companies to show DLP (Digital Light Processing) products. This projection technology, developed by Texas Instruments, is based on a digital micromirror device (DMD) – a large IC with more than 1·3 million digitally-controlled microscopic hinged mirrors that act as super-fast optical switches. The company has 43 and 50in. models.

The Panasonic range included 11 and 15in. LCD models with built-in progressive-scan DVD players (see later). Dewoo's offerings included a 50in. plasma TV model and a 60in. rear-projection model using LCD technology. Fujitsu's plasma models included a 61in. set, while Marantz was showing a 42in. 16:9 plasma set. JVC featured two CRT sets with the new DVI (Digital Video Interface) sockets for set-top boxes and other video devices.

Thomson's Scenium 61in. Model PHD61400 plasma HDTV set includes a DVI socket, an IEEE 1394 socket and Microsoft's Windows CE3.0 operating system for future home-networking arrangements. Talking of Microsoft, Thomson also announced that fifteen of its RCA-branded sets will have video inputs optimised for use with the Microsoft Xbox games console. This exclusive agreement is to last for two years. Zenith showed a 60in. plasma TV set and an LCD HDTV/PC monitor with AV and computer input sockets. Philips has put its PixelPlus technology into a number of sets, including two widescreen models. PixelPlus uses interpolation to add extra pixels and artificially double the vertical resolution with an NTSC signal.

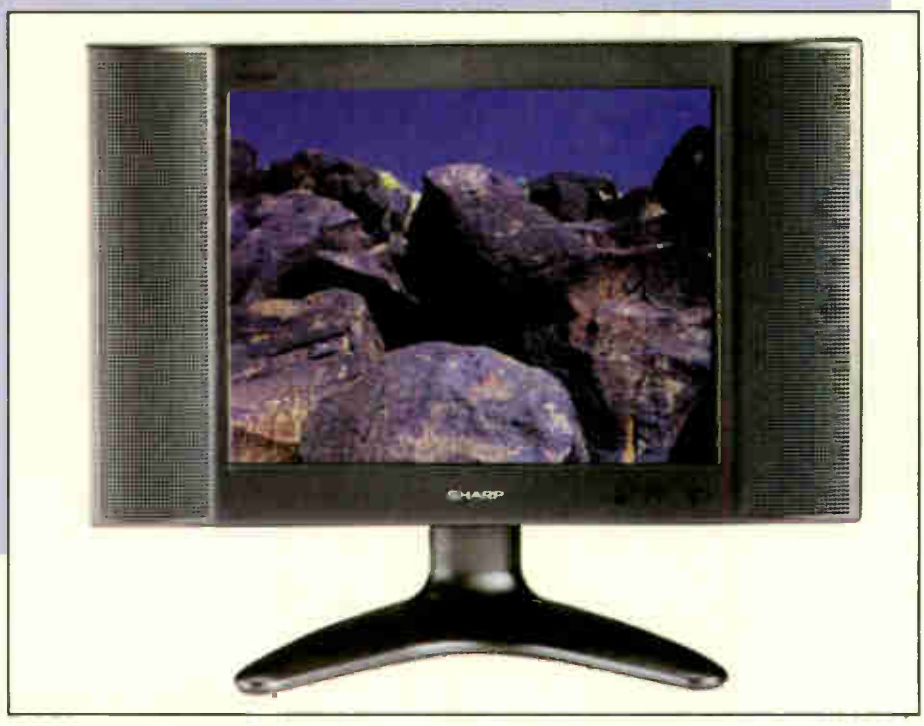
The Samsung DVDL100 portable DVD player with 10in. 16:9 LCD screen.

DVD developments

As in the UK, DVD is now the fastest-selling consumer electronics system in US history: more than 12·7 million players were sold there last year. The average price of a DVD player is £150. Despite this US consumers have not ended their love affair with the VCR, 14·9 million of which were sold last year. This could have something to do with the average VCR price of £38! Some companies showed combined DVD/VCR machines, including Sharp whose Model DV-NC70U is also compatible with CD-R/RW discs and the MP3 file format. Hitachi's DV-PF2 is another DVD/VCR combi unit with MP3 compatibility while Samsung's DVD-V2000 and DVD-V2500 also combine the two technologies.

Progressive scanning is a big selling feature in the US, and many DVD players have progressive-scan output sockets. This includes the Hitachi DV-725U, which has a dual laser pick-up for reading DVD, audio CD, CD-R/RW and Video CD discs. Samsung's DVD-L100 is an interesting portable DVD player with a 10in. 16:9 LCD screen and compatibility with DVD-R, Video CD and various CD formats. It's also compatible with the Memory Stick

The Sharp DV-S1 DVD/CD Player.



One of the 4:3 aspect ratio LCD models in the Sharp Aquos range.

memory card developed by Sony. A Memory Stick is the size of a piece of chewing gum and can currently hold up to 128Mbytes of data. Samsung says that users can now transfer music from a PC and listen it via a DVD player or a home stereo system linked to the player. Samsung has also launched a couple of DVD-Video players with a new EZ (ee-zee!) remote-control unit, an egg-shaped device that provides basic DVD functions like stop, play and reverse skip. A more sophisticated handset with a joy-stick control is also included.

DVD-Audio and SACD compatible DVD players were also on display on a number of stands, but many consumers will welcome Pioneer's DV-47A which plays DVD-Video, DVD-Audio, SACD stereo, SACD Multichannel, Audio CD and CD-R/RW discs. But convenience comes at a price: the DV-47A costs about £920.

Many companies, including Pioneer, Toshiba and Panasonic, showed DVD recorders using either the DVD-RW, DVD-RAM or DVD-R formats, the official DVD rewrite/record formats. The Rewritable DVD Committee, an alliance of DVD companies, announced that DVD Multi products could appear over the next year or so. DVD Multi isn't a new DVD format: it's a specification for a new generation of DVD products that will play all official DVD recordable/rewritable discs.

Philips was busily promoting its rival DVD+RW format with the launch of Model DVDR985, which reads and records DVD+RW discs plus the new write-once DVD+R discs. Most DVD-RAM and DVD-RW recorders can also use write-once DVD-R discs, but the first DVD+RW recorders didn't offer a write-once recording facility. The DVD+R disc overcomes this limitation, and Philips says that a software upgrade via a CD-ROM disc will enable first-generation DVD+RW recorders to become DVD+R compatible.

With DVD recorders only just beginning to appear on the market and consumers already faced with several rival formats, you might think it an appropriate time for a pause in recordable DVD developments. But at the CES several companies were already jockeying for position with the next generation of DVD recorders, which will use blue-laser technology. Panasonic, Toshiba and Zenith (parent company LG) had prototype blue-laser recorders on show. The Toshiba blue-laser (405nm wavelength) system can store up to 30Gbytes of data on a single-layer, single-sided disc, sufficient for three hours of high-definition video. In comparison a DVD-RAM disc stores up to 9·4Gbytes of data on a double-sided disc. To achieve this high-density recording, the new blue-laser system uses a land and groove recording format, i.e. data is stored in both the grooves and the flat land between them, and PRML (Partial Response Maximum Likelihood) signal-processing. Sadly, Toshiba has so far revealed little about the PRML system. Toshiba is recommending its system to the DVD Forum as the standard for the next generation of DVD recorders.

The Zenith/LG system, called HD-VDR, doubles up as a digital set-top box and uses an optical disc with 23Gbyte capacity. The disc's substrate is just 0·1mm thick. An objective lens with a numerical aperture of 0·8 is used, enabling both recordable DVD and HD discs to be read. In addition, while 0·8 numerical-aperture lenses are usually assembled from two or three lens elements the Zenith/LG lens has a single element, reducing the cost. Zenith/LG says that the HD-VDR system will be launched next year.

Sony showed a blue-laser recording system at last year's CES. This year the company focused on its computer products, but it's a fair bet that Sony is working hard to get its system accepted as standard for blue-laser DVD recorders.

A growing number of DVD players are MP3 compatible. At CES 2002 Microsoft announced that four manufacturers, Panasonic, Toshiba, Apex and Shinco, are to launch DVD players that are compatible with its Windows Media Player audio-file format. This means that a PC user could transfer up to 22 hours of WMP-A files on to a CD and play them back via a home DVD player.

The Philips Streamium MCi200 is claimed to be the world's first micro hi-fi system with a broadband internet connection.

Camcorders and data links

The most interesting camcorder news came from Hitachi, which announced three DVD-RAM recorders. Models DZ-MV200A and DZ-MV230A have 12x optical and 240x digital zooms, a 2·5in. LCD screen and can read and record 8cm DVD-RAM and DVD-R discs. The discs can store up to twenty minutes per side of high-quality MPEG-2 video or half an hour per side of lower-quality video. Alternatively they can also hold about 2,000 JPEG images per disc. In this mode the DZ-MV230A provides higher resolution (1,280 x 960 pixels) because of

its 1·1M pixel CCD image sensor. Model DZ-MV200A has a 680k pixel image sensor that provides a resolution of 1,024 x 768 pixels. Hitachi's third DVD-RAM recorder, Model DZ-MV270A, has a 3·5in. colour LCD screen and a USB 2.0 port.

The Universal Serial Bus interface is now standard on all computers. It's far superior to the serial and parallel ports used with older PCs, providing plug-and-play installation (with serial and parallel ports it's a case, as the saying goes, of plug-and-pray!). The USB makes it easier to connect items such as digital cameras, scanners and printers to a PC, and has a much faster data rate – with the USB 1.1 standard data speeds are up to 12Mbits/sec. This is fast enough for transferring relatively small files, but large files, for example moving video, need a faster data rate. MiniDV camcorders use the IEEE 1394 standard, which is also known as DV, FireWire and i-Link. This provides data transfer rates of up to 400Mbits/sec. All Sony computers have i-Link ports, but most other PC manufacturers have been slow to follow Sony's lead. The news from CES 2002 suggests that many companies may stick with USB.

The USB Implementers' Forum was present at CES 2002, promoting the new USB 2.0 (or High-speed USB) standard. This provides data rates of up to 480Mbits/sec. The USBIF had much to announce about the new standard, including the news that USB 2.0 drivers (the software that enables a PC to communicate with other devices) for Windows XP are now being distributed. Intel has developed two PC motherboards with multiple USB 2.0 ports, and Gateway has launched the first PC with USB 2.0 sockets.

Although there are digital camcorders and DVD recorders with IEEE 1394 ports, few if any printers, scanners or external drives (such as Zip or CD-ROM drives) have them, whereas USB port are found on almost all PC add-ons nowadays. It will cost little if anything to upgrade future PCs and peripherals to USB 2.0, but adding an IEEE 1394 port involves a price premium. PC companies will be encouraged to take up USB 2.0 because it's backwards-compatible with USB 1.1 – existing USB cables and hubs can be used with USB 2.0.

Interactivity

Interactive TV was the main talking point a couple of years ago. But, with one or two exceptions (such as the Sky Active system), there's little sign that TV viewers in general want to do much more than sit back and watch their screens. This hasn't stopped companies promoting PC-like activity via TV sets however. The Moxi Media Center (Moxi MC) is a combined digital set-top box, personal video recorder, internet gateway and home networking system. It has a built-in CD/DVD player and a digital jukebox that can store hundreds of music tracks. Its built-in hard-disc can store 60 hours of video. With a home network, Moxi MC can provide dedicated audio and video streams (data) to up to four TV sets around the home. Moxi was founded by Steve Perlman, who devised the WebTV system which was bought by Microsoft. It doesn't plan to market the Moxi MC, but is instead offering the technology to cable and satellite companies. EchoStar, which has almost 6·5 million satellite TV subscribers in the US, has signed a deal with Moxi.

The Moxi media center is a combined digital STB, personal video recorder, internet gateway and home networking system.

Microsoft, which dominates the desktop PC world, wants to see its technology in the living-room TV set as well. To this end it offers Ultimate TV in the US. This combines digital STB and PVR technology. Ultimate TV is currently available with STBs for the DirectTV digital satellite TV service. Microsoft showed two new Ultimate TV enhancements at CES 2002. Remote Record enables viewers to set the Ultimate TV STB's video timer while they are away from home. To do this, a customer logs on to the Ultimate TV website from any computer and uses a password to gain access to the Ultimate TV programme guide. Once the timer data has been entered, it's transmitted to the STB via satellite. Auto-record enables a viewer to enter some basic programme information, such as "tennis": the PVR will then automatically record relevant programmes.

ReplayTV, the rival PVR system to TiVo, is now owned by SonicBlue. The latest Replay TV Model 4000 includes Video Sharing, which enables users with a high-speed broadband connection to transfer video recordings over the internet, and Commercial Advance, which enables viewers to skip past commercials during video playback. It has recording times of up to 40, 80, 160 and 320 hours, depending on video quality. A further feature is Show Organiser, which enables the user to put programmes into specific folders, such as sport, film or comedy.

The Hong Kong company eHome TV was showing the eTV-330, an internet TV set that incorporates an x86-based processor, 32-64 RAM memory and a browser which is compatible with Flash, Java and RealPlayer technologies.

The AverTV from AverMedia enables TV to be watched, video to be played back or games to be played via a PC monitor without having to switch on the PC. It's described as an entire entertainment centre in one hardware device. The price is modest at about £110.

Other developments

Networking technologies using the Bluetooth, IEEE 802.11 (WiFI) and powerline systems were on show. The idea is to develop wireless home networks or ones that use the existing power lines. Either would make a home network easier to set up and use.

Philips showed the Streamium MCi200, a micro hi-fi system with a broadband internet connection so that the user can tune to internet radio stations and download music.

Audio players, camcorders and digital cameras that use the SD Memory Card and Memory Stick were on show. So was DataPlay, which stores up to 500Mbytes of data on a hybrid read only/write once disc the size of a 10p piece. DataPlay was present at last year's CES and was due to launch its system last autumn. Apparently technical problems caused a delay: DataPlay is now due for launch later this year. But with memory-card capacity increasing and formats such as DVD-RAM and CD-R offering miniature discs, one wonders whether DataPlay will manage to find a foothold in the market. We should have a clearer idea when CES 2003 comes around. ■

This 17in. Trinitron-tube monitor's production run lasted for several years. Large numbers were sold as the Dell VC7EN. It's quite complicated, including just about everything you might find in a computer monitor, and thus provides a good introduction to the subject. In this first part of a new series Donald M. Henry explains how to fault-find on the video and sync boards

Servicing the Mitsubishi TFS6705K monitor

This article has been prompted by enquiries from a number of technicians who have been put off by the complex internal appearance of the Mitsubishi TFS6705K monitor: the high component density and many heatsinks can be quite daunting. The service manual, written in 'pidgin' English, can add to the confusion. The monitor was also sold under other names, one of the most common being the **Dell VC7EN**.

Although these SVGA monitors are now old, their build, reliability and material quality are first-class. Repairs are mainly predictable, which means that little time need be spent on chasing red herrings. So long as these monitors haven't been subjected to 'Conan the Courier' – the Trinitron tube has a fragile aperture grille instead of a shadowmask – they can be expected to provide many more years' service with good display quality. The video amplifier's bandwidth, which is specified as 50Hz-100MHz, contributes to the clear detail. Front controls such as vertical and horizontal static convergence have great 'fiddle-appeal' to users. The monitors can provide 1,280 x 1,024 resolution and accept line rates from 30-64kHz and vertical refresh rates from 30-64Hz. They perform well in CAD applications.

Most faults relate to the PWB-video CRT board, so we'll start by taking a look at the video circuitry and some of that on the PWB-sync subpanel, also on how to gain access to the grey-scale adjustments. The test procedure described later should enable technicians armed with only a digital multimeter to find faulty components on the tricky, double-sided print video PCB quickly and safely. Before starting on the video circuitry, you'll need to get the back off the monitor.

Back off

Place the monitor on its face and remove the swivel base by depressing the two plastic tabs on its underside. Then remove the two screws that secure the back to the bezel. Raise the lower edge of the back away from the screw holes by about half an inch. Next look carefully along the top edge, between the bezel and the back, for two recessed slots. With the monitor still face-down, insert a narrow, flat blade into each slot, angled towards the tube's neck. Lever upwards and the back should part from the bezel at the top edge. It becomes easier after the first time!

I've found that the best tool for inserting into the slots is a blanking plate from the back of an old PC. This seems to cause least damage to the plastic.

Table 1: Control voltages at plug J201.

Parameter	*Pin(s)*	*Typical*	*Minimum*	*Maximum*
Contrast	4	–	1·51V	4·51V
RGB gain	5, 6, 7	3·2V	5V	2·82V
RGB bias	1, 2, 3	1·6V	0·85V	5·07V

The video PCB

The video PCB, at the tube base, measures 4·5in. horizontally by 3·75in. vertically and has three ICs mounted on it. They are all on the component side, inside a hefty aluminium can. At the rear, through-hole connections that make direct measurements possible are available with only IC202 and IC203. The third chip, IC201, is surface-mounted above the CRT connector. The proximity of the CRT neck and scan coils makes it awkward to obtain measurements from IC201 directly: *do not try*, as a slight slip of the meter or scope probe could destroy a good chip. The three chips are as follows:

IC201, type AN93B04SCR, a DIP gull-wing surface-mounted chip. Mitsubishi part no. CP263P05701.

IC202, type 911986, an SIP hybrid IC with green body, part no. CP267P042A30.

IC203, type LH2426S, an SIP device chip with a large metal heatsink.

RGB signal path

The RGB signals from the 15-pin D-type connector at the back of the PC arrive at a hefty 13W3 type connector which has three coaxial

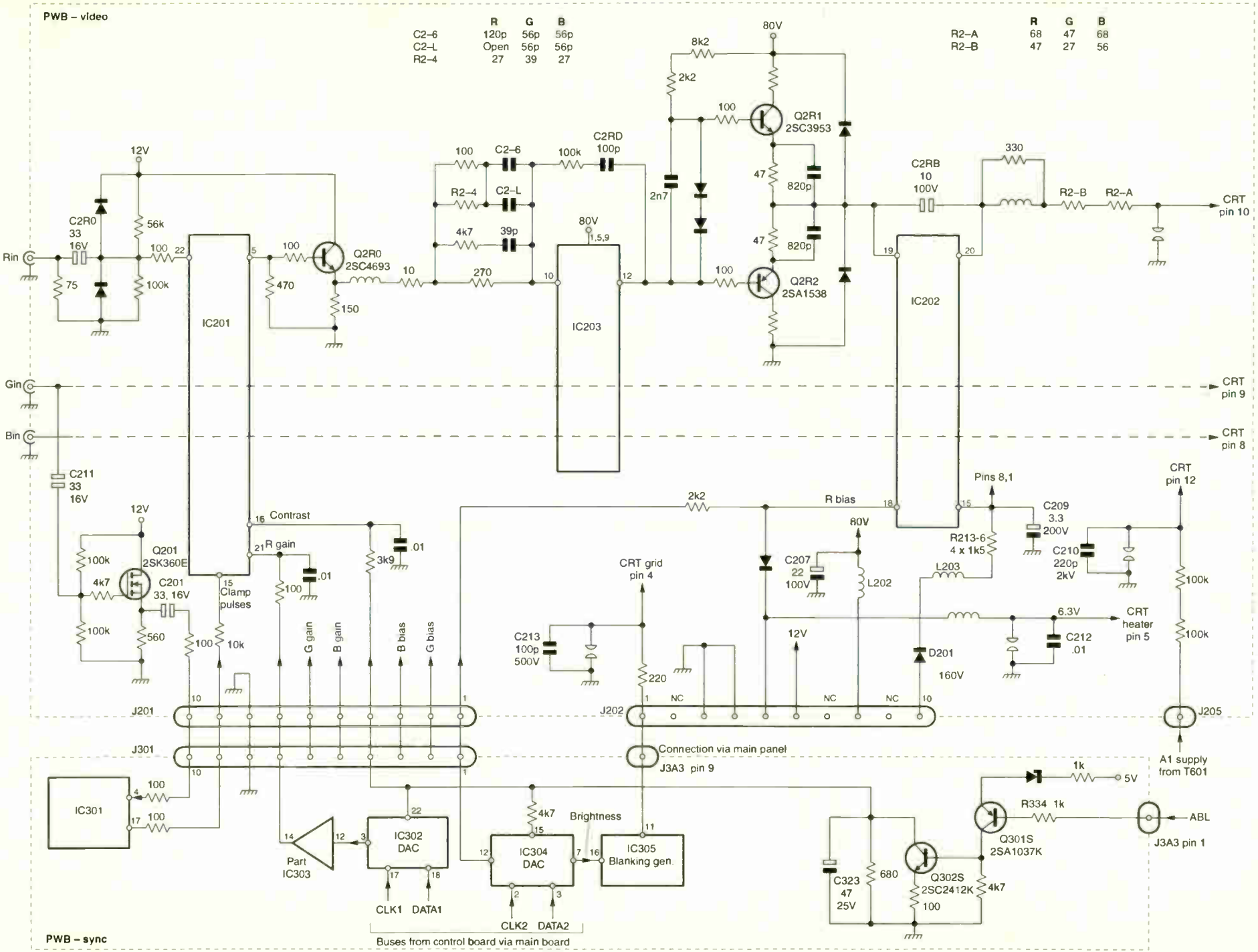


Fig. 1: Basic circuit arrangement on the video panel. Only one of the RGB channels is shown: the other two are identical.

Table 2: RGB emitter-follower voltages.

Electrode	*Min. gain*	*Max. gain*
Base	1·88V	2·61V
Emitter	1·16V	1·88V

Transistors concerned are Q2R0 (red), Q2G0 (green) and Q2B0 (blue). The collector voltage (DC supply) is 11·84V. Voltages measured with a grey-scale VGA pattern applied.

RGB inputs. Inside the monitor three separate, very thin coaxial leads with a little chrome plug at each end take the signals from the main PCB to the video board. See Fig. 1.

Once on the board the signals are fed to IC201, a three-channel, variable-output video preamplifier which increases the amplitude of the 0·7V peak-to-peak inputs to about 2V peak-to-peak maximum at its outputs. Gain is controlled by the DAC8840FP digital-to-analogue converter chip IC302 and the op-amps in the LM324 chip IC303. These are on a module that's called PWB-sync and is mounted on the main PCB. Cables link it to connector J201 on the video PCB. Table 1 shows the voltages to expect at J201. The RGB preamplifier section is analogous to the LM1203N preamplifier chip with preset gain potentiometers found in simpler designs.

The outputs from IC201 are passed to IC203 via the 2SC4693 emitter-follower transistors Q2R0, Q2G0 and Q2B0. These are not surface-mounted and, as their leads pass through the board, they provide good measuring points for the outputs from IC201. Table 2 shows the voltages to expect at the emitter-followers. IC203's RGB inputs are at pins 10, 6 and 2.

IC203 provides the main amplification on the video panel, with outputs at up to 35V peak-to-peak, controlled by the gain in IC201. IC203's RGB outputs are at pins 12, 8 and 4 respectively. Each output is fed to a pair of npn/pnp transistors in a push-pull configuration. These are Q2R1 (2SC3953, npn) and Q2R2 (2SA1538, pnp) in the red channel for example. Physically, these six large transistors are arranged as a block, separated and screwed to aluminium which acts as a heatsink. Full RGB amplification has now been provided. Each channel next requires a DC level to be added for tube biasing. This is taken care of by IC202.

For computer technicians who are not familiar with valve technology, each of the CRT's guns has a different threshold voltage at which the raster just starts to become visible, and each gun has a non-linear gain characteristic. Separate control of each gun's bias and gain is essential, in order to achieve correct grey-scale tracking between the dark and bright sections of the display.

The RGB outputs from the push-pull transistor pairs are AC coupled via C2RB, C2GB and C2BB (all 10µF, 100V) to pins 20, 13 and 6 respectively of IC202, where DC bias voltages are added. As with the previously mentioned gain control carried out in IC201, DA conversion is used to set the DC bias voltages. These arrive at pins 18, 11 and 4 of IC202 from the M62359P DA converter chip IC304 on the PWB-sync board. Table 1 shows the bias voltages to expect at connector J201.

The final combinations of RGB drive and bias voltages are applied to pins 10, 9 and 8 of the CRT, see Table 3.

Devices on the sync PCB

This monitor is compatible with systems that combine the sync signals with the green video signal, i.e. sync-on-green (SOG). Q201 (2SK360E), a surface-mounted FET at the rear of the video board, strips the sync content from the green signal and feeds it to pin 10 of J201, after which it passes to pin 4 of the M52036SP chip IC301 on the sync PCB. Coupling to and from Q201 is via 33µF, 16V non-polarised electrolytic capacitors, C211 and C201 respectively. IC301 also provides, at pin 17, the black-level clamping pulses for pin 15 of IC201, via pin 9 of J201 – regardless of whether SOG or separate line and frame (H and V) sync is employed. More about IC301 next month.

The contrast-control voltage, for pin 16 of IC201 via pin 4 of J201, comes from pin 15 of the DA converter chip IC304. This voltage is reduced when the beam-current limiter comes into action, via Q301S (2SA1037K) and Q302S (2SC2412K). When the contrast-control voltage is reduced, either by beam-limiter action or user adjustment of the contrast control, there is a corresponding reduction of each output (RGB) from IC201.

Control of brightness comes from pin 7 of the DA converter chip IC304. This output is fed to pin 16 of the 911642 hybrid chip IC305, which provides the negative-going blanking pulses required during the flyback periods. Other outputs from IC305 are –100V, 5V, 12V, 24V, V sync, H osc, phase etc. so there's a lot to consider. Fortunately the brightness output is applied to the tube's control grid, so it's easy to confirm whether IC305 is healthy at the CRT base.

Video board supplies

A look inside the aluminium housing will reveal no fewer than twenty electrolytic capacitors, though only three are used for the DC rails. All are rated at 105°C, so reliability is excellent. Each of the three ICs on the panel has a separate DC supply, which helps when checking for shorts (simply unplug J202 and check to chassis).

Pins 20, 24 and 28 of IC201 are fed with 12V from pin 6 of J202 via the surface-mounted coil L201. C205 (220µF, 25V) decouples this supply. There are also 22µF, 25V decoupling capacitors at the pins.

IC203 runs at 80V from pin 8 of J202 via L202 with C207 (22µF, 100V) for decoupling. Pins 9, 5 and 1 are separately decoupled by 10µF, 100V electrolytics.

IC202 is slightly different. It's supply, to pins 15, 8 and 1, comes from pin 10 of J202 (160V) via D201 (HSK83), L203 and R213-6 (each 1·5kΩ) with C209 (3·3µF, 200V) for decoupling.

Compare the supply voltages in the monitor under test with those shown in Table 4.

Video board fault-finding procedure

You can go wrong and get involved in unnecessary expense if you try to make a fault diagnosis based on

Table 3: CRT base voltages.

Pin	*Electrode*	*Voltage*	*Notes*
4	G1	–62·8V	–
5	Heater +ve	6V	–
6	Heater –ve	0V	–
8	Blue cathode	90V	Grey-scale dependent
9	Green cathode	88V	Grey-scale dependent
10	Red cathode	68V	Grey-scale dependent
12	First anode/G2	>237V	Display extinguished at 237V

display symptoms you remember from a previous repair. Each of the three ICs on this board can have a variety of effects on the screen colours, while similar symptoms can be caused by more than one component. Usually however the complaint relates to one particular colour, e.g. the screen is bright green with the video signal present, or bright blue with flyback lines, or the red drive is missing. Only one IC will probably be defective. The following procedure and the voltage readings given in the tables will remove the uncertainty associated with visual assessment.

All measurements were made with a grey-scale VGA pattern input. Set the brightness and contrast to maximum. Enter the factory mode (see later), but do not make grey-scale adjustments yet. Remove the *tin* can only from the rear of the CRT base panel, to gain access to the print side – don't remove the aluminium housing yet, as it helps to keep things cool. Use a meter to check the grey-scale signal at the centre pin of each of the coaxial connections: it should read approximately 0·17V DC (depending on the VGA program being used). Next, measure all the RGB gain control voltages from the DA converter, at J201, to ensure that they are within the range shown in Table 1. These are the control voltages applied to IC201 to determine the gain between the coaxial inputs and the emitter-followers Q2R0 etc. Also check the RGB bias control levels. This should eliminate suspicion of the DA converter chip on the PWB-sync panel – it's usually very reliable. Write down each of the six voltage levels you have measured so far. This will help in setting up the grey scale following the repair. Do this before making any front control-panel adjustment.

Should you have doubts about the performance of the DA converter, you can demonstrate that the gain and bias control voltages are adjustable by using the front-panel controls for each colour. Check that the relevant maximum and minimum voltage levels are close to those listed in Table 1. Remember to set each DC level back to what it was before you adjusted it. Otherwise the grey scale will be way out and cause confusion later.

The next thing to check, assuming that everything is OK so far, is the signal voltages at the bases of the emitter-follower transistors Q2R0, Q2G0 and Q2G0. These are the outputs from IC201, each being fed via a 100Ω surface-mounted resistor.

Table 4: Supply voltages at J202.

Pin	*Typical measurement*	*Function*
1	–62·6V	CRT G1 voltage
2, 3, 4, 9	0V	–
5	6·01V	CRT heater supply
6	12·03V	12V rail
7	6·02V	Generally no connection
8	79·1V	80V rail
10	167·8V	160V rail

The signal level here will vary in accordance with the gain control voltages at J201, set by the separate front-panel RGB gain controls. Again, minimum and maximum DC levels are shown, see Table 2. If the voltage at the base of one of these transistors is 0V or 6V, or if a scope shows that there is absence of a signal, IC201 is probably faulty.

In this case, dismantle the board from its aluminium housing (take a careful note of the earth braid, spring clip and screws) and use a magnifying glass to check for dry-joints at the legs of the surface-mounted IC. If IC201's metal surface has a glazed look, it's probably faulty. Use of hot air to remove it has its dangers – there are surface-mounted components on both sides of the board, and bits can drop off. I prefer to add a large amount of solder along one row (only one) of the gull-wing legs and run the iron back and forth, distributing heat, until the IC drops away from the board at that side. Some prising with a fine knife blade is required until the glue beneath the IC gives up. Repeat the exercise with the other row of legs. Clean the pads with braid and aerosol rework flux – the latter is great stuff for surface-mounted components. Position the replacement IC carefully, and solder it with a sweeping motion of the iron in a direction away from its legs: this reduces the chance of shorts between the legs. Examine your work with a magnifying glass.

If IC201 seems to be OK, the next step is to check the outputs obtained from the LH2426H chip IC203. Table 5 shows the voltages you should find here. Note that a slip of the meter probe will kill this IC instantly. To minimise this risk, make measurements at the following points. Look closely at the print side of the board, beside the row of pins 1-12 for IC203. You will see three surface-mounted capacitors, light brown in colour, each mounted vertically: C2RD, C2GD and C2BD. Check that the voltage at the solder pad at the lower end of each capacitor is in the region of 50-55V DC. A reading of about 78V DC here would usually mean that IC203 is faulty.

To replace this IC, remove the old one by bending until it breaks off (all the PCB print holes are of the feed-through type, and damage-free removal is otherwise impossible). Add a little solder to each of the old pins still in the board, then remove the solder and pin together with a sucker. I am lucky enough usually to find a donor IC on a scrap board. I remove this by using a paint-stripper heat gun (aimed at the print side) with the IC's metal lug in a vice. Warning! The heat gun is dangerous, as you will have to use it at the maximum setting. Keep your fingers well clear.

Finally, the preceding tests having been passed, the voltages around the green hybrid chip IC202 can be checked. Those shown in Table 5 are for use by those with a very steady hand. Alternatively it's much safer to check the CRT's cathode voltages, at the connector. Table 3 shows what to expect, with a VGA grey-scale input. A high DC reading here will mean a missing colour, a low one bright colour. These conditions would indicate a faulty hybrid chip. But don't

Table 5: IC pin voltages.

Pin	*Voltage, IC202*	*Voltage, IC203*
1	125·1V	79·2V
2	NC	1·6V
3	0V	0V
4	0·8V	50·7V
5	51·5V	79·2V
6	90V	1·6V
7	NC	0V
8	125·1V	50·7V
9	NC	79·2V
10	0V	1·6V
11	1·0V	0V
12	51·6V	51·7V
13	88·2V	–
14	NC	–
15	125·1V	–
16	NC	–
17	0V	–
18	3·1V	–
19	52·6V	–
20	68·4V	–

Measured with grey-scale VGA pattern applied.

Table 6: Green LED patterns for various parameters available for adjustment in the factory mode.

LED pattern		*Parameter*
1	0 x x 0 0 0	Green bias
2	0 x x x 0 0	Blue bias
3	0 x x x x 0	Red bias
4	0 0 x x 0 0	Red gain
5	0 0 0 x x 0	Blue gain
6	0 0 0 0 x x	Green gain
7	x x x 0 0 0	Pincushion
8	x x x x 0 0	Key balance
9	x x x x x 0	Keystone
10	0 0 0 0 0 0	Pin balance
11	0 x 0 0 x 0	DBF-V
12	x 0 0 0 0 x	DBF-H

x = LED on, 0 = LED off

overlook the possibility of faulty surface-mounted components to and from his IC, as they run at higher voltages and could be more likely to break down.

Removal and replacement of this IC as is for IC203, by bending and breaking the suspect. Again, take care of your fingers if you use a heat gun to remove a donor from a scrap board.

The six transistors mounted in a block separated by aluminium strips are the three complementary-transistor push-pull RGB amplifier stages. Check them by live voltage measurements, looking for 0·7V DC differences. These transistors rarely fail.

Finally, reassembly of the video board. Ensure that the earthing tag is brought through the hole in the aluminium housing and is not accidentally left lying around inside the housing, ready to cause shorts. Equally important, check that the stainless-steel spring clip is replaced so that pressure is applied to the body of the LH2426S chip, making contact so that the aluminium housing acts as a heatsink. I sure hope you paid attention when you took it all apart!

Failure of the flatpack chip IC201 is the most common fault, accounting for perhaps 75 per cent of video board trouble. Second comes failure of the LH2426S chip, accounting for about 20 per cent of faults. Last on the common-fault list is the green IC. But this is not an exhaustive list. Here are some more possibilities.

Other video board faults

If C210 (220pF, 2kV), which decouples the tube's first anode (G2) supply, is faulty or leaky the display will be blanked out. It doesn't need to give a DC resistance reading to kill the first anode voltage. Indeed you may get an open-circuit reading with a meter, but the capacitor could break down and conduct when voltage is applied.

The red, blue and grey wires that run from the main PCB up to the CRT board, carrying the signals from the computer, are very fine coaxial cables. They have plugs at each end, so are simple to replace. Sometimes the centre core breaks at one of the plugs, going open-circuit with the result that the relevant signal is missing. I have often found that the screen colour flickers slightly as the signal is briefly shorted out in the cable. The reason for this is very simple. A plastic-coated bendable wire clamp anchors the cables to the metal bracket on the main chassis. Many of these monitors must have been assembled by Sumo wrestlers who, in their fierce grip, squash the outer braid through the insulation to contact the centre core. The problem shows up under the influence of heat. You can sometimes replicate the symptom by flexing the large signal-cable plug (type 13W3) where it enters the chassis: this in turn moves the coaxial cables. This can lead to a wrong diagnosis and a lot of time wasted changing sockets. Fortunately the remedy is often simple. Slacken the grip on the cables, and give them a healing 'massage' – rub and roll them between your fingers. A permanent short will require replacement of the offending cable.

Here's another cause of intermittent flickers. You will see three small, flat square ferrites on the print side of the video PCB. One faulty monitor had a ferrite whose copper conductor was making occasional contact with adjacent component legs. The result was flickering of one colour after a warm-up period. Make sure that you pull the ferrites back off the PCB just a little after completing a repair, as they are easily bent inwards and overlooked.

The factory mode

To enter the factory mode, turn the monitor power off, flip the white toggle switch on the main power supply board towards the screen, then press contrast + and brightness – and hold both while turning the power on again. The LEDs should be flashing. If so, release the + and – buttons then press the left select button five times. The LED pattern should be 1 and 3 illuminated. Finally, press both adjust buttons simultaneously. LED 4 should be on.

If you managed to do all this at break-neck speed (under a few seconds), the monitor will be in its factory mode. If you take too long the factory mode will not be entered. Simply start again.

By pressing the select buttons you will now have access to many adjustment parameters not available to the end-user. Do not divulge this information to punters! They can get themselves into deep trouble with another very-similar looking model where there are front-panel adjustments that provide digital setting of the HT and thus the EHT voltage. Think of the potential for X-ray hazard! Be responsible and keep this instruction to those who are genuine technicians.

The adjust buttons take several seconds to reach the digital ends of their analogue travel. When the travel limit is reached, all LEDs flash. Settings memorised become default for the mode in use. Table 6 shows the LED patterns and the associated function available for adjustment.

Grey-scale adjustments

A colour analyser is required for factory-accurate setting of the grey scale. The Minolta CA100 is a fairly industry-wide device, but at several thousand pounds it's hardly within the budget of small repair firms. The Philips PM5639 series is only marginally cheaper but does have a very graphical approach to the X and Y co-ordinates and is easy to use – staff training is also simplified. In addition the CRT being adjusted should be in top shape. In view of the age of these monitors, this is unlikely.

Grey-scale adjustment by eye should begin by displaying the pattern on screen for twenty minutes or so. Use a scope to check that the output from the computer reaches 700mV peak on each channel. But few computers can provide this!

Examine a dark section of the screen and see if there is any colour there. Adjust the biases to make this grey. Then look at the brightest section and adjust the gains to make this white. You have to keep going over this procedure for optimum results.

Next month

In Part 2 next month we'll look at the frame and line output stages. The design is typical of quality monitors. Stock faults will be included. ■

Grandata Ltd

distributor of electronic components

CD Pick Ups and Mechanisms

Part No	Price
KSS 210A Original	£14.00
KSS 210A Replacement	£11.00
KSS 210 B	£15.00
KSS 213 B	£11.50
KSS 213 C	£11.50
KSS 213 D	£16.00
KSS 213 F	£12.00
KSS 240 A	£30.00
NKS 240 A Replacment for KSS240A	£20.00
OPTIMA 6 S	£11.50
OPTIMA 5	£11.50
RCTRTH8151	£20.00
RCTRTH8112	£15.00

CD Mechanisms

KSL 2101 ABM Mechanism	Code : KSL2101ABM	Price : £ 18.00
KSM 213 CCM Mechanism	Code : KSM 213 CCM	Price : £ 15.00
RCTRH8147 Mechanism	Code : RCTRH8147MECH	Price : £ 10.00
CDM 12.1 Mechanism	Code : CDM121MECH	Price : £ 16.00
SF91 Mechanism	Code : SF91MECH	Price : £ 20.00
SF91 Carriage & Mechanism	Code : SF91CARR	Price : £ 20.00

105°c Radial Electrolytic Capacitors

VALUE	CODE	PRICE	PER PACK
10 Volts			
100uF	CAP118	£0.45	10
470uF	CAP29	£1.20	10
1000uF	CAP119	£1.50	10
2200uF	CAP120	£2.10	10
16 Volts			
22uF	CAP121	£0.35	10
33uF	CAP122	£0.35	10
47uF	CAP123	£0.35	10
100uF	CAP124	£0.60	10
220uF	CAP125	£0.80	10
330uF	CAP30	£1.75	10
470uF	CAP31	£1.75	10
680uF	CAP32	£2.10	5
1000uF	CAP33	£2.10	10
2200uF	CAP34	£5.25	10
3300uF	CAP35	£5.00	5
4700uF	CAP36	£6.10	10
25 Volts			
10uF	CAP37	£0.45	10
22uF	CAP38	£0.45	10
33uF	CAP126	£0.40	10
47uF	CAP39	£0.48	5
68uF	CAP127	£0.55	10
100uF	CAP40	£0.70	10
120uF	CAP128	£0.85	10
150uF	CAP41	£0.95	5
220uF	CAP42	£1.20	10
330uF	CAP43	£1 40	5
470uF	CAP44	£1.90	10
680uF	CAP45	£3.15	5
1000uF	CAP46	£3.65	
101500uF	CAP47	£3.90	5
2200uF	CAP48	£2.00	2
3300uF	CAP49	£2.20	2
4700uF	CAP50	£3.65	2
6800uF	CAP51	£3.90	2

VALUE	CODE	PRICE	PER PACK
35 Volts			
1uF	CAP130	£0.40	10
3 3uF	CAP131	£0.40	10
4.7uF	CAP132	£0.45	10
10uF	CAP52	£0.50	10
22uF	CAP53	£0 45	10
33uF	CAP54	£0.50	5
47uF	CAP55	£0.85	10
68uF	CAP133	£0.55	10
100uF	CAP56	£0.85	10
150uF	CAP57	£0.95	5
220uF	CAP58	£1.45	5
330uF	CAP134	£1.60	10
470uF	CAP135	£1.75	10
680uF	CAP59	£6.50	10
1000uF	CAP60	£4.35	10
2200uF	CAP61	£2.45	2
3300uF	CAP62	£10.00	5
4700uF	CAP136	£3.50	2
50 Volts			
1uF	CAP137	£0.35	10
2.2uF	CAP138	£0.35	10
3.3uF	CAP139	£0 35	10
4.7uF	CAP140	£0.35	10
10uF	CAP63	£0.50	10
22uF	CAP64	£0 70	10
33uF	CAP141	£0.85	10
47uF	CAP65	£0.85	10
68uF	CAP142	£0 90	10
100uF	CAP66	£0.85	10
220uF	CAP67	£1 75	10
330uF	CAP68	£2 45	10
470uF	CAP69	£4.35	10
680uF	CAP70	£4 90	5
1000uF	CAP71	£5.25	10
1500uF	CAP143	£4.50	5
2200uF	CAP72	£3.25	2
3300uF	CAP144	£3.25	2

VALUE	CODE	PRICE	PER PACK
63 Volts			
0.22uF	CAP145	£0 45	10
0 47uF	CAP73	£0.35	10
1uF	CAP74	£0.35	10
2.2uF	CAP75	£0.35	10
3.3uF	CAP76	£0.50	10
4.7uF	CAP77	£0.35	10
10uF	CAP78	£0.50	10
15uF	CAP79	£0.95	5
22uF	CAP80	£0.75	10
33uF	CAP81	£0.85	10
47uF	CAP82	£0.95	10
68uF	CAP83	£1.30	5
100uF	CAP84	£1.20	10
150uF	CAP85	£2.80	5
220uF	CAP86	£2.80	10
330uF	CAP87	£4.00	10
470uF	CAP88	£5.25	10
680uF	CAP89	£5.00	10
1000uF	CAP90	£5.40	5
100 Volts			
0.47uF	CAP91	£0.50	5
1uF	CAP92	£0.85	10
1.5uF	CAP93	£0.70	5
2.2uF	CAP94	£0.50	5
3.3uF	CAP95	£0.50	5
4.7uF	CAP96	£0.50	5
10uF	CAP97	£0.95	10
22uF	CAP98	£1.05	10
33uF	CAP99	£1.55	5
47uF	CAP100	£1.75	10
100uF	CAP101	£2.10	10
220uF	CAP102	£6.00	5
470uF	CAP103	£6.00	5
160 Volts			
2.2uF	CAP146	£0.45	10
10uF	CAP147	£1.40	10

VALUE	CODE	PRICE	PER PACK
160 Volts... continued			
22uF	CAP148	£1.80	10
33uF	CAP149	£2.30	10
100uF	CAP150	£3.25	5
200 Volts			
100uF	CAP151	£3.25	5
250 Volts			
1uF	CAP152	£0.60	10
3.3uF	CAP104	£1.75	10
10uF	CAP105	£2.60	10
22uF	CAP153	£2 30	10
47uF	CAP106	£4.35	10
100uF	CAP154	£4.50	5
220uF	CAP155	£2.00	2
350 Volts			
1uF	CAP156	£0.70	10
3.3uF	CAP157	£1.50	10
10uF	CAP158	£2.25	10
22uF	CAP159	£3.40	10
400 Volts			
1uF	CAP107	£2.15	5
2.2uF	CAP108	£2.25	5
4.7uF	CAP109	£3.15	5
10uF	CAP110	£4.00	5
22uF	CAP111	£2.50	2
47uF	CAP112	£3.50	2
100uF	CAP160	£4.00	2
220uF	CAP161	£7.00	2
450 Volts			
1uF	CAP113	£2.80	5
2.2uF	CAP114	£3.20	5
4.7uF	CAP115	£4.95	5
10uF	CAP116	£5.50	5
22uF	CAP117	£4.15	2

Digital Capacitance Meter

3.5 Digit LCD 1999 Count

9 Selectable ranges from 200pF to 20mF

Supplied with Holster

High Accuracy (0.5% < 2000uF , 1%:2000uF , 2%:20mF)

External control for zero adjustment

Overload indication

Safety designed test probe

Powered by 9V battery

Order Code : 24504S

Price : £ 28.00 + vat

Postage : £ 3.00 + vat

K.P. House , Unit 15 , Pop In Commercial Centre , Southway , Wembley , Middlesex . HA9 0HB England

Tel : (020) 8900 2329 Email : sales@grandata.co.uk

Fax : (020) 8903 6126 Website : http://www.grandata.co.uk

Grandata Ltd

distributor of electronic components

Television Repair / Mod Kits

MAKE & MODEL	KIT TYPE	CODE
ALBA		
1452T	POWER SUPPLY	ONWAKIT
1427T	POWER SUPPLY	ONWAKIT
1402	POWER SUPPLY	ONWAKIT
1455T	POWER SUPPLY	ONWAKIT
1456T	POWER SUPPLY	ONWAKIT
1458T	POWER SUPPLY	ONWAKIT
1459T	POWER SUPPLY	ONWAKIT
1499Y	STANDBY FAULT	MODKIT37
2002	POWER SUPPLY	ONWAKIT
2009B	POWER SUPPLY	ONWAKIT
2052T	POWER SUPPLY	ONWAKIT
2152T	POWER SUPPLY	ONWAKIT
2099TX	STANDBY FAULT	MODKIT37
BTV17	STANDBY FAULT	MODKIT37
CTV501	POWER SUPPLY	ONWAKIT
CTV701	POWER SUPPLY	ONWAKIT
CTV840	POWER SUPPLY	ONWAKIT
CTV841	POWER SUPPLY	ONWAKIT
CTV485	POWER SUPPLY	ONWAKIT
AKAI		
CT1417	POWER SUPPLY	ONWAKIT
CT2159U	POWER SUPPLY	ONWAKIT
CT2162UNT	POWER SUPPLY	ONWAKIT
CT2863UNT	POWER SUPPLY	ONWAKIT
DECCA/TATUNG		
TVC563	STANDBY FAULTY	MODKIT37
GOLDSTAR		
CF25A50F	FRAME OUTPUT	MODKIT36
CF25C22C	FRAME OUTPUT	MODKIT35
CF28A50F	FRAME OUTPUT	MODKIT36
CF28C22F	FRAME OUTPUT	MODKIT35
CF28C28F	FRAME OUTPUT	MODKIT36
CF29C42F	FRAME OUTPUT	MODKIT35
GOODMANS		
147TT	POWER SUPPLY	ONWAKIT
149T	POWER SUPPLY	ONWAKIT
1430RA	POWER SUPPLY	ONWAKIT
1430RS	POWER SUPPLY	ONWAKIT
1430RW	POWER SUPPLY	ONWAKIT
1450T	POWER SUPPLY	ONWAKIT
1455TS	POWER SUPPLY	ONWAKIT
2019R	POWER SUPPLY	ONWAKIT
2029T	POWER SUPPLY	ONWAKIT
2029TA	POWER SUPPLY	ONWAKIT
F16 CHASSIS	FRAME	GOODKIT1
F16 CHASSIS	LINE	GOODKIT1
F16	PSU	GOODKIT1
F16	VIDEO	GOODKIT1
GRUNDIG		
CUC 7350		GRUNDIGKIT1
CUC 7301/3 (BUZ90)	POWER SUPPLY	GRUNDIGKIT2
CUC 7301/3 (MJF18004)	POWER SUPPLY	GRUNDIGKIT3
HINARI		
HIT14RC	POWER SUPPLY	ONWAKIT

MAKE & MODEL	KIT TYPE	CODE
JVC		
AV29SX1EK	FIELD OUTPUT KIT	JVCKIT1
AV29SX1EN	FIELD OUTPUT KIT	JVCKIT1
AV29SX1EN1	FIELD OUTPUT KIT	JVCKIT1
AV29SX1PF	FIELD OUTPUT KIT	JVCKIT1
AV29TSIE1	FIELD OUTPUT KIT	JVCKIT1
C14E1EK	POWER SUPPLY	ONWAKIT
C14T1EK	POWER SUPPLY	ONWAKIT
C21ET1EK	POWER SUPPLY	ONWAKIT
CS21M3EK	POWER SUPPLY	ONWAKIT
MATSUI		
1455	POWER SUPPLY	ONWAKIT
1498	POWER SUPPLY	ONWAKIT
2086	POWER SUPPLY	ONWAKIT
2098	POWER SUPPLY	ONWAKIT
21V1N (BUZ90)	POWERSUPPLY	GRUNDIGKIT2
21V1T(MJF18004)	POWER SUPPLY	GRUNDIGKIT3
TVR180R/T/2080	STANDBY FAULT	MODKIT37
MITSUBISHI		
AV1 SERIES	POWER SUPPLY	MITSKIT3
CT1M5B	POWER SUPPLY	MITSKIT3
CT21M5BT	POWER SUPPLY	MITSKIT3
CT25M5BT	POWER SUPPLY	MITSKIT3
CT21A2STX	TDA 8178S	MITSKIT1
CT21AX1B	POWER SUPPLY	MITSKIT3
CT21A3STX	TDA 8178S	MITSKIT1
CT21AV1BS	POWER SUPPLY	MITSKIT3
CT25A2STX	TDA 8178S	MITSKIT1
CT25A3STX	TDA 8178S	MITSKIT1
CT25A4STX	TDA 8178S	MITSKIT1
CT25A6STX	TDA 8178S	MITSKIT1
CT25AV1B	POWER SUPPLY	MITSKIT3
CT25AV1BS	POWER SUPPLY	MITSKIT3
CT25AV1BD	POWER SUPPLY	MITSKIT3
CT25AV1BDS	POWER SUPPLY	MITSKIT3
CT28AV1B	POWER SUPPLY	MITSKIT3
CT28AX1BD	POWER SUPPLY	MITSKIT3
CT28AV1BDS	POWER SUPPLY	MITSKIT3
CT29AS1	TDA 8178S	MITSKIT2
CT29A4	TDA 8178S	MITSKIT2
CT29A6	TDA 8178S	MITSKIT2
CT29B2	TDA 8178S	MITSKIT2
CT29B3	TDA 8178S	MITSKIT2
CT29B6	TDA 8178S	MITSKIT2
CT33B3	TDA 8178S	MITSKIT2
M5 SERIES	POWER SUPPLY	MITSKIT3
NEI/NIKKAI		
CE25 CHASSIS	POWER SUPPLY	NIKKAIKIT1
C289FTXN	POWER SUPPLY	NIKKAIKIT1
C28F41FXN	POWER SUPPLY	NIKKAIKIT1
PANASONIC		
IC561	TDA 8175	PANKIT1
TX25XD60	VERTICAL O/P IC	PANKIT2
TC28XD60	VERTICAL O/P IC	PANKIT2
TX28XD70	VERTICAL O/P IC	PANKIT2
TX29XD70	VERTICAL O/P IC	PANKIT2
TX-W26D3	VERTICAL O/P IC	PANKIT2

MAKE & MODEL	KIT TYPE	CODE
PHILIPS		
310.10708		PHILKIT3
310.20491		PHILKIT2
310.20496		PHILKIT10
310.31994		PHILKIT6
310.32252		PHILKIT5
310.32253		PHILKIT4
310.32254		PHILKIT9
310.32255		PHILKIT7
310.32262		PHILKIT8
310.62264		PHILKIT1
ANUBIS A	SOPS	PHILKIT2
CP110 CHASSIS	SOPS	PHILKIT8
G90A CHASSIS	SOPS	PHILKIT10
G90B CHASSIS	SOPS	PHILKIT10
G110 CHASSIS	SOPS	PHILKIT3
GR2.1 CHASSIS	SOPS	PHILKIT1
GR2.2 CHASSIS	SOPS	PHILKIT1
D-16 CHASSIS	SOPS	PHILKIT6
HSM VIDEO	SOPS	PHILKIT5
JSM VIDEO	SOPS	PHILKIT4
KSM VIDEO	SOPS	PHILKIT9
LSM VIDEO	SOPS	PHILKIT7
SAMSUNG		
CI5944	FRAME OUTPUT	SAMKIT2
CI6844	FRAME OUTPUT	SAMKIT2
VIK310	POWER SUPPLY	SAMSUNGKIT
VIK320	POWER SUPPLY	SAMSUNGKIT
VIK350	POWER SUPPLY	SAMSUNGKIT
VI375	POWER SUPPLY	SAMSUNGKIT
VI395	POWER SUPPLY	SAMSUNGKIT
WINNER 1	POWER SUPPLY	SAMSUNGKIT
SHARP		
51CS03H	POWER / LINE	SHARPKIT1
51CS05H	POWER / LINE	SHARPKIT1
59CS03H	POWER / LINE	SHARPKIT2
59CS05H	POWER / LINE	SHARPKIT2
59CSD8H	POWER / LINE	SHARPKIT2
66CS03H	POWER / LINE	SHARPKIT2
66CS05H	POWER / LINE	SHARPKIT2
66CSD8H	POWER / LINE	SHARPKIT2
THOMSON		
35029400		THOMKIT2
35065920		THORNKIT1
FV70	POWER SUPPLY	THORNKIT1
ICC7 CHASSIS	TDA 8178FS	THOMKIT1
ICC7 CHASSIS	FRAME KIT	THOMKIT3
ICC8 CHASSIS	TDA 8178FS	THOMKIT1
ICC8 CHASSIS	FRAME KIT	THOMKIT3
ICC9 CHASSIS	EAST/WEST	THOMKIT4
R3000	POWER SUPPLY	THOMKIT2
R4000	POWER SUPPLY	THOMKIT2
TX92F CHASSIS	EAST/WEST	THOMKIT4

ORDER CODE	PRICE
GRUNDIGKIT1	£ 10.50
GRUNDIGKIT2	£ 10.50
GRUNDIGKIT3	£ 10.50
GOODKIT1	£ 11.00
JVCKIT1	£ 11.00
MITSKIT1	£ 3.00
MITSKIT2	£ 15.00
MITSKIT3	£ 6.00
MODKIT35	£ 9.50
MODKIT36	£ 5.00
MODKIT37	£ 6.50
NIKKAIKIT1	£ 12.00

ORDER CODE	PRICE
ONWAKIT	£ 12.00
PANKIT1	£ 7.00
PANKIT2	£ 9.00
PHILKIT1	£ 7.60
PHILKIT10	£ 8.50
PHILKIT2	£ 2.50
PHILKIT3	£ 4.00
PHILKIT4	£ 4.25
PHILKIT5	£ 5.75
PHILKIT6	£ 5.50
PHILKIT7	£ 7.60
PHILKIT8	£ 4.25

ORDER CODE	PRICE
PHILKIT9	£ 7.50
SAMKIT2	£ 8.00
SAMSUNGKIT	£ 16.00
SHARPKIT1	£ 11.00
SHARPKIT2	£ 11.00
THOMKIT1	£ 7.00
THOMKIT2	£ 12.00
THOMKIT3	£ 9.00
THOMKIT4	£ 4.00
THORNKIT1	£ 12.75

Grandata Ltd

distributor of electronic components

Aerial & Digital Satelitte Accessories

SLx Distribution Amplifier Range

25mA Line powering on UHF Socket
Designed for TV , Satellite and FM Receivers
Isolation between outputs > 22db
Noise figure < 4db
Frequency Range : UHF 470-863 Mhz
VHF 47-230 Mhz

Auto line powering for masthead amps
10.5db Gain on all ports
Separate UHF/VHF inputs
Digital Compatible
CE and EMC Test Certified

	Order Code	Price		Order Code	Price
2 Way	SLX2	£ 8.00 + vat	4 Way	SLX4	£ 13.00 + vat
6 Way	SLX6	£ 18.00 + vat	8 Way	SLX8	£ 18.50 + vat

SLx Masthead Amplifiers

UHF TV antenna pre amplifier designed for the professional aerial installer

15dB gain masthead amplifier ideal for majority of domestic installations

26dB gain masthead amplifier for longer cable runs (loss of more than 3dB) or if connected to passive splitters

Requires 12V DC power supply via downlead either via dedicated power supply unit or from a distribution amplifier with line powering

SLx 15dB Gain Masthead Amp — **Order Code : 27830R Price : £ 4.30 + vat**

SLx 26dB Gain Masthead Amp — **Order Code : 27831R Price : £ 4.50 + vat**

SLx Masthead Amplifier Power Supply — **Order Code : 27832R Price : £ 5.00 + vat**

** Postage when Ordering 3 or more of the above is charged at £ 5.00 + vat and will be sent by Parcel Force **

SLx Link Eye

Allows control of Sky™ Digibox via the signal feed for second TV

Fully compatible with Sky™ Digital Link

Order Code : 27833R

1 - 9 Price : £ 6.50 + vat each
10 - 24 Price : £ 5.50 + vat each
25 + Price : £ 4.50 + vat each

SLx Amp By Pass Kit

For use with aerial amplifiers and Sky™ Digibox

Allows for operation of Link Eye in conjunction with a distribution amplifier

Order Code : 27829R
Price : £ 5.00 + vat

SLx Link Eye and Magician 4 Combination Pack

Make us of the SLx Link Eye in combination with the Magician 4 Remote Control to control your Sky™ Digibox

Magician 4 controls upto 4 different devices including full function on Sky™ Digibox

Comes in Retail Clam Pack

Order Code : 27834R
1 - 4 Price : £ 16.00 + vat **5 + Price : £ 14.50 + vat**

Sky Digital Remote Control

Order Code
RCSKY

Price
£ 10.75 + vat

Sky Digital Remote & TV Link Eye Combination

Price : £ 18.50 + vat

5 + £ 17.00 + vat each

Sky Digital TV Link Eye

Order Code : TVLINKEYE

Price
£ 10.75 + vat

5 +
£ 7.99 + vat each

10+
£ 6.99 + vat each

Grundig GDS200 Digital Satellite Receiver Repair Kit

EARLY PSU
MODEL : DS0 - 0385 REV C

Order Code : SATKIT34A
Price : £ 10.00 + vat

Grundig GDS200/300 Digital Satellite Receiver Repair Kit

LATER PSU TYPE REV 03
DSO - 0375 REV A
DSO - 0385 REV 5

Order Code : SATKIT34B
Price : £ 10.00 + vat

Grandata Ltd

distributor of electronic components

KÖNIG ELECTRONIC

Konig Electronic Spares

KÖNIG ELECTRONIC

To mark our new association with Konig Electronics we are glad to offer the following Konig Remote Controls at Special Prices !!!

Konig No.	Make	Model/Part No.
IR 9480	**Daewoo**	DMQ14A1 , DMQ20A1 , DMQ2195
IR 9584	**Ferguson**	RCU1734 , RCU1742 ..etc , T742 , T752 , T758
IR 9594	**Ferguson**	RH880 , T789
IR 9325	**Ferguson**	RH885
IR 9259	**Ferguson**	RHT01 , RHT30
IR 9639	**Ferguson**	RHT10
IR 9719	**Funai**	30T1 , 30T2 , 31T1
IR 9403	**Goldstar**	105-068 , CBT2190E , CBT4902 , CBT9905
IR 9854	**Goldstar**	05-219J , 105-224V , 105-229H , 105-230C
IR 9614	**Grundig** **Metz** **Siemens**	CUC5200 , CUC5303 , CUC5310 ,
IR 9529	**Grundig** **Matsui** **Siemens**	CUC5301 , CUC5302
IR 9479	**Grundig**	TP715 , TP770 , TP771 , TP800 ,
IR 9715	**Grundig**	TRC1 , TRC2
IR 9602	**Hitachi**	CLE871A , CLE871B , CLE874A , CLE874B
IR 9476	**Hitachi**	CLE876A , CLE876B
IR 9477	**Hitachi**	CLE876C , CLE876D , CLE876E , CLE876G
IR 9982	**Hitachi**	CLE922A , CLE922B
IR 9576	**Hitachi**	CPT1556 , CPT1557 , CPT1560 , CPT1561 , CST1430 , CST1435 , CST1560
IR 9575	**Hitachi**	CPT2155 , CPT2164 , CPT2558 , CPT2564 , CPT2566 , CPT2669 , CPT2785
IR 9490	**Matsui**	076L067240 , 2076R , 2092T
IR 9573	**Nokia**	FS4/1 , FS4/2 , FS5/1 , FS9 ,FS10
IR 9640	**Orion**	RC37 , RC56 , RC565633 , RCQ
IR 9826	**Panasonic**	EUR37211, EUR50100 EUR50370,EUR51140..etc
IR 9834	**Panasonic**	TNQ8E0461
IR 9553	**Philips**	RC5410 , RC5420 , RC5801
IR 9556	**Philips**	RC5901 , RC5902 , RC5903 , RC5904 , RC5905
IR 9864	**Philips**	RC7512 , RC7535
IR 9546	**Samsung** **Akura** **Daewoo** **Goodmans**	RM100
IR 9432	**Samsung**	RM104 , CX532WT , CX534WT , CX5312W , CX5325W
IR 9457	**Sanyo**	JXBA , JXFF , RC307 , RC317 , RC318 , RC321 , RC612 , RC625 , RC628
IR 9530	**Sanyo** **Mitsubishi**	JXCL , JXCR , RC258 , RC642 939P036050
IR 9139	**Sanyo**	JXGA , JXGE , RC700 , RC702
IR 9460	**Sanyo**	JXGT , JXGW , JXGY , JXLB , JXLG , RC711 , S02 , S03
IR 9487	**Sharp**	C1421 , C2021 , CV2121 , CV3707 , CV3709 , CV3710 , DV1416 , SV2044 ,SV2145
IR 9711	**Sharp**	RRMCG0739BMSA ,G1014BMSA RRMCG1023BMSA , G1036BMSA
IR 9788	**Sharp**	RRMCG1031BMSA , G1046BMSA RRMCG1048BMSA , G1050BMSA
IR 9321	**Sony**	RM640 , RM641,RM641A,RM642A
IR 9336	**Sony**	RM650 , RM651 , RM652 , RM654
IR 9448	**Sony**	RM656 , RM677 , RM687B , RM687C , RM717 , RM719
IR 9123	**Sony**	RM670 , RM671 , RM672 , RM673
IR 9442	**Sony**	RM681 , RM682 , RM683 , RM684 RM685 , RM686 , RM698
IR 9452	**Sony**	RM694 , RM820 , RM828 , RM834
IR 9441	**Sony**	RM816 , RM817 , RM826
IR 9443	**Sony**	RM830 , RM831 , RM832
IR 9451	**Sony**	RM833 , RM837
IR 9871	**Sony**	RM836 , RM839 , RM883 , RM886
IR 9624	**Telefunken**	FB330 , FB340 , FB345 , FB1330 , FB1340 , FB1345
IR 9639	**Thomson**	14GM53 , 14GM56 , 14MS70 , 21DS70 , 21MG51 , 21MS76
IR 9953	**Toshiba**	CT9626 , CT9784,CT9785,CT9859

£ 6.50 + vat each

Buy 5 or more £ 6.00 + vat each

Grandata Ltd

distributor of electronic components

KÖNIG ELECTRONIC

Konig Electronic Spares

KÖNIG ELECTRONIC

Replacement Line Output Transformers

Make	Part No.	Konig No.	Our Code	Price
Ferguson	06 D-3-093-001 , 06 D-3-512-001	FAT 3837	LOT204	£ 14.00
Hitachi	2433291	FAT 3664	LOT172	£ 13.50
Hitachi	2434002	FAT 30095	LOT226	£ 14.50
ITT/Nokia	4515 0340 , D 059/37 , ME/6237-00	FAT 3727	LOT200	£ 12.50
ITT/Nokia	4515 0345 , 4515 0378 , D070/37 , D071/37	FAT 3790	LOT328	£ 16.00
ITT/Nokia	4515 0348 , D 076/37	FAT 3843	LOT330	£ 16.00
Panasonic	TLF 14584 F , TLF 14586 , TLF 14586 F	FAT 30106	LOT41	£ 15.50
Philips	1352.5003 , 4822 140 10544 , 4822 140 10566 , OV 2094/40	FAT 30186	LOT433	£ 12.00
Philips	3111 258 30021 , 4822 140 10474	FAT 30192	LOT562	£ 15.50
Philips	37770 , 37771 , 37772 , AT 2079/15	FAT 30184	LOT129	£ 14.00
Philips	4812 140 10294 , 4822 140 10294	FAT 3820	LOT125	£ 16.00
Philips	4812 140 10325 , 4822 140 10325	FAT 30167	LOT132	£ 15.00
Philips	4822 140 10353 , 4822 140 10356	FAT 3830	LOT284	£ 14.00
Philips	AT 2079/21 , AT 2078/21 , TFB 4090 AD	FAT 30179	LOT395	£ 12.00
Philips	AT 2079/17	FAT 30171	LOT288	£ 14.00
Philips	AT 2079/23	FAT 30170	LOT289	£ 13.00
Sony	1-439-332-42	FAT 3925	LOT100	£ 12.00
Sony	1-439-493-11 , 1-439-423-11 , 1-439-423-12	FAT 30089	LOT369	£ 15.50

This is just a selection of Konig Line Output Transformers .
Please call us on 020 8900 2329 for any that are not listed.

Replacement Televison Mains Switches

KN658304

For Sony and Sony
Price : £ 2.50 + vat

KN668500

Replacement for Grundig 29703-291.07
Price : £ 2.50 + vat

KN668800

For Daewoo
Price : £ 2.50 + vat

If you cannot find the Konig Spares you want in this advert please call us on 020 8900 2329 as this is just a small selection

Grandata Ltd

distributor of electronic components

Remote Controls

Brand Replacement Remote Controls

*Codeless set-up *Teletext and Fastext *Pre-Programmed for the latest models * Replaces broken and lost remotes

Brand	Order Code	Brand	Order Code
Panasonic TV	RCUNI01M	Grundig TV	RCUNI10
Sony TV	RCUNI02M	Sanyo TV	RCUNI11
Philips TV	RCUNI03M	Sharp TV	RCUNI12
Hitachi TV	RCUNI04	Goodmans/Alba/	
Mitsubishi TV	RCUNI05	Bush TV	RCUNI13M
Nokia TV	RCUNI06	Matsui/Hinaril/Orion TV	RCUNI14M
Samsung TV	RCUNI07	Sky Digital	RCUNI15
Toshiba TV	RCUNI08	On Digital	RCUNI16
Ferguson TV	RCUNI09	Satellite	RCUNI17
Grundig TV	RCUNI10		

Price : £7.50 + vat each

Buy any 5 of the above and get a Special Price of £ 7.00 + vat each

We stock Replacement Remote Controls for over 23,000 different models

Prices start from £ 5.50 + vat each

Please call for a copy of our latest Remote Control Catalogue on

020 8900 2329

New Arrivals

Semiconductor Comparison CD

A database of over 100,000 devices

Lists transistors , diodes , thyristors and IC's

Contains pin assignments for discrete semicondutors

Permits searching ans selecting according to type , casings ...etc

System requirement
Pentium PC , 16Mb memory , Windows 3.1/95/98/NT and a CD Rom Drive

Order Code : VRTCDROM

Price : £ 35.00 + vat

DVD Laser Lens Cleaner

Comes with Full On Disc sound and Picture Set Up

Order Code:DVDCLEANER

Price : £ 5.00 + vat

Displex Display Polish

"Displex" is an innovative polish that has been designed to remove scratches from the screens of Mobile Phones .

"Displex" is available in 5g tubes , with one tube being sufficient for approx 8 to 10 applications.

Order Code : DISPLEX

Price : £ 2.50 + vat

Check out our New Online Catalogue at

www.grandata.co.uk

We are stockist of all the following brands :

Remote Controls Accessories	Remote Controls , TV & Video Spares , CD Pick Ups ,Accessories
Remote Controls TV & Video Spares CD Pick Ups	Line Output Transformers

This advertisement is just a selection of our stock.

Please contact us if you cannot find the part you are looking for.

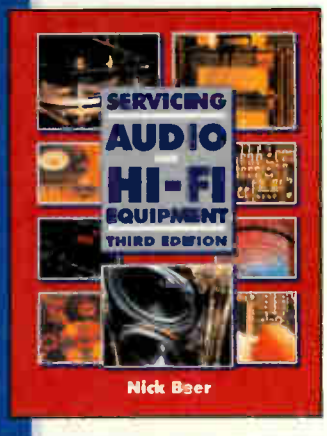
* Please add £1 p+p and VAT to all orders (Unless Otherwise stated) * All components are brand new
* We accept payment by Access , Switch , Visa , Cheque and Postal Order
* All prices quoted are subject to availabilty and may be changed without prior notice

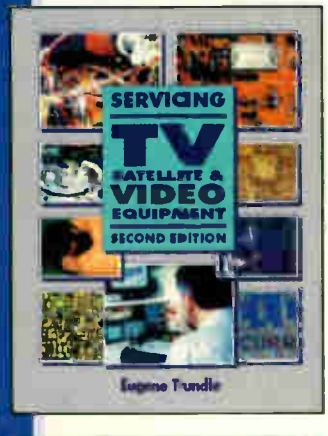
E & OE

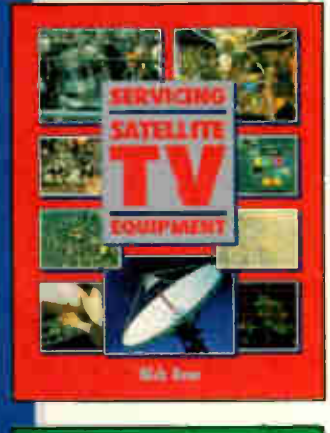
K.P. House , Unit 15 , Pop In Commercial Centre , Southway , Wembley , Middlesex . HA9 0HB England

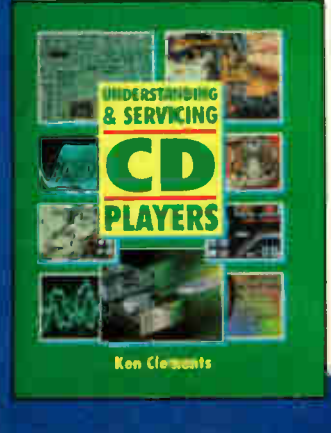
Tel : (020) 8900 2329 Email : sales@grandata.co.uk

Fax : (020) 8903 6126 Website : http://www.grandata.co.uk









BOOKS TO BUY

VIDEO AND CAMCORDER SERVICING AND TECHNOLOGY

This book provides fully up-to-date coverage of the whole range of current home video equipment, analogue and digital. As well as essential information for repair and trobleshooting, the author provides clear explanations of the technology of video equipment, which will enable the service engineer to gain a thorough knowledge of the equipment with which they are working.
As well as traditional VCRs the book includes the full range of video cameras designed for home use and editing systems, and the latest DVD and hard-disk equipment.
READERSHIP: Service engineers, servicing students, advanced electronics DIY.
Price UK £23.00 EUR £25.00

SERVICING SATELLITE TV EQUIPMENT

This is the definitive practical guide to fault-finding, troubleshooting and servicing satellite television equipment, both indoors and outdoors. It will take you through all areas of satellite television system servicing from the simplest fixed dish to fully motorised systems. From PAL to Mac to MPEG all contemporary systems are covered.
READERSHIP: Service engineers, satellite equipment designers and manufacturers audio engineers.
Price UK £35.00 EUR £37.00

SERVICING TV SATELLITE AND VIDEO EQUIPMENT

The first edition of this unique 'hands-on' fault-finding book became the guide and mentor for thousands of service technicians and engineers in many countries and was widely adopted as a college text. In its new and updated form its usefulness is enhanced by five new chapters, including fault diagnosis in digital TV and video equipment, satellite-receiver repair and interfacing/hookup. All the chapters have been based on many years of practical bench and field experience, the book wastes little space on theoretical principles and circuit description where it is well covered elsewhere: here the emphasis is on the practical business of fault diagnosis and repair.
Price UK £35.00 EUR £37.00

SERVICING AUDIO AND HI-FI EQUIPMENT

Service engineers and technicians have come to regard this book as essential to their work. As a bench-side companion and guide it has no equal. Its purpose is to ease and speed up the processes of fault diagnosis, repair and testing of all classes of home audio equipment: receivers, amplifiers, recorders and playback machines. The mechanics and electronics of domestic audio are examined by Nick Beer in a down-to-earth and practical way, concentrating on what goes wrong, how to track down problems, and how to solve them.
READERSHIP: Service technicians and engineers, audio engineers.
Price UK £35.00 EUR £37.00

UNDERSTANDING AND SERVICING CD PLAYERS

Engineers who need to achieve a better understanding of CD technology will find this book an essential tool for fault diagnosis, adjustment and repair. This book not only covers the mechanical design but also the integrated circuits within a CD player. It is written for immediate application and is well illustrated, so it should become a welcome addition to the rack of tools available to the service engineer. Ken Clements has extensive experience of the service industry both as a service manager and later in technical training with Sony and Pioneer. It is his hands-on knowledge that makes the book so valuable, not only as a wide-ranging reference but also as a benchtop manual to be kept within reach at all times when working with CD players.
Price UK £35.00 EUR £37.00

Post your completed order form to:-
Jackie Lowe, Cumulus Business Media, Anne Boleyn House, 9-13 Ewell Road, Cheam, Surrey, SM3 8BZ
Price includes delivery

How to pay

Title

❑ I enclose a cheque/bank draft for £_____
(payable to TELEVISION)

Please charge my credit/charge card
❑ Mastercard ❑ American Express ❑ Visa ❑ Diners Club

Credit Card No: Expiry Date:

_____

Signature of Cardholder_____

Cardholder's statement address: (please use capitals)

Name_____

Address_____

_____

_____

Post Code_____Tel:_____

Stereo FM signal source

In this concluding instalment Keith Cummins provides constructional and setting up information and a detailed components list

The method of construction used for the prototype stereo FM signal source is shown in Photo 1. Fig. 1 shows the arrangement of the modular subassemblies within the case. The mains transformer and power supply are on the left-hand side, while the RF module is at the right-hand side. This positioning was adopted to reduce the possibility of mains hum being induced in the RF circuitry. The subcarrier master oscillator and divider module, enclosed in a die-cast box, is at the rear on the left-hand side, the centre area being taken up by the main board. This module layout uses the available space to the best advantage.

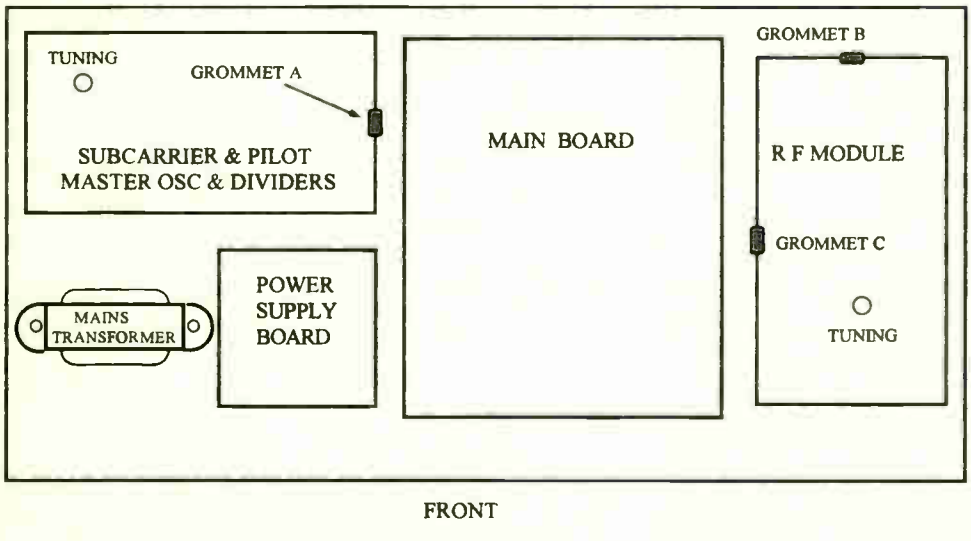


Fig. 1: Positions of the subassemblies in the stereo FM signal source unit. The unit is approximately 12in. wide by 6in. deep.

Constructional details

I've provided dimensions for the positions of the items attached to the outer case, see Fig. 4. There's no need to do so for the items attached to the mounting tray at the bottom of the case. All you have to do is to position these items, i.e. the boards, die-cast boxes, mains transformer etc., then drill from the item into the tray. Everything will then fit exactly with no need to carry out tedious measurements. I've used this approach for years: it saves a lot of trouble and makes life easy.

Construction is further simplified by using plastic stand-offs to secure the boards to the mounting tray and within the die-cast boxes. The stand-offs push in, with locking tabs to secure them in position. Because they are plastic, there's no chance of the inadvertent shorting to chassis that can occur with the use of nuts, bolts and spacers. Furthermore, should you want to lift a board out all you have to do is

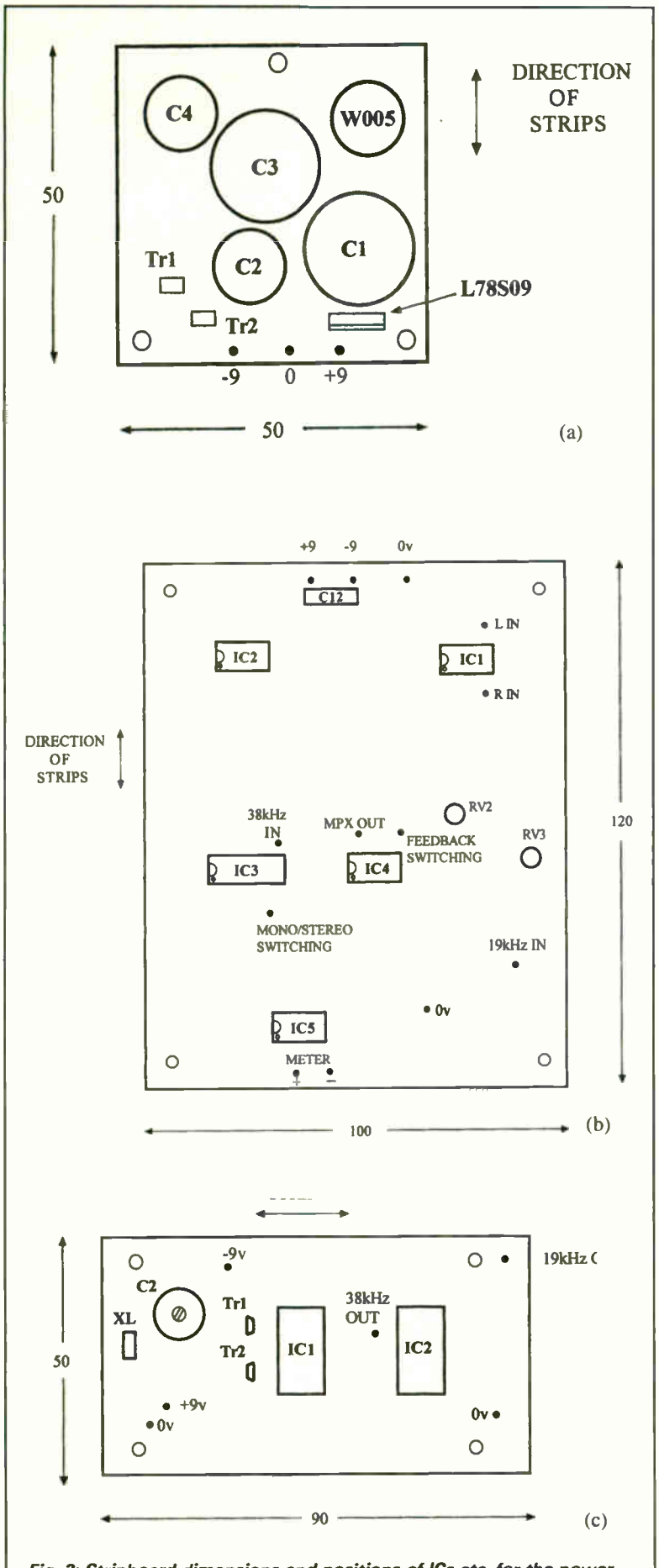


Fig. 2: Stripboard dimensions and positions of ICs etc. for the power supply board (a), the main board (b) and the master oscillator and dividers board (c). Dimensions in millimetres.

to squeeze the locking tabs together, which is much easier than fiddling with nuts and bolts.

Fig. 2 shows the dimensions of the strip- boards, which have to be cut to size, and the suggested positions for the various integrated circuits etc. These positions allow plenty of room for the peripheral components, which can be mounted symmetrically for the left and right input channels. The T-filter inductors should be mounted at right-angles to each other – the two halves of each filter should not have mutual inductance between them, since they are standalone filter elements. This condition can be achieved by mounting the inductors flat on the board at right angles, or by having one flat on the board and the other standing up.

I found that there was an optimum arrangement for running the +9V, –9V and 0V lines from one point to another to avoid hum and interference. It's not complicated: Fig. 3 shows the recommended routeing. It also shows the other peripheral connections. Note that the RF output coaxial cable is earthed at the socket only. This avoids an earth loop to the RF board, something that could cause hum.

Because of its fast transient edges, the 38kHz switching signal to IC3a has to be screened right up to the chip. The screen must be earthed at the source only, i.e. inside the master oscillator and divider module, while the track to pin 9 of IC3a should be cut back as short as possible. These precautions ensure that stray breakthrough at the subcarrier frequency is kept to a minimum.

Fig. 4 shows the hole spacings and dimensions for the case. Note the large hole for the meter: this allows space for the rear illumination lamp to shine through. The meter has no securing-screw locations, so I used Araldite to fix it in position. Heavy green gardening wire, held by the adjacent input level control, was used to position the lamp. Simple but effective.

The Velleman kit

The Velleman kit's PCB is only partially filled with the components supplied. Fit the following: C1 (4·7pF), C2 (5·6pF), C3 (15pF), C4 (trimmer), C5 (15pF), C6 (1nF), D1 (varicap diode), R1 (100kΩ), R3 (22Ω) and Tr1 (BF245A). Do not fit C7, C9, C10, R4-8, T2, T3 or D2. Fit a 22kΩ resistor (not 220kΩ as supplied) in position R2, and a 47µH inductor in position C8. Fit a terminal pin in the position

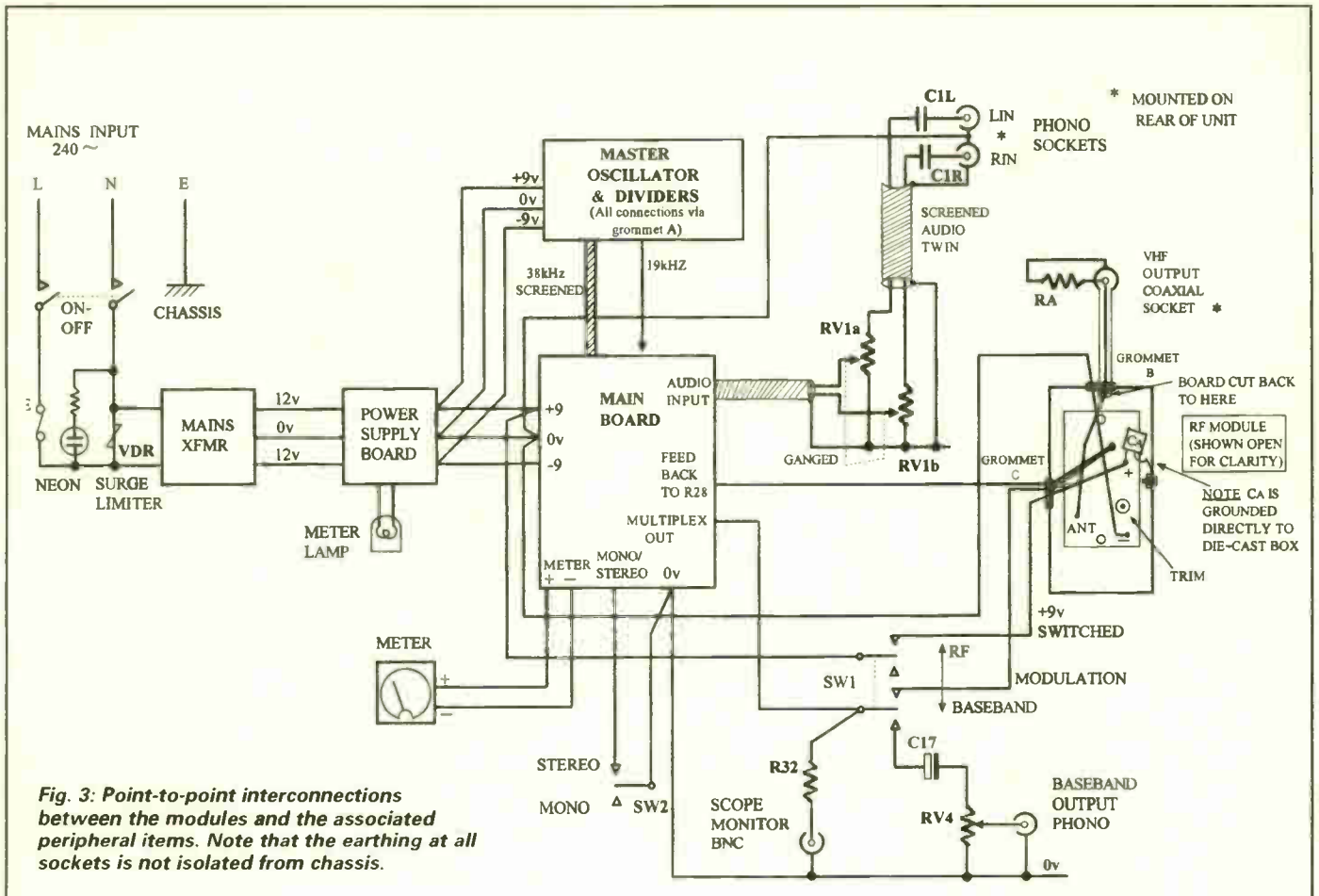


Fig. 3: Point-to-point interconnections between the modules and the associated peripheral items. Note that the earthing at all sockets is not isolated from chassis.

otherwise occupied by R4's slider connection.

The PCB's +ve input is connected via SW1b to the +9V line, also to an 0·1µF capacitor (CA) whose earth connection is to the die-cast box. The –ve input is connected to the 0V line. See Fig. 3. The modulation from SW1a (see Fig. 5 last month) is connected to the terminal pin fitted in the R4 slider position.

Use the board's mounting holes to position the plastic spacers that secure it inside its die-cast box, and drill the box accordingly. Once the internal fixings are complete and it's possible to measure the co-ordinates of the tuning trimmer, drill a hole in the box lid to provide access to the trimmer.

Master-oscillator module

Use the same approach when fitting the master-oscillator/dividers board into its die-cast box. Holes for the lead-out wires, with grommets, will be required for both boxes, as shown in Fig. 1.

Layout considerations

The layout of the circuit boards is not very critical, but note the following points. Mount the filter inductors at right angles, as described earlier. Keep the circuit around the subcarrier modulator circuit IC3a and IC4a as compact as possible, cutting through all unused bits of track. Connect the reservoir and decoupling capacitors in the power supply as close to the 9V regulator (positive) as possible. Keep the tracks in the base circuit of the 456kHz oscillator transistor Tr1 short. Mount C12 on the main board as close to the incoming +9V and –9V lines as possible.

Apart from these points, if construction is carried out to a good, tidy standard you should be rewarded with excellent results.

Final checks

Before you switch on, check that there are no short-circuits across the supply lines. It's a good idea to inspect the boards with an eyeglass to ensure that there are no solder whiskers or other short-circuits. Confirm that all track cuts are complete, without any thin bits of copper still bridging the cut. Care taken in this way will prevent grief later. Equipment starts to look tatty when you have to keep pulling it apart to fix faults. There is also the possibility of damage to the semiconductor devices when this is done.

Testing and setting up

At the very least you will need an oscilloscope, a multimeter and a stereo tuner to check that everything is working correctly. If you have a frequency counter and an audio generator, better still. You won't need an audio-spectrum analyser, but if you do have one it will display all the components of the signal multiplex at a glance.

The recommended setting up procedure is as follows.

(1) Check that there are no short-circuits across the supply rails, then switch on and check the supply-rail voltages. The mains-on neon and level meter should be illuminated.

(2) Connect the scope to the collector of transistor Tr2 in the oscillator and divider module to check that pulses are present. If all is well, set C2 to the half-way position. If you have a frequency counter, connect it to the collector of Tr2 and adjust C2 for 456kHz. It should be possible to get within a few Hz. If you don't have a frequency counter, leave C2 at half

way – we'll get back to it later.

(3) Check that you get one pulse at pin 5 of IC1 for every six pulses at pin 14. If so, the divide-by-six operation is OK.

(4) Check that there is a good squarewave at pin 2 of IC2 and another at half frequency at pin 13. If all these checks are OK, you can be assured that the master oscillator and the dividers are working correctly.

(5) Switch the front-panel stereo/mono switch to mono and the RF/baseband switch to RF.

(6) Tune a stereo tuner to a quiet part of the FM band around 106MHz. Adjust the frequency trimmer in the RF module until it quietens the tuner hiss – this indicates that you have set the oscillator to the frequency selected by the tuner.

(7) Connect a stereo audio signal from an audio generator, tape or other source to the audio input sockets. Turn up the input-level control to obtain level 4-5 on the meter. You should hear the audio signal from the tuner. Retune for optimum quality/signal strength.

(8) Set the subcarrier level control RV2 and the pilot-tone phase control RV3 to mid-travel.

(9) Switch the unit from mono to stereo. If you have already set up the frequencies, using a frequency counter, the tuner's stereo light should come on. If not, carefully set the oscillator trimmer C2 to the middle point where the stereo light comes on. The signal should then be audible as stereo.

(10) Disconnect the left-hand stereo input and the right-hand speaker. Adjust RV2 for minimum signal level from the left-hand channel. Repeat this procedure adjusting RV3 for minimum signal, then give RV2 a final tweak. It's easier if you use an AC voltmeter for this adjustment.

(11) The setting up is now complete. Listening tests with a good stereo source can be carried out. The signal should sound as good as an off-air broadcast.

The following information on the connections to each of the modules in the unit can be used as a check list to ensure that all connections have been made.

Power supply board: Input 12-0-12V. Output connections +9V, –9V, 0V, AC feed for the meter lamp.

Master oscillator and divider board: Inputs +9V, –9V, 0V. Outputs 38kHz (screened) and 19kHz.

RF module: Inputs +9V, 0V and modulation. RF output via coaxial cable.

Main board: Inputs +9V, –9V, 0V, 0V return from front-panel controls, 0V audio input return/screening, right audio, left audio, mono/stereo switching line, 38kHz, 19kHz, meter + and –. Baseband multiplex output and feedback switching to R28. ■

Components list overpage

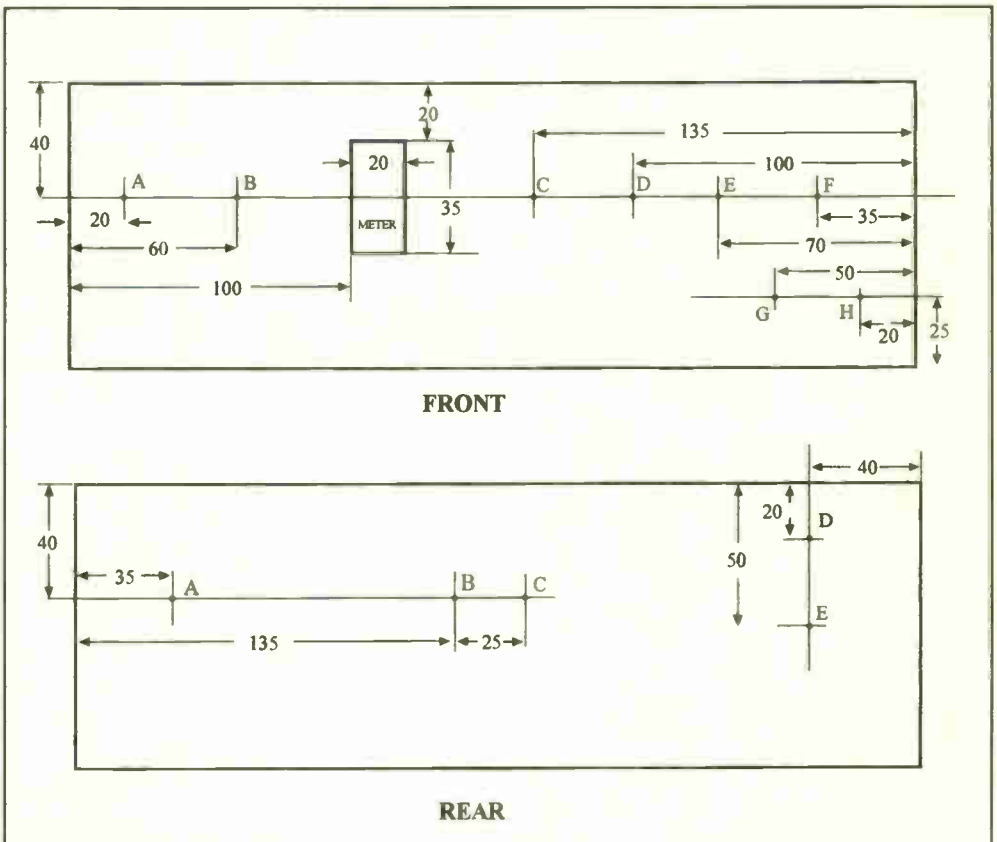


Fig. 4: Spacing of the holes in the front and rear panels, in mm. The holes in the front panel are as follows: A 12mm on/off switch; B 11mm mains neon; C 10mm input level control; D 6mm mono/stereo switch; E 6mm RF/baseband switch; F 10mm baseband level control; G 7mm baseband phono socket; H scope BNC socket. The holes in the rear panel are: A 9mm RF output socket; B 7mm L-input phono socket; C 7mm R-input phono socket; D 12mm fuse carrier; E 12mm mains cable grip.

Photo 1: Internal view of the prototype stereo FM signal source unit.

Components list

Main board and peripherals:

C1	47nF, 100V, 10%	Mylar	R1	15kΩ
C2	2·2µF, 10V, 10%	electrolytic	R2	120kΩ
C3	47pF, 100V, 10%	ceramic	R3, R4	330Ω
C4	47nF, 100V, 10%	Mylar	R5	4·7kΩ
C5	12nF, 100V, 10%	Mylar	R6	100Ω
C6	100pF, 100V, 10%	ceramic	R7	6·8kΩ
C7	1µF, 10V, 10%	electrolytic		All 0·25W, 5%

L1, L2 4·7mH Maplin UK80 TR1 ZTX450

All the above components have to be duplicated for the right-hand channel. The components listed below do not need to be duplicated.

Power supply:

C1	1,000µF, 25V	electrolytic	R1	100Ω, 0·25W, 10%
C2	470µF, 16V	electrolytic	R2	2·2kΩ, 0·25W, 10%
C3	1,000µF, 25V	electrolytic	R3	2·7kΩ, 0·25W, 10%
C4	470µF, 16V	electrolytic	R4	100Ω, 0·5W, 10%

TR1 ZTX550 VDR, Maplin HW13P
TR2 ZTX450 W005 rectifier
L78S09 9V regulator

Mains transformer 240V input, 0-12 + 0-12V outputs, 6VA, Maplin WB10
Mains on/off switch, Maplin FH39; panel-mounting red mains neon indicator, Maplin RX83E; fuse carrier, Maplin CT90; fuse 20mm 100mA slow; stripboard, nuts and bolts, spacers, interconnecting wire etc.

C8	3·3nF, 100V, 10%	Mylar	R8-R13	100kΩ, 0·25W 1%
C9	15nF, 100V, 10%	Mylar	R14-R16, R23, R28, R31	10kΩ
C10, C11	2·2nF, 100V, 10%	Mylar	R17, R18	1·2kΩ
C12	100nF, 100V, 10%	ceramic	R19	22kΩ
C13	1nF, 100V, 10%	Mylar	R20, R22, R27	47kΩ
C14	2·2µF, 10V, 10%	electrolytic	R21	4·7kΩ
C15, C16	1µF, 10V, 10%	electrolytic	R24, R30	100kΩ
C17	10µF, 10V, 10%	electrolytic	R25, R32	1kΩ
C18	22pF, 100V, 10%	ceramic	R26	680Ω
C19	100pF, 100V, 5%	silver mica	R29	82kΩ

All 0·25W 5% unless otherwise indicated

L3-L5 4·7mH Maplin UK80

D1, D2	OA91	RV1	100kΩ + 100kΩ lin	Maplin FW88
IC1, IC4	OP275	RV2	47kΩ lin.	preset
IC2, IC5	TL082	RV3	10kΩ lin.	preset
IC3	4053	RV4	4·7kΩ lin.	Maplin VP94

250µA FSD meter, Maplin LB80
12V, 85mA wire-ended lamp, Maplin PG83
Mini toggle switches SW1, SW2 Maplin FH39
IC sockets, one 16-pin and four 8-pin
Stand-offs, pack, Maplin AQ05
Stripboard, terminal pins, link wire, etc.

Master oscillator and dividers:

C1	1nF, 100V, 10%	polyester	R1	100kΩ
C2	22pF trimmer	Maplin WL70M	R2	3·3kΩ
C3	470pF, 100V, 10%	Maplin RA38	R3	1kΩ
C4	10nF, 100V, 10%	ceramic	R4	4·7kΩ
C5	100pF, 100V, 10%	ceramic	R5	4·7kΩ
C6	100nF, 100V, 10%	ceramic	R6	100kΩ
			All 0·25W, 10%	

L1 4·7mH Maplin UK80

IC1	4017	TR1	ZTX450
IC2	4013	TR2	ZTX550

DCM5003 die-cast box, Maplin GU62
CSB455E ceramic resonator, Maplin UL61R
1 16-pin and 1 14-pin IC socket, terminal pins, link wire, stripboard etc.

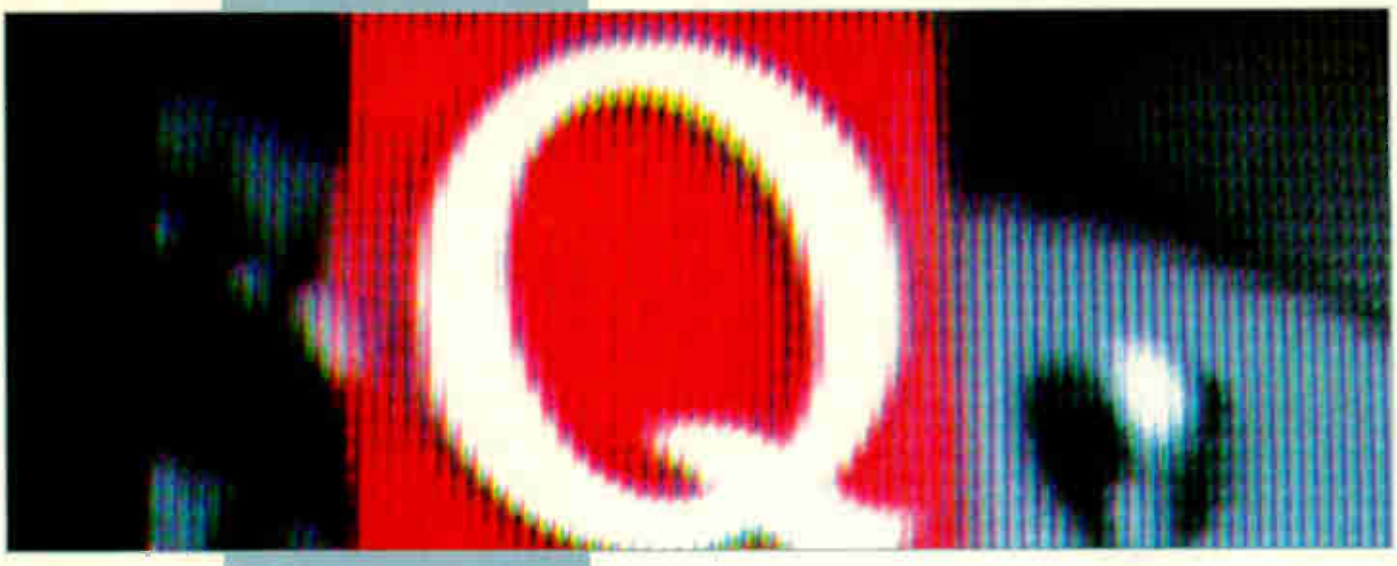
RF module:

Vellerman kit K1771, Maplin VF67. See notes in text
R2 22kΩ, 0·25W, 10% (substitute resistor)
47µH coil, Maplin WH39N, to fit in position C8
CA, 100nF, 65V ceramic capacitor
DCM5003 die-cast box, Maplin GU62
Nuts, bolts, earth tag, short length of coaxial cable, etc.

General assembly:

Blue case 238	Maplin XY49
Two NK2 control knobs	Maplin RX01
SR2 mains lead cable grommet	Maplin LR48
Three chassis phono sockets	Maplin YW06
BNC chassis socket	Maplin UD40
HQ chassis coaxial socket	Maplin FE10

RA 68Ω, 0·25W, 10% resistor (see Fig. 3)
Three 10mm diameter rubber grommets
Approximately 400mm of twin screened audio lead



The type of logo that can cause phosphor burn. This one is for the Q network

A new peril – logo-burn

Eugene Trundle alerts us to the dangers of screen phosphor burn with certain DTV transmissions

Phosphor burn has been a problem with cathode-ray tubes since the earliest days of TV. The most obvious example is perhaps the display screens of hole-in-the-wall cash dispensers. With computer monitors the tubes are protected by screen-savers from icons being burnt in, and TV sets have automatic beam cut-off that operates in the event of field collapse. CCTV monitors very often suffer from image burn-in when the associated security camera is stationary. TV sets are normally immune from this sort of thing because of the constant movement and changes in the picture. Until, that is, the advent of the DTV channels!

DOGs

The trouble is caused by fixed station-ident logos, icons and badges, which have come to be known as DOGs – Digitally-Originated Graphics. These, especially when they are bright, wear and desensitise a tube's phosphors in one small area, typically at the top right- or left-hand corner of the screen, with the result that a negative image is visible when any other image source is selected. This is no joke at all, especially with a projection or plasma-panel set that has a four-figure price tag.

The terrestrial channels BBC1 and 2, ITV and Channel 4 give no problems because they are, at present anyway, logo free, while Channel 5 has a 'soft' logo that's unlikely to cause problems. But there are many offenders amongst the multitude of channels now available via cable, satellite and terrestrial DTV, where bright and hot logos are common. Some, like Tara and B4U music, are unlikely to attract enough viewing time to cause phosphor burn but others, which may remain on-screen for long periods, can and do cause trouble. Examples are Sky News, ITN News, BBC News 24 and the Cartoon Network.

Vulnerability

The sets most vulnerable to this sort of damage are CRT projection types, because the CRTs are operated at high beam currents. Rear-projection models have provided most examples to date, simply because they are more common than the front-projection type. Burning can also occur with the very expensive plasma panels now starting to find their way into domestic living rooms. Conventional direct-view CRTs do not suffer so badly as they are operated at lower beam currents than the small and very bright mono-colour projection tubes. LCD displays, both projection and direct-view, are inherently free from this risk. The same is true of the new DLP projectors, rare as they are as yet.

Another screen-burn effect occurs when a 'square'-tube set is used for long periods to display the letterbox images that are becoming ever more common on all channels. The unenergised top and bottom strips of the phosphor screen stay fresher than the rest of the display area, and are thus liable to produce brighter bands when a normal 4:3 image is displayed. In my experience most cases of this have arisen with large-screen rear-projection sets used in pubs and clubs, where they are run for hours on end at very high brightness levels. It's hard to see a solution to this one.

Solutions

Although prolonged display of a logo-free image may reduce the effect of small-area phosphor burn, the only real cure is tube replacement, a painstaking and very expensive business with projection models – the end user cost can range from £600 upwards when materials, labour, transport and VAT are taken into account. It's a particularly thorny problem with rental sets, because of their high initial cost, the unheeding attitude of the viewer and the low appeal for re-rent of a terminated-hire set with a burnt-on badge.

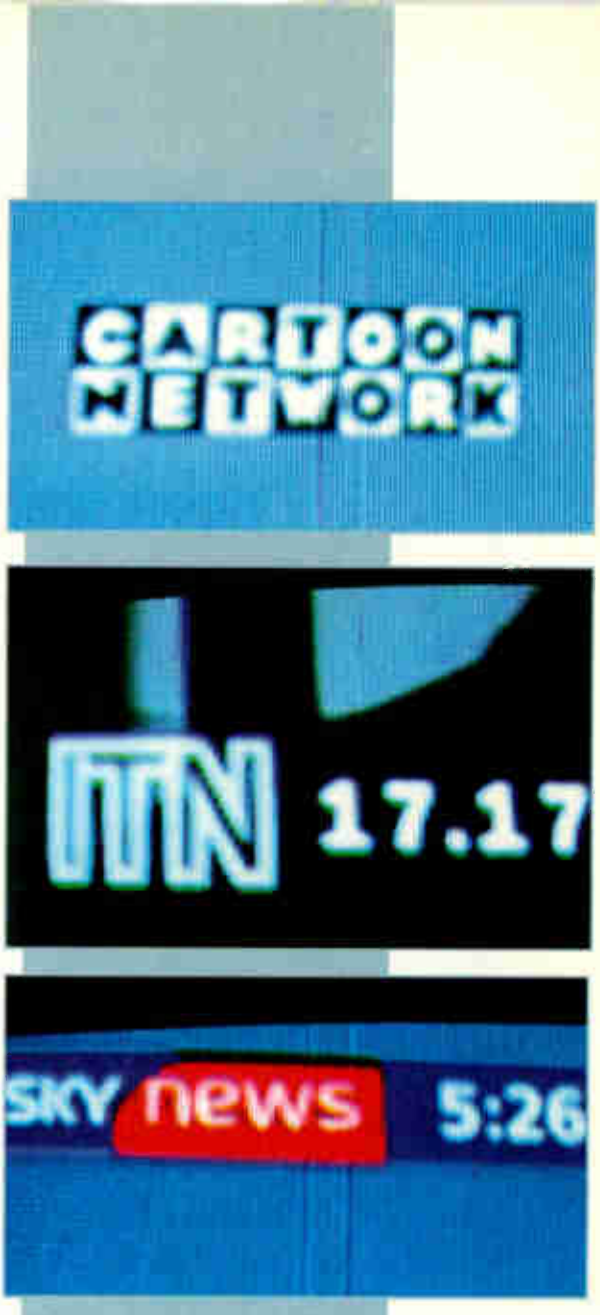
What can be done about this insidious nuisance? At the local level, reducing the brightness and contrast settings to below the factory-default levels and, where possible, using the zoom control to shunt the logos off screen may help. The screen-refresh feature with some plasma-screen sets does little to alleviate long-term phosphor burn. Showroom sets should not be left on the same DTV channel for hours on end.

The real problem is with the broadcasters, whose PR people don't even seem to be aware of it! BSkyB went on record as suggesting that phosphor-burn is due to bad TV design or faulty sets – return them to manufacturers, BSkyB said. The setmakers are well aware of the problem, and report that they can do nothing more to protect tube phosphors. No claims under guarantee will be accepted by manufacturers, who put warnings in their instruction books, but one leading extended-warranty provider has stated that it will pay out on screen-burn claims. The broadcasters and programme-providers say there's nothing "illegal" about their transmitted signal levels, and see no reason why they shouldn't put a badge on their products – indeed they view this as an important corporate marketing strategy, some siting Levi, the jeans manufacturer, as a good example of trademark 'image' and kudos . . .

It would help a great deal if the logos could be softened to become semi-transparent, as on Channel 5. Many people think that there is no need for them at all, since digital receivers give an initial indication of the channel in use when it's selected and a reminder thereafter at one keystroke. The ITC (Independent Television Commission), which one might expect to take an interest in this on behalf of viewers, says it has no jurisdiction over this aspect of broadcasting – its remit extends only to programme content and commercials. But the DOGs are part of the programme content, aren't they?

Campaign

There is a growing campaign against DOGs, based mainly on objection to the intrusive nature and psychological and physiological effects of the logos, URLs (Uniform Resource Locators, i.e. web addresses) and other clutter on our TV screens. I've come across some very vociferous websites devoted to this, for example the following two



Further examples of logos that can cause phosphor burn, leaving behind a negative image – Cartoon Network, ITN and Sky News.

www.logofreetv.org.uk
www.squashthebugs.com

Both have links to other relevant sites. One of them describes how the expensive plasma sets in the public areas of BBC premises have suffered from logo burn. ■

Broadband wireless

Mark Paul surveys proposals for broadband wireless networking, a rapidly developing technology aimed at the corporate and consumer markets

Quite a lot has appeared in print about broadband cable communications. An alternative is broadband wireless. Various proposals for its implementation have been put forward.

Helios

Helios is the world's first unmanned plane designed to function as a 'telecom tower in the sky' for the provision of broadband internet connections. It was built by SkyTower Telecommunications with funding and research help from NASA, and has flown successfully. Its unique design resembles a giant wing (see Photo 1), with a wingspan of 247ft (wider than a Boeing 747) and a height of just six feet. The idea is that it will loiter at the edge of the Earth's atmosphere, in fact at a height of 100,000ft. Being solar powered, by 65,000 cells, Helios generates enough energy throughout the day to operate fourteen electric motors and charge fuel cells that switch in during the period of solar eclipse. Its backers claim that it will be far cheaper than a satellite and more efficient than a wireless tower.

The on-board electronic brain is an Apple Macintosh computer, which will guide the machine back to earth when necessary – Helios is designed to stay aloft for six months or longer. The aim is provide, as a communications platform, fixed broadband next-generation wireless, also narrow-band and direct broadcast applications. It can operate at a data rate of 1·5Mbits/sec with only a 30msec latency, which is comparable with fibre-optics. Latency is the troublesome speed-of-light delay that introduces a significant lag with geosynchronous satellites, which sit at some 22,300 miles above the earth. This is a real advantage of Helios. Another is cost: the estimated cost of a Helios craft is $10m, which compares with $300m for a satellite, ignoring launch costs etc. SkyTower Telecommunications hopes to begin large-scale production of its Helios craft in 2003.

HALO

The manned HALO (High-Amplitude Long-Operation) Proteus is another high-flying plane (see Photo 2) designed to provide broadband wireless communications links. This one has been devised by the US firm Angel Technologies and has already been test flown. The idea is that each plane, operating at 52,000ft, should form a network hub to interconnect tens of hundreds of thousands of subscribers at multi-megabit per second data rates, covering a footprint of 50-75 miles diameter. Planes would be positioned above cities throughout the world.

HALO broadband wireless links would give subscribers access to

Photo 1: The Helios unmanned 'telecom tower in the sky'.

various services, with the ability to handle video, high-resolution images and large data files. Information addressed to non-subscribers or those beyond the region served by a HALO network would be routed through a dedicated HALO Gateway connected to the public switched networks.

In comparison with terrestrial wireless networks, HALO employs a frequency re-use pattern that covers the service area with hundreds of adjacent 'cells', each comparable with a terrestrial communications tower, providing broadband services at very high frequencies. The advantage is consistent high-quality signals available throughout a super-metropolitan region. A HALO network can complement satellite systems by transmitting local or regional content and acting as a local concentrator of data traffic – a HALO plane is 10-1,000 times closer to the user than a satellite, and has ten times the available electric power.

Corporations with LANs and intranets can use HALO to extend their LANs outside the corporate firewall to employees' homes, regional offices, field locations, key suppliers and customers, and could include videoconferencing. Data rates extend from 5-25Mbits/sec and beyond. Private consumers can be provided with multimedia, internet and entertainment services at data rates of 1-5Mbits/sec. The Consumer Premise Equipment (CPE) has a high-gain auto-tracking aerial that's designed for easy installation.

Sky Station International

Another proposal is for airships that maintain position at some 70,000ft above a city, providing broadband wireless communications over some 7,500 square miles with a latency of less than 0·5msecs. The best-known example has been developed by Sky Station International, whose members include Lockheed Martin Global Telecommunications, Alenia Spazio/Finmeccanica, DailmerChrysler Aerospace and Thomson CSF.

Each Sky Station platform would be equipped with a telecommunications payload able to provide high-speed, high-capacity broadband wireless services. A user with terminal could receive data at speeds of 2-10Mbits/sec, giving internet access, media streaming, videoconferencing, local/long-distance telephone etc. Operation would be in the 47GHz band, with the uplink at 47·9-48·2GHz and the downlink at 47·2-47·5GHz.

Photo 3: A Sky Station airship.

The proposal is to park 250 platforms above every major city around the world. Some cities would require additional platforms. Although the craft could vary in size, the average would be some 515ft in length and 203ft in diameter at the widest point (see Photo 3). The plan is to deploy the first craft later this year.

The airships are designed for a life span of 5-10 years but could be recalled for repair if necessary. The solar- and fuel-cell capacity is enough to service a payload of up to 1,000kg. Construction is to the same exacting aerospace standards as commercial aircraft and satellites, to ensure safety and eliminate the possibility of catastrophic rupture of the hull.

LEOS

Going rather higher, Teledesic has proposed the Low Earth Orbit Satellite (LEOS) system which could provide global coverage with a network of 288 satellites in twelve planes, each having 24 satellites. Photo 4 shows the likely form of a Teledesic satellite. The orbital altitude would be under 1,400km.

Geostationary satellite communications systems (at 22,300 miles) require changes to terrestrial network standards and protocols to accommodate their high latency (a minimum delay of half a second per round trip). Teledesic's aim is to meet current network standards instead of changing them, taking fibre-optics as the quality standard. This means low latency, low error rates and broadband capacity.

The Teledesic network could serve as a gateway to existing terrestrial networks or as the means to link users or networks together, with a wide range of data rates. Teledesic terminals would communicate directly with the satellite network, interfacing with a wide range of

Photo 2: The Proteus 9 HALO aircraft.

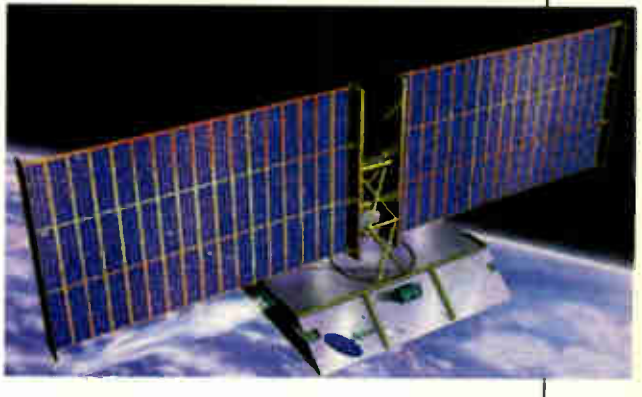


Photo 4: Probable form of a Teledesic satellite.

network protocols including IP, ISDN, ATM and others. Flexibility is the key aim, to cater for multiple channel rates, protocols including the internet, corporate intranets, multimedia etc.

Two-way operation would be at up to 64Mbits/sec for the downlink and 2Mbits/sec for the uplink, using the bands 18·8-19·3GHz and 28·6-29·1GHz respectively. Each satellite would be a node in a fast packet-switching network, with communications links to other satellites in the same and the adjacent orbital planes.

In conclusion

Via these means and others, we can expect pervasive broadband wireless to become a reality – eventually. It could change a lot of the ways in which things are done. It probably won't happen fast, or be painless, and could give us pocket broadband. We shall have to wait and see. ■

Satellite kit and accessories

Our free supplement this month is devoted to all things satellite: what equipment does what, service aids, gadgets for your customer, product availability and suppliers, and more... Text and research by **Eugene Trundle.**

Satellite kit and accessories

The brown-goods service trade is not going through the best of times at present. One bright light is shining on us though, and that is direct-to-home digital TV. It has the world's fastest and deepest market penetration and it is taking place right here in the UK.

The broadcasts, programmes and receivers are only part of the story. Every satellite receiver must be hooked to a correctly-aligned dish, and the signal brought safely to the box, whence the picture and sound need to be coupled to the TV – and, perhaps, other TV sets around the place.

Nor is Sky/Astra the only service provider in the business of distributing satellite TV services: lots more electronic birds are poised in space, beaming down programmes that many people want. The means of receiving them, in terms of hardware and services, is in the hands of specialist dealers, riggers and technicians. This is no do-it-yourself scenario, and the shop assistants in Currys and Asda cannot help with it!

Even the simplest satellite installation often brings a demand for user-accessories in the way of remote extenders, Open TV keyboards, hook-up cables, high-quality RGB and optical coupling links, signal-routers etc. There is a good mark-up on accessories. Also, skilled, caring and expert service in this realm commands better rewards – at least from discerning customers – than replacing a LOPT in a Goodmans TV or trying to fathom out why the tuning drifts in a £79 video recorder.

The opportunities are there for those who'll grab them, and a technician or engineer is better perceived by the customer than a glib salesman or hasty 'in-house' contract rigger.

Starting at the top

The best-known and most visible satellite receiving accessory is the dish, of course. For Sky services, an elliptical 43cm perforated dish is now the norm. If you've lost one, bent one or run over it (!) they are available for as little as £20 from Wizard Satellite, or £39 complete with LNB from The Satellite Shop and D&C.

Perforated dishes tend to deteriorate relatively quickly, especially in coastal districts; solid ones are more durable, but they don't come out at £20! They're available in many forms from, for example, Mersey Sat who stock various sizes and types by Channel Master, Lenson Heath and Triax.

A 98cm Funke alloy dish costs £59 from Transworld Satellite. The *Arcon Sweety* is a small, high-gain dish, ideally suited to use in caravans and flats; it's a 57cm prime-focus type, but with performance nearer that of an 80cm type. It's stocked by Wizard Satellite.

Normally, a dish has to be rigidly fixed and accurately aligned to get a signal at all, so it would seem that reception in a boat or road vehicle is impossible. Not so! Complete modules of dish and special mount are made by Ten Haaft and Tracvision for these purposes.

A specialist in 'dish mobility' is Bradley Wood, which stocks the products of both these manufacturers. The company also offers flat antennas (Attisat FL650 at £97-50), and Cybertenna multi-satellite types.

There's a range of camouflaged antennas for those who don't want the world to know they have satellite TV: Cubsat make these types, again available from Bradley Wood, while a large (and not totally convincing!) outdoor light globe lamp with a 45cm dish inside can be had for £149 from SMS...

The weaker the signal, the larger the dish required. For reception from satellites like Turksat 1C at 42°E and Intelsat 705 (18°W) they are available up to 120cm diameter from many manufacturers and suppliers, including some of those listed here.

Large dishes are typically used by ex-patriots. They need to be very carefully aligned and mounted very firmly, ideally out of site of planning officers! Yet larger dishes – up to 3.1 metres – are available from Vision On.

Low noise

Weak SHF signals call for the lowest possible noise figure in the LNB used, and their noise ratings have come steadily down over the years. The best-specified 'normal-production' one I can find is a 0.3dB type, the Syntec 2000. It is sold at £130 by Signalmaster. Next in line is the *Genesis 3*, rated at 0·4dB.

Very often it's required to feed two or more receivers from a single dish and LNB. Unlike a terrestrial masthead amplifier, a conventional LNB is unable to fulfil this need because it can only look at one polarity of SHF wave at one time. Dual-output LNBs provide a solution here. They cost typically £50-£60; a good

One of the best performing LNBs in terms of noise is Signalmaster's Syntec 2000. It has a typical noise figure of 0.3dB. (Picture courtesy Signalmaster)

QUALITY SATELLITE ACCESSORIES

PULSAT — quality satellite accessories

DIGITAL RECEIVERS

NOKIA 9902S HDD - Superb receiver with embedded Viaccess, CAM slot and 15hr Personal Active Disc MEGA BUY! £469
NOKIA 9800S - Embedded Viaccess + CAM slot MEGA BUY! £269
NOKIA 9650S - FTA + Twin CAM £259
NOKIA 9470S - FTA Reciever £195
£10 OFF ANY CAM WITH ANY RECEIVER

FORCE D-MASTER 1122S - They don't get much better than this. Embedded Conax and Viaccess, Twin CAM, 4000 channels, 3 x scarts, DiSEqC1.2 £295

Humax

HUMAX IRCI5400Z - Embedded Irdeto, Twin CAM, 4000 channels, DiSEqC1.2 with standard CAM £289
With ALLCAM PATCH MEGA BUY! £339
HUMAX VACI5300 £259
HUMAX CRCI5500 £309
HUMAX NACI5700 £329
HUMAX CI5100 £229
HUMAX F1 FOX £159
HUMAX VA FOX £189
NEW RANGE - TWO YEAR WARRANTY
HUMAX ID-DIGITAL F-10E £139
HUMAX ID-DIGITAL CI-20E FTA + One CAM £179

ECHOSTAR OFFICIAL UK STOCK

ECHOSTAR DVR7000HDD - Flagship Receiver, Analogue/Digital, 40GB HDD, MP3, Positioner, Echonav, Twin CAM + more £889

ECHOSTAR DVR5000HDD £499
BEWARE OF GREY IMPORTS - NO UK WARRANTY
ECHOSTAR AD3600IPVA - Superb receiver, Analogue/Digital, 5700 channels, Twin CAM, Embedded Viaccess, Positioner, Echonav + more £419

ECHOSTAR D2600IPVA - Best selling 'Digital Only' version of 3600 model £389
TWIN UNI LNB WITH ANY RECEIVER £39
ECHOSTAR DSB2200VA - Highly recommended, Embedded Viaccess, Twin CAM, DiSEqC1.2, Echonav + more MEGA BUY! £259

ECHOSTAR DSB808VA - Innovative receiver, compact size 10"x8"x2", same features as 2200VA NEW £269

DIGITAL RECEIVERS

SAMSUNG DSR9000VACI Twin Embedded Viaccess, Twin CAM, 2000 Channels, DiSeqc 1.2 MEGA BUY! £225

SAMSUNG DSR9500VACI - Updated version of 9000VACI model NEW £249
BUYING A RECEIVER? - ASK FOR 2xSCARTS FREE!
SAMSUNG DSR9600HDD- New model with 20GB Hard Disc £CALL
DIGENIUS TV BOX CI Excellent twin CI receiver with the fastest channel change yet RECOMMENDED £199

PACKAGE OFFERS

Receive the following low prices with the purchase of any Satellite Receiver

SCT/RCT COMBO CARD	£119
AB SAT	£149
ULTRA BLUE	£119
SEXVIEW TV	£139
SPICE PLATINUM	£ 95
LIVE SEX TV	£149

MOTORISED UPGRADES

DISEQC DELUXE1.2 POSITIONER Premium DiSEqC 1.2 motor with built-in Rotor Control to aid setup at the dish £99
When purchased with any receiver £79
DISEQC 1.2 MOTOR STANDARD £89

3 YR WARRANTY — DiSEqC 1.2

JAEGAR SG99 H-H MOUNT £79.95
DISEQC V-BOX control standard motors with a Diseqc 1.2 receiver £89.95
DISEQC 1.2 ROTOR CONTROL To aid set up of Diseqc motors at the dish £29.95

DIGITAL PCTV & SATELLITE INTERNET

PentaVALUE - Turbo internet and super fast mpeg4 data via your dish £119
PentaU - Turbo internet and super fast mpeg4 data via your dish, USB device £219
PentaVISION CI - Turbo internet + Common Interface TV via your dish £239
SKYSTAR II - Turbo Internet + FTA TV £109
For details on Satellite ISP's see www.pulsat.com

CAMS

IRDETO II CI CAM £85
IRDETO CI ALLCAM SE Also working with official German subscriptions £179
IRDETO CAM (Standard) - For older machines, e.g. Nokia 9200S £95
VIACCESS CAM £79
VIACCESS ALLCAM (Black) £149
CRYPTOWORKS CAM £119
CONAX CAM £109
SECA (ASTON) CAM £109
NAGRAVISION £129

DIGITAL SUBSCRIPTIONS

SCT/RCT COMBO CARD £129
AB SAT - Official Viaccess Hotbird subscription £159
ULTRA BLUE - Official Irdeto or Viaccess Hotbird subscription £129
SEX-VIEW TV - Hotbird, 24 Hrs, Irdeto or Viaccess £149
LIVE SEX TV - Hotbird, 24 Hrs, Irdeto or Viaccess NEW! £159
SPICE PLATINUM Official Irdeto Hotbird subscription NEW! £99
*£10 off any CAM when purchased with any sub

SCT OFFER

SCT/RCT + VIACCESS or IRDETO CAM

£189.00

MILLENNIUM OFFER

Spend over £250 and get the Millennium 2000 VX Max for just £39.95
Spend over £500 and its FREE!

AMAZING DIGITAL OFFER!

Force D Master 1122S Receiver and Satisfaction Channel Subscription

Get the best digital receiver on the market coupled with 12 months of the hottest channel on satellite for this low low price!!!

£409.00

- In-Built Viaccess, Conax and Twin CAM Slot
- 256 Colour On Screen Menus
- Full 12 Month UK Warranty
- 12 Month SCT Subscription Via Hotbird @ 13degrees East
- The Best in European Late Night XXX, 24Hrs A Day

Echostar DSB2200VA with SCT Subscription £369.

RECEIVER SOFTWARE UPGRADES

DVB2000

DR OVERFLOW DVB2000 Get more from your Nokia 9200/9500/9600 with the superb Dr Overflow software, price includes return carriage, 24Hr turnaround £39
Including UK collection New Version £49
NULL MODEM CABLE Premium quality Dual-Head Cable for updating the software in most popular makes of receiver £14.95
Want to know if there's an upgrade for your receiver? Please Call

PC DEVICES & GADGETS

PIC BUSTER & EEPROM PROGRAMMER	£45.00
MULTIPIC PROGRAMMER with ZIF	£47.50
MULTIPIC BUSTER & EEPROM PROGRAMMER	£55.00
SMART MOUSE	£29.00
SMART MOUSE PRO 3.5 & 6.0 Mhz version	£39.00

MILLENNIUM 2000VX MAX NEW Our best selling programmer just got better. Now proprammes a multitude PIC wafer cards inc. the new 876/877 type £69
VX MULTI Superb 9 in 1 programmer with LED display, VxSmart software & Cable MEGA BUY! £99
FUNMASTER210 PROGRAMMER £79
NEOFUN PRO - Fast powerful way to use ATMEL (FUN) Wafer programmer NEW £39
AUTOMATE PRO COPIER Super fast STAND ALONE programmer for copying PIC16F84+24LC16 Eeprom, Gold & Silver Wafer Cards at the touch of a button. No PC required, Includes PSU NOW COPIES SILVER CARDS £59
GOLDCARD TESTER Test both the PIC & EPROM in under 2.5 secs £79

PIC 84 + EEPROM CHIP CARD	£7.00
PIC 84 + EEPROM MINI CHIP CARD	£7.50
PIC628 + 64K EEPROM CHIP CARD	£10.00
PIC628 + 64K EEPROM MINI CHIP CARD	£10.50
PIC876 + 64K EEPROM MINI CHIP CARD	£15.50
GOLD WAFER CARDS	from £2.25
ATMEL WAFER CARD	from £5.00
MEGA877 WAFER CARDS	from £5.00

STEALTH PIC TO PIC COPIER Handheld copier for PIC84's and 508's with ZIP socket and free PSU £49
BDM INTERFACE - Low cost interface for upgrading the firmware on any Nokia 9200/9500/9600 such as the superb DR OVERFLOW DVB2000 £29

ACCESSORIES

DIGISAT PRO SAT METER	£67.95
SKY DIGI REMOTE	£19.99
SKY DIGI TV LINK/REMOTE MEGA BUY	£28.95
OPEN TV KEYPAD	£34.99
POWERMIDS	£39.99
GIGA VIDEO SENDER	£99.95 MEGA BUY
SAMSUNG 0.6 UNI LNB	£19.95 NEW
MTI 0.6 UNIVERSAL LNB MEGA BUY	£23.95
MTI 0.6 Twin UNI LNB	£47.95
MTI 0.6 Quad UNI LNB	£79.95
MTI 0.6 C120 UNI LNB	£29.95
MTI 0.6 C120 TWIN UNI LNB	£59.95
MTI 0.6 Monoblock LNB	£58.95
GENESIS 0.4 UNI LNB	£99.95
GENESIS 0.4 C120 UNI LNB	£109.95
GENESIS 0.4 TWIN UNI LNB	£149.95
GENESIS 0.4 C120 TWIN UNI LNB	£169.95
SYNTEC 2000 0.3 UNI LNB	£129.00
SYNTEC 2000 0.3 TWIN LNB	£169.00
SYNTEC 2000 0.3 QUAD LNB	£199.00
TWO WAY DISEQC	£19.95
FOUR WAY DISEQC	£22.95
SMART PRIORITY SWITCH	£15.99
TONE INSERTER	£16.99
80CM DISH - w/p mount	£49.99
80CM DISH with MT10 .6LNB	£69.99
1M Dish - w/p mount	£59.99
1M Dish with MT10 .6LNB	£79.99
ORIGINAL NOKIA REMOTES	£24.95
VIDEO COPY MATE	£69.95

TO ORDER CALL 07010 702 935

1a Sandhill Drive
Leeds LS17 8DU
Mon - Fri 10am - 6.30pm
SAT 11am - 3pm
Int. +44 (0) 7010 702 935 Fax: 07010 702 936
email sales@pulsat.com Web www.pulsat.com Technical 07010 702 937

VISA · AMERICAN EXPRESS · MASTERCARD · DELTA · VISA Electron — WE ONLY SELL OFFICIAL CARDS

TRADE AND OVERSEAS ENQUIRIES WELCOME. VISITORS BY APPOINTMENT ONLY.
ALL VIEWING CARDS SOLD ARE OFFICIAL SUBSCRIPTIONS, WHERE THE APPROPRIATE FEE HAS BEEN PAID TO THE BROADCASTER
WE DO NOT SELL ANY UNAUTHORISED CARDS OR ANY CARDS PROVIDING ACCESS TO BRITISH PREMIERSHIP FOOTBALL

Satellite kit and accessories

Module for inside a receiver allowing decryption of Conax channels – with appropriate card inserted. (Picture courtesy Digital Sales)

Aston Cam slots into a receiver and takes a card to enable viewing of around 500 encrypted channels. (Picture courtesy Digital Sales)

'universal' one by Grundig is available from TurboSat.

The new breed of satellite receivers incorporating hard-disk recorders require a dual-output LNB all to themselves. But they are usually fitted with quad types, having four independent outputs, all individually switchable polarity-wise: the two spare outputs are for system extensions.

Quad LNBs with 0.6dB noise figure are surprisingly cheap at about £80. You can even get a four-way version of the Syntec 0.3dB type for £200. It's stocked by Pulsat.

Receiving from multiple satellites

Multi-satellite reception is popular with enthusiasts and what my son calls 'sad people'. A great deal more money can be made from this than from a bog-standard Sky installation.

There are several ways of achieving this, depending on the distance apart of the birds required, and their signal strengths. The cheapest and simplest approach – and perhaps the most reliable – involves two LNBs on an arm which holds them a few degrees apart.

'Double' LNB assemblies, moulded side-by-side, are also available. Typically a 6° type will afford reception from Astra 1B etc. at 19·2°E and Hot Bird 1-5 at 13°E with a single dish, though optimum reception from both is not possible in this configuration.

Other solutions involve driving the LNB across the face of the dish (*Satwalker* etc.), and a large horizontally-elliptical dish with several LNBs in line on a bracket. Vision On and Satellite Shop are fond of gadgets like this.

The ultimate multi-satellite reception system is based on a motorised dish, programmed from the receiver and driving the dish from horizon to horizon (H-H) while always tracking the Clarke belt. Installation and alignment of these is particularly critical for full gain over the whole of their travel. Accuracy, 'repeatability' and reliable operation are essential if call-backs are to be avoided.

Drive motors, arms etc. are made by several companies, notably Cryptik, Gemini, Geotrack, Jaeger and Strong. Specially silent types are made by Hirschmann. These devices are best bought from a specialist supplier who is able to offer advice and back-up if required.

Component suppliers who are deep into this side of the business are TurboSat (stocks Hirschmann, Jaeger etc); MerseySat, and TPS, who deal in Cryptik equipment. Dealers SRI specialise in the economy end of what might be called the motorised market, with a universal DiSEqC drive motor at £55 and a complete motorised digital receiver system at £235.

Originally introduced by Eutelsat, the DiSEqC control system is now widely used in multi-satellite systems to drive and control the dish and to select and switch LNBs. It has compatibility with virtually all current receivers and motor drive systems, and is incorporated in the more sophisticated signal-strength meters.

Stand-alone positioners for motorised dishes – complete with remote-control zapper – are available for £65 from East-London based distributor Myers Satellite, who also offer the Aston DS100 adapter: This adaptor provides an interface to enable DiSEqC receivers to drive the older types of motorised dish.

Also in the Myers catalogue are four-slot multi-LNB holders and 'Silent Gold' H to H motors in the £70-£90 range. This company stocks a very wide range of gadgets, gizmos and accessories, some of them hard to find elsewhere.

Manual satellite trackers are available for £30 from Vision On, who also offer other positioners in the form of *Sat Searcher* at £80 and Nokia's 8152 type at £140.

Before I leave dish and LNB gadgets, it's known that they are vulnerable to poor reception in heavy rain. A solution to this is claimed by Digital Sales with their *rain correctional device*. This is a sort of umbrella that fits on top of the dish. I cannot recommend this without the opportunity to try it. My understanding is that rain in the atmosphere – not on the dish – attenuates SHF signals...

Lining up a dish

Once you've found the right dish/LNB assembly and fixed it to the wall or whatever, it has to be aligned with the satellite(s) of interest.

The smaller the dish the easier it is to line up. A signal strength/quality meter is needed to do the job properly in all cases though. The relatively wide acceptance angle of a 43cm dish, while making alignment less critical, has the drawback of rendering it more prone to receiving crosstalk signals from adjacent and closely spaced satellites.

Most installations are for digital reception. With digital systems, the sound and picture give no indication of impending break-up due to narrow signal-strength margin. Also, quality of reception, as indicated by the BER (bit error ratio) reading, is more important than sheer signal strength.

While the position of the most popular bird cluster, Astra 2A/B/D for BSkyB transmissions, is well known at 28·2°E, other satellites can be more difficult to find in terms of latitude and elevation.

There are also the questions of dish size/gain, LNB performance, receiver characteristics and so on. Several reference works and computer programs have been compiled to help with this.

A very useful databank of satellite footprints is available in the form of *Satmaps*, a PC- and Mac-compatible CD-ROM from SatNews Publishers: it contains over 600 footprints of broadcast satellites worldwide.

Signal-strength meters take many forms. The simplest and least expensive merely register the total strength of the signals coming from a single satellite. In this category come the £29 DLS in-line meter from Myers and the

www.Lektropacks.co.uk

The AV Solutions Company
100's of Fantastic Home Entertainment Products


Scart Control Centres


World Standards VCR


NTSC-PAL-SECAM Converters

Optical / Digital coax Converter


NXT Flat FM Radio


Video - Sender Systems


5 Star Cables & Connectors

Programmable Remote Control


PC / Video Interfaces

HARDWARE
Multi-region DVD Player
Video Disc Recorder
World Standard VCR
42-inch Plasma Screen TV

TV & VIDEO
Picture-in-Picture (remote)
Picture-in-Picture (manual)
TV Test Pattern Generator
Indoor Hi-gain TV Aerial
TV screen magnifiers
Hand-held magnifier
Digital Video Stabilizer
Video Copy Enhancer
Deluxe Colour Corrector
Real Time Video Mixer
RFModulator
RFSignal Boosters
Telly Tuner
VideoSenders from

VIDEO FORMAT CONVERTERS
RGBto S video Converter
Component Video to RGBS (Scart)
Transcoder
Video Signal Converter
Video Up-Scaler
DV to Analogue Converter

VIDEO & PC INTERFACES
Video-VGAConverter
Video-VGAConverter with built-in amp and speaker
PC-Video Converter
PC-Video Overlay
Video-USBAdaptar

REMOTE CONTROLS
Smart 10 way Remote
Smart Docking Station
SKY Digibox Repfacement
SKY Digi-eye
E-Pilot 8 way learning
Wizard 8 way
Powermid XL Remote Extender
Powermid Plus system

STANDARDS CONVERTERS
Multi-system VCR with built-in digital converter
Super Multi Converter
Pro-Master 2
Miniature Digital Converter
Economy Converter
Budget Converter
Analogue Converters

DISTRIBUTORS
Scart Distribution Amp
AV Distribution Amp &Selector
Kramer AV Distribution amp
10 way AV Distributor
10 way AV Switcher

AUDIO
IR Surround Headphones
FM Wireless Headphones
NXTSpeaker System
Speaker Controllers
2-way Speaker Source Control
Phono/Mic Pre-amplifier
High Grade Phono/Mic Pre-amp
Speaker Control Centre
TVHeadphone Pro Amp
In-wall Volume Controller

SCART CONTROLS
3 way Scart Video Controller
Satellite Decoder Controller
2-way Scart Video Controller
Quattro+ Scart Controller
Scart Data Switches
Pro Digital Intersert

RCA CONTROLS
Professional AV Centre
3-way Stereo Input Control
3-way AV Input Control
2-way Stereo Mixer
4-way Pro Audio Control
2-way Input Extender
4-way Input Extender

DIGITAL & OPTICAL CONTROLS
Optical 3 x Input Selector
Optical 4 x Input Selector
Coaxial/Optical Converter
Coax to Optical Converter
Optical to Coax Converter
Optical Signal Amplifier
Analogue to Digital Converter

SECURITY
Colour Quad Processor
Two-Page Real Time Colour Quad Processors from
Wireless Colour Surveillance System

HANDY BITS 'N' BOBS
Internet Alert with I.D.
Step-down transformer
Multi Mains Adaptor
S-VHSData Switches
DVD Laser Cleaner
10-gang Pro Mains Block
6-gang Pro Mains Block

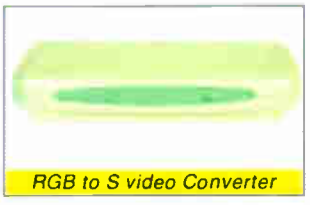
For your FREE copy of the new Lektropacks 56 page ACCESSORY & CABLE GUIDE

Tel. 08700 711911 • email - info@lektropacks

Lektropacks, Unit 6 • Metro Industrial Centre
St. Johns Road • Isleworth
Middlesex • TW7 6NJ

Mail us your Business Card for Trade/Qty Prices

On-line shopping • www.lektropacks.co.uk


RGB to S video Converter


Precision RF Modulator


Real time Video Mixer


Multi-region DVD player


Surround Sound IR Headset


Video Format Converters


LCD TFT Monitor


Fibre Optic Switches


Video Copy Enhancers

Satellite kit and accessories

This digital satellite meter – namely Digimeter – is designed to simplify dish installation. (Picture courtesy Digital Sales)

Diseq – enables an existing system to be motorised for a range of 45°E to 45°W. (Picture courtesy Digital Sales)

£39 VideoLAB Satellite Finder Kit PG-753 at £39 from D&C. The VideoLAB meter includes a compass, battery pack and patch lead!

In the £70 range is the MS250 instrument by Promax; the Digisat Pro from Transworld; and DiSEqC-equipped type DSM10, stocked by Meteor Satellites.

Professional dish riggers need something more sophisticated than these. Swires' Digi-Sat 2001 – reviewed in last January's issue of *Television* – is a good example of a moderately priced instrument with BER and SNR readout capability. Also able to read BER is the Horizon DSM device, priced at a modest £199.

Lacuna Systems have a new and very simple indicator, capable of displaying signal strength and BER simultaneously; it's powered by an internal NiMh battery, comes with a leather case, and is particularly light at less than 1kg.

Moving up the price range, an advanced meter has become available from Satlook via Mardale Technology. On a 4.5in black-and-white screen, it displays off-air pictures and an SHF spectrum. This spectrum is 'zoomable' in 10MHz steps down to 250MHz width.

The same screen indicates the signal strength in dBμV, while a completely separate 64-by-128-pixel backlit LCD simultaneously offers an eight-feature menu-led range of test facilities. These include digital C/N ratio, BER and – for the first time in any such instrument that I've seen – a QSPK *constellation sheet*. This deserves further explanation!

On the main screen you get a cluster of dots, looking a bit like a firework display. These dots show the 'hit-points' and thus the phase-spread of the digital data, plotted on an I–Q map. The tighter the bunch the better the signal quality.

There are many more features and benefits than I have room to describe here, but this is no cheapo! More details from the UK distributor Mardale: see the separate contacts list.

These SHF spectrum analysers are ideal for investigation of co-channel and other interference problems, and for use with MATV (multi-output distribution) systems.

Other manufacturers produce spectrum-display instruments, among them the well-established Spanish firm of Promax. This company also makes the simple-to-use Prodig-2 terrestrial level meter. Perifelec's MC3 model is well proven, and capable of dealing with signals coming via satellite, cable and terrestrial media. Unaohm, from Italy, is available in the UK via the Solutions Group and Vann Draper. Both of these companies offer other types of satellite signal checkers and other test equipment.

MATV – putting it about

MATV is a specialised and – hopefully – rewarding field involving the distribution of signals to groups of dwellings. Satellite MATV is more complex than for terrestrial signals, in that each outlet must have full versatility in terms of band- and polarity selection, while the signal levels need to be closely controlled.

At the head-end, the whole network can be fed by a single high-quality dish and multi-output LNB. Each signal group is separately developed, amplified and made available in SHF amplifiers. Output from these amplifiers are selected by commands from each viewer's receiver in terms of 'LNB' voltage and 22kHz signalling tones.

Equipment for satellite MATV is made by WISI, Televes and Alcad, whose UK sales/service agents' contact numbers are listed below. Typically this equipment comes in 'system-expandable' modular form which can be built up to accommodate SMATV (small) and virtually any size of MATV network.

The supplier can custom-design systems for trade clients, provide all the necessary hardware. Suppliers can also – fingers crossed – advise on any bugs or problems that may arise when it's commissioned, provided it has been installed properly. This is not a job for Wild West Aerials or Stick-em-up, immortalised in past *Test Case* features in this magazine…

Receivers, plain and fancy

So we've got the digital signal, virtually intact we hope, down to the F-connector in the living room. BSkyB plays a large role in the design, manufacture and distribution of satellite digiboxes.

This company's terms for supply, installation and commissioning are well known and advertised, conditional on a phone-line hook-up for the first year, and tailored price-wise to the subscription package chosen by the punter. Dealers are allowed to play a part in this, but they're unlikely to grow fat on the proceeds!

Many independent operators are able to make reasonable profits in the field of dish installation for customers who don't want to have their red-brick houses bisected by white coax cable. Discretely-hidden dishes, glass dishes and painted dishes are all available.

And if you don't want BSkyB...

For those who don't want to have anything to do with BSkyB; want their telephone lines untrammelled; and are ready to phone 08702 438000 for a free-to-air viewing card, 'no-strings-attached' digiboxes can be bought at £200 to £300 from many of the 'general' suppliers listed here.

Aerial Techniques offers a complete package of digibox, dish, LNB cables, plugs, viewing card and all; based on a Grundig receiver. This outfit costs £399 including VAT. Second-hand digiboxes are much prized, and are now becoming available from trade distributors, typically at about £150. SRI offers them from just £99.

TV beyond Sky

As we've seen, the world of satellite TV does not begin or end with Sky and its associated programme-providers.

Satellite kit and accessories

Hisat's 45cm 'Digidish'. (Picture courtesy Hisat)

Vegas terrestrial TV receiver for OnDigital and ITV. (Picture courtesy Digital Sales)

Sky boxes are not best suited for reception from other satellites, but there's a whole raft of what might be called 'freelance' makes and models of digital receivers, and many distributors handle them. They are versatile, typically having 'embedded' decoders for the most popular encoding systems like Viacess, Irdeto, Cryptoworks etc, and/or CAM (Conditional Access Module) slots.

With these, and for some transmissions a subscribed smart card, a whole world of viewing comes alive. It does so courtesy of satellites like Hot Bird, Eutelsat and many more.

Allied with one of the large dishes or multi-satellite systems described above, or simply a suitably-aimed conventional antenna, these satellites make the choice of programmes very wide indeed.

Receiver-boxes with DiSEqC dish-positioning facility, auto-downloading of software from satellite SPs, 2000 channel capacity, dual smart-card readers and twin PCMCIA (common interface) are available for little over £200. The Samsung DSR9000 is a good example from a well-known manufacturer, at £229 via distributors TriStar Corporation.

One of the best known makers of digital receivers is Humax. The company's cheapest box, namely the F1–Fox, comes out at a mere £159 And it's complete with a free 0.6dB LNB from Turbosat at the time of writing. Humax models range up to £330 in the form of type NACI-5700, a twin common interface model with embedded NacraVision decoder.

Other major players in this field are Aston, Nokia, Manhattan, Palcom. A maker of top of the range kit is Dutch manufacturer Echostar, whose DVR7000HD receiver/HD recorder is an amazing device indeed. The Echostar range is stocked by Wizard Satellite.

There are even dual standard digital/analogue receivers to be had to satisfy the DX-TV leanings of the Roger Bunneys of this world: Strong is very strong on these, while the Topfield 'motorised' model TF3000CIP combines analogue and digital reception facilities in a box costing less than £300: it comes via Cosmos Satellite Systems.

Digital FTA receivers are of special interest to ethnic groups, ex-patriots and overseas-based companies. There are many suppliers and service-providers specialising in 'foreign' reception, offering complete hardware packages tailored for specific ethnic groups.

These companies know that French programming comes from the Telecom satellite group, Turkish TV from TurkSat/EurasiaSat, and all things Arabic from ArabSat at 26°E. Amongst the UK specialists in this field are Astrix, Just Satellite and NTV Satellite.

Blue viewing

Whatever your personal view of pornography, it has to be acknowledged that it's not illegal to receive and watch adult programmes. Many people require something raunchier than what's offered on the late-night channels in the UK, constricted as these are by the regulations of the ITC watchdog body.

The main source of these programmes – *Satisfaction, Ultra Blue, Absat, Sexview TV* etc. – is the Hot Bird satellite group at 13°E. A typical set-up includes a digital 'free-to-air' receiver with either a CAM or embedded decoder for Irdeto, Seca or Viaccess encryption. You'll need subscription card costs typically £140 for a year's viewing and a 70cm dish pointed at – or at least capable of receiving from – the 13°E spot.

Many companies cater specially for this niche market, with complete packages: Dee-Sat offers a receiver and card for £329 complete, as does SMS. A similar outfit for £299, based on the inexpensive Humax F1-Fox receiver mentioned above, is supplied by Vision On.

Of late there has been some 'churn' of these porn-providers, with some disappearing and others taking their place: the payment for and possession of a legitimate viewing card may not necessarily guarantee a year's viewing, and I doubt that getting a refund is as easy as it is on the unexpired portion of your regular TV licence!

Lounge lizards and remote possibilities

Satellite TV viewers are characterised by a plethora of remote-control zappers. At the very minimum there are usually three – for TV, VCR and satellite box. When a DVD and audio system are present it goes up to five.

Some of my customers, into home-cinema and multi-satellite reception, have six or more lined up on the chair-arm or coffee table, bristling with over 200 buttons between them. Hence the large market in 'universal' control units in which one zapper can be programmed to take the place of several.

The most modest ones, looking like a well-equipped conventional type, are relatively inexpensive: the One For All four-device can control up to three different devices, typically a TV, VCR and digibox, and costs just £14-39 from CPC.

From the same maker and distributor comes a £27 six-device upgradeable zapper – stock no. HS00406. This unit can download new software via an ordinary phone line if

WWW.HISAT.COM

Satellite TV Trade & Wholesale

MTI LNB's from £8.75

CAMs from £50

UK Satellite TV Receiver agents for

GBSAT ASTON HYUNDAI SONY
DIGIQUEST GRUNDIG STRONG
PACE NOKIA PHILIPS HUMAX
STAB Italia, Marmitek, Geotrack, Cambridge, MTI,

Easy install digital motorised systems from about £220 complete

Satellite finding meters from 7 GBP

Dishes / Mounts / DiSEqC Interface & Much More

Tel:- 0117 9721814 Fax:- 0117 9857349 email TV2@hisat.com
Butterfly House, 161 Bloomfield Road, Brislington, BRISTOL, UK

DELUXE MULTI-PROGRAMMER

FUNCARD IRDETO SECA VIACCESS

Program ATMEL, Funcard, Goldcard, PIC, Memory, PCS-1/2/3, Wafer

- Programs ALL card – NO chip removal
- Powerful Easy-to-use windows software
- Accepts any file format from the Internet
- Convert between the different file formats
- Code + Key Editors for Funcard, Seca, Irdeto, Viaccess
- Supplied with CD, battery connector, 12 months guarantee

The most powerful programmer available £69.95 + postage

INDUSTRY LEADERS SINCE 1992

Satellite Systems Redcar
66 The Esplanade, Redcar
Cleveland TS10 3AH
Phone 01642 477043/07778787127
www.satsystems@yahoo.com

Technosat.com
www.technosat.com

MasterCard VISA

ZeroDefects

Entertainment & Communication Equipment Specialists

Sky Digibox repairs - Analogue & Digital
High Speed Internet Via Satellite
Fixed & Motorised dish systems

Also TV/Video, DVD, HiFi, CCTV, PMR446 & Computers

Quick Turnaround

Sales, Installation & Repair
Call: 01392 201692

Friendly Service

Email: Enquiries@zerodefects.eu.com
Unit 50, Exeter Business Centre, 39 Marsh Green Road,
Marsh Barton, Exeter, Devon EX2 8PN
Www.Zerodefects.eu.com

Keene Electronics mail order

Remote Controls

One For All MOSAIC

Control up to 15 devices (with 72 keys per device), up to 21 macros each of up to 32 keystrokes. Massive built-in device code library plus full learn capability. Customisable via PC connection or by just tapping the screen (includes PDA style slide out stylus). Update system codes by downloading a file to your PC and playing it back to the Mosaic as an audio file! 'Editors Choice' and overall winner *Home Entertainment* remote group test March 2001 at £249.99, Keene price **£239.00** Mosaic docking station c/w NiMH rechargeable battery pack [MDS] £49.99. Mosiac remote plus docking station bundle [MKIT] £275.00

Marantz RC5000i

Latest version of this wonderful remote, with 2MB memory and enhanced display options. Features large, touch sensitive high resolution LCD screen with auto backlighting. Fully customisable with built in virtual key-board, up to 255 step macros. Number of devices and macros limited only by memory. PC link option (buy from Keene and get FREE PC Edit software), complete with 'docking station' for easy battery charging. Order [MRC5000i] **£215.00**

Philips Pronto 2. Now with 2MB memory and other new features. Similar spec to Marantz 5000i, complete with PC Edit software.
Order [PRONTO] **£219.99** Pronto 2 'docking station' for battery charging order [PC] £49.99
Pronto 2 remote plus docking station deal order [PDEAL] **£265.00**

New Philips PRONTO PRO

Designed with the aim of being the 'ultimate' Home Entertainment remote, this truly is an amazing bit of kit. Features include
• Fully customisable colour touchscreen display with near photo quality graphics.
• Massive pre-configured IR code database, plus learning ability • 8MB memory • IR and RF transmitter modes • Tilt sensor – just pick it up and it lights up! • 9 configurable hard keys. Complete with docking station, PC serial link and editing software. Treat yourself. Order [PPRO] **£675.00**

E-Pilot

The E-Pilot looks like its 'Angel' predecessor, but has been completely updated. The massive (110 x 60mm) touch sensitive LCD control screen, (auto backlit when dark), re-draws itself according to the device selected. 8 device control (TV, DVD, VCR, SAT, AMP, TAPE, TUNER, AUX, with 28 buttons per device. Supports macro commands (up to 25 steps). A "learning" remote - you need your originals to teach it with. Order [EPILOT] **£69.99**

Find many more great AV products in our catalogue – **new 2002 issue out now**. Phone, fax, write or email to get your free copy.

DVD Recorder

At last, recordable DVD is here with the fantastic Philips DVDR1000. Record almost any AV source on to DVD. Also plays DVDs etc. [DVDR1000] **£995.00**

LEADS AND CABLES

STERLING CABLES Gold

AV leads for the professional and high end domestic user

- **Optical leads**
  Toslink & MiniDisc connectors
- **DV (Firewire, i-Link) cables**
- **Keene 'Leads to Go'**
  High specification custom cables made to order in any length.

100s of leads in our free catalogue and at www.keene.co.uk

Scart distribution amp

One input to five outputs, fully buffered using broadcast grade video amplification ICs. Pin 8 is routed through (input goes high, all outputs go high) and every pin connection is carried through for composite, S-video and RGB compatibility. Robust metal case. Ideal for displaying one signal on multiple TVs or making up to five simultaneous copies from one source. Mains adaptor included.
Order code [SDA] **£89.99**

Standard delivery £2.00 per order. Fast add £2.00, next working day add £6.00 (UK mainland only)

Now your IR remote can 'see' round corners and into cabinets!

The Keene IR Distribution amplifier receives IR signals from your remote or the receiver of a wireless system (Powermid, Wavecom) and routes them to where they're needed, even round corners or into cabinets. There, your choice of low power, high power and side firing emitter 'wands' transmit the commands to the equipment. Supports up to 5 wands. Basic kit comprises IR distribution amp, one each low and high power wands, mains power adaptor, code [IRBKIT] **£34.99**
Requires receiver: Standard [IRSR] £7.99 Wideband [IRWBR] £12.99

Browse & buy online at www.keene.co.uk

SCART CONTROL CENTRE

Just press a button to change the input! This switchbox really will solve all your scart headaches. Connect up to five devices and control all the signal routing from your armchair. Here's what it can do in detail: • RBG signal routing from SAT, VCR and AUX1 • S-Video/Composite video/Stereo audio from ALL inputs • Intelligent signal switching (pin8 control) • Remote control operation • Make two different recordings at the same time • Make up to four simultaneous recordings • LOCK function for uninterrupted recording. All housed in a smart black case (325mm x 230mm x 60mm). 220/240v mains operated. A treat, stop scrabbling around with cables and just enjoy the viewing.
Order [BT941] **£79.99**

RGB to S-Video convertor

RGB is a great for sending video, with picture resolution as good as S- and much better than composite video. Trouble is, not everything can accept an RGB signal. Problem solved! This box converts the RGB scart output of Sky Digital/ITV Digital boxes, and DVD players, into S-video. Ideal for making high resolution connections to AV amps, S-VHS/D-VHS recorders and plasma screens. Order code [RGB2S] **£59.99**

Order by phone any time. Speak to real people 24 hours a day, 365 days a year
Technical & customer service calls
9.00 – 5.30 Mon – Sat only

Tel 0870 990 9000
Fax 01332 830551

KEENE ELECTRONICS

WAREHOUSE AND SHOWROOM VISITORS WELCOME 9.00–5.30 MON–SAT

UNIT 9 OLD HALL MILLS BUSINESS PARK LITTLE EATON DERBYSHIRE DE21 5DN UK

Satellite kit and accessories

required. The new URC model has bar-code reading from a supplied booklet, reminiscent of the Panasonic technology. This version has a built-in sleep timer: costing just £15, its code number is HS00341.

At the top of the One For All range is the very posh – and rather expensive – *Mosaic* device. It has a touch-screen LCD display, and it can drive up to 15 different pieces of equipment. This equipment ranges from basic TV sets to DVD players and satellite receivers, each having up to 72 key functions. Like the One For All 6, it has a built-in modem for updating via a phone line. This award-winning multi-zapper costs about £200+VAT.

Up in the same price bracket is the Marantz RC5000i and the Philips Pronto 2, both with 2Mbyte memory and touch-screen control.

The ultimate remote control zapper, at least as far as I know, is Philips' *Pronto Pro*. It has a fully customised colour touch-screen display panel with near-photo-quality graphics, 8Mbyte memory, IR/RF transmitter modes, docking station and PC serial link/editing software. Wow!

At £675 including VAT though, it costs more than many large-screen TV sets. These Marantz and Philips zappers are stocked by Keene Electronics, which also offers the more modest, but still very comprehensive £70 *E-pilot* hand-set. Successor to the '*Angel*' type, the *E-pilot* has an auto-backlit LCD touch screen and the capability of learning commands from original IR controllers. It can control up to eight home-entertainment devices.

Vegas programmer for programming smart cards. (Picture courtesy Digital Sales)

More exotic remote control

Control from within the living-room is made easy by multi-zappers, but many viewers want to go beyond that: to other rooms where there's a TV, wired via an RF distribution cable network to the players and receivers in the lounge.

For the digibox, a cheap and effective control extender is the Global Remote Eye – a £20 device that uses the RF cable link to relay remote control commands back to the Sky receiver. The receiver has a built-in command path for this purpose.

Though inexpensive, this solution is not versatile enough for some customers, who need to control a VCR, DVD player or whatever, as well as the digibox, from the bedroom, dining room or kitchen. The solution here is provided by RF-transmitting devices like the *Powermid*, priced at about £40.

With an IR receiving device at the remote location and a receiver/IR emitter in the lounge, these facilitate house-wide control of anything via its own zapper. They come from Pulsat, Wizard Satellite and others. Nor does the picture and sound have to come via cable any more!

The original 'Videosenders' were on the wrong side of the law, but now there are legitimate frequencies around 2.4GHz assigned to this purpose. Several manufacturers offer equipment working within these communication slots.

An increasing choice of devices that can send commands in one direction and sharp pictures with stereo sound in the other – all without cables – is becoming available. New on the market are the *Freeline IR* from Hypex Electronics Ltd and the *Digisender* DG200 distributed by AEI. Mini-VS (£60), VS Plus (£80), and Giga 30 (£99) are stocked by Lektropacks.

Maybe the remote controls' infra red beams cannot see well into the cabinet that houses all those silver boxes? If so, an IR distribution amplifier may be the answer. Such an amplifier is available from Keene Electronics. It costs £35 – code IRBKIT – and there are optional receivers to complement it.

As the number of entertainment boxes in the home increases, it can be difficult to hook them all together in a way that permits full versatility in use. It's true, for instance, that most RGB-equipped TV sets offer the facility on only one of their two or three Scart sockets. This is a problem when both a digital box and a DVD player are in use and the best possible picture quality is required from both.

Scart switching

You can use a simple switch-box or swap plugs as required, but a better approach – one that doesn't require the couch-potato to get up – is an 'intelligent' Scart switching/control centre. This permits multiple simultaneous recording, easy signal routing with RGB, S- and composite video, and passes on stereo sound.

Such a switch costs £80 from Keene Electronics. This, the *Quattro+*, is available at the same price from Lektropacks. This company's catalogue is rich in other gizmos and gadgets in little black, cream and silver boxes: 'Copymates', to clean crud from sync pulses and thus achieve stable tape recording; RF modulators to get, for instance, a DVD player's output onto a UHF distribution cable (Keene do these, too); PIP converters, enabling you to view two pictures on one screen; standards converters which will convert between NTSC, Secam and PAL; and hook-up cables galore.

There's also a gadget that translates optical signals to co-ax-borne ones for the digital sound now being broadcast by Sky and others.

The cheap-and-cheerful cables stocked in

USALS – an aid to setting up a dish

Universal Satellite Automatic Location System, or USALS, mathematically calculates where a satellite is located. As part of the installation process, the client or engineer enters the longitude and latitude of the dish site. This information, together with the pre-installed data that tells the mount where each satellite is in the sky, means that after these values are entered the mount can move to where any satellite is positioned.

Why is this such a big benefit? It's quicker and easier to locate all satellites and new satellites can be found without guesswork.

For more on USALS, visit: www.hisat.com

Satellite kit and accessories

the shops – and sometimes supplied with AV equipment – are far from ideal for high-performance equipment: they have unscreened signal conductors and often common earth paths. This leads to crosstalk, interference pick-up and other problems.

Better – but of course more expensive – cables are stocked by Keene, Lektropacks, Customcable, Ixos and QED. They are essential for 'clean' sound and vision, and not necessarily costly in terms of the total value of the equipment they hook together.

... and computer nerds...

Increasingly, the home PC is being used with satellite links. Freely available now are satellite tuner cards to fit into a computer's PCI slot.

The best-known maker of tuner cards – to me, anyway – is Hauppauge. Currently, the company makes two types. One retails at £233 and incorporates hardware MPEG2 decoder and CI compatibility. The other is £129 and has a software MPEG heart. Both models are are stocked by distributor Computer 2000.

Satellites also handle internet data for home users. They provide very fast data transfer rates – far ahead of anything which can be got down a copper wire! Turbo-internet it's called. Complete receivers – based on Humax type IRCI-5400Z – with 3.2 patch are available from TracSat. The ISP subscription is £17 per month.

Satellite internet

Other satellite-internet hardware comes in the form of tuner/decoder cards from Pulsat, which also render pictures and sound, of course: The *Penta* range includes USB and PCI devices at prices from £140 to £240; Pulsat can also arrange internet accounts from £10 per month.

Quite apart from the communication and receiving capabilities outlined above, a home computer, be it an IBM-compatible or MAC type, has the capacity to program receiving cards, given the necessary software and interfaces. This micro-world has its own jargon and buzz words: Multipic Busters, Stealth Copiers, Gold Wafers, Funcards – wow!

This specialist business is conducted by Satellite City, Pulsat, Wafercards, Vx Tools, Activ8, Technosat and Smart Cards 'R' Us; the latter also do a stand-alone programmer/copier, called *Goldmate*, which does not require the use of a PC. It's priced at £60, is claimed to be as fast in operation as computer-based equivalents, and comes complete with a mains power supply and operating instructions.

Thus...

As we've seen, then, there's a whole world of satellite accessories out there, and a lot of people who want them – and want help with them. You hold the turnkeys... ■

Contacts

Activ8	0208 325 1199
AEI	01424 813222
Aerial Techniques	01202 423555
Alban Electronics	01727 832266
Alcad	01727 832266
Astrix	0208 8839 9955
Bradley Wood*	
Computer 2000	01256 463344
Cosmos Satellite Systems	0035 3419 841002
CPC plc	08701 202530
Customcable	0208 942 9124
D&C	01663 766668
Dee-Sat	01597 811082
Digital Sales	01257 471204
Echostar	0208 208 4444
Global	0800 731 3792
Hauppauge	0207 378 1997
Hisat	0117 972 1814
Horizon	01400 282254
Hypex Electroniques Ltd	0208 908 3110
Ixos	0121 745 1115
J W Hardy	0121 784 8478
Just Satellite	01903 502559
Keene Electronics	0870 990 9000
Lacuna Systems	01983 822702
Lektropacks	0870 711911
Manhattan	0208 452 6699
Mardale Technology Ltd	01392 445454
MerseySat	0151 521 8000
Meteor Satellites	01179 414192
Myers Satellite	0208 520 7277
New Channels	0870 777 9903
NTV Satellite	0207 5805288
One For All	08701 202530 (CPC)
Perifelec	01903 723726
Promax	01727 832266
Pulsat	07010 702935
QED	01483 747474
Satellite City	0208 531 0111
SatCure	www.satcure-focus.com
Signalmaster	01935 413999
Smart Cards 'R' Us (EVS)	01992 524001
SMS	01276 20916
Solutions Group	01604 788221
SRI (now New Channels)	0870 777 9903
Swires Research	01268 417584
Technosat	01642 477043
Televes	01633 875821
The Satellite Shop	01903 730615
TPS	0161 344 0123
TracSat	01642 468145/452555
Transworld Satellite	01947 820999
Tristar Corporation	01795 429666
TurboSat	0870 758 8885
Unaohm	01283 704706
Vann Draper	01283 704706
Vision On	0800 731 3792
Vx Tools	01206 827673
Wafercards (Satstore)	01386 48731
WISI	0161 746 8037
Wizard Satellite	01455 444404
Zero Defects	01392 255006

*Bradley Wood is not The Satellite Shop

SPECIAL OFFERS

TEKTRONIX 2445A 4 Ch 150MHz Delay, Cursors etc Supplied with 2 Tektronix probes **ONLY £425**

TEKTRONIX 2232 Digital Storage Scope. Dual Trace 100 MHz,100m/s with probes £525
H.P. 54501A Digitizing Oscilloscope100MHz, 4Ch £425
H.P. 3312A Function Gen 0.1Hz-13MHz AM/FM Sweep/Trl/Gate/Burst etc £300
FARNELL Dual PSU XA35-2T 0-35V 0-2A Twice QMD LCD Display £180
CIRRUS CRL254 Sound Level Meter with Calibrator, 80-120dB, LEQ £150
EDDYSTONE 1002 Receiver 150kHz-30MHz + Broadcast FM £125
FARNELL AMM255 Automatic Mod Meter 1.5MHz-2GHz Unused £300
FARNELL OSG1 Low Frequency Syn Sig Gen 0.001Hz to 99.99kHz, Low Distortion TTL/Square Pulse Outputs etc £95
FLUKE 8060A Handheld True RMS OMM $4^1/_2$ digit ..... As new £150 Used £95
BECKMAN HD110 Handheld $3^1/_2$ digit DMM 28 ranges with battery, leads and carrying case £40

H.P. 3310A Function Gen 0.005Hz-5MHz Sine/Sq/Trl/Ramp/Pulse £125
FARNELL FLM4 Sine/Sq Oscillator 10Hz-1MHz low distortion TTL Output. Amplitude Meter £125
H.P 545A Logic Probe with 546A Logic Pulser and 547A Current Tracer £90
FLUKE 77 Multimeter $3^1/_2$ digit Handheld £60
FLUKE 77 SERIES II £70
HEME 1000 LCD Clamp Meter 0-1000A In Carrying Case £60

Racal 9008 *ONLY* Automatic Modulation Meter AM/FM 1.5MHz - 2GHz **£95**

Datron 1061 High Quality 5.5 Digit Bench Multimeter True RMS/4 wire Res/Current Converter/IEEE **£150**

Datron 1061A High Quality $6^1/_2$ digit Bench Multimeter True RMS/4 wire/Current Converter **£225**

Racal Receiver RA1772 50KHz - 30MHz LED Display. Basically Working **£250**

MARCONI 2019A

AM/FM synthesised signal generator 80kHz - 1040MHz *NOW ONLY* **£400**

MARCONI 893C AF Power Meter, Sinad Measurement. Unused £100 Used £60
MARCONI 893B - No Sinad £30
MARCONI 2610 True RMS Voltmeter Autorangin 5Hz-25MHz £195
GOULD J3B Sine/Sq Osc 10Hz-100kHz. Low distortion ..... £75-£125
AVO 8 Mk6 in Ever Ready Case, with leads etc £80
Others Avos ..... from £50
GOOWILL GVT427 Dual Ch AC Millivoltmeter 10mV in 12 Ranges Freq 10Hz-1MHz ..... £100-£125
SOLARTRON 7150 OMM $6^1/_2$ digit True RMS - IEEE ..... £95-£150
SOLARTRON 7150 PLUS £200

HIGH QUALITY RACAL COUNTERS

9904 Universal Timer Counter, 50MHz £50
9916 Counter, 10Hz-520MHz £75
9916 Counter, 10Hz-560MHz, 9-digit £50
WAYNE KERR B424 Component Bridge £125
RACAL/AIM 9343M, LCR Databridge, Digital Automeasurements of R C L Q D. £200
HUNTRON TRACKER Model 1000 ..... £125
MARCONI TF2015 AM/FM sig gen, 10-520MHz £175
FLUKE 8050A 4.5 Digit, 2A True RMS £75
FLUKE 8012A 3.5 Digit, 2A £40

SOLARTRON 7045 Bench Multimeter 4.5 Digit Bright LED with Leads *ONLY* **£30**

Portable Appliance Tester Megger Pat 2 *ONLY* **£180**

H.P 6012B DC PSU 0-60V, 0-50A 1000W £1000
FARNELL AP60/50 1KW Autoranging £1000
FARNELL H60-/50 0-60V 0-50A £750
FARNELL H60/25 0-60V, 0-25A £400
Power Supply HPS3010 0-30V; 0-10A £140
FARNELL L30-2 0-30V; 0-2A £80
FARNELL L30-1 0-30V; 0-1A £60
Many other Power Supplies available.
Isolating Transformer 240V In/Out 500VA £40

GOULD OS 300 OSCILLOSCOPE

DUAL TRACE 20MHz TESTED WITH MANUAL **£95**

OSCILLOSCOPES

TEKTRONIX TDS350 Dual Trace 200MHz 1G/S unused £1500
TEKTRONIX TDS320 Dual Trace 100MHz 500M/S £1200
TEKTRONIX TDS310 Dual Trace 50MHz 200M/S £950
LECROY 9400A Dual Trace 175MHz SG/S £1500
HITACHI VC6523 Dual Trace 20MHz 20M/S etc unused £600
PHILIPS PM3092 2+2Ch 200MHz Delay ..... £800 As New £950
PHILIPS PM3082 2+2Ch 100MHz Delay etc ..... £700 As New £800
TEKTRONIX TAS465 Dual Trace 100MHz Delay etc £750
TEKTRONIX 2465B 4Ch 400MHz Delay Cursors etc£1500
TEKTRONIX 2465 4Ch 300MHz Delay Cursors etc .. £900
TEKTRONIX 468 Dig Storage Dual Trace 100MHz Delay £450
TEKTRONIX 466 Analogue Storage Dual Trace 100MHz £250
TEKTRONIX 485 Dual Trace 350MHz Delay Sweep £550
TEKTRONIX 475 Dual Trace 200MHz Delay Sweep £400
TEKTRONIX 465B Dual Trace 100MHz Delay Sweep £325
PHILIPS PM3217 Dual Trace 50MHz Delay .. £200 - £250
GOULD OS1100 Dual Trace 30MHz Delay £150
HAMEG HM303 Dual Trace 30MHz Component Tester £275
HAMEG HN203 7 Dual Trace 20MHz Component Tester £200
FARNELL DTV20 Dual Trace 20MHz Component Tester £125

MANY OTHER OSCILLOSCOPES AVAILABLE

MARCONI [illegible]ed AM/FM Sig Gen £525 - £750
10KHz - 1.01GHz LCD Display etc
H.P. 8657A Syn 100KHz - 1040MHz Sig Gen £2000
H.P. 8656B Syn 100KHz - 890MHz Sig Gen £1350
H.P. 8656A Syn 100KHz - 990 MHz Sig Gen £995
R&S APN62 Syn 1Hz - 260KHz Sig Gen £425
Balanced/Unbalanced Output LCD Display
PHILIPS PM5328 Sig Gen 100KHz - 180MHz with 200MHz £550
Freq Counter IEEE
RACAL 9081 Syn AM/FM Sig Gen 5KHz - 1024MHz £250
H.P. 3325A Syn Function Gen 21MHz £600
MARCONI 6500 Amplitude Analyser £1500
H.P. 4192A Impedence Analyser £5000
H.P. 4275A LCR Meter 10KHz - 10MHz £2750
H.P. 8903A Distortion Analyser £1000
WAYNE KERR Inductance Analyser 3245 ..... £2000
H.P. 8112A Pulse Generator 50MHz £1250
MARCONI 2440 Freq Counter 20GHz £1000
H.P. 5350B Freq Counter 20GHz £2000
H.P. 5342A 10Hz - 18GHz Freq Counter £800
H.P. 1650B Logic Analyser 80 Channel £1000
MARCONI 2305 Mod Meter 500KHz - 2Ghz £750

RADIO COMMUNICATONS TEST SETS

MARCONI 2955/2955A ..... from £1500
Rohde & Schwarz CMT 0 1 - 1000MHz £2000
Schlumberger 4040 ..... £900

JUST IN

H.P 6063B DC Electronic Load 3-240V/0-10A 250W ..... P.O.A
H.P. 66312A PSU 0 - 20V/0-2A £400
H.P. 66311B PSU 0 - 15V/0-3A £400
H.P. 66309D PSU Dual 0 - 15V 0-3A/0-12V 0-1.5A ..£750
H.P 6632B PSU 0 - 20V/0-5A £500
H.P 6623A PSU Triple Output ranging from 0-7V 0-5A to 0-20V 0-4A £850
H.P./Agilent 34401A DMM $6^1/_2$ digit ..... £400/£450
H.P 3478A DMM $5^1/_2$ digit £275
FLUKE 45 DMM Dual Display £400
KEITHLEY 2010 DMM $7^1/_2$ digit £950
KEITHLEY 617 Programmable Electrometer £1250
H.P 4338B Millionmmeter £1500
RACAL Counter type 1999 2.6 GHz £500
H.P Counter type 53131A 3GHz £850
H.P. Agilent 33120A Function Gen/ARB ..... £900/£1000
100microHz - 15MHz
SONY/TEKTRONIX AFG320 Arbitary Function Gen ..£1250
H.P. 8904A Syn Function Gen DC - 600KHz£1000/£1250
BLACK STAR JUPITOR 2010 Function Gen 0.2Hz - 2MHz with Frequency Counter £140
H.P. 8116A Pulse Generator 1mH-50MHz £1950
H.P. 8657B Syn Signal Gen 0.1-2080MHz £2500
CO-AXIAL SWITCH 1.5GHz £40
IEEE CABLES £10

SPECTRUM ANALYSERS

H.P. 8561B 50Hz - 6.5GHz £6500
H.P. 8560A 50Hz - 2.9GHz Synthesised £5000
H.P 8594E 9KHz - 2.9GHz ..... £4500/£5000
H.P. 8591E 1MHz - 1.8GHz 75 ohm £3500
H.P 853A with 8559A 100KHz - 21GHz £2250
H.P 8558B with Main Frame 100KHz - 1500MHz .. £1250
H.P. 3585a 20Hz - 40MHz £3000
H.P. 3580A 5Hz - 50KHz £800
AOVANTEST R4131B 10KHz - 3.5GHz £3500
EATON/Alitech 757 0.001 - 22GHz £1500
MARCONI 2382 100Hz - 400MHz High Res £2000
MARCONI 2370 30Hz - 110MHz ..... from £500
H.P. 182 with 8557 10KHz - 350MHz £500
H.P 141T Systems
8553 1KHz - 110MHz ..... from £500
8554 500KHz - 1250MHz ..... from £750
8555 10MHz - 18GHz ..... from £1000
TEKTRONIX 491 10MHz - 12.4 GHz £500
H.P. 8443 Tracking Gen/Counter 110MHz £250
H.P 8444 Dpt 059 ..... £750
B & K 2033R Signal Analyser £750
H.P 5372A Frequency & Time Interval Analyser £2250
H.P 8754A Network Analyser 4MHz - 1300MHz £1250
H.P 3577A Network Analyser 5Hz - 200MHz £3000
H.P. 53310A Modulation Domain Analyser Opt 001/003 ..... £5000
DND SOKKI Portable FFT Analyser £1500

STEWART OF READING

110 WYKEHAM ROAD, READING, BERKS RG6 1PL
Telephone: (0118) 9268041 Fax: (0118) 9351696
www.stewart-of-reading.co.uk
Callers welcome 9am-5.30pm Monday to Friday (other times by arrangement)

USED EQUIPMENT - GUARANTEED. Manuals supplied.
This is a VERY SMALL SAMPLE OF STOCK. SAE or telephone for lists. Please check availability before ordering. CARRIAGE all units £16. VAT to be added to total of goods and carriage.

TELETEST

Video & Computer Test Equipment

OZT1500: TELETEST PC
8 test patterns
VGA, S-VGA outputs
9V battery powered
£159.95 ex VAT

OZT1110: TELETEST 2
6 test patterns, 1kHz audio
Composite, S-video, RF outputs
9V battery powered

£159.95 ex VAT

Tel: 01202 759911
Fax: 01202 759922
Intl: +44 1202 etc

Free Info Pack
www.teletest.co.uk

Available Now...

The NEW
Seme Trade Catalogue
of General Spares & Accessories including the
NEW
SALI 8
CD Catalogue

The most powerful combination of parts information ever produced for the service industry.
If you would like our Trade Catalogue including the latest SALI CD please contact sales and add **CAT2002** to your next order.
Every order* of £12 or more that you place using SALI will be despatched Carriage Free.

*applicable to Electronic orders only, excluding fax, from credit account customers.

Seme

Tel: 01664 484000
Fax: 01664 563976
email: sales@seme.co.uk

DX and Satellite Reception

Terrestrial DX and satellite TV reception reports. News on international broadcast TV and satellite band changes. A grouped channel-balancing system for domestic reception. Roger Bunney reports

An announcer received by Ryn Muntjewerff in the Netherlands. This ch. E2 signal is likely to have been from either Thailand TV3 or RTM Malaya.

The excellent F2 propagation conditions that were present during December continued throughout January, bringing Band I reception of varying quality, and at times high signal strength, from deepest Russia, Syria, the Gulf, China and SE Asia. Garry Smith (Derby) measured a ch. E2 signal from Syria at 1mV (61dBμV)! My own log shows that, with the exception of the 25th, ch. E2 and/or ch. R1 signals were present every day during the morning period: ch. E2 signals from SE Asia would start to appear at about 0815 GMT, ch. R1 signals a little later. Ch. E2 fade out was often in mid-morning, with signals from the Middle East, the ch. R1 fade out being at anything up to 1300 GMT. Odd that on some days ch. R1 would provide excellent signal levels with ch. E2 poor, while the next day the opposite conditions would be experienced.

There were no reports of ch. E2 or E3 reception from the south however, either via daytime F2 or evening TE propagation, despite ch. E2 transmitters still being in operation in Ghana, Nigeria and Kenya. On the 17th the maximum usable frequency rose to produce ch. A2 (system M) programming from either the US or Canada between 1450-1510 GMT. This reception was logged by Garry Smith and Tim Bucknall (Cheshire).

On the 18th Peter Schubert (Rainham, Essex) noted Koran readings in Arabic in ch. E3 and a signal from either IRIB (Iran) or Syria in ch. E2, at 0847 GMT. Ch. E2 audio (53·75MHz) was present here at Romsey on the 24th at 0805 GMT, but work then terminated what could have been an interesting morning! A note from Ryn Muntjewerff (the Netherlands) confirms his earlier reception of Khabar-TV, ch. R1, from Kazakhstan. Cyril Willis (King's Lynn) reports excellent ch. E2/R1 reception during the month and continued success with the DigiPan computer program to measure carrier-plus-offset frequencies to establish exact transmitter locations – on the 2nd for example he logged ch. E2 signals at 48·2395MHz and 48·2502MHz. Cyril spent a couple of weeks at Los Gigastes (Tenerife, Canary Is.) in early January and confirms that TVE Izana is still in operation in ch. E3.

During a small SpE opening on the 3rd I received Video ch. E2– (an Italian 'private' station) and TVE ch. E3 (at 55·2630MHz). This confirms that TVE was still using Band I, at the start of the year at least.

During the month low-band VHF communications signals were present daily in the 35-45MHz spectrum, including US/Canadian police, pagers, and cordless phones at 39·366MHz, in an unknown language, and endless Russian dialogue. Iain Menzies (Aberdeen) reports a "massive ch. E2 signal" on the 13th, many 50MHz amateur signals, and "F2 with fire engines booming in from the US".

All in all an excellent month for DXing.

Satellite sightings

A letter from Dave Dyson (Accrington) alerted me to interesting transmissions within the CNN multiplex at 11·495GHz H (SR 19500, FEC 2/3) via Telstar 11 (formerly Orion-1) at 37·5°W. The signal is strong and easy to locate. There are CNN (US version), the CNN Headline News and four other services that are identified as Quad UAV, Airscan, C 12 Mars and P-3 Serial Data. When I have checked these four services, usually in the evenings, I've found close-ups of analogue-type clocks, giving more or less the same time, in the latter three and, in the first, a screen split into four sections with the clocks in three of them. When I checked with Roy Carmen (Dorking) and the March issue of *TeleSatellite International* I discovered that these services show military operations and surveillance pictures, from 30,000 ft, at locations in Kosovo, Croatia and other Balkan states, the purpose apparently being to check on drug activities, gun running etc. The airborn cameras often show parts of the aircraft – aerials etc. During surveillance downtime the clocks replace the aerial pictures. The signals are downlinked at 2·5GHz (S band) to a small ground station and then uplinked to Telstar which in turn downlinks to the main HQ north of Skopje. The signals are at the present in the clear and are worth checking out. It's worth getting the March issue of *TeleSatellite International* – the web address is www.TELE-satellite.com.

With the uneasy peace in Afghanistan, uplinking from the area is much reduced. Any feeds that appear last for only a short time. 'Sky News DSNG UKI-685', 'Kabul Intercon Afghanistan' appeared on colour bars in early January at 12·522GHz V (5632 + 3/4) via Europe*Star (45°E), but perhaps the sighting of most interest was the CBS news anchorman Dan Rather during his visit to the troops and camps around Kabul in the middle of the month. He was relaxed and was obviously enjoying his time there, being photographed with the troops and surveying the damage around the city. This extended uplink was on '514045' at 11·515GHz V. As I was scanning Europe*Star on the 20th, the digital signal level shot up at 11·512GHz V and colour bars with the inlaid identification 'Newsforce Africa' appeared. Unfortunately the transmission cut and never reappeared. I was left wondering whether this signal originated from the region of the Congo volcanic eruption.

There was real corporate excitement on the 7th, via NSS K (21·5°W). While flicking over the Globecast multiplex (11·590GHz V, 20145 + 3/4) I came across an Apple computer presentation, the 'MACWorld Conference and Expo', live from California on Channel 2. The Apple CEO was introducing the new flat-screen iMAC which, he assured the gathering, spelt "the death of the CRT". Demonstrations of the new 'Digital Hub', showing iPhoto, iBook and other inputting spurs, produced applause and almost gasps from the audience. It was a slick, well rehearsed and presented event. Meanwhile on Channel 3 a more down-to-earth General Motors presentation was in progress.

Tony Blair was at Kabul on the 7th, an evening live feed for UK news appearing at 11·481GHz V (5632 + 3/4) via 45°E. At 2030, after the speeches, the Scotch soldiers were seen milling around, with hot drinks and obviously shivering. The time in Kabul is +5½ hours GMT. Several of the troops were interviewed, but the audio quality was rather disconcerting – it sounded as if the bit-rate setting was too low.

Eight days later, at about 1800 hours, the French police were seen taking militant action, marching along a busy main town street with whistles blowing and banners being waved. The transmission was via Intelsat 801 (31·5°W), at 11·005GHz V (5632 + 3/4), with the service ident 'Montpelier TF1'. More French news was available at 11·025GHz V. These signals are relatively strong in comparison with the much lower downlink levels noticed with the 'BT TES-42' and 'BT TES-43' feeds for Anglia and Meridian respectively. These two trucks seem to be using encryption or a non-MPEG-2 format, as both now clock up as 'Encrypted'.

Globecast carried the Bob Hope Chrysler Classic in the PGA-Golf 2000 series in late January, via NSS K. Nice to see the blue skies and green lawns while we in the UK shivered during the frosty nights!

Finally Edmund Spicer (Littlehampton) mentions that he found six versions of BFBS Television (British Forces TV) at 11·324GHz V via Eutelsat W3 (7°E). Unfortunately they are encrypted. More interesting are the radio channels BFBS-1 and BFBS-2, which are free-to-air, intended for places around the world. For Germany and Cyprus the transmissions are stereo, for elsewhere mono. BFBS-2 carries Radio 5 for Saturday sports coverage.

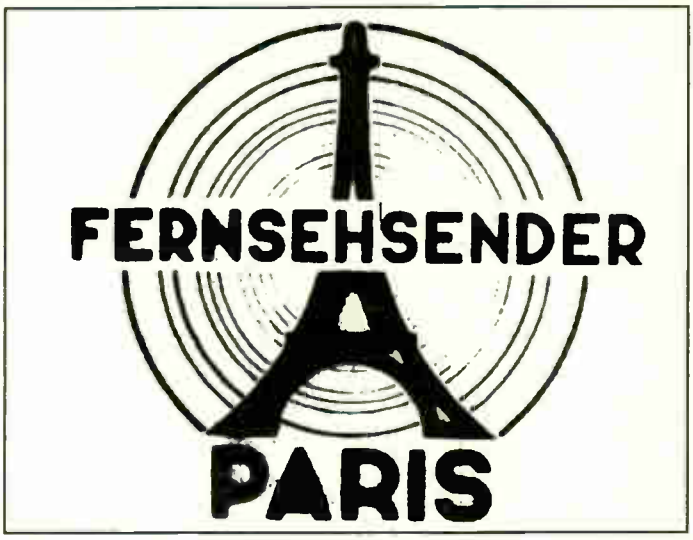
Broadcast news

TV channels: SVT (Sweden) launched a digital sports channel, SVT Extra, on January 14th, using frequencies that had previously been allocated for regional digital transmissions.

The new IBA (Israeli Broadcasting Authority) Channel 33, to start this spring, will carry both English and Arabic programmes. It will be transmitted terrestrially for local viewers and via satellite for viewers across the Middle East.

The Russian commercial TV channel TV-6 has been ordered by an appeal court to close and be liquidated within six months: TV-6 plans to appeal to the European Court of Human Rights.

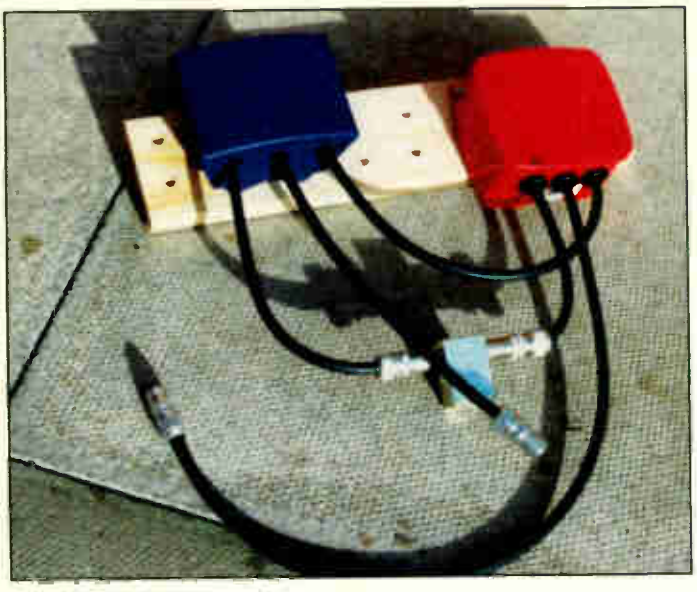
The Saudi Arabian TV station Aramco closed on December 31st 1998. Formerly known as HZ-22, it was transmitted from Dhahran for many years for the benefit of local English-speaking workers and subsequently included Arabic-language programmes.



The Germans had a broadcast TV service in Paris during part of World War 2. This was the station logo. Photo provided by Gosta van der Linden.

It was a real DX catch, originally using channel A2 (525-lines) with the Indian Head test card, then converting to 625-line PAL on ch. E3. There have been no reports of European reception in recent years. An e-mail to the Aramco station brought information on its closure.

France: DVB-T test transmissions are to start this summer in Paris, Marsellies, Lyon, Bordeau, Toulouse, Lille, Ajaccio,



Roger Bunney's grouped channel-balancing system.

Bayonne, Bourges and Brest. Channels L29 and L32 will be used for the Lille region, with 1kW ERP transmission power. The French channel La Cinquieme is being renamed France 5, to give it a similar identity to the France 2 and France 3 services. The three channels will be colour-coded red, blue and green.

Germany: Broadcaster SAT-1, which transmits both terrestrially and via satellite, has returned its terrestrial licence to the Baden-Wurttemberg authorities. Terrestrial transmissions are to cease on April 30th.

Finland: The Swedish Peoples Party has suggested an analogue close-down in 2004 instead of 2006 to encourage digital TV take-up.

Papua New Guinea: A local TV network started on February 5th, with initial transmissions in the capital Jayapura.

Pakistan: The government has approved the start of commercial radio and TV transmissions. A new body, PEMRA, has been set up to provide regulation.

Afghanistan: The Italian government is to fund the building of a new, enlarged broadcasting centre in Kabul, for both radio and TV. The BBC World Service Trust is to provide training and resources to get the broadcasting network back into operation, following a request from the UN to the BBC to assess requirements.

Grouped channel balancing

Five years ago I moved from the centre of Romsey to the northern outskirts. The previous location, near the abbey, was heavily screened, so that domestic TV reception from Rowridge, Isle of Wight was a problem, particularly with Channel 4 (on ch. 21). The move to a location without screening should have improved both local and DX reception. For domestic reception I opted to use a wall-mounted Triax wideband UHF grid aerial and a Labgear CM7271 wideband preamplifier, feeding a Fringe Electronics one input, six output distribution amplifier to feed sets around the house. The move, of just under half a mile, changed the situation from weak signals to overloading. As a temporary solution, I inserted about 40ft of thin 50Ω CB-type coaxial cable in the main cable feed. The result, fortunately, was high-quality, noise-free pictures.

Five years on two changes have occurred. There are now Channel 5 transmissions, not from Rowridge but from a tall chimney at Fawley, and there is the challenge of reception from the Isle of Wight RSL station TV 12. The latter is on ch. 54, with a transmitter power of only 2kW (Rowridge uses group A for the four main channels, which are transmitted at 500kW ERP). It was time to remove the CB coaxial cable attenuator, which was pushing the weak Channel 5 and TV 12 signals further into the noise. What I needed was amplification for the weak Channel 5 and TV 12 signals, which use group E channels, with attenuation of the group A channels to prevent overloading. I decided to use items that were either to hand or readily available from an aerial supplier. A Triax TMC3335STP low-loss UHF group diplexer, a Wolsey VA20 0-20dB variable attenuator and a Fringe Electronics wideband combiner provided the solution. The arrangement is shown in Fig. 1, while the accompanying photograph shows the units connected together.

The Triax diplexer, which has an insertion loss of <1dB, is available from Aerial Techniques. It has one input for chs. 21-33 and the other for chs. 35-69. To take future requirements into consideration, no digital channels are planned for the ch. 33-35 gap. The diplexer is connected in reverse, with the output from the Triax grid aerial and Labgear preamplifier connected to its 'output'. This made available separate ch. 21-33 and ch. 35-69 outputs, the latter with a DC pass to power the masthead preamplifier.

The outputs from the diplexer are fed to the Fringe Electronics wideband combiner, with the Wolsey VA20 attenuator in the ch. 21-33 feed. The output from the combiner is plugged into the attic-sited distribution amplifier. The only adjustment required is to the attenuator: the optimum setting was found to be –9dB.

The quality of the four local group A signals remains excellent, while the much weaker Channel 5 and TV 12 signals are considerably improved. It has been a very worthwhile, low-cost project.

Incidentally ch.54, used for TV 12, is also used for Channel 4 from Mendip, at 500kW ERP. Although the Mendip signals are fringe at Romsey, noise-free reception is possible. When propagation conditions are good, line-pairing is visible with TV 12 reception, but generally TV 12 provides entertainment-quality signals via the Triax grid aerial. A twin-stacked Yagi array, suitably-spaced, would provide a null towards the north west to avoid interference from Mendip but, in view of the low level of co-channel interference experienced, the cost and effort of installing one don't seem to be justified.

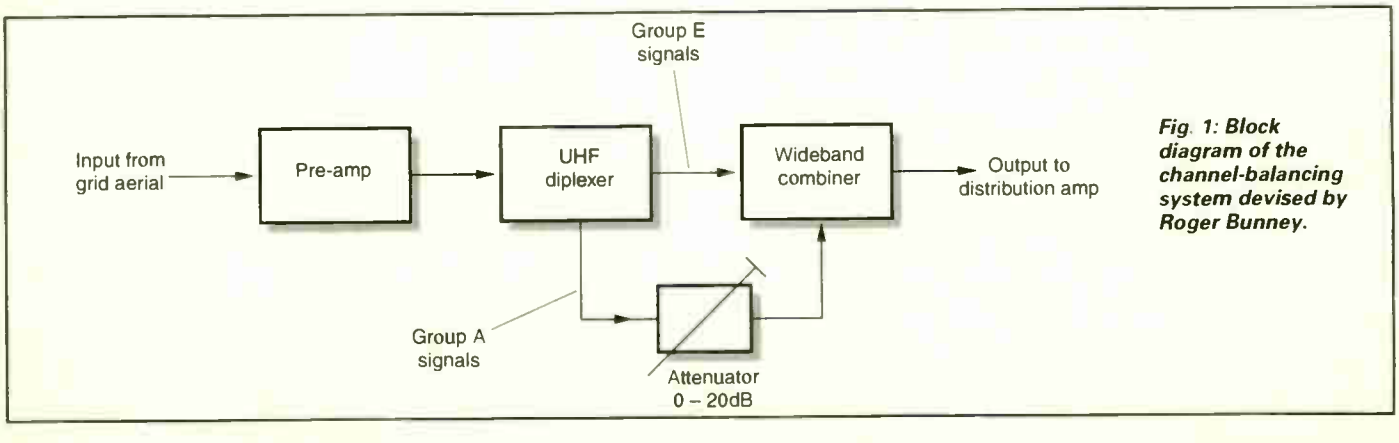


Fig. 1: Block diagram of the channel-balancing system devised by Roger Bunney.

Satellite news

The EBU has leased additional bandwidth aboard the AsiaSat-2 satellite at 105·5°E to provide increased C-band capacity for sports and news exchanges between Europe, Australia and the Asia/W. Pacific region. Access to/from Europe is limited however, the satellite's footprint at its extreme west just reaching Turkey and Greece. This suggests that a secondary hop will be required. It's an odd choice, since Europe*Star at 45°E provides links between W. Europe and S/SE Asia/Australia via a single Ku-band hop. Recent tests of the latter have shown that transmission between Perth, Western Australia and the UK is possible using just a 1·8m dish for reception.

Polish viewers in the UK will lose TVP-1, TVP-2, TV Polonia and WOT-TV via the Polsat digital multiplex as a result of legal problems over the licensing agreement. The Italian Fincast Media is to open a Polish-language service, Tele-5, during 2002.

Despite excess satellite capacity at present, Intelsat has signed contracts for two more launches – for the first and second of the new series 10 craft. The Astrium-built satellites will be launched in the summer and autumn of 2003. 10-1 at 50°W will have 23 Ku- and 56 C-band transponders, 10-2 at 1°W 36 Ku- and 70 C-band transponders. The Ku-band spot beams will have EIRPs of up to 55dBW at the centre of the boresight. A plasma propulsion system is to be used for in-orbit station keeping, allowing 50 per cent greater mass than with series 9 craft. This means that either larger satellites or larger solar panels for increased power can be used.

The Egyptian channel Nile TV is broadcasting about two hours of Hebrew-language programming daily via its NileSat downlink, intended to present the Arabic view to Israeli viewers. NileSat at 7°W has footprints covering the Middle East and North Africa. The signals are at a very low level in the UK, the 48dBW contour following the North African coast. Egypt is to open a satellite TV channel covering most of North Africa later this year. The

SPT identification logo received from NSS K (21·5° W).

Hezbollah-backed al Manar TV channel is to continue transmissions via the NileSat, Arabsat and Telstar 5 satellites despite pressure from the US and Iran to close the controversial channel.

The Australian government is backing the ABC Asia Pacific TV service which started on December 31st via PAS-8. There are two digital channels at 4·180GHz, one being time-shifted by two hours with a footprint that reaches across six time zones excluding Australia and New Zealand. For further information check the website at

www.abcasiapacific.com

Indian government groups have recommended that twenty digital Ku-band channels should be allocated to the Doordarshan-India TV service, giving total coverage of the subcontinent either directly or via cable distribution. To encourage digital take-up, STBs would be made available to viewers at half price. ■

MONITORS

Fault reports from Gerry Mumford and Ian Field

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

Reports can be sent by post to:

Television, Fault Reports,
Anne Boleyn House,
9-13 Ewell Road,
Cheam,
Surrey SM3 8BZ

or e-mailed to:
tessa2@btinternet.com

Acer 1554

This monitor would display a distorted picture in the 640 x 480 mode, with insufficient width and excessive height, but there were no displays at all in the higher-resolution modes. This is the classic symptom when the B+ regulator/voltage multiplier circuit isn't working. Checks showed that the 2SK2161 B+ regulator FET Q317 was leaky. A replacement restored normal scanning but, on soak test, the colours flickered intermittently. This was cured by resoldering the dry-joints on the CRT socket. **G.M.**

Dell D1528LS

There was initially no green in this monitor's display. Then, after several minutes, the green would gradually appear. In addition there were horizontal bands of green when the CRT PCB was tapped. Visual inspection revealed that C933 (1µF, 100V) had vented and blown off its can, which was floating around in the bottom of the case. A replacement cured the fault.

As the monitor then sailed through a soak test successfully, my conclusion is that an isolated CRT flashover had caused the problem. **G.M.**

Acer 7176I

This monitor was dead. I found that the 2SC4542 line output transistor Q311 was short-circuit. It had killed R458 (1Ω, 2W) and R329 (1Ω). Once replacements had been fitted the unit powered up, but the display had excessive width and EW bowing. Checks showed that the TIP47 PIN output transistor Q313 and its 2SD669A driver transistor Q312 were both short-circuit. But these two transistors failed repeatedly after replacement. I eventually found that the EW loading transformer T302 (19.20058.001) had shorted turns. One was obtained from a scrap chassis, which saved the day. **G.M.**

ADi Microscan PD959

This monitor was totally dead. The BD2520DF line output transistor Q831 and 2SK2098 B+ regulator FET Q567 were both short-circuit, and because of this the fusible feed resistor R866 (2·2Ω) was open-circuit. After fitting replacements the unit just screamed loudly when it was powered up, and Q831 ran very hot after just a few seconds. Unfortunately the line output transformer was to blame for this but, as luck would have it, a replacement was found in a scrap chassis. This cured the fault. **G.M.**

Acer 7176I

There was no blue in this monitor's display. Unusually, the video amplifier circuitry is all on a separate panel at the side instead of being on the CRT base panel, which contains very little. Checks revealed that Q173 (BFQ232A) was short-circuit. It forms half of a class-B output stage that drives the CRT's blue cathode. **G.M.**

Viglen MM15M28NI

This monitor had no display. The B+ regulator had blown up, killing the 2SK2350 FET Q521, the SF35 diode D511 and the 1·2Ω, 1W fusible resistor R556. Replacements restored normal operation. **G.M.**

Radius THN9175SKTKW

This huge old monitor was stone dead. Visual checks in the power supply revealed that the fusible resistors R916 and R920 (both 0·27Ω, 1W) had blasted open violently. This power supply design is based on an STRS6709 chopper chip (IC902), which read short-circuit between some of its pins. Replacement of these three items restored normal operation. The other active device present, IC901 (MJ2400), is a dual-FET which is used as a power-factor controller. It was unharmed. **G.M.**

AOC MM413S

This monitor was dead, and none of the common causes of power supply failure were to blame. AOC's fondness for over-complicated, discrete-component power supplies meant that I had to trace out the circuit by hand before I could investigate the cause of no drive to the TIPL760C chopper transistor. I eventually found it, by making 'door-to-door enquiries', starting with the transistors then moving on to the diodes.

D724 (FR101) was short-circuit. It's in the coupling from the sync loop round the ferrite core of the LOPT. Coupling is directly to the base of the chopper transistor, via D724 and R728 (15Ω, 2W). With D724 short-circuit, the resistance of R728 is low enough to stop the base drive.

Almost every type of monitor I've seen converted to Atari seems to suffer from some weakness as a result of the line-scan change. With this chassis D724 is probably the weakness.

I used a BYM26C as the replacement. In all cases where switching speed is suspected as being the basic cause of diode failure I add ferrite beads to help protect the circuit from reverse-recovery transients.

Typical power levels in a line-frequency chopper synchronising circuit are quite high. The components that carry out the same function as D724/R728 in the Royal X1448 are a bit smaller and as a

result are always severely heat-discoloured. The AOC MM413S has the 15Ω, 2W feed resistor in series with two forward junctions. The Royal has an 0·22µF capacitor, whose reactance works out at about 20Ω, plus two forward junctions and a 100Ω, 0·5W shunt resistor, which is sometimes 'ashed'! This suggests an average current close to 70mA with a scanning waveform. The peak current will be many times that. **I.F.**

ADi Microscan LM1764

The complaint with this monitor was "unstable picture – worse when warmed up". The chassis is undoubtedly of Acer origin, and is similar to that in the Compaq 171FS. It was manufactured in 1996: the pollution deposits around its anode cap provided another clue to its age, as did the condition of the soldering – the likely cause of the trouble.

Initially I intended to begin with a general resolder of the main PCB, starting with the DIL ICs, modules and connectors with SIL-pin layouts, any TO220 devices (especially those with heatsinks), and all the large heavy-duty components. This strategy provides a 'guided tour' of the PCB and makes it easy to spot poor soldering to adjacent components not on the original 'target list'.

Once the tour was under way and a few such connections had been singled out it became apparent that more extensive work was required. In many cases when the solder of a joint being reworked was melted it rolled up into beads, separating from the component lead. This even happened with some joints that didn't look too bad. Clearly there was an oxide problem. There was unfortunately no alternative but to melt every single joint to ensure that each was properly alloyed to the component lead and the copper track. In such a case RS 555-869 'red jelly' soldering flux can be used, to avoid wasting fresh solder just for its flux cores. It's not a particularly aggressive flux but, with the high voltages and the sensitivity of MOS circuitry to leakage, the flux residues must be removed spotlessly.

I used to use cellulose thinners to clean flux off, but found that on many occasions they damaged 'rubber-diaphragm' tact switches. Nowadays I always use a steel-wire brush, which works very well with dried resin flux residues but is almost useless with over-applied paste fluxes. **I.F.**

CRT heater supplies

I've noticed a considerable rise in the number of monitors, some less than a year old, that come in with failing CRT emission. This seems to be because there is a growing tendency for the heaters to be run at less than the expected 6·3V. Failure of the associated reservoir electrolytics is not the sole cause.

While sorting through some old data books I found an Addendum, dated November 1994, tucked into a copy of the Philips CRT data book. It may explain this trend, so I will quote it:

"In the past, the recommended heater voltage was always specified at zero beam current. This was because the voltage across the cathode would, in older power supply designs, drop to a desirable level (6·15V) under operating conditions.

Today's power supplies are more stable however, so under operating conditions the voltage across the cathode hardly drops and may remain at a level that could be non-optimum for best tube life.

To provide maximum protection for our customers therefore, we have changed the way we define the recommended heater supply voltage from 6·3V at zero beam current to 6·15V under operating conditions.

It will take some time however for us to incorporate this amended recommendation into all our product specifications."

In my experience any CRT operated with a heater voltage of less than 6·3V will, before very long, require this to be raised slightly above 6·3V in order to restore prematurely failing emission. **I.F.**

Samsung CSR5987L

This dead 15in. monitor had already received attention from someone who had failed to get it going. There was a fault I'd seen before with the earlier 14in. version: the 320V track to the primary winding of the chopper transformer had flashed over to the two adjacent auxiliary-winding pins. While I was filing out a guard ring and removing the sooty PCB material, I wondered why the tracking had occurred at one of the wider gaps – the 320V track runs closer to several other tracks, but the voltage didn't cross these narrower gaps.

The explanation was easy to see. The zinc plating on the steel chassis tray under the chopper transformer had been peppered with molten copper, right next to a hard-rubber support block that had dents in it from two of the chopper transformer's pins. Removal of the support block is not an option, so I coated the affected PCB area with hot-melt glue to protect it from the rubber's corrosive decomposition products and, as an extra barrier, gave the top of the rubber block a smear of Teflon lubricant.

There were no damaged fuses or surge-limiting resistors, but the monitor remained lifeless when it had been reassembled. As the start-up resistors were intact, I removed the KA3842B chopper control chip and reapplied power. Previously there had been no voltage at pin 7, now there was a supply here. The chip was short-circuit. Once a replacement had been fitted the monitor was OK. **I.F.**

Compaq Presario V510 (Model 316)

The complaint with this monitor was that the display "goes dim when warmed up". On inspection I noticed that the soldering had a smooth, satin finish. This means that it is lead-free. It looks pretty, but doesn't last long. In effect, every single solder joint had to be reworked to ensure reliability and, as lead-free solder is more prone to 'stringing' and 'whiskering', plenty of flux has to be used to minimise these effects, also solvents to remove the flux afterwards. About ten per cent of the joints looked as if they were OK but, as soon as heat was applied, the solder rolled away from the component lead to form little isolated blobs around the edge of the solder pad.

Once this had been dealt with I found that the monitor started up with a crimson picture which quickly turned to a normal grey-scale. This usually indicates a fading CRT, often because of inadequate heater drive. The first step is to check/replace the heater supply's electrolytic reservoir capacitor, C833 (470µ F, 16V) here. As this was a fairly severe case, the next step was to replace the heater supply's rectifier diode with a Schottky-barrier type – eliminating the minority-carrier recovery losses can provide a voltage increase of up to 500mV. I used a 31DQ06. In addition to the Schottky-barrier diode, add a polycarbonate capacitor in parallel with the reservoir capacitor to offset the new diode's increased junction capacitance.

Unfortunately the Schottky-barrier diode didn't last very long, because the peak reverse voltage was too high for it. A peak detector diode and reservoir capacitor used to check the heater winding's peak reverse voltage revealed that it was 53V. When this was added to the 8V across the Schottky-barrier diode's reservoir capacitor, the total just exceeded the PIV rating of the 31DQ06.

By adding a bleed resistor across the capacitor the peak detector circuit can be turned into a snubber network to limit the peak reverse voltage. I used a 2·2µF, 100V Mylar capacitor and the previously fitted heater rectifier diode. Trial and error can be used to select the resistor value. For a good starting point, calculate the resistance that will dissipate 1W at the unloaded peak reverse voltage value. See what effect it has on the voltage before adjusting the resistance value to get the required limiting. A good safety margin is needed if the resistor is to be mounted in a confined space on the print-side of the PCB. I suggest 5W per 1W of actual dissipation. **I.F.** ■

STRANGE FAULTS

Alan Dent on some unusual and difficult faults, several of which have occurred more than once. Watch out!

Crown CTF14R/CTF14T

There was no picture, the line output transformer squealed loudly and the line output transistor kept blowing. Once these sets have been brought out of standby the DC supply to the jungle chip IC201, which produces the line drive, is derived from the line output stage. So diagnosis was going to be a bit of a problem. A check on the drive at the base of the line output transistor showed that it consisted of bursts of a 40µsec pulse waveform. I decided to disconnect the line output transistor's collector and power IC201 from an external source to see what was going on.

Initially the supply to IC201 is about 6V. In this condition the chip provides a 40µsec line-drive waveform to kick-start the line output stage, which then provides the correct running voltage for IC201. In turn IC201 produces the 64µsec line-drive waveform required for normal scanning. When the supply to IC201 rises, the crystal oscillator is supposed to take charge, driving the output stage correctly. In this case the crystal oscillator wasn't working. Thus when the supply voltage rose the line drive stopped and as the voltage fell the 40µsec drive started again.

After a lot of head-scratching I called a friend at Philips Semiconductor Application Labs. He suggested that the chip's internal reference voltage could be the cause of the trouble. Indeed it was! Because C261 (22nF) was leaky, the reference voltage was only about 4V instead of 7V. It should be measured with a very high-impedance meter or scope. Once C261 had been replaced, everything was OK. Thanks Paul.

Moral: it pays to have friends in important places. It also pays to persevere – since the initial one we've had more sets with this fault. You also find them badged **Harwood HTF142SL**.

Beko 35228T

We had two of these sets with the following fault symptom: low sound output with an audible oscillation. They were passed to me after the first engineer's time limit had been exceeded by several hours. I contacted Beko tech help early on, but they had no idea what the cause could be. When I explained that I had two sets with the same fault it was suggested that I checked the menu settings. Some help!

I discovered that the tweeter speakers were getting hot. A scope check showed that the outputs from the audio amplifiers were accompanied by an oscillation at approximately 16kHz. It was obvious that the Nicam PCB at the left-hand side of the chassis was the source of the fault, as there was no oscillation at the inputs from the IF section. This type of fault suggests a decoupling problem, so the wet-finger technique was applied. I found that when one area was checked in this way the sound came up correctly and the oscillation stopped.

The area was around the 36·4MHz crystal Q382 and the SAA7710T chip IC303. Was the crystal off frequency? When a trimmer capacitor was added in series with the crystal the oscillation stopped and correct sound was produced. After a few more tests however I decided that this was not the answer. I found that adding a 68kΩ resistor and a 68pF capacitor across C344 (18pF) provided a complete cure. The circuit was then tested with extreme temperature changes and proved to be stable.

Bush 11AK20S chassis

The LED was continuously green. When one of these sets is powered the LED should be red, changing to green when the set is brought out of standby. The 12V regulator IC805 is switched on by Q803 (BC547), which was leaky. As a result the 12V supply was stuck at 10V, with no potential change across the bi-colour LED to alter its colour. Otherwise the set worked normally.

Models that use this chassis include the **Bush 1433** and **Alba CTV3409**.

Goodmans GVR5000/1/2

I've had a couple of interesting problems with these VCRs. The first one had no playback video output. After replacing IC4001 'to get it out of the way' I really had to start looking for the cause of the fault. The surface-mounted 100nF capacitor C4069 proved to be leaky.

The symptom with the other machine was noisy playback pictures – it looked as if the heads were worn. Drum replacement made no difference, so the cause of the fault was obviously on the PCB. IC4001 was replaced to eliminate it, and again was not to blame. This time C4073, another surface-mounted 100nF capacitor, was leaky.

Both faults have now been experienced with several of these machines. ■

AUDIO FAULTS

Reports from Keith Wevill Geoff Darby and Nick Beer

We welcome fault reports from readers – payment for each fault is made after publiation. See page 358 for details of where and how to send reports.

Quad 44 control unit

This control unit had a habit of sometimes switching to the default radio input. A temporary cure was achieved by replacing IC101 on the control board attached to the front panel, but the real cause was dry-joints at the through-board links on the main board. These are in the +7·5V and –7·5V supplies to the front panel. **K.W.**

Aiwa CXNF9K

This unit's front-panel volume control was very erratic in operation. It's a common problem with Aiwa units that use a rotary encoder instead of a conventional potentiometer. The cause is grease, with which the manufacturer stuffs the control to give it a 'treacle' feel. Over the course of time this grease migrates on to the contacts, where it solidifies into a jelly, wreaking havoc with the electrical characteristics.

Once the control has been removed from the PCB it can easily be dismantled, by bending back four metal tabs. The contacts can then be cleaned, retensioned and treated with a thin film of contact lubricant. **G.D.**

Technics SA-EH750 tuner/amplifier

When this unit was switched on 'F61' briefly showed in the display, after which there was nothing. This fault indication often means that the hybrid output IC has failed. In this case its failure had been violent, with one pin burnt right off. I removed the IC then powered the unit again to see if there were any other problems.

F61 again appeared. It's difficult trying to find the cause of a fault like this, with the protection circuit preventing power-up. As the obvious cause of the trouble had been removed, I decided to bypass the protection circuit temporarily. I did this by placing a short across Q971 to keep relay RL702 energised and the basic power supplies alive. This enabled me to check the conditions around the fault-sensing transistors Q601 and Q602, which look for a DC offset at the outputs from the hybrid IC. The voltages at the collectors of these two transistors were low, but not because of the conditions at their bases.

Two diodes, D657 and D658, are connected to the collectors of Q601 and Q602. Their cathodes are connected to the 14·8V and 7·5V supplies respectively. If either of these supplies is missing the relevant diode conducts, pulling down the collector supply with the same result – shutdown – as if a DC offset had been detected at the base of one of the transistors. The 14·7V supply was missing, because the 4·7Ω safety resistor R721 was open-circuit. A replacement resistor, followed by removal of the temporary short-circuit across Q971, proved that the unit was now able to power up without errors. A quick check on the power supply outputs showed that they were all present and correct. Finally, a replacement RSN311W64B-P output IC restored full operation.

The reason for going to all this trouble before replacing the IC is that it's *very* expensive. The last thing you want is to find that it goes up in smoke again. **G.D.**

Sony CMT-CP11

The complaint was failure to read discs. A nice simple one for a change. A couple of the tracks in the laser flexiprint were open-circuit. This fault is not uncommon, and I keep some of these FPCs in stock (part no. 1-757-055-11). As expected, a replacement cured the fault. **G.D.**

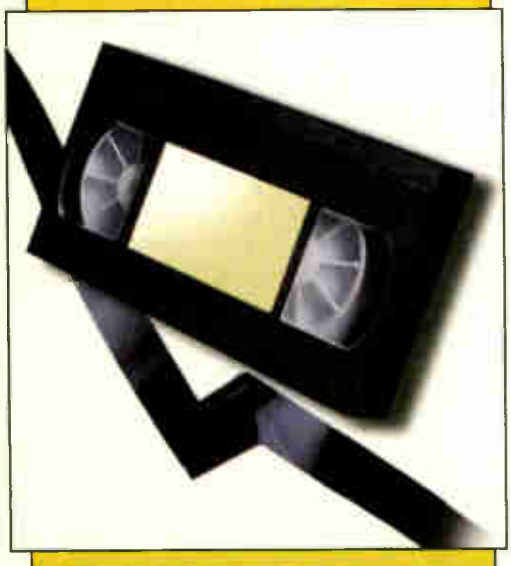
Sony HCD-C70

This integrated hi-fi unit had a problem with its CD section. There was no audio from either channel, just a gentle hiss. With all other sources the audio was fine. I decided to work backwards from the CD audio outputs and found that the audio amplifier IC205 had no discernible inputs at pins 6 and 2 (R and L respectively). Back one stage then to the PCM67U DA converter IC204, which had little by way of outputs at pins 7 and 4. The data inputs at pins 13 and 17 seemed to be OK, as did the clock signals at pins 14, 15 and 16. As all the supplies were correct, the obvious thing to do was to replace IC204, which involved surface-mount reworking. Once this had been done the CD section provided its audio outputs. **N.B.**

B&O Beocenter 5000 (type 1802-4)

There was very low, sometimes no audio from the left-hand tape channel of this hi-fi centre. Signal injection tests showed that the playback worked most of the way back to the head. When I carried out scope checks from the head, using the right-hand channel as a guide, I found that there was no signal to speak of at the collector of TR100, in the second transistor stage after the head. The transistor was in fact biased hard off, with its base and emitter at 15V and its collector at –15V. I found that C102 (220µF, 16V), a reservoir electrolytic capacitor at the emitter of TR101, was open-circuit. A replacement put matters right.

These units may be old but they perform excellently and I find that many customers will happily spend up to £200 having the units overhauled. **N.B.** ■



VCR CLINIC

Reports from
Eugene Trundle
Michael Dranfield
John Coombes
Michael Maurice
Gary Laidler
and
Bob Flynn

We welcome fault reports from readers – payment for each fault is made after publication. See page 358 for details of where and how to send reports.

Sony SLVE230

The problem with this machine was that the RF output from the UHF modulator seemed to disappear intermittently. In fact it was reverting to about ch. 22 from its presetting at ch. 33. The cause was loss of the UNREG 30V feed. Coil L600 (68µH) at pin 8 of the power supply module, or its soldered jointing, was going open-circuit. **E.T.**

Akai VSG270

The fault with this machine showed up when going from fast-forward to play: a rough, mistracked picture would appear for a couple of seconds, then the deck would shut down. It occurred because the supply-spool brake failed to engage. The slack tape produced the picture then, as the reel lost momentum, stopped and failed to rotate in the play mode, shutdown was triggered. The basic cause of the problem was very dirty mode-switch contacts. This machine is unusual amongst the cheaper models nowadays in having a supply-reel sensor. **E.T.**

Sharp VCMH711

At switch on the cassette housing would try to load a tape even without one being pushed in. I thought the cause was going to be nice and easy, a dry-joint at the end sensor or cassette LED. Quite wrong! The voltage at the right-hand sensor was low, but the sensor was OK. Pin 79 of IC701, the microcontroller chip's end-sensor input, was dragging the voltage down. A new IX1420UMN8 micro chip was required, and with a trade price of £27 plus VAT I couldn't see the customer agreeing to have this job done. Wrong again! The estimate was accepted. **M.D.**

JVC HRJ625

This VCR wouldn't eject the tape. The cause was the change-arm assembly. SEME part no. VPAR7178 – the small plastic peg had broken off, releasing the spring. At first I thought that the spring was missing, but it had retracted beneath the sliding brake plate. **M.D.**

Sony SLVE275

Damage to the slide crescent and a broken soft brake can cause the following symptoms: very poor or no rewind, and no picture in the reverse-search mode with all other functions operating correctly. Replacements will restore normal operation. **J.C.**

JVC HRJ220

The cause of a dead machine is usually three capacitors in the power supply. Check and replace C860 (22µF, 50V), C868 (47µF, 16V) and C806 (2·2µF, 50V).

If the machine won't accept or eject tapes, i.e. a tape will not go into the VCR, replace the arm assembly. The cause of the problem is that a lug breaks off, which prevents the spring from pulling the arm across to the drive cog. **J.C.**

Panasonic NVFS100

There was normal E-E and standard/extended play operation but no playback S-video picture. The cause was traced to module IC303, part no. VEFH05B). A replacement cured the problem. **J.C.**

Toshiba V727B

A complaint you can sometimes get is whistling in the E-E mode. The sound may be poor, as if the detector coil is misaligned. The cause of the trouble is faulty decoupling capacitors: C102, C103, C104 and C105 can develop leakage. 2,200pF, 50V chip capacitors should be fitted in positions C102 and C105. **J.C.**

Samsung SV224B

If one of these machines will not accept a tape, or the tape has to be pushed in a long way before it's accepted, the start sensor PT602 (9PT493F) is probably the cause. It is difficult to remove the deck when a tape is jammed inside. The tape can be unwound mechanically after removing the worm holder (B446). **J.C.**

Hitachi VTF360

Intermittent tape looping on eject was the complaint with this machine. It was another mode-switch fault. Once a replacement had been fitted the machine behaved itself. **M.M.**

Grundig GV6001V+

This machine wouldn't play tapes because the drum wouldn't rotate. The cause was lower drum seizure because the lubricant had dried out. Relubrication isn't simple, as you have to remove the upper drum first, but this cured the fault. **M.M.**

Hitachi VTM212E

The complaints with this machine were that it didn't respond to remote-control commands and that the front-panel buttons were sluggish. Both faults were cured by resoldering several dry-joints at the connector on the front-panel operation PCB. **M.M.**

Mitsubishi HS550V

This machine was dead. I traced the cause to TR8 in the power supply. **M.M.**

Mitsubishi HSM16

This VCR worked except for the fact that the clock display was missing. Checks in the power supply revealed that C905, C908 and C909 were all leaking electrolyte, but

replacements failed to cure the fault. R904 was then found to be open-circuit and D917 (HZ30-2) short-circuit. **G.L.**

Sanyo VHR279E

The recorded sound would vary between being OK and including samples of the previously recorded sound. I cleaned the full-erase head, but this made no difference. I then noticed quite a bit of bare copper wire at the two connections at the rear of the head. A check on the resistance at these connections produced a reading of 28Ω. After resoldering, the resistance had fallen to 1Ω and the machine now recorded perfectly. **B.F.**

JVC HRS7500

An annoying squeak while in play or record was cured by removing the deck, taking out the clutch unit and the small gear next to it, then cleaning and relubricating the shafts. Operation was then silent. **B.F.**

Sanyo VHR390E

This VCR struggled to wind or rewind, especially near the ends of a tape. The usual cause of this is that a white piece of plastic breaks from the underside of the deck. It sits between item 9 and items 3 and 7 shown in the deck diagram, and can be refitted using a screw or glue. In this case however it was still in place, but I noticed that the nearby plastic fixing which secures the underside of the supply spool shaft to the deck was badly cracked and loose.

The cure was to glue the fixing back in place and lubricate all the drive gears and their shafts, also both tape spools and their shafts. **B.F.**

Panasonic NVSD200B (K deck)

This VCR didn't know that it had a tape inside: it made no attempt to eject, play or wind the tape. When I called up the fault codes, by pressing FF, rewind and eject simultaneously, no error codes appeared.

To extract the tape to allow deck removal I took off the top plate and gently separated the arms at the sides of the cassette holder. While doing so I noticed that the right-hand arm had warped badly away from the housing, and was not holding the right-hand side of the cassette fully down. Once the mechanism had been removed the deck was found to be in the full eject position, with the cassette holder in the down position. I presume that because of the warped arm the cassette holder had failed to lift.

All was OK on test when a new main shaft unit, part no. VXP1330-1L, had been fitted. **B.F.**

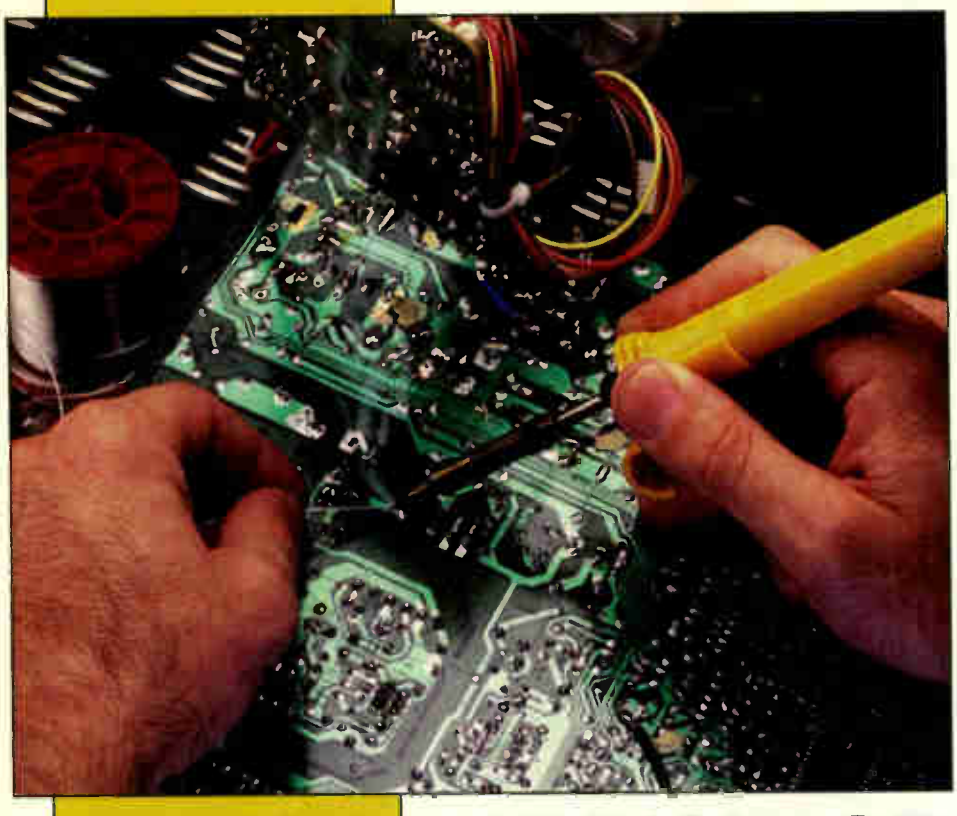
JVC HRJ225

There was an intermittent fault with this VCR: sometimes a tape would play for a few seconds then the machine would turn off. When I removed the top I found that in the fault condition the take-up spool didn't rotate. As a result there was a tape build up at the pinch roller, then the machine turned off.

I could see no mechanical reason for this from the top, so I removed the deck. There were no signs of trouble except that the external contacts on the mode switch were badly tarnished. The problem was cured by cleaning these and the contacts on the main board. **B.F.**

Philips 14PV184

The TV section of this combi unit's remote-control handset worked correctly but none of the VCR buttons had any effect, though the LED at the front of the unit would flash to indicate that commands had been received. I assumed that the handset had to be the cause, and was relieved when a new one proved the case. **B.F.** ■



JACK'S WORKSHOP

Jack Armstrong

Humax 5300VA-CI receiver

I received an e-mail from David of SkyView, Hereford, about this two-year old digital receiver. The message said: "The power supply has now given up. When the receiver is connected to the mains supply you can see a LED on the front panel flicker for a moment, then nothing. The receiver has lived in a hot cabinet, so it could well be that the electrolytic capacitors are the cause of the fault. The question is, which ones?!"

The diagnosis was correct of course, but it's wise to replace all the electrolytics. If one has failed, the others won't be far behind. Relkit 35 from SatCure (http://www.satcure.com) provides all the electrolytics required for this receiver plus one polyester capacitor.

David later confirmed that fitting the capacitors in this kit had cured the fault. He then felt confident enough to give his customer a 36-month guarantee on the power-supply repair.

A common mistake – one that's caught out many manufacturers – is to use cheap capacitors. The electrolytic capacitors used in a switch-mode power supply should have a very low ESR (effective series resistance), because part of their job is to filter out fast rise-time, high-current pulses. If the capacitor's internal resistance at the pulse frequency is too high, the capacitor heats up and the electrolyte boils away. So a low ESR is essential.

Some plastic-film capacitors are simply rubbish and won't tolerate the moderately high temperature in a power supply. As a result, they fail. Replace such capacitors with a more expensive, better-quality type. The ones that fail most often in satellite receivers seem to be dipped in a green resin.

Avoiding viruses

Apparently many users of PCs with Windows software suffered from virus problems at Christmas. The most drastic anti-virus action I've come across was that taken some years ago at my children's school – all the floppy-disk slots were locked. This was effective but not particularly helpful. Nowadays most viruses travel via the internet. The school I've just mentioned has spent tens of thousands of pounds on 'firewall' software and new hardware. Quite needlessly in my opinion.

I've been using the internet since 1994 and have never been affected by a virus. How come? The most obvious solution is not to use Windows as the operating system. Linux now works with most common business software, so this is one possibility. I started off with a BBC Microcomputer. As I'd used it to write a book, the next logical step was to publish the book. Back in 1987 the only route was to transfer the files to an Apple Mac and use a laser printer to make the final proof. So I acquired an Apple Mac. As it supports almost all the common business software (and then some) I've used one ever since and have never lacked the ability to do whatever I wanted – usually more quickly and easily than with Windows, and with far fewer crashes. Remember that Microsoft Word was first written for the Apple Mac. Windows came later, when Bill Gates realised how well the Apple Mac worked. To get back to viruses, Mac viruses are not as easy to create and, as the vast majority of PC users use Windows, most viruses are written for Windows. So the easiest way to avoid viruses is to buy a Mac.

A precaution you can take is to put the first name in your address book as aaaaaaaaaa and leave the address blank. If a virus is programmed to send copies to all those in your address book, it will fall at the first hurdle – because the blank address will cause an error.

Another precaution is to use less popular e-mail software and make sure that it lets you set a limit to the incoming file size. I set my limit to just 30k, which is larger than most text messages and smaller than most viruses. If the software detects a large file, you get the option of deleting or downloading the file. I don't think that Microsoft Outlook or Outlook Express provide this option, so look for something different. Try Eudora.

The Grundig digibox

Malcolm Collins reports that he fitted a SatCure Relkit 33c to fix the power supply in a Grundig digibox. After doing so the front panel LED and the internal green LED flashed on and off repeatedly without a picture appearing. This symptom is similar to what you get with a faulty modem board, but that wasn't the cause. The digibox would sometimes work for some time before reverting to standby.

On further investigation Malcolm found that the SIL connector socket on the power supply module had one or more internal sockets, probably those with black wires, that must have been making intermittent connection to the main PCB, causing a sort of reboot. The solution was to take each internal socket out of the connector and bend it so that it made better contact.

Malcolm's report is most interesting. It could explain some weird Grundig digibox problems I've had, and might also explain why I've had a spate of Panasonic digiboxes that are stuck in standby or revert to standby when the channel is changed.

A permanent solution might be to do what I used to do with the old Amstrad SRD5XX series receivers – solder a wire from the 0V tracks in the power supply to

the corner of the tuner module on the mother board.

Another RF modulator

In a previous column I mentioned an RF modulator that could be connected to the scart socket of a satellite receiver or a DVD player, with DIP switches for UHF output channel selection. An improved Model, the V40-104, has now been introduced by SatCure – see the accompanying photograph. It has a much cleaner output, and push-buttons are used for UHF output channel selection. The selected channel is retained even during failure of the mains supply. The UK PAL-I audio offset can be changed to PAL-G for use with Continental TV sets.

The V40-104 UHF modulator from SatCure with integral power supply (top). For full information go to http://www.satcure.com

Mobile phones

I'm told that transmitters for blocking mobile phones are available and are used in some pubs. As the transmitters are illegal, the authorities take harsh measures against anyone found using such a device. For one thing it could interfere with the use of phones for medical purposes, with possibly disastrous consequences. There are plenty of other examples of essential phone use.

Most of us get annoyed with those who use mobile phones in a loud and frivolous manner, but we have to put up with it. There's a simple reason why people tend to shout with a mobile phone when they would talk quietly with an ordinary house phone. In the early days of telephones, designers found that if they provided electronic voice feedback from the mouthpiece to the earpiece the user would speak more softly. This feedback is known as 'sidetone'. With a modern house/office phone you will find that you can hear your own voice in the earpiece. There are technical problems that at present prevent the use of this technique with mobile phones. So people don't hear their own voice and tend to shout. Once this is pointed out, users are better able to regulate their voices.

The problem of cellphone theft has become serious and is a major cause of muggings. According to the Home Office, a mobile phone is stolen every 45 seconds. Apparently it's easy to reprogram a cellphone to work with a different 'SIM' card. The government is urging manufacturers to make phones more secure, and Orange, Virgin Mobile, One 2 One, Cellnet and Vodafone have now agreed to co-operate by exchanging information on stolen handset identity numbers (IMEIs) so that their use can be blocked.

Be careful with your phone. A thief could easily run your phone bill up to a staggering total by the time you realise that it has gone and are able to report its loss. Always use a PIN security code. It won't prevent theft, but will stop a thief from making calls immediately. ■

If you have any questions about SkyDigital problems or Apple Mac computers, or need spare parts for either, please visit the web site at: http://www.satcure.com

Information and spare parts for analogue satellite receivers can be found at http://www.netcentral.co.uk/satcure

Information and parts for ICE (in-car entertainment) equipment can be found at http://www.satcure-focus.com

Test Case 472

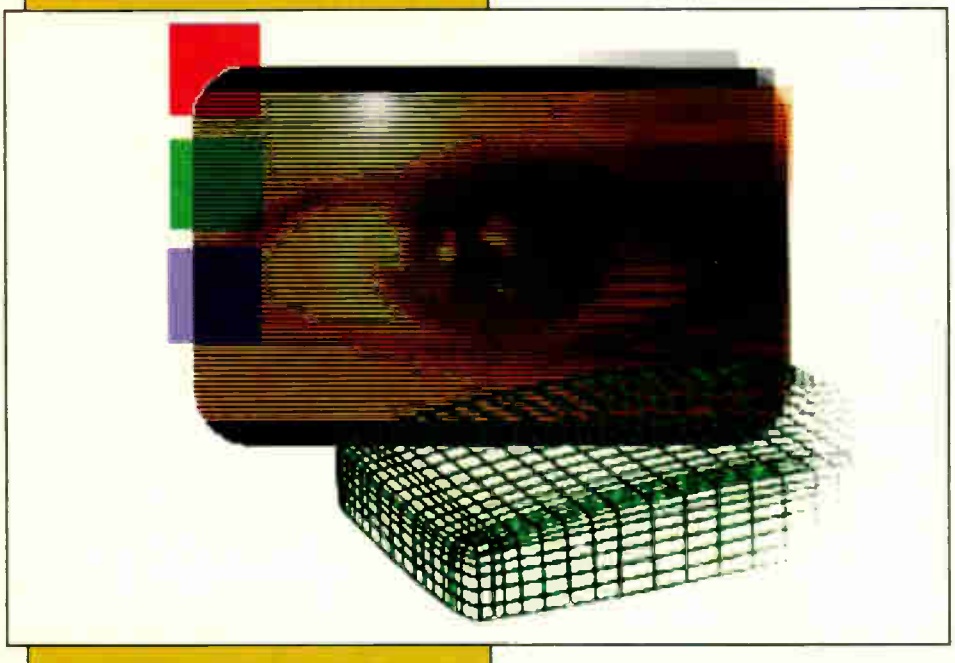
As regular readers will know, the Test Case workshop gets a varied range of equipment for attention, particularly on the TV side. Alongside the latest widescreen Wega wonder from Sony you might find a fifteen-year old veteran, a 5in. monochrome 'lorry set' or a digital set-top box, the latter probably en route to its manufacturer for repair.

The TV set highlighted this month is an oldie. It had to be serviced for no charge, and during lunch hours and tea breaks – because the owner is Real Technician's girlfriend! It's a Panasonic TX25T2 (Alpha 2W chassis) that had provided long but not particularly good service – it had a history of 'eating' line output transistors. With this particular chassis the 2SD1441RL transistor (Q551) is best ordered from Panasonic, since those from other sources don't seem to do too well here. The last one fitted had been obtained from Panasonic and had held out so far, but it was the third one the set had had, all in the last three years. Television Ted, irritable because he couldn't suss out why the Hitachi set on his bench had no teletext, threw out some suggestions on the subject of line output transistor failure. One of them was found to apply here, though this was not the main reason why the set was in the workshop on this occasion. What do you think had been causing that problem?

The main reason for the set's presence this time was the picture's unstable size. At high brightness levels the picture would expand by about an inch all round, and at random times it would 'balloon' somewhat, generally becoming larger than it should in terms of raster size. There was little effect on the sound – just a slight crackle as the picture twitched, barely noticeable except at high volume settings. Sometimes the fault would not put in an appearance for hours on end. If anything, it was more likely to appear during the first half hour after switch on from cold.

There had been problems with power supply feedback opto-couplers in the workshop recently, so Real Technician suspected the one in this set, D811. A check with the circuit diagram showed that it's used for on/standby switching however, so this item was ruled out. There's no set-HT potentiometer to suspect or twiddle in this power supply design. In fact almost everything is built into the big STR54041M regulator chip IC801, including the chopper transistor itself. The chip was popular with designers when the Alpha 2W chassis came out, as it could be used to provide a relatively simple power supply with little to go wrong. Plainly something had gone wrong here however! An oscilloscope connected across the supply's HT output reservoir capacitor C854 showed that the voltage fluctuated when the picture size varied.

If the regulation system is built into the chopper chip, why not replace it? There was a used one in the stores, with OK scrawled on its case. So it was fitted and the set was left running on test. There was no trouble for the rest of the day, but the symptom reappeared soon after the set was switched on next morning. With the help of Television Ted, the problem was finally solved. What was the gremlin? For the solution, turn to page 375.



TV FAULT FINDING

Reports from

Michael Dranfield

Eugene Trundle

Glyn Dickinson

Philip Salkeld

Mark White

Kevin Green, MIIE

Graham Bond

Robin Beaumont

Martyn S. Davis, I.Eng., MIIE

G.W. Roper

and Roger Burchett

We welcome fault reports from readers – payment for each fault is made after publiation. See page 358 for details of where and how to send reports.

Thompson 24WK24U (ICC17 chassis)

This set was tripping, with flashes from the red standby light. After much wasted time getting nowhere I decided to disarm the safety circuit by shorting together the collector and emitter of transistor TL71. The set then came on with a blank display except for the six RGB auto grey-scale lines being visible across the centre of the screen. This proved that there was a field timebase fault. In this chassis the TDA8351 field output chip IF01 has separate LOPT-derived scan and flyback supplies, instead of the usual flyback boost arrangement. The cause of the fault was that the field flyback supply was missing. because protector ZL11 (MP25) in the rectifier circuit was open-circuit. A replacement restored normal operation. **M.D.**

Sharp 37AM23

There was no green in the display because the EEPROM had been corrupted. The solution is to replace Q708 and Q704 (both type BC338-40) in the power supply, also C716 (220µF, 10V). This will prevent a recurrence of the EEPROM crash. **M.D.**

Tatung B series chassis

There was field foldover at the top with bright scenes and in addition white scenes affected the colour purity – with high beam current there was shadowmask doming. The cause of the problem was traced to R537 (470Ω) in the beam-limiter circuit. On test it gave an open-circuit indication, but when tested after removal it seemed to be OK. Nevertheless a replacement cured the fault. **M.D.**

Ferguson T78N (TX92 chassis)

This set's red standby LED was flashing on and off. Now a common cause of this is a faulty line output transformer. My in-circuit LOPT tester gave a faulty indication, so a new transformer was fitted. Just to be sure, I ran an in-circuit test on the new one and obtained a green for go reading. The old transformer was indeed faulty. but the set was still dead with the standby light flashing – just as before.

The power supply was running, but there was no 9V output from the TDA8139 regulator chip IP70. Pin 4 of the regulator is taken high to enable the 9V output, but it was stuck low. A check at the microcontroller chip IR01 revealed that the 8MHz clock was running, but pin 29 was high all the time. To force pin 4 of IP70 high, I connected the base of transistor TR02 to chassis. The set then came on, but there was no video or OSD. At switch on the serial clock and data lines from IR01 to the X24C04 EEPROM chip IR02 came up then went dead. I suspected the EEPROM chip, and a new one cured the problem. The old one must have been damaged by the faulty LOPT. **M.D.**

Samsung CI1683

The complaint with this set was intermittent failure to switch on – the indicator flashed on then off again. The cause was traced to capacitor C808 (47µF, 25V) in the start-up circuit. It measured 47µF, but its guilt was proved by an ESR test. **E.T.**

Sony KV28FX20U (BE3E chassis)

This newish widescreen set was dead. I spent a little time carrying out checks in the main power supply before I realised that there's a very simple chopper standby power supply on the control PCB. This had failed. The items that had to be replaced were IC5605 (TNY253P) and R5602 (4·7Ω, 0·25W safety), part nos. 8-759-584-19 and 1-249-389-11 respectively. **G.D.**

Matsui 2107

This set, which is fitted with a Vestel chassis, was dead though there was slight tripping. No shorts could be detected on the secondary side of the chopper transformer, and a good waveform was present at the gate of the chopper FET. Despite this, the cause of the trouble was the unusual chopper control IC (TDA16846). There seem to be supply

problems at present with this chip, which is available from CPC and Charles Hyde.

The IC is also used in some versions of the **11AK19 chassis**, often being the cause of a dead set. **G.D.**

Amstrad CTV3121

This set was dead with the power supply ticking. All the LT supplies were varying in sympathy, but there were no short-circuits. The cause of the fault was the mains bridge rectifier's reservoir capacitor C5 (100µF, 400V). **G.D.**

Bush 2867NTX (11AK19 chassis)

The symptoms displayed by this set were severe lack of width and bowing. Checks showed that the EW FET's drain voltage was missing. I found the feed resistor R629 (2·7Ω fusible) open-circuit because of a dry-joint at C630, which is next to the scan coil plug. Fortunately there was no PCB damage. **G.D.**

Samsung WI24W6VN

Varying brightness is becoming a common problem with these sets. The cause of the fault is a defective A1 potentiometer on the line output transformer, T444. The only cure is to fit a replacement. Note that the part number is on the side of the transformer. **P.S.**

Matsui 28WV2N

This set, which is fitted with the **Grundig CUC2059 chassis**, was dead. Some quick checks showed that the chopper transistor T60006 was short-circuit. A BUZ90 can be fitted in this position. Also replace the two resistors that cause T60006's destruction. These are R60001 (68kΩ, 1W) and R60007 (270kΩ, 1W). All was well once this had been done. **P.S.**

Bush 2874NTX

How about this for detective work?! The set was stuck in standby and the customer also complained that the front controls didn't work. This second problem can normally be cured by going into 'features' and setting the child lock to 'off'.

The thing I found puzzling about the actual fault was that there was 15V at the collector of the line output transistor. After finding that the power supply was operational, I decided to remove the EEPROM chip. The set then started up. To cut a long story short, when I fitted a front panel from a scrap set and reconnected the EEPROM there was normal operation. The cause of the fault was the remote-control sensor. **P.S.**

Hitachi C2546TN

This set produced a blank raster, with no sound or picture. It worked all right with signals connected via the scart socket. After finding that the supplies to the tuner were present and correct I decided to order a replacement. The new tuner, part no. E710029, restored normal operation. **P.S.**

Bush BTV170T

These portable combi sets come in cabinets with various colours – silver, black and yellow. No text is a common fault. To deal with it you need to contact Bush Technical who will fax through a program sheet to restore the text. It's straightforward once you are in the service menu. **P.S.**

Tatung F series chassis

When this set, a **Decca Model D14RFG6**, was first switched on a picture appeared. Then, after a minute or so, everything closed down. I also noticed that the on-screen display was very dark. This drew my attention to the tube base, where I found that the three 180kΩ, 0·5W resistors R909, R913 and R922 all produced different resistance readings. Once replacements had been fitted there was a good picture. **P.S.**

Samsung CI633CN

There was sound but no picture with this set. When I advanced the setting of the first anode control on the line output transformer the picture returned. This led me to suspect the transformer, but I phoned Samsung Technical for confirmation. I was given a word of warning as well. When you fit the replacement, back off the A1 control for about fifteen minutes. Wonders never cease! **P.S.**

Hitachi C2886TN

This set had a good picture but no sound. A check on the voltages around the sound output IC showed that they were all OK, and I then found that the muting transistor Q4000 had been turned on (0·6V at its base). The mute signal comes from the microcontroller chip, so thought turned to the EEPROM settings – I'd had trouble in this area before. As it was, there had been a thunder storm in the area a couple of days previously. So into the service mode I went, to check that the correct sound system was selected etc. Everything was OK.

It was time for more radical action. I selected "E2 shipping mode", which downloads default data into the memory. After doing this the set had to be retuned, but the problem had been solved. I wish I'd thought of it before taking the back off!

To get into the service mode, hold down the menu key until the installation line appears. With the install menu on screen, press the volume up and down buttons at the same time, for about six seconds, until service becomes an option. Once this has been done follow the on-screen pointers. **M.W.**

Panasonic TX25W2 (Alpha 3 chassis)

The report said that there was a teletext fault with this set. When it was switched on and left for several minutes the text header became erratic and unstable. When mixed text was tried it was not synchronised, nor was the channel identity.

After much detective work the cause of the trouble turned out to be C3511 (220pF) on board H. It's connected to pin 24 (timing PLL) of the SAA5231 text video processor chip IC3501. **K.G.**

Mitsubishi CT25M1

This very strange fault turned out to be manmade. When it was tested the set was seen to have faint bars across its screen, but it was OK with a scart-input signal. While carrying out checks in the power supply I noticed that someone had replaced Z950 with a 1Ω resistor instead of a circuit protector. C956 also appeared to be the worse for wear. **K.G.**

Ferguson T14R (TX805 chassis)

This set displayed a blank screen: if the CRT's first anode voltage was increased a slightly reddish raster appeared. The cause of the fault was RT40 (68kΩ, 0·5W) on the CRT base panel. It forms part of the base bias network for the RGB output transistors. **K.G.**

ITT CT3436 (80R 90° chassis)

A squeak on sound, just after switching off, was one of the faults with this vintage set. The cause was eventually traced to failure of C232 (100µF, 25V) in the HF module. While this module is apart, it's as well to replace C227, C228 and C229.

Another problem was intermittent white spots on the picture and a persistent spot at the centre of the screen after the set had been switched off. These faults were cured by dismantling the focus control and resoldering the earth connection. **G.B.**

Sony KVX2162U (AE2 chassis)

This set had caused us a problem over several months. From time to time the picture would disappear, leaving normal sound but the LED on the front panel flashing randomly, which indicates a fault within the auto-greyscale circuit. The video driver IC and various components on the tube base panel were replaced, but

the fault was so intermittent that I was never sure of the diagnosis – and the set kept coming back.

After a while the fault became more or less permanent and I was able to make some comparison checks with another similar set. The first anode voltage seemed OK at about 350V, but in fact should be nearer to 700V. When I investigated the 680kΩ feed resistor R701 on the CRT's base panel it fell apart. A replacement restored the A1 voltage and a normal picture. **R.B.**

Hitachi CPT2196 (G8Q chassis)

There were several fault symptoms with this set: patterning on the picture, slow response to remote-control commands, and occasional complete loss of the signal. While checking in the power supply I noticed that C933 (2,200µF, 25V), which is the reservoir capacitor for the supply to the 12V regulator IC932, was leaking badly. Normal operation was restored once this and several other doubtful capacitors had been replaced. **R.B.**

Philips 14PV345/05 (TVCR99 chassis)

This televideo unit had no TV picture and no video playback, though the teletext and on-screen displays were OK and the sound was normal. The TDA8841 jungle chip receives RGB text information from the SAA5562 'painter' IC: pin 26 of the TDA8841 switches it to the text mode. I found that this pin was not fully earthed in the picture mode, so the IC thought it should be displaying text. After tracing the circuit back via a number of intermediate components I came to the conclusion that the painter chip was faulty. A replacement cured the problem.

If a set fitted with this chassis appears to be dead at start up but the record LED is flashing, suspect the EEPROM chip IC7801 on the TV board, near the text IC. If the standby LED is flashing, suspect the other EEPROM chip IC7818 on the video board. Note that this information is incorrectly reversed in the service manual. As usual, I found out the hard way. **R.B.**

B&O Beovision L4500

The picture was poor, with a distinct blue cast and blue steaks from white edges. Checks on the tube base PCB showed that the blue video output transistor's 10kΩ load resistor was open-circuit. **R.B.**

Thomson 37M973J (ICC9 chassis)

The problems with this huge set were a dicky on/off switch and the picture bowing in at the sides. The switch was easily sorted out, but the EW problem was one of those repair-by-instalment faults!

A scope check at pin 27 (EW drive) of IV01 showed that there was no output. There should be a 1·2V peak-to-peak waveform at line frequency here. So I replaced IV01 (STV2160). This involves uprating the surface-mounted capacitor CV46 to 22nF (previously 10nF) – it's the breathing compensation capacitor at pin 19. I also found that RL45 (3·3Ω), which is in series with the EW driver transistor TL40 (BD675), was open-circuit. It seemed best to replace them both.

At switch on I found that the right-hand side of the picture was correct but the left-hand side was still curved in. I suspected that one half of the EW coil LL08 might be short-circuit. In addition there was no EW adjustment. Replacements for LL08 and CL42 (4·7µF, 160V), which measured low in value, finally cured the fault. CL42 is in TL40's collector circuit.

Replacement part nos. are IV01 11039162, TL40 10520590 and LL08 10092690.

To enter the service mode, carry out the following procedure. Switch off using the mains switch and allow the LED to extinguish. Switch the set on again while holding down the blue text key on the remote-control unit. Press the blue key again. **M.S.D.**

GoldStar CI20E20F

This set was drifting in and out of tune. The fault was cured by replacing Q06 (KTC3198V), ZD401 (33V) and D404 (1N4148), which are by the tuner, and C415 (220µF, 16V), C414 (47µF, 50V) and C418 (10µF, 50V) which are by the line output transformer. **M.S.D.**

Akai TV2034

This set was stuck in standby. The HT was low at only 50 per cent of the correct voltage, and the front LED was blinking. Sounds bad? The set was actually in the child-lock mode. All I had to do was to obtain the remote-control unit, switch on and disable it. **M.S.D.**

Ferguson M8422U (ICC17 chassis)

If one of these sets comes in dead with the mains fuse blown, check DP06 (BZW04-342) which is connected across the mains bridge rectifier's reservoir capacitor. The part no. is 25354340. It's not shown in all the circuit diagrams for this chassis. **M.S.D.**

Toshiba 55PJ6DB (C5SS chassis)

The complaint with this large projection set was "keeps going off". I had to wait about 50 minutes for the fault to occur. Sure enough the set was completely dead, but life was restored by switching off and on at the mains supply.

The clue was the fact that the set went off completely, with no LED light at the front. This indicates loss of the 5V supply from regulator Q852. A quick check here revealed a broken and dry joint at one of its legs. Q852 has a large, ungainly heatsink attached to it, and this doesn't quite sit properly. As a result the IC's legs are stressed, which can result in a fractured leg.

Access to the main power supply board is quite easy. Simply remove all the screws from the back panel, reach your right hand into the back of the set and unclip all the connecting leads. Don't worry too much about how to refit them, as they are more or less unique to their own sockets and go back in quite easily. Once its own two retaining screws have been removed the whole assembly slides out of the rear of the set.

Resoldering Q852 provided a permanent repair. **M.S.D.**

Sharp 66DS03H

If one of these sets comes in with only half the field scan, check fuses F601 and F602 (2·5A) before you panic and reach for the pills. They commonly fail, producing this symptom. **M.S.D.**

Ferguson X51FB (TX91 chassis)

This set was stuck in standby. A check on the BUH515 line output transistor produced measurements that seemed to be all right, but it was hot. A replacement solved the problem. **M.S.D.**

Bush 2863NTX/A (11AK19E3 chassis version)

This set seemed to be dead, but there was an extremely low HT supply – 16V. I tried running the power supply with a dummy load in order to check the components on the primary side, including the optocoupler, but everything seemed to be OK. Thinking that there might be a heavy load on one of the LT supplies, I checked around the regulators. The supply to the 5V regulator IC804 was missing because R867 (0·33Ω) in the feed was open-circuit. A replacement also restored the HT, with the set then fully functional. **G.W.R.**

Amstrad CTV3028

The nearest thing to a good old-fashioned stock fault with this model is an intermittently over-bright raster with flyback lines and the sound present. The cause is loss of the supply to the RGB output stages of course. When you follow the four-way ribbon cable from the tube base PCB to the main board you will find the dry-joint obvious – it's at the pin nearest the back edge of the board. The socket should be unsoldered and pushed fully home. This is usually prevented by a resistor that needs to be gently bent out of the way. **R.Bu.** ■

HELP WANTED

The help wanted column is intended to assist readers who require a part, circuit etc. that's not generally available. Requests are published at the discretion of the editor. Send them to the editorial department – do not write to or phone the advertisement department about this feature.

Wanted: 6in. blue CRT type SANYO180YB22, made by Hitachi, for a Sanyo rear-projection TV system, model no. unknown. Would consider a complete TV for spares. Also looking for a CRT base. R. Brown, 11 Garnet House, St. George's Road, Brighton BN2 1EU. Phone 07980 164 189.

Wanted: The following FETs, type NF510 (or 2N4391) and ITS3948 (this is a dual FET). They are used in the Philips PM2423 digital multimeter. P. Watmough, The Chow Chows, Church Lane, Redmile, Notts NG13 0GE. Phone 01949 842 687 or 07850 202 678 (mobile).

Wanted: A chopper transformer and TDA4600 IC for the Ferguson Model 51P7 (TX98 chassis). R.E. Hill (H09447), VTC Electronics Workshop, HMP Dartmoor, Princetown, Yelverton, Devon PL20 6RR.

Wanted: Has anyone encountered the following fault with a Goodmans Model TV2055T? When the remote-control unit's text button is pressed a minus digit appears. The station changeover and colour-shading buttons operate normally. J. Reed, 88 Conway Road, Llandudno LL30 1PP.

Wanted: DAF (dual astigmatism and focusing) module, part no. 2322 460 92612, for a Philips Brilliance 21A monitor. Willing to pay a good price to fix an otherwise scrap monitor. Phone Terry Walters on 01628 628 140 (evenings) or e-mail terry@walters821.freeserve.co.uk

Wanted: Circuit diagram/service manual (photocopies OK) for the Cathay Model MTV12 (PCB 1491). It's a Chinese-made monochrome portable (not TV6200 or MTV1250). Alternatively does anyone know the pin connections for the KA2912 and KA2102 ICs? Also help required with the following problem. The set, fitted with the Ferguson/Brandt IKC2 chassis, is stuck in standby. Circuit protector FP02 in the 15V supply goes open-circuit after the standby light flashes for a while. The line driver transistor TL17 has been replaced, and IF01 (TL082) and TR16/TR17 check OK. Roy Bailey, 22 Grebe Close, Waterlooville, Hants PO8 9UT. Phone 02392 783 811.

Wanted: Service information on cordless telephones – all makes, from earliest to current models. Does anyone have any redundant manuals, or does anyone know of a source? Would consider purchasing manuals. Any help in obtaining information would be much appreciated. Roger Burchett, 12 Ormonde Road, Hythe, Kent CT21 6DN. Phone 01303 267 969.

Wanted: CRT base board (CRT 251001.04-SSCU) for the Grundig Model GT2103 (G1000 chassis), or a complete set for spares. Please phone Terry on 0121 459 1050 (Birmingham), evenings.

Wanted: I am willing to pay cash for circuit diagrams of central-heating control boards. Makes such as Potterton, Pektron, Pactrol, Stelrad and Vaillant in particular, but anything considered. John Fish, 25 Upper Roman Road, Chelmsford, Essex CM2 0EX. Phone 01245 609 750.

Wanted: IC type SI1125H4 for the B&O Model 2002. S. Whilson, 14/3 Dalkeith Road, Edinburgh EH16 5BP. Phone 0131 667 2426 (CWTV). Mobile 07951 489 585.

Wanted: Circuit diagram or service manual for the Yamaha YTA-45 combi amplifier. Photocopies OK. Steve Riley, 49 Poppy Lane, Stockton-on-Tees, Cleveland TS19 8FL. Phone 01642 679 207.

Wanted: XYZ amplifier board for the Philips PM3070 oscilloscope; service manual for the Barco 90 00500 projector; and a head for the Philips VR712 VCR. Phone Denis Bunker on 01442 864 334 (Berkhamsted).

Wanted: Lead for a Panasonic multi-changer to connect CX-DP600 (13 pin) to its head unit CQ-R35LEE (8 pin), or wiring information so that I can make one. Reasonable price paid. Phone Phil Barry on 01677 424 573 or e-mail phil@colourfusion.fsworld.co.uk

Wanted: For spares or repair, non-working Quad 405 power amplifiers, Quad 33 and 44 preamplifiers, Quad FM3 and FM4 tuners. Also require Spendor BC1 speakers and Denon DL103 cartridges. Phone Mike on 01758 613 790.

Wanted: Pace PRD800/900 and Amstrad /Fidelity SRX100/200 analogue satellite receivers, with service manuals and remote controls, for teaching purposes. B.Speaks, Room 125 Engineering Staff, Bolton Community College, Manchester Road, Bolton, Lancs BL2 1ER. Phone 01204 453 396/453 397 or e-mail bertinspeaks@hotmail.com

For disposal: A small stock of 0·25W metal-film resistors, capacitors, ICs, transistors, potentiometers and three cassette housings, all new, free – about 8kg. Also a large stock of ICs and transistors going very cheaply, separately or in bulk. Phone Maurice Nalletamby on 020 8852 2871. Webpage address http://web.onetel.net.uk/~simplelife

Wanted: A Mullard thermistor type VA1077 – the original is oblong and is colour-coded orange, red, black. Also a BSR TC8H or X5H cartridge. Geoff Davies, 13 Bowen Road, Rugby CV22 5LF. Phone 01788 574 774.

Wanted: Main circuit board for the Grundig Jumbo Model M95-490/NIC/FT/GB (CUC3850 chassis), preferably in working order. Larry Vyas, 8 Tiverton Road, Edgware, Middx HA8 6AZ. Phone 020 8933 0098, mobile 07958 420 568.

Wanted: 33in. CRT type A80EFF002X11 for the Toshiba Model 3357DB. Phone John Howes on 01892 537 288 (Tunbridge Wells, Kent).

Wanted: Remote control unit for the Uniden UST-7007 satellite receiver. Phone F. Thorne on 01726 67 585.

Wanted: Instruction book for the Xsat CDTV200 digital satellite receiver, manufactured by Xcom Multimedia in France. Also if possible a circuit diagram and/or manual. V. Smith, 175 Lyon Park Avenue, Wembley, Middx HA0 4HD. Phone 020 8902 5447.

Wanted: Power supply board, part no. A-1245-419-A, for the Sony Model KV-16XMTU. R.J. Schroder, 6 Ploughmans Drive, Shepshed, Loughborough, Leics LE12 9SG. Phone 01509 505 272 (evenings), 01509 612 256 (daytime).

WEB SERVICE

To reserve your web site space telephone

Tel: 020 8722 6028 Fax: 020 8722 6060

E-MAILS j.thorpe@cumulusmedia.co.uk

Alltrade Aerials & Satellite Ltd

http://www.alltrade.co.uk

Phone 01273 413798 Fax 01273 425700
Full e-commerce site with over 1500 products with in-stock quantities!! We supply everything associated with Digital/Analogue Terrestrial & DTH/Motorised Satellite reception. All Antennas. All Brackets. All Cables. All Connectors. All Amplifiers. We provide a free MATV/SMATV planning service as well.

A.R.D. Electronics Plc

http:/www.ardelectronics.com

A.R.D.'s Website details all the information you need to know about this new and exciting electronic component distributor. It shows how to: open an account (credit or cash), obtain a trade catalogue and place orders (both online and direct).

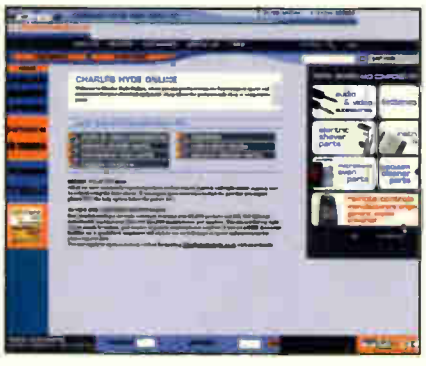
Cricklewood Electronics

http://www.cricklewoodelectronics.co.uk

Cricklewood Electronics stock one of the widest ranges of components, especially semiconductors including ICs, transistors, capacitors, resistors. all at competitive prices.

Charles Hyde & Son Ltd

http://www.charleshyde.co.uk



Search for both original and copy spare parts in our extensive database covering Akai, Alba, Bush, Ferguson, Goldstar, Hitachi, LG, Matsui, Nokia, Saisho, Sanyo, Sony, Sharp, Thomson, Panasonic, Philips, Samsung, Tascam, Teac, Toshiba, Yamaha and many more. In addition huge ranges of Lasers, Lopts, Remote controls and Semiconductors may be accessed.

Dönberg Electronics

http://www.donberg.ie

http://www.donberg-electronics.com

http://www.electronic-spare-parts.com

As the leading distributor for the TV, Video and Audio trade in Ireland, we supply over 2000 shops & service dept with Audio-Video and TV spares, Semiconductors, Test Equipment, Service Manuals, Remote Controls etc. At present we stock over 35,000 different lines. We hold agencies for: Panasonic, Sharp, Mitsubishi, Sanyo, Beko, Ersa, Müter, Diemen HR, Philex, PRF, König-electronics. We specialise in parts for all continental sets and obsolete semiconductors.

EURAS International Ltd

http://www.euras.co,uk

This website offers you a comprehensive online Repair Information System, including Technical Repair Information, Discussion Forum, Tech-Chat and a valuable Pinboard System. Visit the site and apply for a free 30 day trial (no deposit required)

J W Hardy Communications

http://www.jwhardy.co.uk

R.F. Network Specialist.
Shop online - for R.F.network components. We supply a full range of TV, radio reception equipment to receive analogue/digital signals from both terrestrial and satellite sources. We provide a free planning service for your R.F. networks, MATV and SMATV etc

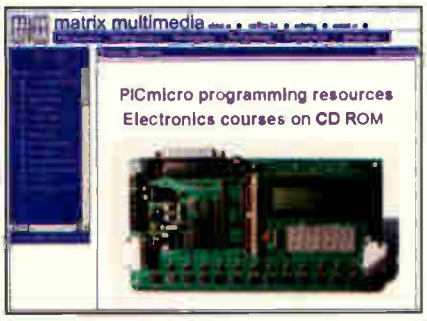
Holderness Solutions Ltd

http://www.digisatsolutions.com

Suppliers of over 3000 lines of equipment to the aerial and satellite trade. All major brands stocked from coax plug to 1.8mtr + dishes.

Matrix Multimedia Ltd

http://www.matrixmultimedia.co.uk



Matrix Multimedia produces courses in electronics and PICmicro programming. Products include a flexible PICmicro development board and Flowcode - which converts flowcharts into PIC programs.

M.C.E.S.

http://www.mces.coo.uk

The MCES site gives details of our range of service including Tuners, Video Heads, RF & IF Modules plus latest prices offers.

MMWafercards

http://www.mmwafercards.com

Smartcards and programmers for all access-controlled applications.
Incorporating www.satstore.co.uk
The Enthusiasts Satellite Store.
Tel 01386 48731 Fax 01386 765875

Radio Restoration Company

Edinburgh

Specialist repairs to Hacker & Roberts radios, postal service if required. All valve and transistor radios & rebuilds undertaken. Free estimates – trade welcome, large selection of radios large & small Etc, from 1920s on always available.
Contact:- Jamie Gillan 0131 2251475

Service Engineers Forum

http://www.E-repair.co.uk

The forum is now visited by Thousands of engineers every week, over 3000 pages of content including new repair tips, servicing articles, circuits, help, for sale, wanted & industry news sections, open access to the site is free to all engineers.
Our product mailing list is also available free of charge for engineers without net access, ring Mike on 0151 522 0053 with your address details.

Switch-it-on

http://www.switch-it-on.co.uk

We sell multi-region dvd players to trade and public, also tv, videos, hifi and playstation 2. We design our own upgrades on dvd and we sell all spare parts. All makes and most models stocked.

Swires Research

http://www.swires.com

Swires Research produce high quality instruments for the television industry, including portable signal level meters and spectrum analysers for digital and analogue RF signal measurements.

Televes

http://www.televes.com/ingles/ingles.htm

Televes website was launched as an easier way to keep in contact with our World-wide Network of Subsidiaries and Clients. This site is constantly updated with useful information/news plus you can download info on our

range: TV Aerials & accessories, Domestic and Distribution amplifiers, Systems Equipment for DTT and Analogue TV, Meters and much more.

Transworld Satellite

http://www.transworldsatellites.co.uk

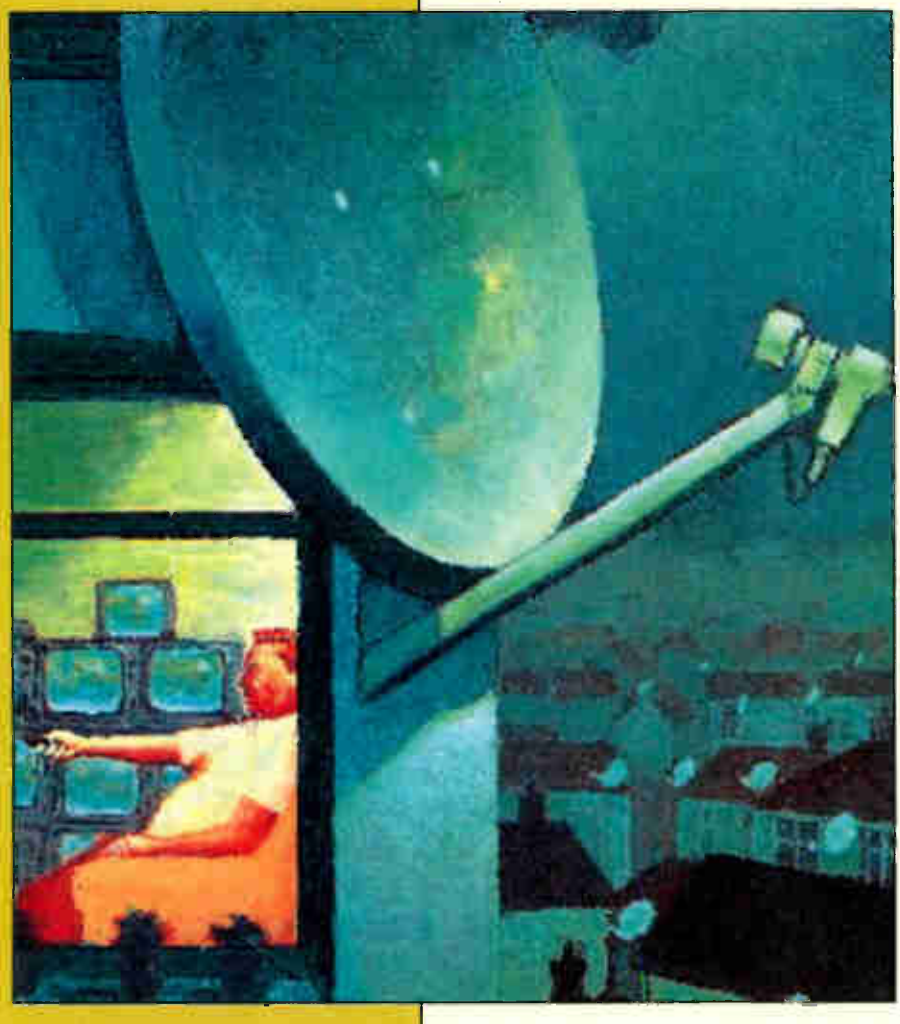
Fifteen years experience serving enthusiast hobbyist, broadcasters, trade, complete range receivers, cams, programmers, cars, dishes, motors. with excellent technical support and friendly service. Telephone 01947 820999

Vintage Wireless Co London

http://www.vintagewirelesslondon.co.uk

Phone 0207 2583448 Fax 0207 2583449

Supplies of vintage hi-fi, wireless, sales & service, spare parts, valves, components, transformers, knobs, ceramic cartridges, stylus and more. Vintage hi-fi litreture, magazines, circuits. Wanted tannoys & early hi-fi audio valves for cash.



SATELLITE NOTEBOOK

Reports from Michael Dranfield and Christopher Holland

Grundig GDS200/1 LNB power supply

Problems with the LNB supply produced by this digibox are not difficult to rectify, but it's helpful to understand how the circuit works. The 13/18V supply for the LNB is produced by a separate chopper power supply that's fed from the main one. It's arranged as a 'forward converter'. Fig. 1 shows the circuit, simplified.

Rectifier diode D8 is fed from a winding on the main chopper transformer. It produces about 30V across the reservoir capacitors C22 and C23. This voltage is also used to feed the tuning-voltage regulator IC7. L6 and C24 form a low-pass filter to remove switching ripple from the input to the LNB chopper transistor Q5. The toroidal inductor L7 provides energy storage when Q5 is switched on. The 'efficiency diode' D9 switches on when Q5 is switched off, thus maintaining the current flow.

The drive applied to the base of the chopper transistor Q5 is a fixed-frequency (64kHz) squarewave whose mark-space ratio is altered to provide an output at 13V (vertical channels) or 18V (horizontal channels). Horizontal/vertical channel selection is carried out by altering the voltage on the green wire in the power supply. This voltage is fed to Q6, which acts on the chopper control chip IC6.

When Q5 is switched on, current flows via the LNB and L7. The current in L7 produces a magnetic field, which means that energy is stored in the core. When Q5 is switched off, the negative-going potential at its collector switches D9 on. The magnetic field around L7 collapses, maintaining a flow of LNB current via D9. Current limiting in the event of an LNB short is achieved by sensing the voltage across R43 and reducing Q5's on time. The power supply can provide a maximum of 350mA and, because Q5 is either fully on or fully off, there is minimal dissipation in this transistor. The low-pass filter C27/L8 removes 64kHz ripple from the LNB supply. The white wire on the PCB is the output to the LNB.

With revision A PCBs the chopper control chip is on a separate stand-up subpanel. Because of the high-frequency of the chopper action, small-value smoothing capacitors can be used.

This is where most of the problems arise. Because C22 and C23 are in parallel, an in-circuit ESR test on either capacitor may produce a good reading even when one of them is open-circuit. Any capacitor that has a bulged top or a brown stain on top where it has vented must be replaced. An oscilloscope check for HF ripple is essential. A supply that

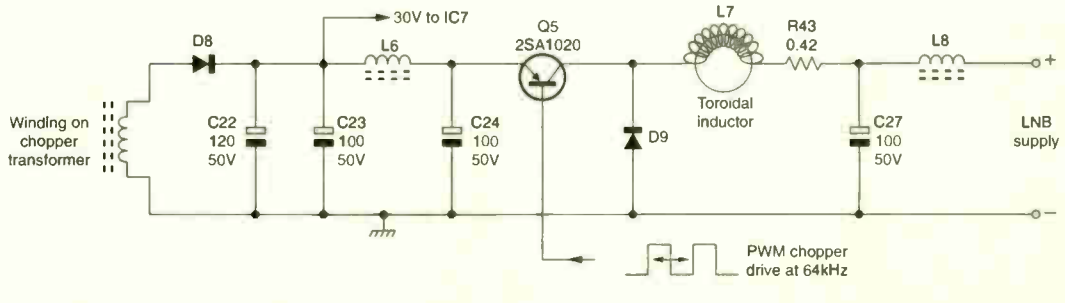


Fig. 1: Simplified circuit diagram of the LNB power supply used in the Grundig GDS200/1 digi-box, revision A PCB.

has more than 50mV peak-to-peak of ripple has a decreased-value capacitor across it. The increased HF ripple when the value of a smoothing capacitor falls by even a small amount can cause all manner of peculiar faults, though the voltage may measure spot on. Replacement electrolytics must be of either the low or, better still, ultra-low ESR 105°C type.

Photo 1: ADU test pattern transmitted via Eurobird transponder D5S.

Photo 2: Another test pattern seen via Eurobird transponder D5S.

Photo 3: Kingston Communications identification, with colour bars.

Photo 4: The Motors TV caption.

In the event of a capacitor failure it's best to replace all the electrolytic capacitors on the power supply PCB, but this depends on how much the customer is prepared to pay – ultra-low ESR capacitors are not cheap. The black capacitors used in this power supply seem to be of poorer quality than the brown ones, and are more suspect.

Dry-joints are also starting to show up in the GDS200 power supply, especially at the heatsink-mounted regulators and power diodes.

The voltages on the output rails in the GDS200 power supply are as follows:

Yellow lead 12V
White lead 13V or 18V to the LNB
Brown lead 5V
Green lead, voltage select: low = vertical, high = horizontal
Blue lead 30V tuning supply
Black leads (nine) all at chassis potential
Red leads (four) 3·3V rails

But remember to check very carefully for ripple. **M.D.**

Pace 2200 digibox

This digibox had suffered from lightning damage – confirmed when I found that the 39V zener diode D852 at the line side of the modem was short-circuit. A modem kit was obtained and fitted, along with a new DSP1675 modem microcontroller chip (U700). But at switch on the box was completely dead – even the standby light wasn't illuminated. Checks on the primary side of the power supply revealed that D2 (RS2K) in the snubber network was short-circuit. I decided to replace the TOP224Y chopper chip U2 as well, and wondered whether to replace the optocoupler U3 but decided against it. Instead, I connected a digital voltmeter across the 3·3V line and switched the digibox on.

The 3·3V output rose to 4·4V, and I quickly switched off. I knew I should have replaced the optocoupler! After doing this the digibox came on, but it wouldn't change channels. It was likely that the flash memory had been corrupted by either the lightning strike or the high output voltages from the power supply. All that was required to restore the digibox to full working order was a forced flash-memory upgrade. **M.D.**

Digital channel update

The latest channel changes at 28·2°E are listed in Table 1 – where allocated, the EPG number is shown in brackets after the channel name.

Some BBC interactive services are now using transponder 30 (Astra 2B, 12·288GHz/V). Tests of the Eurobird transponder D5S (11·546GHz/H) have started, with transmissions of various test patterns – see Photos 1 and 2 for example. This should delight test card enthusiasts! Kingston Communications has recently been transmitting colour bars with the identification KCOM PLAYOUT (see Photo 3) via transponder 33 (Astra 2B, 12·344GHz/H). Transmission of the Breeze (EPG 136) and Wellbeing (EPG 211) channels has ceased.

Fox News left the Eurobird transponder D3S (11·508GHz/H) in January but has since returned and is listed in the EPG as ch. 531. A Sky subscription card is required to view the channel however – it's not available with a free-to-air viewing card.

A Motors TV caption has started to appear via Eurobird transponder D4S (11·527GHz/V), see Photo 4. **C.H.** ■

Table 1: Latest digital channel changes.

Channel and EPG	*Sat*	*TP*	*Frequency (GHz)/pol*
BBC Radio 5 Live Sports Extra (907)	2A	5	11·798/H
CBBC (621)	2A	1	11·719/H
CBeebies (622)	2A	1	11·719/H
Formula 1 Digital + (434)	2A	23	12·148/H
Gaydar Radio	2B	33	12·344/H
Let's go Shopping (650)	EB	D7S	11·588/H
Rampage Radio (906*)	2B	32	12·324/V
Team Talk Radio	2B	33	12·344/H
Text Me (841)	2B	33	12·344/H
UK Style+1 (149)	2A	6	11·817/V

*Rampage Radio appears in the EPG only with viewing cards for the Derby/Midlands area, though it can be added to the other channels list manually elsewhere.

Gaydar and Team Talk Radio have no EPG number at the time of compiling this table.TP = transponder, 2A = Astra 2A, 2B = Astra 2B, EB = Eurobird.

DVD

Fault reports from Geoff Darby

We welcome fault reports from readers – payment for each fault is made after publication. See page 358 for details of where and how to send reports.

Sony HCD-S300

The reported fault with this combined DVD player/5.1 channel power amplifier was "CD stuck in drawer". When it was first powered there was a soft clatter from the deck, in bursts. This would sometimes clear up and the unit would then work normally until left to get cold again.

I dismantled the deck from its carrier/drawer assembly and laid it on top of a sheet of card so that I could see what was going on. As I suspected the clatter came from the laser drive worm, which was slipping against the drive pawl because the laser was already firmly 'home'. A check with the manual showed that the laser-home sensor is optical. Scope checks then revealed that while there was a supply to the LED section of the sensor the output pin was low under all conditions.

This led me back to R004, a minuscule 22kΩ surface-mounted resistor on board TK, which is mounted beneath the deck. There was 3·3V at the adjacent through the board plated hole at one end but nothing at the other end. Inspection with a powerful magnifying glass then revealed that there was no solder at all at the 'high' end of this resistor. Once I had added some, using a tiny-tipped soldering iron, there was normal operation.

Proline DVD1000

This DVD player's power supply was completely dead. The circuitry is fairly simple, based on a single TOP series chopper IC. None of the associated components appeared to be distressed but, before condemning the IC, I thought I would check a few other components. When I checked D7 on the secondary side of the circuit I found that it was short-circuit. A replacement restored life to the power supply but when I asked the drawer to open it came out a couple of centimetres then jammed. This had, presumably, been the reason for the rather unusual diode failure.

The cause of the jamming was that the U-section strengthening bar across the top of the deck had been fitted upside down – the arms of the 'U' were pointing down instead of up. As a result a plastic pin that stands up at the back of the tray caught on it. Clearance was restored once the bar had been fitted the correct way round, and the whole unit then worked normally. I wonder who had been inside the unit, and why?

Sony HCD-S300

Two of these units came in during the same week, with similar fault symptoms but totally different causes. In both cases there was no audio output from any of the six channels, because the protection relays failed to pull in.

With the first unit the cause of this was a defective output chip, IC361, which drives the left front and rear speakers. It's not easy to determine which of the three digital output ICs is faulty. When they are operating normally there is a DC offset of about 7V with respect to chassis at both speaker socket pins with each of the six channels. When I checked the outputs with this unit, at the input sides of the relays as they were not closed, the two good chips had, misleadingly, 0V at their output pins while the faulty chip had 12V at one pin and 7V at the other.

These measurements can vary. Past experience has shown that the most reliable way of establishing which IC is faulty is to find the one that has different voltages from the other two at its output pins – even when the different voltages seem right!

The second unit with similar symptoms had the correct voltages to chassis at all the IC output pins, which indicated that the cause of the fault was not in the output stages. So I decided to check the protection circuit, which is on a sub-PCB that's plugged into the main one. To my dismay it bore no relationship to the circuit diagram or layout shown in the paper manual, nor the electronic Sony Assist one. To make things even more difficult, none of the fourteen connections to the protection PCB are labelled functionally on the circuit diagram.

I eventually found that the drive for the relay-driver transistor is at pin 3 of the board's connector, CN402. This pin should go high about six seconds after the unit is taken out of standby. As this happened, suspicion fell on the relay-driver transistor Q405. This tiny, surface-mounted transistor has to switch three 100Ω relay coils and doesn't look anything like man enough to do the job. Although it read OK with DC checks its gain was low. A replacement restored normal relay operation. ■

Answer to Test Case 472

– page 365 –

The old Panasonic TX25T2 is now back with Real Technician's girlfriend, with a stable picture and a good prospect that it will stay that way, also that the set's line output transistor will see out the CRT. The items that Real Technician had overlooked in the power supply are those most vulnerable to ageing and unreliability: the electrolytic capacitors. There are two on the primary side, the mains bridge rectifier's reservoir capacitor C807 (220µF, 400V), and C808 (10µF, 50V) which provides the chip's LT supply. At TV Ted's suggestion they were tested with an ESR meter. Both produced poor readings. R818 (120kΩ) was also replaced. It read all right when checked with an ohmmeter, but looked a bit tired. It's in the feed to the chip's error-sensing pin. The original chip has been returned to the stores with OK written on it!

The solution to the problem of spasmodic line output transistor failure was to rework the line driver transformer's pins thoroughly. Careful examination revealed that they had not been making reliable contact. Why are line driver transformers so prone to this trouble? We reported on the problem recently, in Test Case 467 (last September).

Anyway, Real Technician's girlfriend now thinks that he's an ace engineer. She doesn't know that he had overlooked the obvious, and that Ted had provided the diagnosis.

NEXT MONTH IN TELEVISION

Home networking

Mark Paul provides an update on the 'intelligent home', covering the latest technology in this field. The three approaches – use of existing wiring as the transmission medium, installing new wiring, and RF techniques – are covered.

Hitachi VT645 fault-finding guide

John Coombes on how to tackle the various faults you can get with this VCR.

Latest developments from Sony

Sony recently released details of a number of technological developments in several areas, including DVD-Video, DVD recording, digital imaging, Super Audio CD, the MiniDisc, recording media and TV displays. George Cole reports on the innovations and products we can expect to see later this year.

Avoiding PC virus attacks

PC viruses have become a plague and cause wasted time and effort. The best policy is to play safe and install protection. Quite a lot of this is available. Nick Beer surveys the current situation and makes recommendations.

Panasonic's Motion DV Studio

Brian Storm describes the use and features of this digital video editing system, which works with IBM-compatible PCs.

Published on the third Wednesday of each month by Cumulus Business Media, Anne Boleyn House, 9-13 Ewell Road, Cheam, Surrey SM3 8BZ. **Cumulus Business Media** is a division of **Highbury Communications PLC**. **Filmsetting** by G&E A1 Parkway, Southgate Way, Orton Southgate, Peterborough PE2 6YN. **Printed** in England by Polestar (Colchester) Ltd., Newcomen Way, Severalls Industrial Park, Colchester, Essex CO4 4TG. **Distributed** by Comag, Tavistock Road, West Drayton, Middlesex UB7 7GE (tel. 01895 444 055). **Sole Agents** for Australia and New Zealand, Gordon and Gotch (Asia) Ltd.; South Africa, Central News Agency Ltd.

Send letters to "Television", Cumulus Business Media, Anne Boleyn House, 9-13 Ewell Road, Cheam, Surrey SM3 8BZ

or e-mail tessa2@btinternet.com

using subject heading 'Television Letters'.

Please send plain text messages. Do NOT send attachments. Be sure to type your full name, address, postcode, telephone and e-mail address (if any).
Your address and telephone number will not be published but your e-mail address will unless you state otherwise.
Please send ONLY text intended for the letters page. Correspondence relating to subscriptions and other matters must be sent to the office address given above.

LETTERS

Technical support

After about two years of almost constant decline in brown-goods servicing there has, during the last six months, been a consistent revival in my turnover. This could be because of less competition – many repairers have gone out of business – or it could possibly be because large-screen/widescreen sets, sales of which increased a few years back, are now starting to fail. Whatever the reason, there are at last some genuine grounds for optimism.

Unfortunately some features of our trade have become even more difficult. Here's a practical example. I recently had in a Ferguson TX807 chassis set with the following symptoms: no results, and the standby light flashing. After spending an hour checking for a protection-mode fault I phoned Ferguson technical and was told that the set was in the child-lock mode! Easy enough when you know, but what would have happened if the set had been manufactured by Sony, Philips or indeed virtually any of the other setmakers, who provide no technical help? How many hours of time and how much money would have been wasted? It makes my blood boil, it really does.

Make no mistake about it, this lack of help is a threat to our survival as independent repairers. So our policy should be to encourage the sale of equipment produced by those manufacturers who help us, and discourage the sale of unrepairable products from unhelpful manufacturers. Say what you like about Bush/Alba for example, whose products are not always the last word technically, at least they are straightforward to repair and the company does give technical help to those in the trade.

It's vital to support companies who support us.

Justin Smith, proprietor ATV, Hillsborough, Sheffield.

DTT reception

I can well understand Dick Oliver's frustration with his digital terrestrial TV reception problems (letters, January), but it's wrong to blame the system for shortcomings with a particular type of receiver. The digital text slowness, lack of colour with subtitles and absence of colour when viewing text are all limitations with some first-generation DTT decoders. My Pioneer set-top box produces none of these symptoms, nor do we get picture pixellation or freezing or pops and bangs on sound.

Dick admits that he is "out of area", which could explain why his reception is so poor. The 'threshold' characteristic of all digital systems means that performance degrades very quickly with marginal signal strength. The 'graceful degradation' with analogue signals is a thing of the past.

I share Dick's concern about bit rates, but changing to SkyDigital won't help – the picture quality is generally no better. DTT has its shortcomings but is by no means as bad as sometimes suggested.

Richard Russell, Orsett, Essex.

I've been a reader of *Television*, or *Practical Television* as it then was, since 1959 and have made the occasional contribution to your pages. Now we are in the digital era, which I can only describe as a shambles. Here are my experiences since I obtained an ONdigital (as it then was) box about a year ago.

When I initially called at my local (Milton Keynes) branch of Currys a sales assistant was very helpful but said that no multiplexes were available in my area. This was 'confirmed' by the in-store reference book and the fact, I was told, that customers had brought back ONdigital boxes because they "didn't work". Now I have excellent analogue signals from Sandy Heath and the Oxford Beckley transmitters and, having logged on to www.jaura.freeserve.co.uk and www.digiguide.com, I was, unlike the shop, fully aware of the digital TV provision in my area and Milton Keynes. I also knew that I would need a horizontally-polarised wideband aerial. Once a very efficient Blakes aerial had been installed, with a double-screened

A scart-only VCR

I had almost given up repair of centre-loading VCRs, because of the inaccessibility of the PCB and the complications when trying to run a VCR with the deck floating in mid air. I took on a Ferguson FV205 which had a broken tape stuck inside however. There seemed to be no easy way of extracting the tape without removing the deck. A sneaky screw under the PCB meant that this had to be removed, along with everything else, from the plastic case.

After reassembling the unit I played a prerecorded tape and looked for the signal. The deck ran perfectly, but I couldn't find any signal. In desperation I asked the customer if he had the user manual. When he brought it along I found a small note in the set-up procedure saying that the machine doesn't have an RF modulator and can be used only with a scart connection!

I had never come across this before, and my relief was tempered by anger that no mention of this vital fact was present on the back of the machine. I wonder whether I'm the only one who has been caught out by this, and how many of these machines have been bought by people expecting to be able to use them with a TV set that doesn't have a scart socket? Even the cheapest machines can be used via an RF output socket.

L.P. Watkinson, Telesonic Services, Week St. Mary, Devon.

coaxial downlead (this is a must for reliable digital TV reception – so much for the system's much-vaunted noise immunity), I was able to obtain all the channels from the Beckley transmitter at good strength, even though this is not now my highest analogue signal level. So, having installed the dreaded box, I rang ONdigital.

I was assured that there wasn't any coverage in my area despite the fact that, during my phone call to arrange a viewing package over and above the much-vaunted free channels, the company enabled the package which worked immediately, minus the missing multiplex.

The Nokia Mediamaster 9850T box has a mind of its own however. When it's switched on, using the remote-control unit, there's a fairly lengthy delay before it kicks in. Reception quality is then excellent but, as and when it fancies, the box stops working and provides no picture whatsoever. Only by pressing the front-mounted reset button do I get any response – several attempts may be required.

Use of the text facility leaves a lot to be desired in comparison with the analogue system. And trying to guess which aspect ratio is being used for a particular programme is beyond a joke. Just for amusement the other night I gave interactive TV a try with *Who Wants to be a Millionaire*. Forget it. The programme makers couldn't even keep the questions and answers together. To expect someone who only wants to watch a favourite soap to mess about like this is ludicrous.

The programme content of the extra channels is another matter, ranging from absolutely superb to totally abysmal. It seems that there is insufficient material to fill the extra channels, unless you enjoy endless oldies, repeats and sport.

Finally, can someone tell me which genius decided to use a mixture of letters and numbers to describe the multiplex channels instead of one or the other?

Derrick R. Isham,
Buckingham, Bucks.

Vintage rectifiers

Further to previous letters on this subject, some of the old valve rectifiers were very reliable. For example I can remember replacing a UU6 that had been run continuously for sixteen yeas before going low-emission. Good reliability starts with the drawing board, and woe betide designs where the capacitors were not rated for peak voltage or higher just because a slow-heating thermionic rectifier was used. This point was overlooked by a famous German test-gear manufacturers who was the market leader in swept-frequency displays. The German equipment used large HT rectifiers which were the last valves to warm up. Unfortunately they were also the last to cool down and, true to Murphy's Law, the danger period was about the same time that it took to unplug the equipment and move it to another bench. When this was done the small, receiver-type valves would cool rapidly but the HT rectifiers would still have a hot cathode. If power was then applied the smoothing capacitors would sometimes explode. In the end modifications were devised, using a time-delay relay and avalanche diodes. This cured the problem. The moral of this little tale is that anyone who assumes that a peak voltage will never be reached is skating on thin ice.

In the Fifties a cowboy who overlooked this point destroyed a relative's pre-war wireless. The set had developed mains hum. He replaced the smoothing capacitor using one rated at 350V (the original had been rated at 450V working). It lasted a fortnight and this time the mains transformer burnt out. As the set used valves with 4V heaters, a suitable transformer couldn't be obtained. In those days electronic equipment was very costly, and the loss of the wireless and the fee paid to the cowboy was very upsetting. Nowadays, when colour TV sets in working order can be purchased at the 'recycling centre' (tip) for a pound or two the austerity of the Fifties seems weird.

David Benyon, I.Eng.,
Bude, Cornwall.

Getting on a bit, I can clearly recall directly-heated valve rectifiers (Letters, February). The 5U4 and 5Y3 were the Octal types most frequently encountered, the 5Z4 (EZ34) being the indirectly-heated counterpart. The main disadvantage with a directly-heated rectifier was when the rest of the valves were indirectly heated, as the HT rose to nearly the peak AC value of the mains supply at the rectifier's anode(s), stressing the electrolytic reservoir capacitor. A similar situation arose when silicon diodes were first used with indirectly-heated valves: one used to see electrolytics that were marked "350V DC wkg, 500V surge".

I remember repairing some early Cossor radio receivers that also used a directly-heated audio output valve, type PX4. There was a balancing potentiometer across the heater line to adjust for minimum hum, and the rectifier was of the 5U4 type. One day a neighbour's wife found that their receiver didn't work. This adventurous lady removed the back and saw that the rectifier's filament was cold. She rummaged in the cupboard, found a valve "of similar size" and plugged it into the rectifier's socket. To her delight the radio worked again, but after a few minutes billows of waxy smoke poured from the rear of the set. She had replaced the rectifier with a PX4.

When I was in South Africa many years ago I used to repair cinema audio equipment. Much of it was of US origin, with 5U4 rectifiers and wet electrolytics. Replacing these was good business! Eventually I used 5Z4s and dry electrolytics, and charged more for the repair.

Graeme Young,
Ravenshead, Notts.

DVD player jitter rate

My thanks to Geoff Darby (Letters, March) who also e-mailed to me the Panasonic information on DVD player jitter rate. It can be found at the Pananet website for dealers, and does indeed mention a rate of 082 (8·2 per cent). But it also says that for the model I had and other third-generation machines (DVD-A160/360, DVD-L50, DVD-LV75, DVD-PV55. DVD-RV20/40/60 and SA-HT80) a jitter rate of between 10 and 12 per cent is to be expected with a known good disc, e.g. a test disc. It adds that "some discs may show a higher rate than this at certain points, but tracking problems do not normally occur until the jitter reaches 15 per cent".

Panasonic technical confirmed this when I spoke to them. But clearly, as Geoff suggests, a lower reading should be expected.

Nick Beer,
Bideford, Devon. ■

Charges

I was puzzled by Jack Armstrong's comment that he charges £60 an hour (Workshop, march). Do I live on a different planet, or does he? Or maybe it's just a parallel universe.

I found that customers moan at paying £6 an hour for repairs. In fact they want you to work for nothing, and would probably like you to take them for a meal and decorate their homes as well, for free.

I've given up repairs now. But if Jack can give me some pointers to enable me to charge his hourly rate, or lets me know where such affluent customers live, I just might start up again. Alternatively he could employ me at £30 an hour, still charge £60 and spend his time down at the pub, which sounds great to me!

Stephen Woodbridge-Smith,
South West Hi-Fi,
Plymouth.

Service Link

PHONE 020-8722 6028
FAX 020-8770 2016

FOR SALE

CHROMAVISION
S-o-T
01782 848153
07970 728844
All working stock inc remotes
14" Combinations ..£79.80 + VAT
DVD Players.....£59.80 + VAT
28" Nicam.....£90.00 + VAT
28" Widescreen....£125.00 + VAT
VCR's .....from £32.00 + VAT
Direct loads available

SKY DIGIBOX REPAIR CENTRE
Same day collection.
Large stocks of refurbished boxes.
From £150 - call for details.
SERVICE DEPT
S.D.S 01237 425999 / 470333
SALES DEPT
The Digital Centre, Greenlanes, Barnstaple, Devon, EX31 1UL
01271 325777 / 325888

inStore ELECTRICS LIMITED
1043 LEEDS ROAD, BRADFORD BD3 7DB
TEL: 01274 665670/660196
FAX: 01274 665246
E-MAIL: tradesales@instorelec.fsnet.co.uk
MANUFACTURERS NEW GRADED STOCK, MINT IN ORIGINAL PACKING EVERYTHING FULLY GUARANTEED
COMBI TVCR from.....£99
14" PORTABLES SCART £59
WIDESCREEN TV from £185
ON DIGITAL WIDESCREEN.....£375
SVHS VCR £195
MICROWAVE OVENS.....£34
DVD MULTI REGION.....£120
AUDIO • DVD • CDR • Cameras • Fax • MWO
CREDIT CARDS WELCOME • 48 HR DELIVERY

LINEAGE

PRIVATE RETAILER has excellent part exchange colour televisions and videos to clear. Tel: 01494 814317.

EX RENTAL TELEVISION slot meters in lots of ten, £65.00 vat post and packing. Tel: 01200 429056.

LINEAGE

STOCK CLEARANCE: ICs, transistors for CTVs, videos, monitors. Lots of rare and difficult numbers, very cheap. 020 8852 2871, http://web.onetel.net.uk/-simplelife

REPAIRS

Trade repairs to
Sky digiboxes
Pace, Amstrad, Grundig, Panasonic, (including Fluid Ingress).
All makes repaired at a fair fixed price.
Scan Digital Services
For details
Give Alan a ring on
Tel/Fax: 01633 25 40 50
E-Mail: alan@scansat.globalnet.co.uk

SERVICE DATA

NEED HELP NOW?
Then ring the
★ ELECTRON TECHNICAL HELPLINE ★
Genuine help available to all repairers of
T.V. - V.C.R. - SAT - AUDIO (Inc Valves) - MICROWAVE - MONITOR AND MOST ELECTRONIC EQUIP
Over 30 years experience and vast data base
0906 470 1706
Calls cost 60p per minute
Hours of Business Mon to Fri
9.00 am-12.30 pm : 2.15 pm-5.30 pm
Sat Morn 9 am-12 noon
ELECTRON G.T.
9 CHAPEL ST, DONISTHORPE, SWADLINCOTE, DERBYSHIRE DE12 7PS

OPEN 6 DAYS
TV/VCR CIRCUITS (WE DO NOT STOCK AUDIO OR MONITOR INFORMATION)
TEL A.T.V. on
0114 285 4254
SAT/CTV Circuits £5.00
VCR Circuits £7.00
CTV Manuals £10.50
VCR Manuals £14.50
(P/P add £2.50 to each order)
419 LANGSETT ROAD, SHEFFIELD S6 2LL

ELECTRONIC SURPLUS CLEARANCE SALE
SCOOP PURCHASE
FLUKE HAND HELD DIGITAL MULTIMETER MODEL 8024B
A digital Handheld LCR Meter. Measuring Inductance, capacitance and resistance. 3.5 digit. 1999 count., l.e.d. display, inductance range 2MH to 20H, capacitance range 2000pF to 200μF, resistance range 200Ω to 20 megohms. Brand new and boxed with test alligator clip leads and user manual. £44 + £3.50 p&p.
Cancelled export order 750V AC/DC 2 amp AC/DC Resistance 20Megohm plus Siemens range. Also measures temperature –20°C to +1265°C. Temp. probe not included. Calibrated for K-type thermocouple. Peak hold facility. Supplied brand new and boxed but with original purchasing organisation's small identifying mark on case. Test leads and handbook included. Offered at a fraction of original price: £47.50, p&p £6.50.
(Dept.T) CHEVET SUPPLIES LTD
157 Dickson Road, BLACKPOOL FY1 2EU
Tel: (01253) 751858. Fax: (01253) 302979
E-mail: chevet@globalnet.co.uk
Telephone Orders Accepted
Callers welcome Tues, Thurs, Fri and Sat.

SERVICE DATA

SERVICE SHEETS AND MANUALS
For most makes and models of TV – Video – SAT – CD – Audio

	Complete S/Man	Service Sheet
CTV –	10.00	4.00
VCR –	15.00	6.00

Service sheets include circuits and essential electrical/VCR mechanical set-up information.
All other items – price on application.
Add P/P of £2.00 to order total. No VAT.
Payment by cheque or P.O. only please.
D-TEC
PO BOX 1171, FERNDOWN, DORSET BH22 9YG
Tel: 01202 870656

Fryerns
Service Information **FES** Circuit Diagrams
TV's, VCR's SATELLITE AUDIO & HI-FI
Most Models Covered
Prices are from £4.75 + £2.75 P/P
1 item – total £7.50 inc
2 items – total £12.25 inc
3 items – total £17 inc etc
note: some items priced individually
Payment by credit card. P.O. or cheque
Tel/Fax: 01206 211570
e-mail: colin@fryerns.fsbusiness.co.uk
2 The Lodge
Easthorpe Green
Marks Tey, Colchester
CO6 1HA

SERVICE MANUALS
Have you ever turned away work for want of a Service Manual?
Have you ever bought a Service Manual and never used it more than once?
Then why not join . . .
THE MANUALS LIBRARY
For details and membership application form write, phone or fax:
HARVEY ELECTRONICS
43 Loop Road, Beachley, Chepstow, Mons, NP16 7HE
Tel: 01291 623086 Fax: 01291 628786
Visa: Mastercard accepted

SERVICES

Avoid Bypass Surgery!
Stressed Out or just not earning enough?
I will show you how to easily create more income for less stress.
For your free report call
01132 989192 or
www.no2work.co.uk. Ref 02

WANTED

BEST CASH PRICES PAID
For ALL valves especially KT88, PX4 and other audio types.
Tel: 01403 784961
Billington Export Ltd
Sussex RH14 9EZ
Fax 01403 783519
Email: sales@bel-tubes.co.uk
Visitors by appointment

SITUATIONS WANTED

A TIME-SERVED ELECTRONIC ENGINEER
with experience and microprocessor technology know-how seeks employment in computer workshop or microcomputer based job.
Contact: Charles Antonio on Wednesday
0208 586 0765

WANTED
by established dealer.
A supply of ex-Rental or previously-owned Televisions and Videos, working or not.
We will pay cash and collect any amount from any location.
Please contact David on:
Sheffield
0114 231 2832
Apologies – wrong telephone in last month's advert

CLASSIFIED TEL:020 8722 6028

RECRUITMENT

Excellent Opportunities for Bench Engineers at Normanton nr. Leeds & Field Engineers in Scotland, Northwest and West Yorkshire

ELECT SERVICING

As one of the UK's largest independent electrical after sales service providers, we have a strong reputation for a quality aftercare and support service, carried out by Engineers who enjoy managing their own workloads. After all, only experience can tell you how much time and attention each customer's job needs. You will repair televisions and other audio and visual products down to component level either in the customers home or in our well equipped modern workshops.

So whatever the problem, you will have the skills to remedy the situation, quickly and efficiently, coupled with the customer care that ensures an individual service.

Join us and we will fix it for you to receive a highly competitive benefits package including pension scheme with up to 5 weeks holiday.

Applications to:

Mark Perrier Personnel and Training Manager, Elect Servicing, Unit 19, Imex Business Centre, Ripley Drive, Normanton WF6 1QT (please enclose salary details) or email: mark.perrier@electservicing.co.uk

For an informal discussion call Mark Perrier on **07753 622491**

RECRUITMENT

ENVIRONMENT AND CONSERVATION

ISLINGTON

Parking Meter Maintenance Officer

£18,387 - £19,908 p.a. inc.

This post involves both office and outside duties relating to the maintenance and repair of on-street parking equipment (including pay & display machines) and parking street furniture.

You should have one year's relevant experience of electro-mechanical work or similar, possess a full driving licence, and be able to use hand and power tools. It will be necessary to work in adverse weather conditions and to carry out repeated moderate and occasional heavy lifting.

The working hours are: 11am - 7pm, Monday - Friday.

The Council will also require you to work on alternate Saturdays for which time off in lieu may be taken.

Previous applicants need not apply.

For an application form and further details, please send an A4 sized stamped addressed envelope (57p) quoting reference number CS/00624/CB to the Islington Job Centre, 4 Upper Street, London N1 0MN.

Closing date: 12 April 2002.

Interview date: w/c 29 April 2002.

Islington Council is an equal opportunities employer. We are a non smoking Council.

POSITIVE ABOUT DISABLED PEOPLE

COLOURVISION COLOURTRONICS LTD

Member of National Network with workshops in Ilford
Require min 5 year (or don't apply)
Highly experienced

BENCH ENGINEER

(occasional Field)
For TV, VCR, HiFi.
All Manufacturers!
Up to £24k for right person.
123 Ley Street, Ilford, Essex IG1 4BH
Fax: 0208 220 8129

WORKSHOP ELECTRONICS ENGINEER

Required with experience of TV, VCR and PC component level repair.
Near Liverpool Street Station, London, to £16,500 P/A & Bens,
CV's by e-mail to chriss@opsres.com
or fax to
0208 667 9123
Tel 020 8667 9000

To advertise in Television classified please call Jan Thorpe on Tel: 0208 722 6017 Fax: 0208 722 6060

AERIAL & SATELLITE DISTRIBUTOR

		3+
● 0.6dB UNIVERSAL STRONG LNB	£8.49	
● SATELLITE TV LINK	£5.99	£5.49
● SKY REMOTE CONTROL	£8.49	£7.99
WOLSEY SET BACK AMPS		
● 1 WAY 20dB gain	£5.95	
● 3 WAY 9dB gain	£7.50	
● 4 WAY	£7.95	
● 8 WAY	£10.50	
● SCART/SCART 21 PIN 1.5M	£0 .75	
● SCART/SCART 21 PIN WITH SCART LOCK 1.8m	£1.99	
● PIXX ADT-1200 FREE TO AIR DIGITAL R/X	£94.99	
● PIXX ADT-3500 CI FREE TO AIR DIGITAL R/X	£129.00	
● CCT CAMERAS & MODULES from	£29.38	
● FRACARRO MASTHEAD AMPS + PSU from	£8.99	
● VIKING 85cm DISH	£19.99	
● VIKING 1 MTR DISH	£25.00	

OVER 3000 LINES IN AERIALS, DISHES, BKTS, CAMS, RECEIVERS, POLES, CABLE ETC.
ALL PRICES + VAT @ 17.5%

HOLDERNESS SOLUTIONS LTD,
UNIT B3, CITADEL WAY,
GARRISON ROAD, HULL HU9 1TQ
TEL: 01482 222295 FAX: 01482 222213
EMAIL: Lesley@holsat.freeserve.co.uk

WHAT A LIFE

A mixed batch of faults and an even more mixed batch of odd customers. Don Bullock's servicing commentary

"Do you mind looking after my few bags and things, Mr Bullock, while I pop into the Doctor's?" asked this scruffy little fellow who had poked his head round the door. "I mean, you can't really cart all your junk into the doctor's place, can you?"

I gave him a watery grin, popped his bags under the counter, and off he went. A few days later I noticed that they were still there. So I peered inside and found that they were full of rubbish. A few chipped mugs, a bunch of dusty dried flowers, a celluloid collar, a broken cap gun, a ball of dirty string – that sort of thing. As I was lugging them off to the rubbish bin Steven breezed in. Late, but full of bounce.

"We get some odd folk in here, don't we?" I commented.

"Oh, I don't know" he replied. "They're all normal enough in their own way. Perhaps you're a bit too sensitive."

"Could be, I suppose" I said as he popped off again. No sooner had he left than Mrs Taff drove up in front and nipped in.

"Mornin' Mr Bully" she trilled, "it's my telly why I'm 'ere. In the car and on the blink, see. You'll mend it for me, hasn't it?"

I looked at her. Her smile was as honest as an August cornfield. And she held the door open as I struggled back in with her set.

"Mind your knuckles on the door, Mr Boiler: skinned knuckles hurt, haven't they?" she commented, then left.

No red

The set was a Sharp C66CSD8H. When I switched it on I saw that there was no red output at all. The tube's base panel is a horrible two-sided one, with tracks on both sides, but I noticed that the RGB output transistors Q870, Q871 and Q872 were so dry-jointed I could almost lift them off the board. Some resoldering cured the trouble, and when Mrs Taff called back she was delighted. I think so, anyway.

"Oh, that's wonderful, can't it?" she said.

A giant Fidelity

The next caller was Eddie Slowcombe, who keeps a riverside farm. He always calls on his way to market and collects the set, if it's done, on his way back home. I saw him manhandle a set from amongst the hay bales and muzzled sows in the back of his wagon. He was shouting at it as he struggled in through the door.

"Come on there. Over a bit. Now through tha' door. That's it. Didn't want to, didja?"

He deposited the huge 32in. Fidelity set, Model CTV3228, on the counter. "I wants 'un beller than he be" he said.

"What's the trouble?" I asked.

"Ain't good enough, I wants 'un beller" he replied.

I nodded. I wasn't going to learn more by persisting.

"Donald" he said soberly, looking at me eye-to-eye, "you're a good man. You've shown kindness to a stricken soul."

"Ah yes" I found myself saying, "do have this little repair on me, of course."

As he drove off I tried the set. The fault was field collapse. We've had it before with this model, and there's a fault pattern. So I replaced the usual components: the TDA8145 EW/field generator chip IC600, the 3·3Ω safety resistor R711 in its supply and C720 (0·47µF, 250V).

Then I congratulated myself. Another job successfully done I thought, life can be quite good at times. But when I switched the set on there was severe EW bowing.

I checked the width and EW adjustment potentiometers, which were OK. A further series of tests got me nowhere and wasted quite a bit of time. I was feeling rather weary when I got to L679 in the EW driver stage. At last! It had several shorted turns, baked together. A new coil completed the repair.

"It's OK now" I said when Eddie returned, "I've replaced . . ."

"Don't wanna know what you'd to do, an' no paper either. Just wanna know whether 'un bella'n when I brought 'un in."

"Much beller, er better" I replied.

Eddie dug into his pocket and produced a wad of notes. "How many you want?" he asked.

A few minutes later he was shouting at the set as he took it back to his wagon.

A Goodmans/Philips

I hadn't seen the Reverend Goode for a while. Then he turned up in his ancient motor car, open-topped with running boards.

"Hello Donald. What a glorious day. The heavens are smiling upon us" he boomed. "Marshall the Bullock boys. I've got old Mrs Dadd's set in the car. She needs it badly. Very sad. Her husband was called last week. Awful shock. Good man. Leaves a gap, you know."

We got the set in and the reverend departed. It turned out to be a Goodmans 256NS, a 25in. model fitted with the Philips L6.2 chassis. The fault was the same as with the Fidelity one I'd just done – EW bowing. I concentrated on the line output section and started checking components there. It wasn't long before I found that C2913 (390nF, 250V) was short-circuit. A replacement cured the trouble.

I reassembled the set and gave the reverend a quick call. He was soon back.

"Donald" he said soberly, looking at me eye-to-eye, "you're a good man. You've shown kindness to a stricken soul."

"Ah yes" I found myself saying, "do have this little repair on me, of course."

"God be with you" the reverend said quietly, as he reached for the gear stick. Then he chugged off in a cloud of blue smoke.

Audio trouble

As the cloud cleared I saw Oscar Gunge and his mother heading for the shop. Oscar was carrying a Sony hi-fi system.

"Tell Mr Bolshie the trouble" Mrs Gunge said loudly when they came in.

Oscar raised his head and breathed in, but his mother was too quick. "We can't hardly hear the sound, Mr Bolshie" she said, "tell him the rest, Oscar."

Oscar raised his chin and tried again, but his mother beat him to it. "And what sound we do get comes and goes" she continued. "Don't just stand there like a dummy" she said to Oscar, "Mr Bolshie needs to know it all."

Oscar made another attempt, but was too slow.

"It's the same whallever the volume control's set at, Mr Bolshie" she continued, "can't make it out." Then she turned to Oscar.

"Joo know, you get more mealy-mouthed with every day that passes. Just like your father. He can't say boo to a goose. What counts today is mouth. And you ain't got none. What'll happen when your old ma is gone?"

When they'd departed Paul put the unit on his bench. It was an HCD-RX70. He suspected the STK4152 chip IC801, fitted a replacement, and tried the unit out. The new IC had done the trick.

Ribby Ellis

The phone rang and a voice at the other end seemed excited. "There's smoke pouring from the top of your roof – oh – and some flames. I can see it all from across the street."

I threw down the telephone and rushed out. But when I looked up at the roof there was nothing to be seen. Then I noticed a grinning fellow sliding out of the phone box opposite. It was Ribby Ellis. He had a TV set with him.

"Har. har. Had you that time Don. You gotta keep on your toes when old Ribby's about" he said.

"Thanks Ribby" I replied, "what can we do for you? Make some emigration arrangements maybe?"

"Nah. Look here. I've got this new girlfriend, see. Ruby. Quite something."

"Er, what's this got to do with us?" I asked.

"Well, her mother's telly grunted a bit the other night and I said it was the audio coil and I was good with tellys. Said I'd take her set home and fix it for her. Trying to impress her mum, like. Anyway I took it back and now it won't tune it."

"And you want us to fix it double quick I suppose?" I asked.

"Yea. but the cost's down to me, because the fault happened after I took the set away. And I can't afford much."

"You'll have to leave it with us" I said.

The set was a 20in. Daewoo GB20A5T. I passed it to Steven to look at. When he tested it he found that the set carried out search tuning but didn't recognise the stations. He swapped the tuner, just to eliminate it. Then, after checking hopefully for silly faults like dry-joints, he decided to replace the 56-pin TDA8374A chip. That cleared the fault and, after I'd reassembled the set for him, I called Ribby.

"Set's done Ribby" I told him, "but bad news about the cost. We've had to replace the two pi active filters, the phase-check loop and fit a new control subpanel."

There was a strangled gasp, then "how much, how much. Remember it's me who's paying, it's gotta be me, like I said."

"Just a hundred and fifty to you" I replied, "and that's cheap. Come and get it before the boys work out the right price with the new catalogues."

He looked half-slaughtered when he arrived. "A hunred and fifty pounds" he croaked, "every cent I'd saved to take Ruby to see Terry Wogan."

"Well, I still don't know how we managed to get it right so cheaply" I remarked. "Here, I'll demonstrate it for you." Then I switched it on.

He looked at the set and stabbed it to a few other channels. It worked perfectly, and he started to count out from a wad of money.

When he'd finished we pushed the notes back to him. "This time you've enjoyed one of our hilarious jokes" said Steven. "Twenty quid will cover the repair, since it's for you."

He looked puzzled but soon recovered. "How can I thank you all?" he said.

I pointed to a building just down the road. "The Red Lion should have just opened" I said.

"Be my guests" Ribby replied.

"Another time. Cheers for now" I said.■

Special Offer Sale – 20 Remote Controls £20.00 (mixed all well known brands)

NEW TYPES MAIN SWITCHES
10 MIXED £2.00
VT311-VT210-VT311
REEL DRIVE £2.00
ZSK2761
600v/10amp N FETS £100
TDA 8362N £5.00
24CO2 15p
TDA81785 £5.00
TDA2653A £3.00
TDA4866 £3.00
MITSUBISH VIDEO
HEAD & DRUM 948B231820 £10.00
HEAD 928B654080 £5.00
UNIT GUM IDLER £2.00
LOPT CT2145 £5.00
CT246 £5.00
PHILIPS TUNERS NTSC FS936E £3.00
PHILIPS TUNER U1343/5 31-39-147-15281 £3.50
10 OFF NEW TYPE HAND SETS
MITSUBISHI £5.00 + £5.00 POST
NEW CHASSIS TUNER
ALL COMPONENTS AND LOPT
CT21AVIBS, CT28AVIBS } £6.00 POST £5.00
CAR IMMOBILISER WITH KEY £5.00
TUNER UE25-B56D £3.00
FERGUSON ICC 7 HAND SET £3.00

FERGUSON VIDEO
FV90 LV HAND SET £3.00
FV80 LV HAND SET £3.00
BRIDGE RECTIFIERS 10 FOR £1.00
CAMCORDER-UNIVERSAL
BATTERY 9.6V - 1400MA FOR JVC-PANASONIC-PHILIPS £5.00
DESOLDER PUMP £2.00
FILTERS - 455 & 480 EACH 10p
GAS SOLDER IRON-PORTASOL
HOBBY £10.00
INFRA RED DETECTOR
WIDE/SHORT ANGLE WITH RELAY £5.00
INFRA RED RECEIVER-MATSUMI
MINIATURE £1.00
PANEL-1K2-FM2211 STEREO £5.00
PANEL-CVC80-POWER £5.00
POSITOR 18 2 PIN 20p
POSITOR-2322 662 98012 50p
PSU AC 12V 500MA £1.50
PSU AC 9V 1A £1.50
QUARTZ HALOGEN -
500W 200V FOR OUTDOOR LAMPS £1.00
RELAYS-SUB MINIATURE 25p
SATELLITE TUNER UNIT -2427611
.... BASE BAND/VIDEO OUT £3.00
SCART TO 4 PHONO LEADS 1.5M £3.00
SCART TO 6 PHONO LEADS £3.00
SCART TO "D" PLUG £1.00
SCART TO SCART LEADS -
ALL PINS CONNECTED
- 1.5 METRES
MODULATORS £2.00
SOUND 5.5MHZ MPM 1000T £1.00
SOUND 6.0MHZ MPM 1040 £1.00

FERGUSON
ADAPTOR - VPT - TEXT - VA354 £2.00
AC MAINS & BATTERY-VA365 P/P £3.00 ea
CAMCORDER BATTERY HIGH CAPACITY 9.6V 1800MA-VA310 £3.00
CAMCORDER BATTERY CHARGER 9.6 VOLTS VAZ65 EACH £6.00
CAMCORDER CAR ADAPTOR CHARGER - AND BATTERY-VA308 £5.00
CAMCORDER LENS 20FF - TELE-CONVERSION LENS x1.4 & x0.7 £1.00
CARDIOID CAMERA MICROPHONE-VA SUPER 218 TELESCOPIC BOOM & STAND £5.00
CHROME BOARD-ICCS
I/Cs U4647TKF OR HA11498 £6.00
DECK AND CAPSTAN MOTOR: FV6ILV~ FV62LV, FV67LV FV68LV EACH £30.00
FV7OB, FV7ILV, FV72LV, FV74LVX EACH £30.00
FV77HV £30.00
FV3IR £12.00
HEAD AND DRUM
MODULATOR-SATELLITE-T1040-SRD3/4 £2.00
PANEL-T1228B
TEXT FOR TX89, TX98, TX99, TX100 £6.00
PANEL-TX90 THORN FRONT - - 8 BUTTONS 01M4-515-002 £5.00
PANEL-TUBE BASE-ICC5 £5.00
PANEL-TUBE-BASE-TX89, TX98, TX99 £5.00
PANEL-TUNING 1509G-TX9, TX10 £5.00
POWER SUPPLY 12V-3A
FOR VIDEOSTAR CAMERA PP3 £4.00
PUSH BUTTON UNIT-TX85, TX86 - 8 BUTTONS £5.00

HITACHI
DECODER-TELETEXT PC232A5 - ISSUE 4 £15.00
HEAD AND DRUM - 620E £12.00
OSCILLOSCOPE 20MHZ DOUBLE BEAM - V212 £188.00
PANEL-TELETEXT G8P - ISSUE 6 £10.00
PANEL-TELETEXT PC315-11- ISSUE 7 £15.00
PANEL-TEXT-VT7S3E £20.00
TELETEXT CONVERSION KIT £3.00
CORE 2 90° ITT TEXT PANEL £3.00
1996/7 MATSUI
VIDEO CHASSIS WITH TUNER-IR POST £4.00 £5.00

MATSUI - ORION
DECKS WITH HEADS - D1096 VXA110 VP 9401 £16.00
HEAD-VSR 1500 = ORION D2096 £5.00
PANEL-MAIN-VSR 1500 P/P £5.00ea £3.00
POWER SUPPLY-VSR 1500 £5.00
POWER SUPPLY & REG - TYPE STK 5343-VP9501 £8.00
POWER SUPPLY-SWITCH MODE-1500 £3.50

SAMSUNG TECUS983 VA24A
VHF-Tuner with Aerial Socket
UHF Fit most new TV's £5.00

FERGUSON NICAM MODULE III
Art No 989 591-E00 £5.00

VIDEO DECKS
AIWA 1500, MATSUI VXA 1100, MATSUI 1500, ORION D1094, ORION D1096, ORION D2096 ETC } £5 £9 POST
CAPSTAIN MOTOR FOR ABOVE DECKS £8.00
20 HIGH VOLTAGE CAPS 1500V - 2000V MIXED £1.00

HANDSETS
AMSTRAD
4600 £3.00
4700 £5.00
6000 £15.00
6800 £4.00
UNIVERSAL £3.00
DECCA
NICAM LCD £4.00
FERGUSON
BSB £1.50
FV41R/3V59, FV41R/FV42-FV51-52 } £10.00
ICC5 £7.00
IK2000, IK7000 EACH £4.00
SRD2, SRD3, SRD4 EACH £1.00
T780 £2.00
TV/SATELLITE WITH FST £3.00
HITACHI
CPT2158 (NO REPLACEMENT) £5.00
VIDEO RM933E VIDEO PLUS £30.00
MATSUI
1500 £5.00
VSR 1500 £4.00
VX3000 £3.00
3000/ORION - TV AND VIDEO £2.00
RC = PACE 900, FERGUSON, SONY, GRUNDIG £5.00
MITSUBISHI
RM35 - VIDEO £5.00
NOKIA
RC202 £4.00
VP9401
D1096
VXA 1100
AND VIDEO PLUS
ORION
TV AND VIDEO £2.00
VIDEO WITH LCD - 1992/93 MODELS £5.00
SAMSUNG
HANDSETS, TV & VIDEO - 12 TYPES EACH £3.00
SANYO
UNIVERSAL VIDEO £3.00
COMPLETE REPAIR KIT, CLUTCH AND PINCH ROLLER, IDLER D2906 £7.00

TUNERS
IF TERC8-022A TBJZA-00ZA-ALPS £3.00
SATELLITE SXT2302 180968 £3.00
SATELLITE
WITH BASE BAND MIN SXT2302234 £4.00
SMALL UNF/VHF £3.50
VHF/UHF - TEKE4- 112A 4944 £4.00
U321, U341, U342, U343, U344, U411, U412, U944 } EACH £2
U743, 7744
AMSTRAD
UE33-BO 1 £3.00
MRF7-7E33
MATSUI ORION VIDEO TUNER IF £5.00
FERGUSON
1F2105-RE £5.00
MTP2011-AP00 £5.00
UHF - ICC5 £5.00
VHF - ICC5 £5.00
TX85, TX86, TX89, TX90 EACH £4.00
TX98, T99, TX100 EACH £4.00
ORION
1500 - UE33 BO9 £4.00
PANASONIC
SMALL UHF/VHF £3.00
FERGUSON
DOUBLE SIDE NICAM £10
ICC5 NICAM SINGLE BOARD ICC5 £10
TATUNG
UNIVERSAL 205 OR EQUIVALENT WITH AERIAL SOCKET £3.00

MOTORS
HITACHI
CAPSTAN 150E £3.00
MATSUI
CAPSTAN I/C NO. M56730 ASP £15.00
2 TYPES 1995 TO 1997 MODELS MATSUI VIDEO DECKS WITH CAPSTAN MOTOR AND HEAD P/P £5.00 £20.00
MITSUMI
MOD MRF7-UF32 £5.00
MOD TMUG3-103A £5.00
MITSUBISHI
CAPSTAN-HSE4I-I/C MSI782ASP £2.00

12vto 15 D.C.
TV MODULATOR WITH LEADS
VIDEO IV 75R
AUDIO IV 10K
HV100 £3 EACH

TV AERIAL AMPS VHF /UHF
1 WAY 20dB EACH £5
2 WAY18dB EACH £5
4 WAY10dB EACH £5
8 WAY4dB EACH £5
240v MAINS

COMPUTER 3 PIN MAINS LEADS
2½ METRES LONG - GREY EACH £1.50
2 METRES LONG - BLACK EACH £1

SCART TO SCART - ALL PINS -1 METRE EACH 60p

7805	28p	25D1432	£1.00	BU204	60p	BUT11AF	50p	BYW29/50	15p	HD61404251	50p
7806	28p	25D1453	£1.00	BU205	75p	BUT12A	20p	BYW95	10p	HD61408115	£1.00
7809	28p	25D1576	£1.00	BU206	£1.00	BUT13	£1.00	BYW95C	10p	HEA4528BP	15p
7812	28p	25D1577	£2.00	BU207	£1.00	BUT18AF	£1.00	BYW562A 100V	8p	HEF4029BP	20p
7812F	28p	25D180/T03	15p	BU208	80p	BUT71/800	15p	BYX10	10p	HEF4093	20p
2SC960	£1.00	25D1878	£1.00	BU208A	£1.50	BUW11	40p	BYX38/300	25p	HGA1124A	50p
2SC3795	£1.00	25K1460	£1.00	BU208D	90p	BUW84	60p	BYX55/350	10p	HM6264	
2SC3973B	£1.00	25K1464	£1.00	BU222	£1.00	BUX39	£1.00	BYX55/600	10p	ALP-15	£3.50
2SC4313	£5.00	2SC4891		BU326	£1.00	BUX84	50p	BYX71/60	20p	IK7ST 6031 B1	£3.00
2SC4569		1500V/15A	£2.00	BU407	40p	BUX84AF	50p	BYZ10B	18p	IN5401	3p
10A/1500V	£2.00	AN5521	£1.00	BU508A	90p	BUY49	20p	BZW-C110	5p	IR106A	18p
2SC7350	15p	AN5551	£1.00	BU508AF	£1.00	BY187	5p	BZW83-C20	3p	L298N	£4.00
2SD200	£1.00	AN5831	£2.00	BU508D	80p	BY208-800	8p	CA3123Q	50p	LA7830	£1.00
2SD401	40p	BC550C	20p	BU508DF	£1.00	BY228	15p	CD4555BE	20p	LA7831	£1.00
2SD716	£1.00	BDV648	50p	BU705	£1.00	BY229	6p	CLE71A	£5.00	M708 ABI	£1.50
2SD787	30p	BDV658	50p	BU801	50p	BY255	5p	FE3B	4p	M708 LBI	£1.50
2SD789	30p	BF869	20p	BU806A	£1.00	BY299-200	15p	HA1140	£1.00	M37204ECSP	£1.00
2SD820	£1.00	BF870	20p	BU807	50p	BY299-800	30p	HA1185	£1.00	M58658P	£1.00
2SD968	75p	BPW41	15p	BU808DFI	£1.00	BY T71-800	15p	HA1196	50p	MN1650	£1.00
2SD880	30p	BT Phone Batterys	£1	BU824	50p	BYV 10-30	15p	HA11485ANT	£1.50	SI3572N	£1.00
2SD1264	50p	BU105/04	80p	BU826	£1.00	BYV 28-200	15p	HA11804INT	£1.50	SAA1061	£3.00
2SD1266	£1.00	BU108	£1.00	BUK444/800	£2.00	BYV 95B	10p	HA51338SPI	£2.00	SAA3018	£1.00
2SD1398	£1.00	BU124	50p	BUK445/600	£2.00	BYV 95C	12p	HA51338SP3	£2.00	SAA5010	£2.00
2SD1415	£1.00	BU126	80p	BUK454/600	£1.00	BYV96D	18p	HCF4520	50p	SAA5231	
2SD1427	£1.00	BU180A	65p	BUT11	50p	BYW 20-08-9	£1.00	HCF4520BE	50p	(TEXT)	£2.00

No accounts — No Credit Cards

SENDZ COMPONENTS

63 BISHOPSTEIGNTON, SHOEBURYNESS,
ESSEX SS3 8AF.
Tel: 01702 332992 Fax: 01702 338805

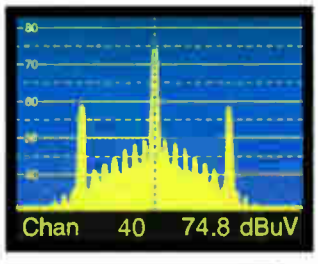
Specific P/P charges are PER ITEM • For UK addresses add P/P to order then 17.5% VAT to total. This applies to EC unless VAT No. is given • Exports – P/P at cost • Postal Order/Cheque with order. Unless otherwise specified add £1.70 P/P to SMALL ORDERS + Additional P/P for HEAVIER GOODS. Technical information by telephone only • Government/School Orders on official headings.

Callers to shop – 212 London Road, Southend-on-Sea Open Saturday Only 10-12noon – 2-5pm.

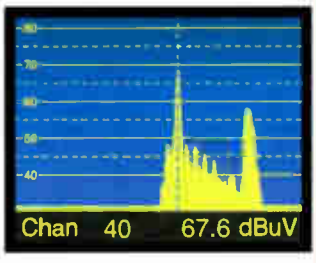
PLEASE ADD 17.5% VAT TO BOTH THE GOODS TOTAL AND P/P CHARGE

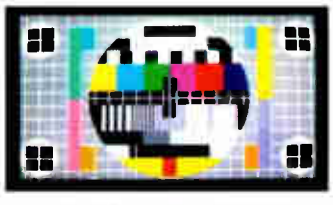
PROMAX

TELEVISION TEST PATTERN GENERATORS



The new pattern generators GV 798 and GV 898 offer advanced features at realistic prices. They produce 16:9 and 4:3 formats, output level set in 1 dB steps, multistandard, VITS, WSS, VPS, PDC, Teletext and much more. GV 898 uses vestigal side band modulation.





PROMAX GV SERIES

- Choice of 12 instruments
- NICAM and Teletext
- 4:3 and 16:9 Formats
- Full field and VITS
- Computer Controlled
- Front panel memories
- Multi Standard, PAL, NTSC, SECAM
- Own Company Logo
- Computer Monitor testers
- Hand Held Models
- High Quality Construction
- Attractive Price Levels
- Full After Sales Service
- Available from Stock

FOR TELEVISION PATTERN GENERATORS, THERE'S NO WIDER CHOICE THAN WITH PROMAX

PROMAX

SELECTED ITEMS FROM THE PROMAX RANGE OF TEST EQUIPMENT

MS 250

Analogue and Digital Satellite Detector.

PRODIG 1

Satellite Dish Installer's Meter
Does more than just BSkyB

PRODIG 2

Analogue & Digital Aerial Meter
Measures digital channel power and C/N

MC 377+

Analogue & Digital, Satellite & Terrestrial
Measures channel power and C/N

PROLINK 3 SERIES

Satellite & Terrestrial, Analogue & Digital,
Spectrum Analyser with Optional BER

Alban

ALBAN ELECTRONICS LIMITED

THE PROMAX SERVICE CENTRE

6 Caxton Centre, Porters Wood,
St. Albans, Hertfordshire, AL3 6XT.

TEL : 01727 832266
FAX : 01727 810546

EMAIL : albanelectronics@cs.com

SALES + SERVICE + CALIBRATION

PROMAX

AA-930

Audio Analyser

TA-901

CRT Rejuvenator

TA-903B CRT Rejuvenator