

NEWS AND TECHNOLOGY ■ INSTALLATION ■ SERVICING ■ DEVELOPMENTS

TELEVISION

AND CONSUMER ELECTRONICS

AUGUST 2004 £3.20



Mediacast 2004

Profitable field servicing

An SSM-signal analyser conversion

Vintage car radios

A laptop video out problem



FAULT FINDING FOR TV ■ AUDIO ■ SATELLITE ■ VIDEO ■ IT

We are pleased to announce
that the entire range of
Classic remote controls are also now
available from Charles Hyde & Son Ltd.
Tel: 0870 990 9474
www.charleshhyde.co.uk



It takes a big catalogue to give you all the remote controls you need!

We didn't mean for it to be so big, it's just that when we asked you what was needed by the industry the answer was – the most definitive remote control cross reference available in the European market.

We listened to you and the result is our latest 2004/2005 remote control catalogue. It is big! 456 pages listing over 15,000 models, 22,000 part numbers/handset numbers and 4,400 original handset illustrations. It is the most complete guide to remote controls ever produced.

As new models are being added to our range every day even a catalogue such as this will not contain the new additions to our range since printing. No problem! Simply check for the model you require on our website www.classic-serviceparts.com

Over the next two months your Classic distributor will be sending you your very own copy of the catalogue. If you do not receive your copy or you need an additional copy contact your usual Classic distributor, phone us on 01635 278678 or email us at sales@classic-electronics.co.uk



Technical helpline 01635 278678

CONTENTS

August 2004

Vol. 54, No. 10

579 Comment

CE microprocessors. Dixons in transition.

580 News

Sky goes for FTA and HDTV. Domestic networking. Transmitter masts sold. DVD update. Portable PVR. Sunglasses with TV.

582 Servicing in the field

There are two schools of thought on how to run a repair service: take every product back to the workshop, or try to carry out as many repairs as possible on site. Michael Maurice finds the latter



approach best suited to his one-man business with its large suburban customer base, completing about 90 per cent of repairs in customers' homes.

584 Vintage car radios

J. LeJeune takes a look at car radio design in the post-war period, up to the time when transistors came into use, and in particular considers the power supply arrangements.

588 A spectrum-analyser conversion

A spectrum analyser is very helpful when dealing with RF problems. Chris Jones describes a minimal-cost modification to a widely used signal-strength meter so that, in conjunction with a suitable oscilloscope, it acts as an effective spectrum analyser.

592 A microcontroller-based CCTV switching system

In this concluding instalment John Young describes the receiver end of the four-camera CCTV security system he devised to operate over a distance of some sixty yards.

596 The TV boom years

Ron Bourne describes the days when TV was still something new and exciting, for the public, service engineers and sales people alike

603 A laptop video out problem

A customer bought a laptop PC with a 15in. screen because it could be used with photo CDs and DVDs and had a video output. There were problems with commissioning the 'TV out' feature however. Ray Porter explains the problem and its solution.

604 Mediacast 2004

J. LeJeune describes what was new at the recent Mediacast show.



606 Letters

TV transmitter masts. ESR meter. Let's go digital. Is Sky worth it? Mains plugs/sockets. Service information for digiboxes. Comment.

608 What a Life!

Feedback from readers and a miscellany of TV and video faults. Donald Bullock's monthly commentary.

610 DX and Satellite Reception

Terrestrial DX and satellite TV reception reports. Broadcast and satellite TV news. Reception from low-elevation satellites. Whatever happened to Channel 1? Roger Bunney reports.

613 College course on Plasma TV

614 Audio faults

615 Test Case 500

616 DVD and home cinema fault reports

618 VCR clinic

620 TV fault finding

624 Books to buy

The Television book service, with details of some of the titles you can order.

626 Extended fault reports

A few longer reports on complex or tricky TV faults.

628 Satellite notebook

Matched digiboxes. Recording satellite radio on CD. Digital channel update (28-2°E) and EPG changes. Transmissions from Arabsat 3A and 2D. Digibox fault reports.

631 Help wanted

632 Web service

634 Monitor faults

635 Next month in Television

Editor

John A. Reddihough
TVeditor@highburybiz.com

Deputy Editor

Tessa Winford

Production Editor

Jane Massey

Production Executive

Dean Turner
01322 611206
d.turner@highburybiz.com

Group Sales Executive

Steve Morley
01322 611 289
Fax 01322 616 376

Editorial Assistant

Caroline Fisher
01322 611 274

Managing Editor

Bill Evett

Publishing Director

Tony Greville

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.

Disclaimer

We work hard to ensure that the information presented in *Television* is accurate. However, *Television's* publisher - Highbury Business - will not take responsibility for any injury or loss of earnings that may result from applying information presented in the magazine. It is your responsibility to familiarise yourself with the laws relating to dealing with your customers and suppliers, and with safety practices relating to working with electrical/electronic circuitry - particularly as regards electric shock, fire hazards and explosions

Next issue, dated
September, on sale
August 18

atlas LCR

Passive Component Analyser

**Automatic Identification
and Measurement**

Inductance: 1 μ H to 10H
Capacitance: 1pF to 10,000 μ F
Resistance: 1 Ω to 2M Ω
Basic accuracy: 1%

*"Astonishingly, this little unit
seems to pack most of the punch
of a large and very expensive
automated LCR bridge
into its tiny case."*

Andy Flind - EPE Magazine

features high contrast green-mode LCD



£79

fully inclusive UK price

£60

fully inclusive UK price



enclosure colours may vary

atlas DCA

Semiconductor Analyser

**Automatic Pin-out Identification:
Just connect any way round!**

Transistor gain measurement
MOSFET gate threshold measurement
PN junction characteristics measurement
Shorted Junction identification
Transistor leakage measurement
Auto power on/off

Bipolar transistors, Darlington transistors,
Diode protected transistors, Resistor shunted transistors,
Enhancement mode MOSFETs, Depletion mode MOSFETs,
Junction FETs, Diodes and diode networks,
LEDs (+bicolours)

star pack!

£134!

LCR40 and DCA55 Pack

Why not order both analysers in the
NEW special edition carry case
and save yourself £20!!



Visit www.peakelec.co.uk to download the data sheets, user guides and copies of independent reviews. You can pay using a cheque, postal order, credit or debit card and even pay securely online. Please contact us for your volume requirements.

Also available from Farnell,
Maplin, Rapid and CPC
(prices vary)

COPYRIGHT

© Highbury Business, 2004. All rights reserved. No part of this publication may be reproduced, stored or transmitted in any form or by any means without the written permission of the publishers. All reasonable precautions are taken by *Television* to ensure that the advice and data published are reliable. We cannot however guarantee it and we cannot accept legal responsibility for it.

CORRESPONDENCE

All correspondence regarding advertisements should be addressed to the Advertisement Manager, *Television*, Highbury Business, Media House, Azalea Drive, Swanley, Kent, BR8 8HU. Editorial correspondence should be addressed to *Television*, Editorial Department, Highbury Business, Media House, Azalea Drive, Swanley, Kent, BR8 8HU.

INDEXES AND BINDERS

Indexes for Vols. 38 to 53 are available at £3.50 each from SoftCopy Ltd., who can also supply an fifteen-year consolidated index on computer disc. For further details see page 571. Binders that hold twelve issues of *Television* are available for £6.50 each from Modern Bookbinders, Pringle Street, Blackburn, BB1 1SA. Telephone: 01254 59 371. Make cheques payable to "Television Binders".

Newstrade Enquires

Seymour Distribution Ltd

ISSN 0032-647X

SUBSCRIPTIONS

Highbury Fulfilment Services, Link House, 8 Bartholomew's Walk, Ely, Cambridge CB7 4ZD. Telephone 01353 654 431. Fax 01353 654 400. Email hbc.subs@highbury-wyvern.co.uk. Please notify change of address.

Subscription rates:

UK 1 year £33.80
2 years £54.00
3 years £71.00
Republic of Ireland 1 year £38.95
2 years £62.00
3 years £81.85

Mainland Europe 1 year £49.00
2 years £78.40
3 years £102.90

Rest of World 1 year £63.50
2 years £101.00
3 years £133.00

Cheques should be made payable to *Television*.

BACK NUMBERS

If available issues are £4.00 each



CE microprocessors

Why should consumer electronics require digital processing equivalent to that of a high-power IBM computer system? Well, to be able to operate sophisticated games systems might be one answer, and think of all the processing required for video signals to be able to drive flat-screen displays and provide enhanced TV, HDTV and so on. But that's only part of the story. With broadband networking, vast quantities of AV data can be fed to domestic CE systems. So substantial processing power is, for various reasons, required in the CE field.

Sony is to invest some £2.5bn over the next three years on developing semiconductor devices that it hopes will give its products a technological lead. Almost half of that is to go towards a microprocessor called Cell, which Sony is developing in conjunction with Toshiba and IBM. Cell is described as a 'network processor' that can be used in any network-capable device – phones, TV sets, cameras, audio systems and so on. Development of Cell started back in 2001. It has also been referred to as a "supercomputer on a chip", with the ability to carry out a trillion calculations a second, a thousand times faster than the microprocessors currently used in PCs.

Cell is expected to be the heart of the next-generation PlayStation system, which Sony says will be far more than a games machine. It will, for example, be capable of interactive games operation via the internet. Sony also wants to be able to use Cell to provide a dramatic improvement in TV picture quality, and to enable TV sets to operate as a home server computer. Sony plans to launch a Cell-equipped TV set in 2006, the company's sixtieth anniversary year.

Toshiba envisages use of Cell as a living-room server that will act as a central database for other domestic electronic equipment. It

has in mind five markets for Cell: digital CE products, mobile products, intelligent office equipment, domestic appliances and automotive products.

The Cell alliance is investing heavily in the project. Its plans extend beyond developing just a powerful microprocessor: it envisages that Cell will become the standard processor for broadband products, as the Intel Pentium has become the standard for PCs. Mass production of Cell microprocessors is expected to start next year, with Toshiba producing chips that use 65nm technology. Within the alliance, Sony is primarily responsible for applications development, Toshiba for chip manufacturing technology and IBM for chip design.

Intel, the leading microprocessor manufacturer, is naturally not overlooking such applications and has been developing chipsets aimed at the CE market. The recently launched 915 and 925X Express chipsets will work with a Pentium 4 microprocessor and Microsoft's Windows Media Centre software to enable a PC to act as a CE product. Intel's European director of marketing Erik Steeb maintains that a PC is "the best platform for storing and managing CDs and videos". At a recent event he demonstrated the use of the chipset to provide 1,080-line interlaced video in conjunction with Windows Media Video HD compression, play audio CDs and run games, using a huge widescreen display and Dolby 7.1 sound.

Are we at the beginning of a new era in CE technology? There are certainly exciting prospects ahead. But current technology can do most of what we could possibly want in the normal domestic environment. In the end it will be a matter of who can provide the best compromise solution in terms of cost and capabilities.

Dixons in transition

The Dixons Group had record turnover of £6.492bn in the year to May 1, 2004, with profits up year on year from £279m to £366m (though they peaked in 2001, at £647m). It might seem surprising therefore to see all those high-street Dixons stores with closed-down notices. This is part of the closure of 106 under-performing stores mentioned in our news pages in the June issue. Dixons itself is no longer the main business in the group: international trading accounts for £1.794bn of turnover, Currys for £1.752bn, PC World for £1.532bn, Dixons for £798m and The Link for £407m (there are some other activities as well).

The question is, where does Dixons itself go from here? The two larger of the new xL out-of-town stores are apparently not per-

forming to expectations. Recently there has been speculation about extending the range of products, and also about scaling back the size of the new outlets. A new product range is due in the stores in time for the Christmas trading season, but there is no information at present about what it will contain. Meanwhile service contracts, the old extended warranties, are to be relaunched, the sales pitch being that they differentiate Dixons from its less specialist rivals.

We shall just have to see how things develop. Dixons has good product ranges, well-trained staff and keen prices. But it faces fierce competition, in particular from the supermarkets and now e-traders. The situation is not an enviable one.

Sky goes for FTA and HDTV

What do you do when you have some 7.3m subscribers and the growth rate is slowing down? This is the situation that BSkyB has been facing recently. The huge success of the terrestrial Freeview service – some 4.4m Freeview set-top boxes and integrated digital TV sets are now in use – has also been seen as a threat to Sky's potential growth. We now know Sky's solution to the problem: to go for its own free-to-air offering, which has been dubbed FreeSat by media observers, in order to drive growth, and drive profits by introducing a premium, HDTV service.

FreeSat will be available direct from BSkyB for £150, which provides a minidish, a set-top box, a viewing card and professional installation, and is guaranteed to be available for at least two years initially. Viewers will be able to receive some 115 FTA TV channels and 80 radio stations, including the BBC services, also interactive services. Sky had previously offered a free dish and decoder to those who did not wish to subscribe to a Pay-TV package for an installation charge of £120. The advantage of the new offer for Sky is easy upgrades to Pay-

TV packages. BSkyB aims to have 8m subscribers by the end of next year.

The proposed HDTV package would include sports, movies and documentaries. Sky points out that UK broadcasters already use HDTV cameras to record programmes in order to be able to sell them to overseas broadcasters – HDTV services are in operation in the US, Japan, South Korea and Australia. The proposed start date for Sky's HDTV service is some time in 2006. It's not certain which of the two international HDTV standards, 1,080 lines inter-

laced or 720 lines with progressive scanning, will be used.

BSkyB also has under consideration adding web content, using Web TV Programming Language (WTPL). This would probably be a payable service.

BSkyB is to increase the price of its packages for the second time this year. From September 1st viewers who subscribe to the top-tier package – over half of Sky's subscribers – will pay £41 a month, an extra £1, representing a 2.5 per cent increase. In January the price rose from £38 to £40, a 5 per cent increase.

Domestic networking

The Digital Living Network Alliance (DLNA), which was formerly known as the Digital Home Working Group (DHWG), has published its Home Networked Device Interoperability Guidelines version 1.0.

More than 140 companies are members of the DLNA, including Intel, IBM, Microsoft, Nokia, Panasonic, Philips, Samsung, Sharp, Sony and Thomson. Its aim is to develop agreed specifications that will enable digital content, such as music and images, to be shared by various devices such as a PC, TV set and mobile phone. The Interoperability Guidelines define the design principles for moving content from one CE, PC or mobile product to another via a wired or wireless home network.

Research suggests that 52 per cent of US on-line households and 47 per cent of European broadband households will have a home network by 2008. The DLNA, reaching a cross-industry consensus, has identified two major components, a media server and a media-rendering

device, as being necessary for seamless interoperability among items that can access a home network. These components are based on open standards such as Internet Protocol (IP), HTTP and WiFi.

The DLNA is developing agreed specifications for digital rights management and copy protection, and a logo that identifies products which comply with its specifications.

The first DLNA-compatible products are expected to become available next year.

Packard Bell has launched the net2plug Home Networking Kit, which provides home networking via an existing domestic electricity supply, i.e. power-line communication (PLC). The Kit consists of two USB plugs, two USB cables and software. The system gives full coverage within the household, 56-bit DES link encryption with key management, multiple wireless and mobile applications (Ethernet and WiFi plugs will soon be available), and high-speed transmission – 14Mbits/sec now, with 200Mbits/sec available later this year. The cost is £99.99.

Portable PVR



A portable personal video recorder, the pPVR, has been launched by Fusion Digital Technology Ltd. of Harrogate, North Yorkshire. Its 20GB hard disk enables up to forty hours of video programming to be stored. Dimensions of this natty device, which is unique in being able to accept analogue and digital inputs, are 120 x 81 x 16mm (about 4.75 x 3.25 x two thirds of an inch).

The integral 3.5in., back-lit LCD screen provides entertainment on the move. Battery life with video viewing is five hours, ten hours with audio only use. The record timer gives the unit the flexibility of a full-size

PVR, and recordings can be played back via a home entertainment system.

Files can be downloaded from a PC via a USB 2.0 port, by direct connection to a dedicated STB or DVR or, via its built-in MPEG encoder, from an audio or composite video/S-video source. The unit can provide MPEG-2 and MPEG-4 playback, also playback of MP3 and WM9 audio files.

For further information contact Fusion Digital Technology Ltd., Crown House, Hornbeam Park, Harrogate, North Yorkshire, HG2 8PB. The phone number is 01423 815 000.

DVD update

Toshiba has announced two digital video recorders that can record on a DVD or a hard disk and can record two TV programmes simultaneously on the hard disk. Models RD-XS53 and RD-XS43 can also be remotely controlled via the internet. The latter is done via Net de Navi software, which makes remote control possible from a PC, a PDA or a mobile phone. Once a programme has been recorded it can be saved in any one of 24 folders, enabling users to set categories for a programme library. The new recorders include DEPG, Toshiba's proprietary electronic programme guide: by means of a broadband internet connection the user can download an on-screen programme guide from which selections can be made for recording.

Model RD-XS53 has a 320GB hard disk that enables up to 570 hours of material to be recorded, and can interface with and control an external tuner for the Japanese Sky Perfect TV service. Model RD-XS43 has a 250GB hard disk that provides up to 445 hours of digital recording. Both models have a

multi-drive that enables DVD-RAM, DVD-RW and DVD-R discs to be used. Other features include enhanced recording quality using Toshiba's new RD Engine W, a recording mode that provides sustained recording at a video bit rate of 1Mbits/sec, and high-speed dubbing from the hard disc to a DVD at up to 32 times standard speed. The two models are to be launched in Japan on August 1. No price or details of a European launch have been announced.

Sharp has launched a number of new digital video recorders in Japan. Model DV-HRD200 can record on a DVD or a 400GB hard disk, the industry's highest capacity. HDTV broadcasts can be recorded off-air using the built-in HDTV tuner. Recording capacities are up to 34 hours of HDTV programming, up to 102 hours of standard-definition digital TV, up to 390 hours of analogue TV or up to 750 hours of radio material. Models DV-HR450 and DV-HR400 are combined hard disk and DVD recorders that provide high-speed dubbing at up to 48 times standard speed. Model DV-

HRW30 is a combined hard disk/DVD/VCR combi unit with three built-in tuners. Model DV-RW190 is a DVD/VCR combi recorder.

Panasonic has launched a home-cinema system, Model SC-HT37R, with a hard-disk and DVD recorder, recording on DVD-RAM or DVD-RW/R discs or an 80GB hard disk. Up to 142 hours of video can be stored on the hard disk and up to 16 hours of video on a double-sided DVD-RAM disc. High-speed dubbing enables a one-hour HD recording to be transferred to a DVD-RAM disc in 2.5 minutes or a DVD-R disc in two minutes. High-speed dubbing from a DVD-RAM disc to the hard disk is also possible.

The Panasonic digital video recorder Model DMR-E85 has been released in the UK. It can record on DVD-RAM/DVD-R discs or an integrated 80GB hard disk, with five recording modes. Up to 142 hours of video can be stored on the hard disc and dubbed to DVDs. Model DMR-E65 at about £400 is a DVD-RAM recorder with

SD and PC card slots for viewing JPEG and TIFF images. It has five recording modes and a progressive-scan output. Model DMR-E75V, a combined DVD-RAM/VHS recorder, includes DVD-Audio and Quasi S-video playback. Recordings can be copied from one format to the other, and a twin tuner enables two different programmes to be recorded simultaneously on disc and tape. No price details have been released.

LG Electronics has launched the 8000 series of slim DVD players. Models DV8731, DV8600 and DV8900 are just 39mm high. They are compatible with DVD-video, DVD±R/RW, SVCD and VCD video discs and CD, CD-R, CD-RW and MP3 audio discs, include a JPEG picture viewer, and work with Windows Media Audio. They are also supplied with Kodak picture CD software, enabling users to view digital images that have been stored on a CD. Model DV8731 includes last-scene memory, a x100 high-speed smooth scan, x2 soft scan, 3D surround sound and DTS.

Masts sold

You wouldn't think that transmitting masts and towers are the sorts of things that are there for buying and selling. Nowadays however they are. In 1997 Crown Castle UK bought the BBC's TV and radio towers. It now owns 750 towers that are used for transmitting analogue and digital radio and TV, and 3,500 masts (about 18 per cent of the total) that provide services for 10,200 mobile phone operators. The whole lot is being

sold by US-owned Crown Castle Corporation to National Grid Transco, which owns the country's electricity and gas networks, for £1.1bn. Through its Gridcom subsidiary NGT already owns a network of some 1,400 mobile phone masts that provide services for 2,800 operators including Orange T-Mobile, Vodafone, O2 and 3. It seems that Crown Castle Corporation expects better returns from developing its business in the US.

Sunglasses with TV

If you can't bear to be away from TV and video, a pair of sunglasses called the Eyetop Centra could be the thing for you. They incorporate a colour LCD screen on the inside of one of the lenses, at the lower centre of the lens, and can be connected to a TV source, DVD player, camcorder or other video device via a control unit attached to a belt - this also supplies power. Sound is supplied via earplugs. For camcorder use the device can be used as an external viewfinder. Price is about £350. For further information check the web at www.eyetop.net or www.gadgets.co.uk



Freeview EPG launched

A seven-day Freeview electronic programme guide (EPG) has been launched, initially from Crystal Palace. This is expected to be the start of a nationwide roll-out for the EPG. Software downloads will make it available for existing set-top boxes and IDTVs, though there could be problems with some because of on-board memory constraints.

Servicing in the field

There are two schools of thought on how to run a repair service: take every product back to the workshop, or try to carry out as many repairs as possible on site. **Michael Maurice** finds the latter approach best suited to his one-man business with its large suburban customer base, completing about 90 per cent of repairs in customers' homes

There are two schools of thought on how to go about carrying out repairs to TV, video and other consumer electronics products. One is to uplift every product and take it back to the workshop, or have the product delivered, and carry out the repair there. I find that one disadvantage of this approach is that the customer doesn't get to see what you are doing, so there can be queries about what has and hasn't been done. I try to repair as much as possible on site, even if it means returning a day or two later with the required part(s).

This approach is especially important with TV sets, which seem to be getting heavier and heavier. Remember that your back is delicate and, unlike the TV set you are working on, cannot be replaced. The less I have to carry, the less strain on my back. Another advantage is that if you can repair the product on site during a first visit you will save the time and fuel cost that would otherwise be required to return it.

Product knowledge

To carry out work in this way requires a considerable amount of confidence and knowledge of the products you are servicing. I am not suggesting that you repair every product in the customer's home. This would be a nearly impossible feat: lack of spares and circuits, difficult faults, also poor lighting and working conditions mean that there will always be some repairs which simply cannot



be completed on site. One line of the advertisement I place in local papers says "Repairs carried out in your home (where possible)".

During the course of the initial telephone conversation I try to establish the product's make and model number and obtain a brief description of the fault I'm being asked to repair. In this way I can ascertain what the cause of the problem might be and give the caller an indication of the likely cost. I never do free visits or estimates. Why should we? On the few occasions when I have succumbed and given a free estimate I've never been given the job and have lost out on time and fuel.

Getting organised

To be able to repair products in customers' homes, you have to carry with you test equipment, tools and

spares. These take up the whole of the rear part of my Volvo estate car, leaving the back seat free for smaller products that may have to be taken back to the workshop – or returned. See accompanying photo.

My main tool case contains a variety of screwdrivers, including Torx, Posidrive and flat-bladed drivers. There is also a small jeweller's set, and I have a number of nut-spinners. Pliers, tweezers and cutters are of course essential – don't buy the expensive ones, as they are easily lost. A 24V soldering iron with a mains transformer, solder and desoldering braid are included. The transformer is a toroidal type, to keep it slim, and is built into a case. Other contents of the number one tool case are a magnetiser/demagnetiser tool, a digital multimeter, a torch, a bag full of odd screws (they come in very handy), cable ties, a

fibre-tip pen, a videohead cleaner, solvent cleaner, silicone lubricant, grease and of course silicone heatsink compound.

The next tool case is for heavier work, i.e. aerials and satellite problems. It contains coaxial plugs, F connectors, cable clips, a hammer, saw, drill bits and heavier-duty tools.

A third tool case is used for large tools that are less frequently used. It contains a hairdryer, a hot-melt glue gun and sticks, freezer spray and flux in a spray can.

So much for the tools required to open the product and work on it. You also need a stock of spares.

Spares carried

A portable chest of drawers contains a selection of mains-supply switches, posistors, mechanical video parts and batteries. The switches include the types used in Philips, Sanyo, Ferguson and Sony TV sets, with or without auxiliary contacts. You don't need to carry loads of these parts. A couple of each will suffice – restock as you use them. Posistors include the general 96209 type, some two- and three-legged black types and some of the special Philips and Panasonic types.

It's not so easy to know what video parts to carry. Demand for VCR repairs is diminishing, so you must be careful not to overstock. I carry a couple of pinch rollers and the worm wheel and shaft used in Philips Turbo decks, Panasonic load-motor couplers for the K deck, the Toshiba V-shaped arm and the clutch assembly used in later Toshiba, Sony and Samsung models. All other video spares are obtained from suppliers as required.

I have boxes of AA, AAA and PP3 batteries, the latter being used mainly for the multimeter.

The next four containers are slimline, compartmentalised carry boxes used for semiconductor devices, non-electrolytic capacitors and resistors.

I keep a good stock of transistors and diodes. Transistors include the BU2508AF, BU2508DF, S2000N, S2055N, BUH515, BUH515D, BUT11AF, the 2SD2539 and 2SC5251 used in some Sony sets, and a small selection of power MOSFETS. The latter includes the BUZ90/91 and IRFP50 (used in some Grundig sets). The diode selection includes types 1N4148, 1N5602, BY228, BY399 and BA159. In addition there are a few zener diodes.

Another case contains ICs, including the STV9379, TDA8170,

TDA8171, TDA8172, LA5515, LA5521, LA7845N, TDA3653B and TDA3654 for field deflection and the STR54141, TDA4603-5 and others used in power supplies.

The third of these slimline cases is used for resistors. I stock a selection of low-value fusible resistors, both 0.25W and 0.5W types. For high-value resistors, i.e. over 10k Ω , I use the Philips 1W and 2W types, obtaining them from Farnell. If you service Ferguson sets fitted with the TX10 and TX100 chassis, carry a few 3.3k Ω resistors. There are still a few of these sets with the original TDA3652 field output IC. You will need to modify them when changing to the TDA3654.

The fourth slimline case contains non-electrolytic capacitors, including 6.8nF, 8.2nF 9.1nF, 10nF and 11.5nF line output stage tuning capacitors, and 390nF, 470nF, 560nF and 680nF line scan coupling/correction capacitors. Other types include the 220pF and 330pF (both 2kV) capacitors used in some Philips power supplies, the 1nF, 1.2nF and 1.5nF 3kV capacitors used in line output stages, the small orange trimmers used in chroma oscillator circuits and a few others.

The largest parts case looks like a tool case and contains electrolytic capacitors, fuses, some Sony spares and all other bits and pieces. There are three RAACO boxes within the case, the largest being used for the electrolytics. Many repairs involve replacing electrolytic capacitors, so a good stock of high-quality, high-temperature types is essential. I prefer to buy these from RS or Farnell. Make sure that you include some high-voltage types, e.g. 250V.

Another box contains a selection of 20mm fuses, both quick-blow and time-delay types. I also keep a good stock of 3A, 5A and 13A plug-top fuses. A small box contains some Wickman fuses and F and N type solder-in fuses.

For some time I have kept a selection of common Sony spares. These include the 110 Ω and 220 Ω 10W resistors and the 680 μ F, 50V electrolytics and trimmer capacitors used in the AE1 chassis, the RGPI0-17 diode used in the 1kV A1/G2 supply and the associated 1k Ω fusible resistor, and the STR54041 chopper chip (the pin connections differ from the standard version).

I do not carry optical blocks and line output transformers with me, for two reasons. First there are a number of different types, especially with LOPTs, and secondly any



Rear view of Michael Maurice's Volvo estate car, showing the way in which the spares and equipment he carries are arranged.

guarantee provided by the supplier will date from his invoice, not the date of fitting.

Carrying tools and stocks of spare parts requires a considerable investment: I would suggest a good mark-up to cover the cost of obtaining and stocking these items.

In addition to the above I have an oscilloscope in the car. It is useful, but don't carry an expensive one around – you'll regret it if this is stolen. A pattern generator is also a Godsend. I use a slightly-modified Manor Supplies Mark IV type.

Ordering

No engineer can carry every part for every model – the investment would be huge and the financial returns very poor. Most items would lay unused for months if not years. So it's up to you as engineers to find out which parts you use frequently.

Distributors such as SEME and Charles Hyde carry a good stock of all common parts and, provided the postal service is not on strike, most items are delivered within 24-72 hours. I have been known to order parts from SEME at ten to five and find that they have arrived on my doorstep at 8.00 a.m. the next day.

Portable office

I give a three-month guarantee on all my repairs. The best way of keeping track of work carried out is to use a computer. I carry a laptop computer together with a printer. I have a connection on it to the internet, and the Sali CD ROM, so I can check on the price and availability of spares 24 hours a day, seven days a week!

I also have a subscription to Euras, so that I can look up difficult faults in the customer's house – provided a phone line is available.

Key to success

So there you have it: my key to successful servicing in the field. On average, I complete about 90 per cent of my jobs in the customer's home. ■

Vintage car radios

J. LeJeune takes a look at car radio design in the post-war period, up to the time when transistors came into use, and in particular considers the power supply arrangements

Today's car buyers expect a radio to be fitted. Fifty years ago however a car radio was a luxury, and often a liability for the unwary. Before transistors came along and altered electronic technology for ever, portable and mobile equipment was bulky, heavy and power-hungry. The valves used in a car radio needed heater power and an HT supply of something over 150V.

Basic models

Most vintage car radio designs use a standard valve line-up with three or four valves to provide the following functions: frequency changer, IF amplifier, detector, audio amplifier and audio output stage. A push-pull Class AB1 output stage was occasionally used to provide greater output power. The detector diode was usually incorporated in the IF or audio amplifier valve.

Power was obtained from the car battery of course, usually a 6V or 12V type. A vibrator unit with a step-up transformer produced the HT voltage required. It consisted of an oscillating-contact spring set

that fed the DC input in alternate directions through the primary winding of the transformer, see Figure 1. With this type of vibrator arrangement the output would be rectified by either a valve rectifier such as the 6X4, a heaterless valve rectifier such as the OZ4 or a metal rectifier of the copper-oxide or selenium variety. The valve heaters were supplied by the battery directly: there were 6.3V and 12.6V valves to suit the battery in the car. Incidentally it has been said that these standard valve heater voltages were set by the requirements of lead-acid battery operation, being the voltages of car batteries in use and under partial-charging conditions.

Because of the very low voltage supply and the considerable power consumed by a receiver, it is not surprising that if someone decided to stop the car for a while and listen to the radio they may not have been able to get started again, as the battery had insufficient energy left to start the engine. Use of the starting handle would then be required. A typical current con-

sumption with a 12V car radio of basic design was 6A: more sophisticated models took up to 10A.

Physical arrangements

The size of early models was such that much of the receiver was installed in the engine compartment, close to the battery to avoid the need for long cables. All that was visible inside the car was a control panel that included the tuning knob and illuminated dial, the on/off switch, a wavechange switch and the volume control. The tuning and wavechange functions were operated by Bowden cables, and a relay was used to switch on the supply to the receiver, avoiding the need for long power cables to the control panel. Later models brought the receiver unit inside the passenger compartment, leaving the power unit and audio output stage in the engine compartment.

A problem with all vehicle radios is ignition interference. Early attempts to obtain noise-free reception included resistive suppressors in the ignition leads and screened ignition leads.

Subsequently the now common suppressor cable came into use. The dynamo used to maintain battery charge sometimes also required suppression: unsuppressed ones caused a sharp whine that varied with the engine revolutions. The vibrator unit in the receiver's power supply could also add to the general load of hash generated under the bonnet: spark-suppression capacitors were always fitted to damp the interference and prolong the life of the vibrator contacts.

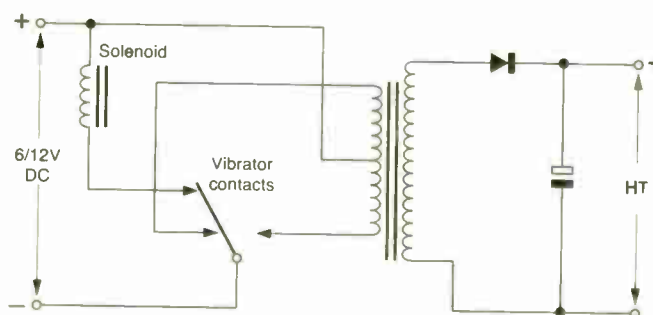


Figure 1: The basic vibrator power supply arrangement.

The vibrator

The vibrator was housed in a sealed can and consisted of a set of spring changeover contacts operated by an electromagnet (solenoid) that was connected to an auxiliary contact on the spring set, see Figure 1. The solenoid was thus energised when DC was applied to the unit. As a result the spring-set changeover contacts were moved to one side, connecting the supply across one half of the transformer's centre-tapped primary winding and at the same time breaking the connection to the solenoid. As the solenoid field collapsed, the contacts swung

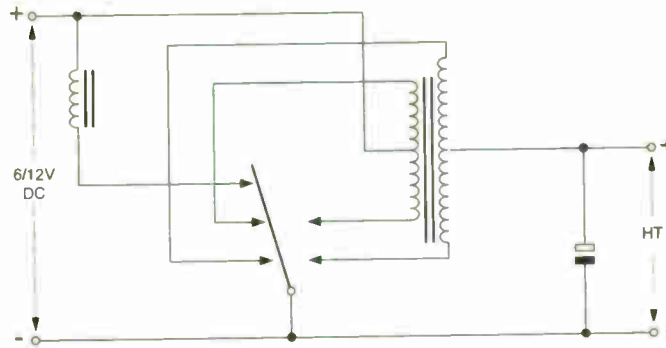


Figure 2: The synchronous version of the vibrator power supply had an extra pair of contacts that did away with the need of a separate rectifier.

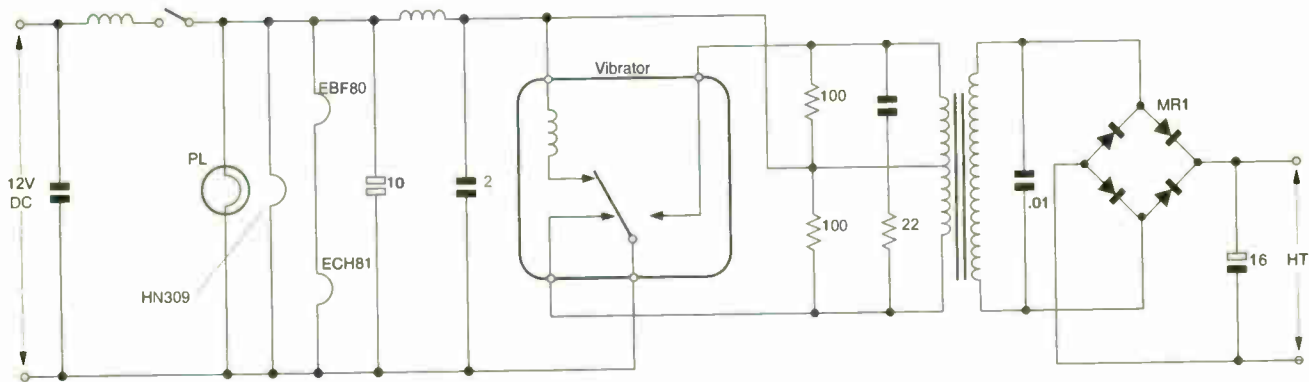


Figure 3: Vibrator power supply used in the Radiomobile Model 20X.

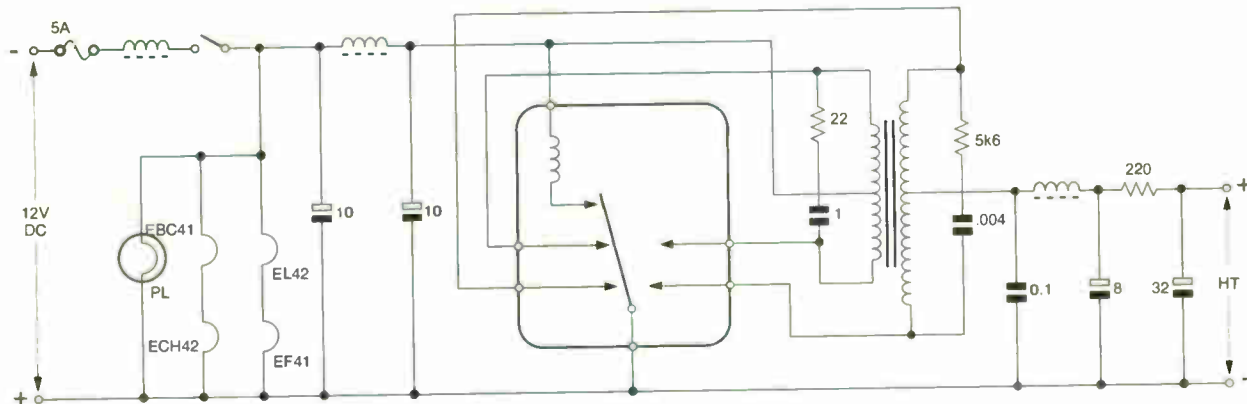


Figure 4: Synchronous vibrator power supply used in the Ekco Model CR280.

back again, connecting the other side of the primary winding to the supply and reconnecting the solenoid energising contact.

This 'buzzer' action sent current through the sections of the transformer's primary winding alternately, setting up an alternating flux in the core. The step-up transformer produced a high voltage across its secondary winding: after rectification, this provided the receiver's valves with their HT supply. Buzz it did, and one didn't need a keen

ear to determine whether the vibrator supply was working or not.

Some vibrators, known as the synchronous type, had an extra pair of contacts that provided rectification. This arrangement is shown in Figure 2.

Figures 3 and 4 show practical non-synchronous and synchronous vibrator circuits.

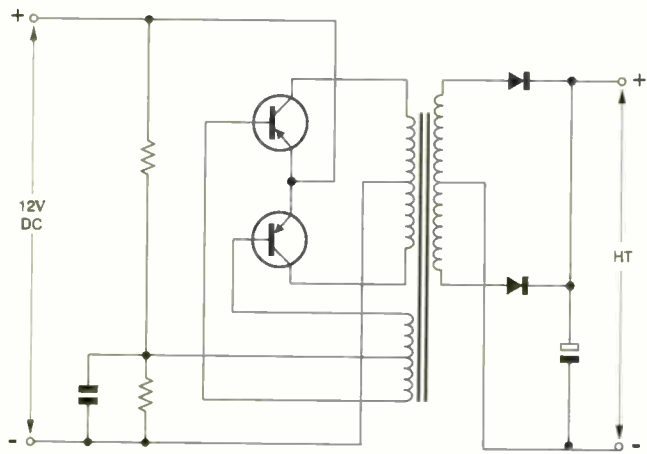
Receiver circuitry

The receiver was generally a three- or four-valve unit that was tailored

to provide extra performance from a small whip aerial under extremely variable signal conditions. AGC, which was sometimes delayed, was applied to the IF amplifier valve and the mixer section of the frequency-changer valve, a fast-operate, slow-release action being preferred.

Stable tuning was a number one priority. It was difficult to achieve, because of the high temperature range experienced by a receiver unit mounted in the engine compartment. Some early receiver manufacturers

Figure 5: Typical transistor converter circuit.



adopted permeability tuning because temperature compensation was easier to apply, using a fixed capacitor and variable inductance. This was cumbersome however with receivers that had more than one waveband. Superhet circuits were always employed, because of their superior performance, the ease of applying AGC, and their better stability. Extra sensitivity could be achieved by having an RF amplifier stage ahead of the frequency-changer stage or two instead of one IF stages.

The more 'de-luxe' the receiver, the higher the current consumption. But a push-pull output stage didn't significantly add to the overall battery drain unless the receiver was operated at high volume, as would have been the case had today's pop music then been around. Class AB1 or AB2 operation was popular for push-pull output stages, as the current consumption is to a large extent proportional to the audio-output level.

The Radiomobile 20X and Ekco Model CR280 were popular models from the 1957-8 period, both providing MW/LW reception. The former is a basic receiver designed for 12V operation only, with either positive- or negative-chassis electrical systems. The power unit has a non-synchronous vibrator, the transformer's secondary winding being connected to a selenium bridge rectifier. The valve line-up is ECH81 frequency-changer, EBF80 IF amplifier and detector, and HN309 audio amplifier/output.

Permeability tuning was a feature of the CR280. Its power supply used a synchronous vibrator that was set for positive-chassis systems: changeover to negative-chassis use was achieved by reversing the leads connected to the transformer's primary winding. The valve line-up was ECH42 frequency changer, EF41 IF amplifier, EBC41 audio amplifier/detector and EL42 audio output. This model had a current consumption of only about 2A.

Progress

When transistor portables began to appear it was not unusual to see such sets hung by their carrying handles from the top of the driver's window, because their puny output was often insufficient to be heard above the engine and road noise in cars of that era. Having the radio hung by the driver's ear was the best way for him to hear it. The advent of power transistors such as the OC16 and OC25 transformed car radio, and led to the now uni-

versal fitting of radio receivers in cars. There was an interim period during which hybrid receivers were used, with valves for the receiver section and a transistor audio section. The vibrator was designed out. There were two approaches to this. The first was to use a transistor converter, with two transistors to drive the step-up transformer. Figure 5 shows a typical circuit. The second was to use a range of valves that could provide reasonable performance with an 'HT' supply of only 12V!

Development of the AF116 and AF117 range of transistors sounded the death knell for the use of valves in cars, and car radio development went ahead rapidly.

Radio is as popular today as it has ever been. The introduction of viable FM receivers started a huge upswing in car radio, coupled with the excellent traffic reporting service for drivers supported by the major broadcasters. The introduction of a tape cassette playing facility and subsequently CD have added to the interest. It's now called "in-car entertainment".

Test Patterns DVD

SET-UP AND DIAGNOSTIC TOOL

£19.99
inc p&p

The affordable alternative to expensive pattern generators!

Test Patterns DVD offers eighteen Industry Standard test patterns in both 4:3 and 16:9 formats, all with a 1Khz audio tone.

Ideal tool for use in field and workshop environments!

Bonus materials include:
■ Pro-Logic System Set-Up ■ Test Cards Of Nostalgic Interest.

Enquiries: ahmet.h@btconnect.com

Order Form: Enclose cheque for £19.99 made payable to A. Huseyin

Name (Block Caps): _____

Address: _____

Post Code: _____

Phone: _____ Email: _____

Send this form with your payment to:
A. Huseyin, Unit 1b Foxholes Ave, Hertford, Herts SG13 7JG

GV 198



PROMAX



NEW!

TELEVISION TEST PATTERN GENERATOR

FEATURES INCLUDE :

- ◆ Suitable for Televisions, projectors and flat screens
- ◆ Covers 4:3 and 16:9 formats
- ◆ Tunable RF modulator between 37MHz and 865MHz
- ◆ Tunable by channel (CCIR, OIRT or FCC) or frequency
- ◆ PAL / SECAM / NTSC Colour Systems
- ◆ B / G / D / K / L / I / M / N Standards
- ◆ Composite Video and Sync outputs
- ◆ High Quality Construction
- ◆ 10 Front panel memories
- ◆ EUROCONNECTOR interface
- ◆ Electronic Attenuator
- ◆ Compact and Strong
- ◆ User friendly
- ◆ Attractive Price
- ◆ Clear LCD Display
- ◆ Available from Stock
- ◆ Full After Sales Service

WIDE SCREENS



PROJECTORS

FLAT SCREENS



PROMAX

FOR ELECTRONIC TEST EQUIPMENT, THERE IS NO WIDER CHOICE THAN WITH PROMAX

Alban

ALBAN ELECTRONICS LIMITED

THE PROMAX SERVICE CENTRE

6 Caxton Centre, Porters Wood, St. Albans, Hertfordshire, AL3 6XT.

**TEL: 01727 832266
FAX: 01727 810546**

**WEB: www.albanelectronics.co.uk
EMAIL: info@albanelectronics.co.uk**

SALES + SERVICE + CALIBRATION



GV 241

COMPUTER MONITOR PATTERN GENERATOR

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

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

AA 930

AUDIO ANALYSER



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

- ◆ Low Frequency Generator
- ◆ Wow and Flutter Measurement
- ◆ Distortion Meter
- ◆ Stereo Watt Meter
- ◆ Millivolt Meter
- ◆ Azimut



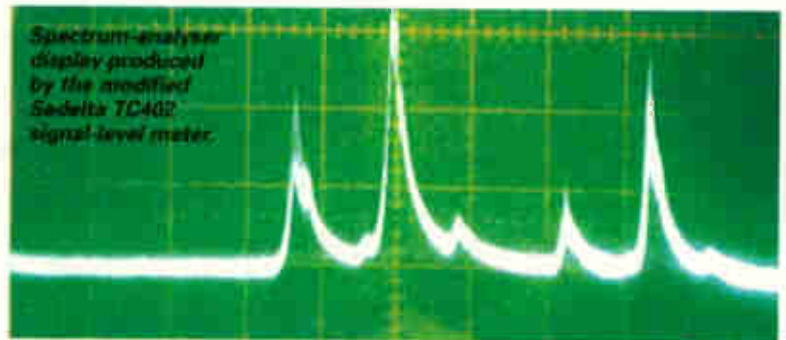
TA 903B

CRT REJUVENATOR

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

A spectrum-analyser conversion

A spectrum analyser is very helpful when dealing with RF problems. Chris Jones describes a minimal-cost modification to a widely used signal-strength meter so that, in conjunction with a suitable oscilloscope, it acts as an effective spectrum analyser



While designing various pieces of radio equipment in my workshop it became obvious that a simple spectrum analyser would be very handy. I had been using a Sadelta TC402 VHF/UHF signal-strength meter, which displays RF signal levels as an analogue meter reading. This meter is OK but it would obviously be better if, when problems turn up, I could scan and see a range of frequencies continuously. Spectrum analysers provide a real-time display of signal levels on a CRT or similar device. This form of display is extremely useful for observing relative signal levels over a wide bandwidth, also for spotting random and fleeting signals within a particular bandwidth.

Basic approach

When I checked inside the TC402 I found that the manual-tuning arrangement consists of a ten-turn,

50k Ω potentiometer that selects a proportion of the internally-generated 36V supply and feeds it to varicap tuning diodes within a Philips tuner module. Further investigation indicated that the output from the detector circuitry could be fed to an oscilloscope's Y input.

A ramp voltage instead of the manually-set tuning potential would scan across the whole or part of the instrument's tuning range. This feature and the bench oscilloscope would provide a spectrum analyser at very little cost. It's likely that many if not most modern signal-level meters use the same or a similar tuning method, so it should be possible to use the sweep circuit I devised in other instruments.

Warning

A word of warning to start with. Don't attempt this project unless you

are competent to carry out the modifications involved, and be wary about carrying out changes that cannot be undone should you wish to restore the equipment to its original mode of operation. We can take no responsibility for any damage to equipment.

Design rules

A few rules were decided on before starting the design. These are as follows:

- (1) The extra circuitry must fit within the original unit.
- (2) No additional power source will be required.
- (3) Modification to the TC402 should be kept to the minimum necessary.
- (4) It should be easy to switch the TC402 between 'normal' and 'analyser' modes.

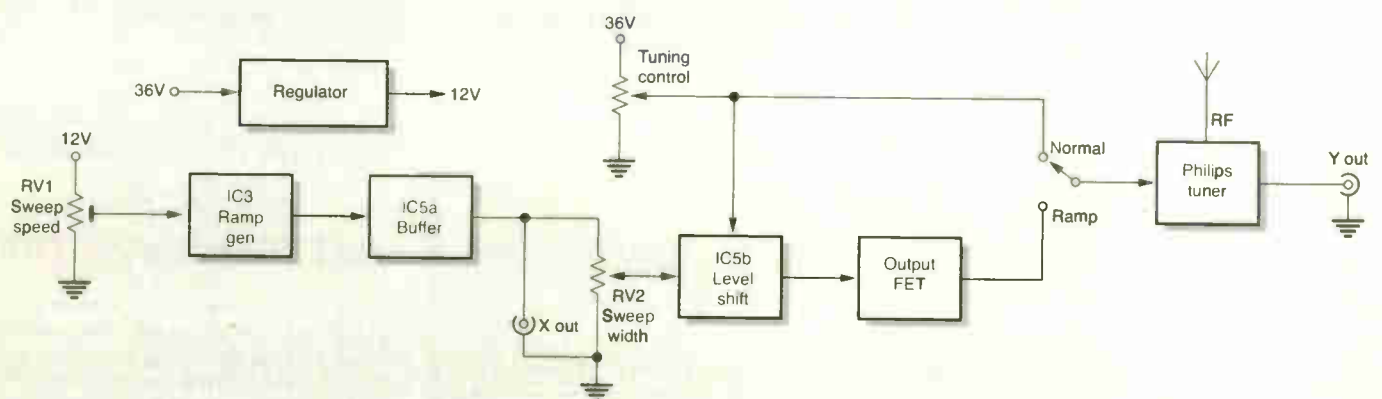


Figure 1: Block diagram of the scan system.

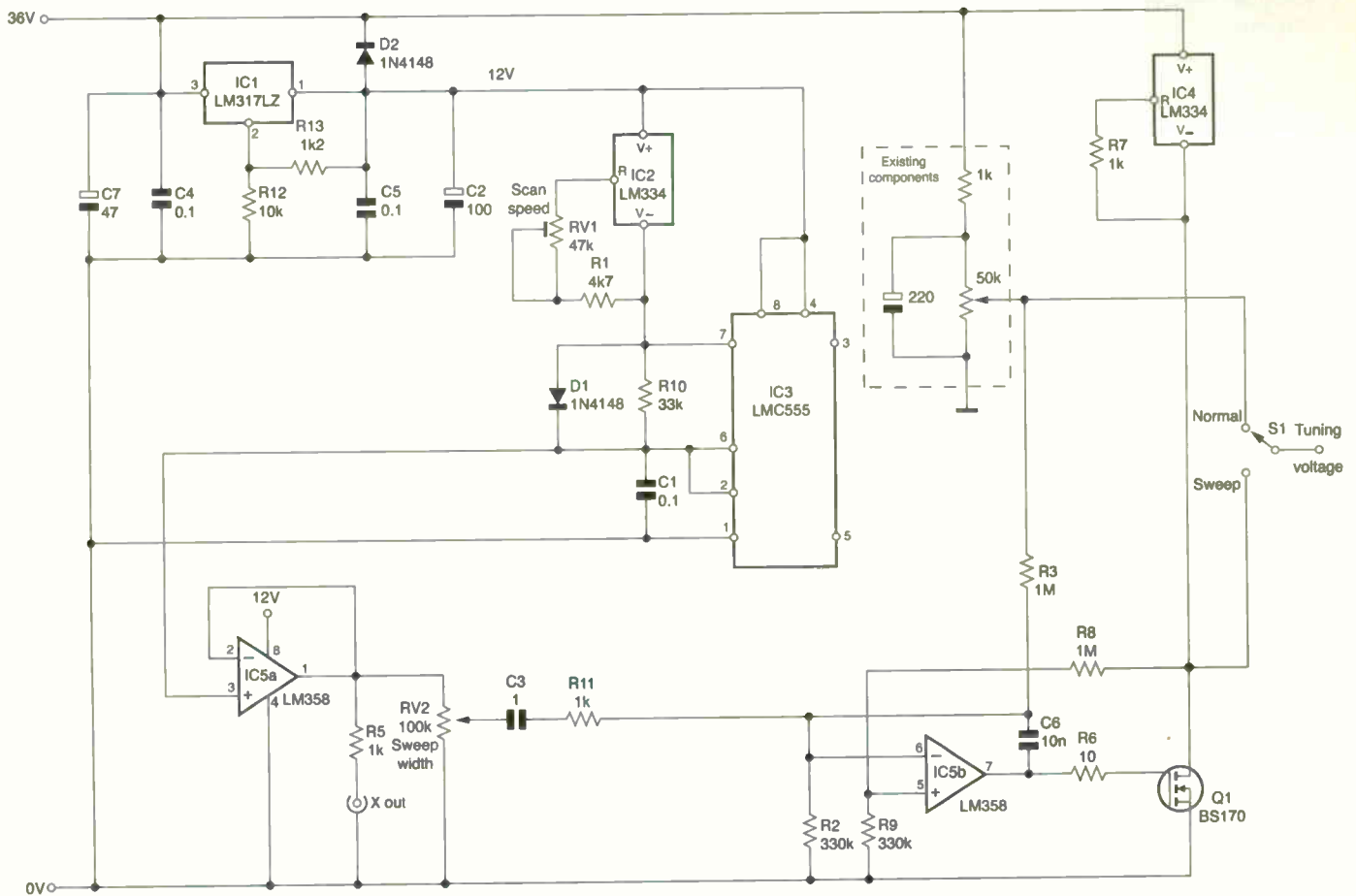


Figure 2: Circuit diagram of the spectrum-analyser scan generator.

Various ideas were tried, with varying degrees of complexity and sophistication. In the end a fairly simple circuit emerged as the best compromise. The circuit is powered from the meter's internally-generated 36V supply, which has a limited current capability (less than 10mA), and must therefore be able to function within this constraint.

Scan speed depends on a number of factors, one of which is the ability of the receiver to keep up with the sweep signal, another the fact that there is noticeable screen flicker when the scan speed is slow. If the detector circuitry within the signal-level meter is too heavily smoothed, the sweep rate will need to be slowed down or the detector may have to be modified slightly. This might involve reducing the value of the detector's smoothing capacitor. A compromise is often needed between scan speed and display flicker.

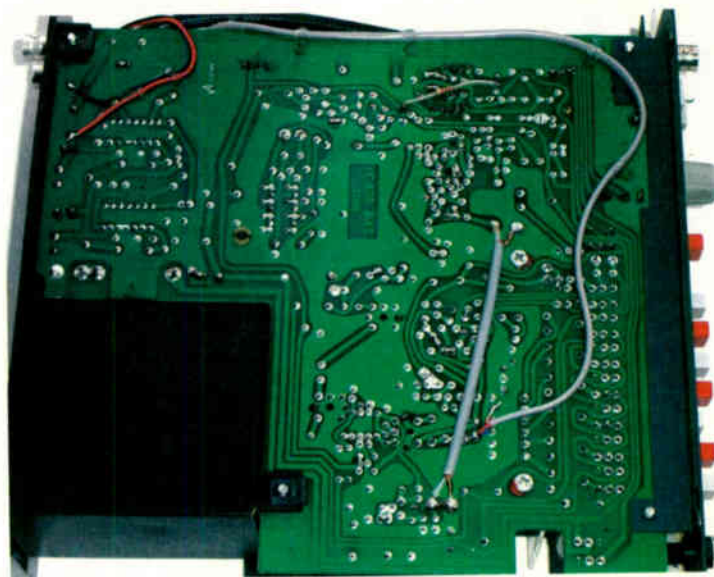
If a digital-storage oscilloscope is used, screen flicker will not be a problem and the scan speed can be slowed considerably. The limiting factor then becomes the ability to detect fleeting signals within the scan bandwidth. The oscilloscope I

use has an XY or external horizontal facility, which is a must when using this circuit.

Circuit description

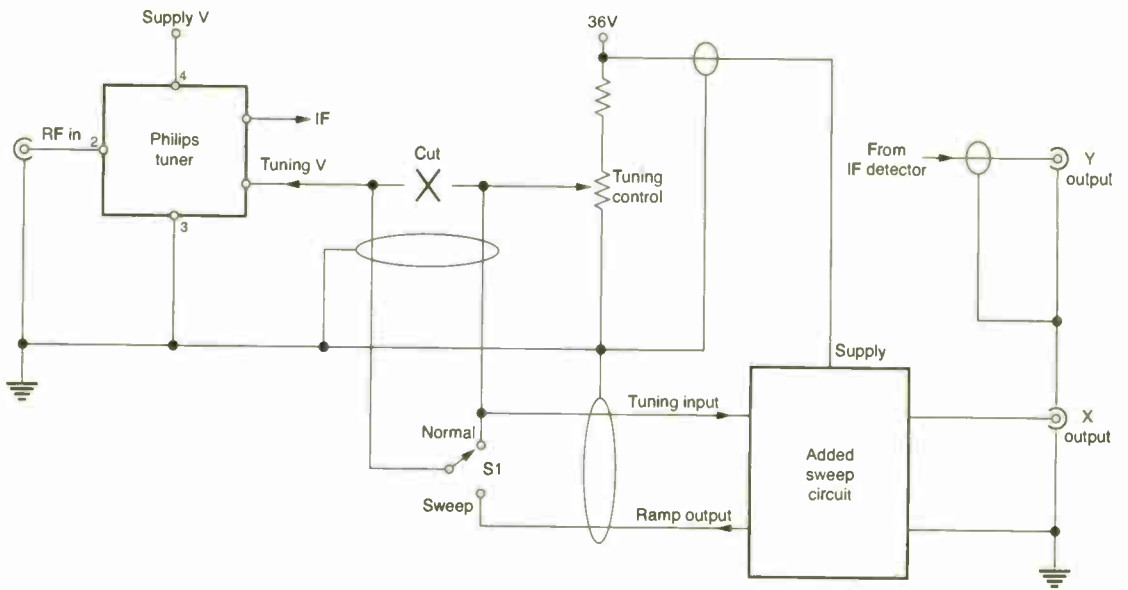
Fig. 1 shows the scan system in block diagram form and Fig. 2 the circuit diagram. A 555 timer IC is the simplest means of producing the required ramp voltage, but the CMOS version is needed to reduce

the current requirement. The 555 has a maximum supply voltage of 18V so, to work with the 36V supply, a voltage regulator is required. A zener diode would have been OK, but would have been too wasteful of current. I used an LM317LZ regulator – an LM78L12 would be a suitable alternative. If the supply is greater than 36V, extra components will be needed to



Wiring modifications inside the TC402 signal-level meter.

Figure 3: Internal wiring for the spectrum-analyser modification.



Addition of Y and X output BNC sockets at the rear of the Sadelta meter.



Front view of the Sadelta TC402 signal-level meter with the normal/sweep changeover switch added at the op left of the panel.

reduce the input to the voltage regulator IC to a safe limit (the maximum is 40V).

As long as the control voltage at pin 5 is not adjusted, the ramp produced by a 555 IC is from a third to two thirds of the supply voltage. Thus with a 12V supply the voltage across the timing capacitor C1 will start at 4V and rise to 8V before returning to 4V. The ramp waveform produced by the standard 555 timing circuit is far from being a linear ramp. To linearise the rising part of the ramp, a constant-current control chip (IC2, LM334) is included. The falling part of the waveform, controlled by the value of R10, is less important and doesn't need to be linear.

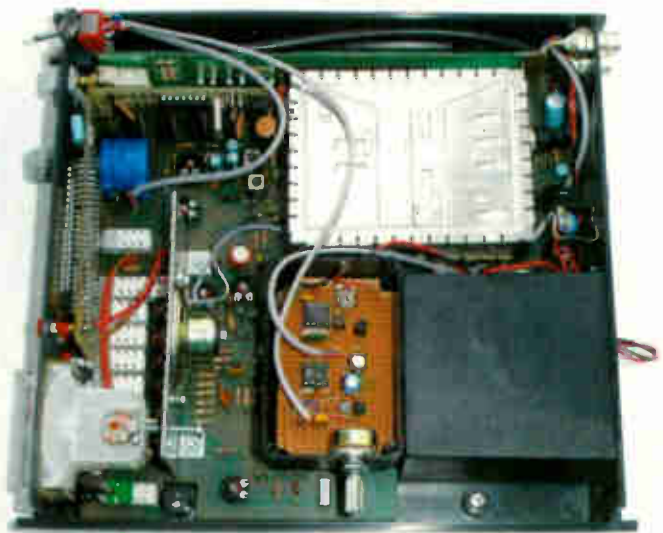
The ramp waveform generated across C1 is buffered by the first op-amp, IC5a, and is fed to the

oscilloscope's X input as well as to the sweep-width control RV2. For simplicity I decided to leave the sweep-width as a screwdriver-variable adjustment: the control could be panel-mounted if required.

The operational amplifier IC used is fairly standard. It doesn't need to be a single-supply type, because none of the signals need to go right down to 0V. For instance the output FET's gate control range is several volts above its source potential. An LM358 dual op-amp is used to reduce the board area and pin count.

A changeover switch (S1) is used to change between normal signal-level meter operation and the spectrum-analyser mode.

The X and Y outputs are fed to two BNC sockets added at the back of the meter.



Internal position of the sweep-scan circuitry, showing the interconnections.

Construction

The circuitry was built on stripboard, with Kynar links on the copper side – I've found it to be the quickest and simplest way of constructing this type of project. The circuitry doesn't need to be screened, so a plastic box was used to house the stripboard. The box was glued, using a hot-melt glue gun, to a convenient part of the inside of the meter to keep it separate from other circuitry.

Fortunately the plastic box can be butted up against the side of the instrument case, giving access to the sweep-width potentiometer RV2 if this is needed. Miniature screened cable is used to connect everything except the power.

No modification to the original circuitry is required other than to disconnect the ten-turn potentiometer's wiper and connect it to the mode changeover switch, see Fig. 3. A single hole was drilled in the front panel for the switch. Two holes to suit the BNC sockets were drilled in the rear panel. A hole can be drilled in the side of the case for access to RV2 if required.

Setting up

The only component that needs to be set up in the added circuitry is the scan-speed preset RV1. It's best set at the slowest speed that can be tolerated with regard to display flicker. If the oscilloscope has a digital-storage facility, the main constraint is to be able to 'catch' fleeting signals.

As mentioned previously, the oscilloscope must have some form of XY or 'External Horizontal/Timebase' facility. The Y output is connected to one of the channels, which must be set to 5mV/div. The other output is connected to the Horizontal or Timebase input, which is the trickiest to set up. Oscilloscopes from different manufacturers are likely to react differently to X signals, so some experimentation may be needed to get the best results. It might be wise to try the circuit out with the oscilloscope to be used before modifying the signal-level meter.

I carried out X setting by tuning to a good mid-band TV signal in the 'normal' mode then switching to the 'scan' mode and adjusting the display to get the peak in the centre of the screen, see the accompanying spectrum-analyser display photo. Note that the lowest extremity of the frequency range is likely to be non-linear, because of the ramp 'bottoming' at 0V. This

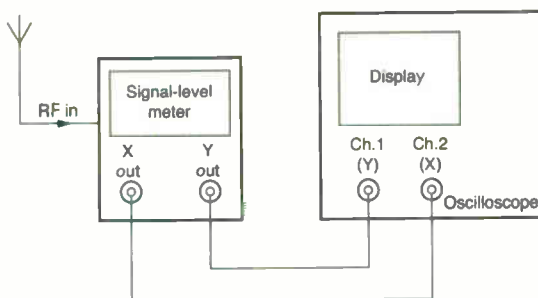
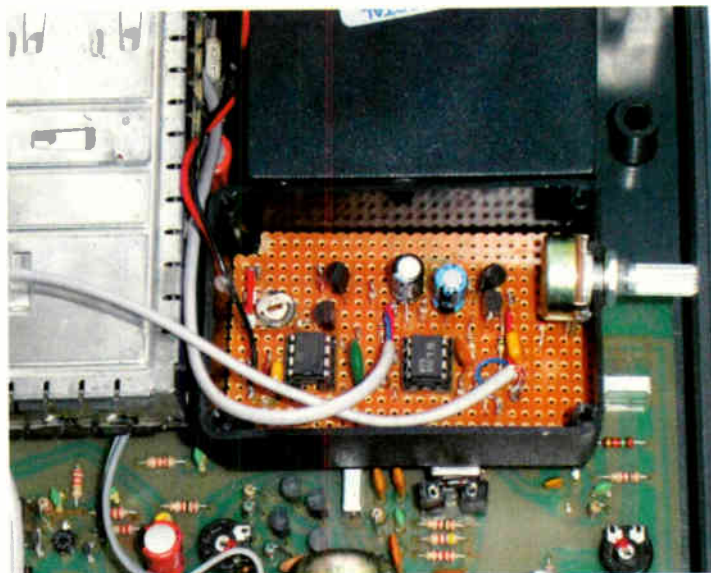


Figure 4: Signal-level meter and oscilloscope connections for spectrum-analyser operation.



Close-up view of the added circuitry.

should not be a problem if the scan width is not excessive.

I use a Hameg 605 oscilloscope, with which the best settings were found to be:

Channel 1 (Y input) mono, alternate, set to 5mV/cm AC.

Channel 2 becomes the X input and is set to 0.5V/cm AC.

Two BNC-to-BNC coaxial cables have to be made up to connect the X and Y inputs to the

oscilloscope. Fig. 4 shows the spectrum-analyser connections.

The sweep-width control setting depends on the instrument to which the circuit is connected as well as the intended use of the instrument. When TV signals are being observed it's best to accommodate several in the display at once, in order to spot adjacent-channel problems etc. Too wide a scan will tend to lose signals. A good compromise is to set the scan width to show five-six TV channels. ■

Components list

C1, C4, C5	100nF	R1	4.7kΩ
C2	100μF, 25V	R2, R9	330kΩ
C3	1μF	R3, R8	1MΩ
C6	10nF	R5, R7, R11	1kΩ
C7	47μF, 50V	R6	10Ω
D1, D2	1N4148	R10	33kΩ
IC1	LM317LZ	R12	10kΩ
IC2, IC4	LM334	R13	1.2kΩ
IC3	LMC555	RV1	47kΩ
IC5	LM358	RV2	100kΩ
Q1	BS170		

Hardware: Two BNC sockets, stripboard, miniature screened twin cable, miniature screened single cable, miniature changeover switch, plastic box



A microcontroller-based CCTV switching system

In this concluding instalment **John Young** describes the receiver end of the four-camera CCTV security system he devised to operate over a distance of some sixty yards

The camera system described in Part 1 last month consists of four low-cost monochrome CCTV cameras with PIR sensors, controlled by an AT892051 (8051) system microcontroller IC. It transmits audio, video and control signals via a low-cost 2.4GHz transmitter. The output from the 2.4GHz receiver consists of video, audio and 500Hz control signals. These are fed to a microcontroller system that uses another AT892051 chip. Fig. 1 shows a block diagram of the arrangement, while Fig. 2 shows the circuit diagram of the microcontroller system.

The receiver microcontroller chip IC4 reads the time of day and date from a battery-backed DS1307 real-time clock chip, IC7. It adds the RTC data to the video signal from the receiver using an STV5730A on-screen display chip, IC6. The modified video signal (with the time and date inserted) and the audio signal are connected to the start input of a VCR.

The receiver microcontroller is connected to a modified infra-red remote-control handset for the VCR. The 500Hz control signal from the transmitter (on the right-hand audio channel) starts and stops the VCR by means of infra-red commands. At the start of the

500Hz control signal a record command is sent to the VCR for 200ms; the stop command is sent when the 500Hz control signal ends.

The microcontroller chip counts each record command and stores the count at a memory location in the RTC chip. When 960 record commands have been counted, a rewind command is sent to the VCR (960 x 15 seconds = 240 minutes in the standard-play mode). Infra-red commands are inhibited for two minutes after the rewind command so that the tape rewinds completely.

Circuit description

An auxiliary output socket on the 2.4GHz video receiver supplies power to the microcontroller circuitry. The LM7805 regulator, IC2, provides a 5V supply for the system.

The AT892051 microcontroller chip IC4 checks for the 500Hz audio control signal using the timer 0 input T0/P3.4. Timer 0 is used in mode 3, giving two separate 8-bit counter/timers. Timer 0L counts the number of incoming pulses at T0/P3.4 during a 10ms interval in order to detect the control signal. Timer 0H generates 250µs interrupts which are counted to create 10ms and 333ms flags. Timer 1 generates a 9,600-baud clock for the serial port.

The DS1307 real-time clock IC7 communicates with the microcontroller chip via an I²C bus.

SuperCap SC1 keeps the RTC oscillator in IC7 going in the absence of the 5V supply. A string of 1N4148 diodes (D1-4) reduces the 5V supply to the 3V required by the clock, with R15 (1kΩ) included to limit the charging current for SC1 if it is totally discharged. SC1 could be replaced by two AA cells with D1-4 and R15 removed.

The STV5730A chip IC6 adds the time and date to the video signal. Time and date are updated by the microcontroller every 333ms.

The TL7705 microcontroller supply supervisor IC3 monitors the 5V line, with Tr1 providing a watchdog function for the microcontroller. If the microcontroller fails to pulse the base of Tr1 from port P3.7 for more than 700ms, the watchdog circuit restarts the microcontroller.

The 500Hz control signal from the controller at the transmitter is amplified and squared by the LM358 chip IC8, with Tr5 (type VN2410L) to provide a full 0-5V squarewave tone input for pin 8 of the microcontroller chip. In the prototype the minimum amplitude of the control signal needed to generate a squarewave is 133mV. Below

133mV there's no output, increasing the circuit's noise immunity.

IC1, type MAX202E, carries out TTL to RS232 conversion and supplies $\pm 10V$ for the DG413DJ chip IC5, which interfaces the micro-controller and the infra-red remote-control unit for the VCR.

In normal operation the circuit consumes about 70mW. The 2.4GHz receiver I bought has a very convenient 12V auxiliary output that I use to power the circuit.

R33 (100k Ω) increases the stability of the video insertion. The shape of the sync pulses from the three cheapest cameras in the system is rather curious (differentiated), so the STV5730A field sync disappeared, with the result that the time and date rolled through the frame. R33 reduces this to a slight judder. The problem is caused by the quality of the camera syncs rather than the STV5730A chip. There is no problem with the fourth camera, which produces high-quality syncs.

Remote-control unit modifications

Unfortunately it's necessary to trace the connections inside the remote-control unit. This isn't trivial, even though only the record, stop and rewind functions are required. The IR remote-control unit I use has a mere 41 buttons. Its PCB is single-sided phenolic (CEM1), with the carbon deposits for the button contacts forming a 'second layer' on the same side as the copper, insulated by the solder resist. The only soldered connections are those to the IC. To avoid damaging the RC handset, I soldered wire-wrap wires to the relevant pins of its controller IC.

The analogue switches in the DG413DJ chip (IC5) won't interact with each other so long as the voltages on the switches are within $\pm 10V$ with respect to IC5's ground pin. Most infra-red remote-control handsets operate at 3V, so this shouldn't be a problem.

A connection between the ground plane of the PCB and the negative battery connector of the infra-red remote-control handset defines the potential at the handset with respect to IC5, helping to ensure correct operation.

Setting the time and date

For maximum user inconvenience, i.e. because of insufficient code space, the time and date are set by an external terminal (or a computer running a terminal emulator program) connected to the RS232

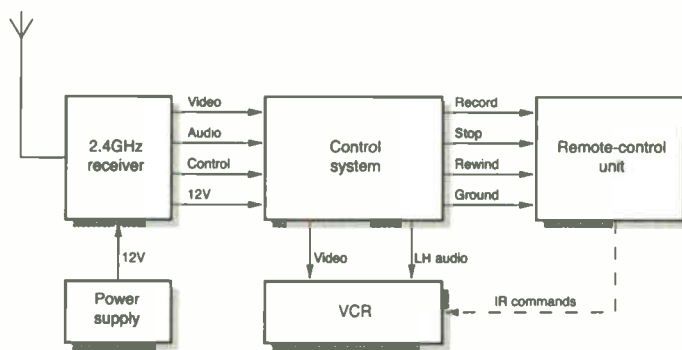


Figure 1: Block diagram of the receiver end of the switched CCTV security system.

interface. The ASCII string

```
<ESC>dHHMMSSDDMMYY<DAY>Y>
```

is sent to the serial port at 9,600 baud, 8 bits, no parity, 1 stop bit, where

<ESC> is the escape character (0x1b, or CHR\$(27))
d is the ASCII character d or D
HH is the hour in 24-hour format 00 to 23 (maximum 23)
MM is the minute 00 to 59 (maximum 59)
SS is the second 00 to 59 (maximum 59)
DD is the date 01 to 31, 30, 29, 28 (maximum 31: not checked against the month!)
MM is the month 01 to 12 (maximum 12)
YY is the year 00 to 99 (maximum 99 – built-in century bug! Come back and complain in 2100!)
<DAY> is the ASCII character 1 (for Sunday) to 7 (for Saturday).
So

```
<ESC>d1224130102047
```

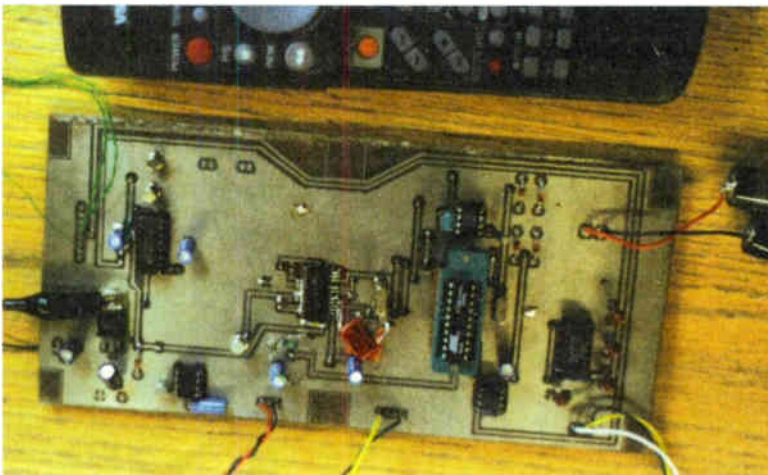
sets the RTC to 12:24:13 on 01 February 2004 Saturday.

Construction

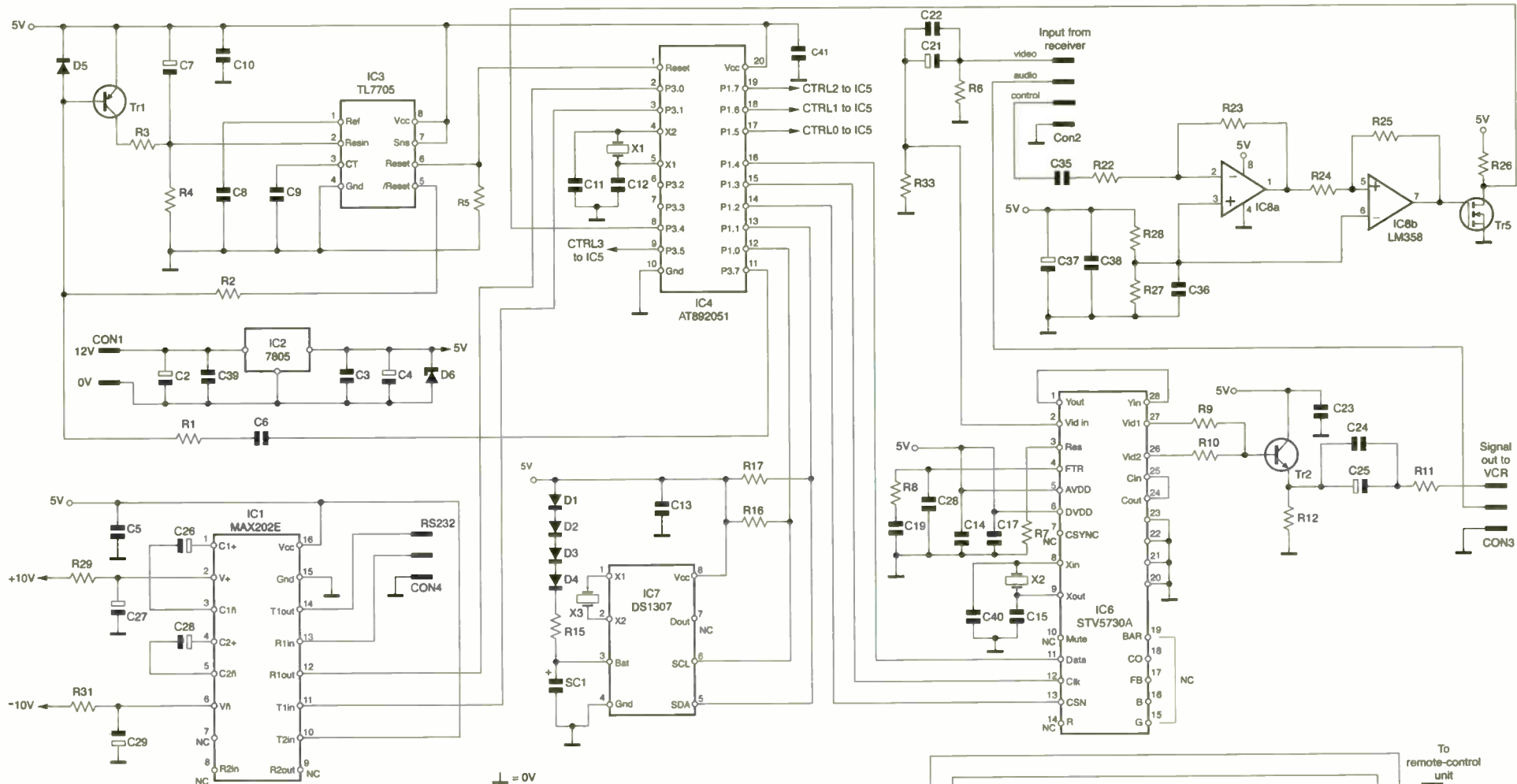
The receiver system circuit was assembled on a double-sided PCB, with large areas of print used as ground plane. The prototype PCB was coated with electroless tin to make soldering easier. This isn't essential (it looks pretty though). Thermal relief around ground pins reduces the difficulty of soldering ground connections to the ground plane.

The SV5730A chip IC6 is a 28-pin surface-mounted device with 50 thou pitch. Apart from IC6 the ICs are fitted in sockets. Non-polarised capacitors up to 100nF and all resistors are 1206 size. The remaining parts are through-hole.

Assembly is simple because the PCB is large and the components are well-spaced. There are no vias underneath components, which simplified production of the prototype. The STV5730A chip IC6 is the most difficult item to solder, but at 50 thou pitch is easy enough using a pointy tip (e.g. Weller



Layout of the control board at the receiver end of the system.



Corrections to Part 1: Pin 12 of the DG413DJ chips IC6 and IC7 (see Fig. 2) should have been labelled VL, not GND. These pins are connected to the 5V supply, with pin 12 of IC6 decoupled by C3 and pin 12 of IC7 decoupled by C30.

Several minus signs in Fig. 2 appeared as an n with a tilde above. This has happened before and could happen again. The cause is some sort of incompatibility between the publisher's and the printer's computer systems. It's very difficult to control this glitch, as the problem arises after we have corrected pages.

Figure 2: Circuit diagram of the receiver end of the switched CCTV security system. There is no connection to pins 6 and 7 of IC4.

PTAA or PTP), surface-mount flux and solder wick.

Software

The software was written in C, using the Keil 8051 compiler in its special Atmel 2K demonstration version. Code space restrictions ensure that it isn't very much like C.

The software consists of an idle loop with interrupt handlers for the serial port, timer 0L and timer 0H. The idle loop

(1) Checks the serial port receive buffer for characters.

(2) Passes received characters to the time-setting function.

(3) Checks the timer flags for 10ms and 333ms time-outs.

(4) Updates the STV5730A data when the 333ms flag is set.

(5) Checks the count from timer 0L every 10ms to determine the frequency of any input at T0/P3.4.

(6) Reads the current time and date from the DS1307 IC every 333ms.

(7) Updates the time and date in the DS1307 IC when a valid time and date string is received.

(8) Toggles P3.7 at every repetition of the loop to pacify the watchdog.

Miscellaneous points

CON6, CON7, R18-21, R30, R32, Tr3 and Tr4 are not required in this application and are thus omitted (code space again!).

The infra-red remote-control unit will probably start transmitting commands when power is removed from the main circuit. This is a minor irritation, but flattens the batteries quite quickly during power cuts. A solution might be to obtain power from the 5V supply, using a suitable 3V regulator and remembering that infra-red remote-control units take quite large, spiky currents.

The microcontroller cannot check the operation of the VCR.

At present the embedded software matches the characteristics of a Daewoo infra-red remote-control unit and a Daewoo VCR (using Evil Compiled-in Constants). The length of the record pulse applied to the remote-control unit is critical: too short and it is unreliable, too long and the VCR thinks that half an hour or more of record time is wanted. The software cannot select the AV input. This has to be done manually, using the remote-control unit. The Daewoo VCR conveniently forgets this during a power cut.

Experience indicates that domestic microwave ovens (>700W at about 2.4GHz) produce rather interesting effects on the received video and audio. This sometimes confuses the microcontroller chip, with the result that the VCR records to the end of the tape. Corrections to Part 1: Pin 12 of the DG413DJ chips IC6 and IC7 (see Fig. 2) should have been labelled VL, not GND. These pins are connected to the 5V supply, with pin 12 of IC6 decoupled by C3 and pin 12 of IC7 decoupled by C30.

Software

The programs for the AT892051 chips can be obtained by email from blackrock.software@talk21.com

Component details

<i>Circuit ref.</i>	<i>Type</i>
C2, C4, C21, C25, C31, C33, C37	10µF
C3, C5, C6, C8-10, C13, C14, C17	
C22-24, C30, C32, C34-36, C38, C39, C41	100nF, 1206
C7	4.7µF
C11, C12	22pF, 1206
C15, C40	27pF, 1206
C19	22nF, 1206
C20	220pF, 1206
C26-29	1µF
SC1	100mF SuperCap
D1-5*	1N4148
D6	BZX79C6V2
IC1	MAX202E
IC2	LM7805
IC3	TL7705
IC4	AT892051
IC5	DG413DJ
IC6	STV5730A
IC7	DS1307
IC8	LM358 or LM1458P
Tr1	BCY70 or BC212
Tr2	BC107
Tr5	VN2410L or equivalent
R1, R16, R17, R22-28	10kΩ
R2, R4, R5, R33	100kΩ
R3, R9	1kΩ
R6, R11	75Ω
R7	5.6kΩ
R8	22kΩ
R10	3.3kΩ
R12	100Ω
R15*	1kΩ
R29, R31	10Ω
X1	11.05MHz
X2	17.7MHz
X3	32.768kHz
CON1	2W Molex
CON2	4W Molex
CON3, 4	3W Molex
CON5	8W Molex

*D1-4 and R15 not fitted if primary cells used.

The TV boom years

Ron Bourne describes the days when TV was still something new and exciting, for the public, service engineers and sales people alike

During the Sixties I joined a large local radio and TV retailer as a service engineer. It was a very forward-looking company for the time, with over nine shops in the area and a motto – “It’s the service that counts!” – that was blazoned on all the company’s vehicles. The vans, mostly Ford 100Es, also had coloured balloons painted on the sides. If a car heater was installed you were lucky. But, living up to the motto, the vans were fitted with the first Pye radiotelephones. So we were in constant communication (well, for most of the time!) with the service centre. This, along with other offices and departments, was in a large former public house that dated from the Victorian period.

The main office was upstairs. Other rooms were occupied by sales representatives, the sales office, the Sales Manager and, of course, the Managing Director. He would pass his comments and instructions on in memos that were written in bright green ink. We quaked in our shoes if we received one of them! I recall a service engineer being reported for excessive speeding in the city. The memo he received said “if the police don’t get you next time, I will!”



Servicing procedures

When we arrived at the Service Department we would report to the Radiotelephone Office, which was run by a former army captain. He had four gorgeous girls as his assistants: we all enjoyed rapport with them! To start the day’s work we would be given a clipboard with triplicate job sheets attached.

Our kits included a large, heavy mains-operated soldering gun. So we also required an extension lead and numerous mains socket adaptors – two-pin 15A, three-pin 15A, two-pin 5A, three-pin 5A. Wylex types and the new-fangled 13A plug top. If I had only a couple of soldered joints to do, for example to replace an EY51 EHT rectifier valve, I would use a bog-standard Woolworth’s soldering iron, asking the customer if I could heat it up on the gas stove!

If you couldn’t carry out the repair on the spot, you radioed the RT Office. A larger van would be sent along later that day to pick up the set and bring a loan one. If calls came in while you were out they would be passed on to you. My call sign was “C Charlie”!

A French-polisher was also employed, to renovate sets. Don’t forget that in those days they were pieces of furniture. A joiner was employed for alterations to the shops. He later fitted individual service booths in the Television Room for each inside engineer.

Salesmanship

The sales team was driven hard. We service engineers would get ten shillings for each sales lead that led to a sale, and there was a competition for the engineer who generated most sales each month. One sales gimmick offered a free holiday for two as the prize. The outside sales staff had a deck chair fixed atop their vans with a placard that said “Are you going to Alassio?” Some staff didn’t take kindly to having this stuck outside their house when they went home.

I remember our Sales Manager once accepting a cake from a customer as a deposit for a TV rental! He wouldn’t let a stone go unturned in the effort to make a sale. That’s how he came to be head of the sales department. He was forever thinking of gimmicks to increase sales.

The fleet of vehicles would be replaced every two years. As a public-relations exercise the new vans, in the latest colours, would be paraded single file through the city, with a public-address van in front. There were no traffic problems in those days. In fact the police helped us. This could have been because our Managing Director was a well-known local magistrate!

On Sunday morning we were expected to take our vans to the Ford dealer to give them a good wash and clean. There was no excuse for a dirty van. We didn’t get paid for this chore – it was simply expected of us to maintain the good name of the firm.

High jinks

One day they couldn’t light the coal fire in the RT Office. The domestic engineer had the bright idea of throwing some old washing-machine oil on the stubborn fire. There was a great cloud of smoke followed by a huge bang. The plaster above the fireplace fell off, and the chimney pot blew off and fell through the roof of the premises next door, narrowly missing a mechanic who was working on a car.

We were a happy crowd, and didn’t realise what good times we had.

Len Briggs

Incidentally, does anyone remember the Pye lectures that were given by Len Briggs? He was a gem, from his first lecture in Birmingham on the principles of television to the last one, given at Belle Vue, Manchester, on teletext. By that time he had to welcome “ladies and gentlemen” – up to then only male TV engineers had been present at these events.

Besides a blackboard, his main aid was a large cane which he used to demonstrate that a negative pulse can go more negative.

In the early days only about a dozen engineers would be present. At later events this grew to hundreds. The sets he covered over the years ranged from a 9in. TRF model with EF50 valves through models such as the V4 to more modern 625-line chassis such as the KT3. He didn’t get to deal with many ICs, but did cover the notorious TDA2600 class D field output chip in the G11 chassis.

They were great get-togethers for us to discuss TV faults. Those were the days, when digital reception was way off!

Grandata Ltd

distributor of electronic components

Television Repair / Mod Kits

MAKE & MODEL	KIT TYPE	CODE
ALBA		
1452T	PSU	ONWAKIT
1427T	PSU	ONWAKIT
1402	PSU	ONWAKIT
1455T	PSU	ONWAKIT
1456T	PSU	ONWAKIT
1458T	PSU	ONWAKIT
1459T	PSU	ONWAKIT
1499Y	STANDBY	MODKIT37
14SLTX	STANDBY	MODKIT37
1799Y	STANDBY	MODKIT37
2002	PSU	ONWAKIT
2009B	PSU	ONWAKIT
2052T	PSU	ONWAKIT
2152T	PSU	ONWAKIT
2099TX	STANDBY	MODKIT37
BTV17	STANDBY	MODKIT37
CTV501	PSU	ONWAKIT
CTV701	PSU	ONWAKIT
CTV840	PSU	ONWAKIT
CTV841	PSU	ONWAKIT
CTV485	PSU	ONWAKIT
AKAI		
CT1417	PSU	ONWAKIT
CT2159U	PSU	ONWAKIT
CT2162UNT	PSU	ONWAKIT
CT2863UNT	PSU	ONWAKIT
DECCA/TATUNG		
F SERIES	PSU	MODKIT30
TVC563	STANDBY	MODKIT37
GOLDSTAR		
CF25A50F	FRAME	MODKIT36
CF25C22C	FRAME	MODKIT35
CF28A50F	FRAME	MODKIT36
CF28C22F	FRAME	MODKIT35
CF28C28F	FRAME	MODKIT36
CF29C42F	FRAME	MODKIT35
GOODMANS		
147TT	PSU	ONWAKIT
149T	PSU	ONWAKIT
1430RA	PSU	ONWAKIT
1430RS	PSU	ONWAKIT
1430RW	PSU	ONWAKIT
1450T	PSU	ONWAKIT
1455TS	PSU	ONWAKIT
2019R	PSU	ONWAKIT
2029T	PSU	ONWAKIT
2029TA	PSU	ONWAKIT
COMPACT 11	PSU	MODKIT47
F16 CHASSIS	FRAME	GOODKIT1
F16 CHASSIS	LINE	GOODKIT1

MAKE & MODEL	KIT TYPE	CODE
GOODMANS..continued		
F16	PSU	GOODKIT1
F16	VIDEO	GOODKIT1
GRUNDIG		
CUC 2050	PSU	MODKIT48
CUC 2051	PSU	MODKIT48
CUC 2058	PSU	MODKIT48
CUC 2059	PSU	MODKIT48
CUC 2080	PSU	MODKIT48
CUC 7350		GRUNDIGKIT1
CUC 7301/3		
(BUZ90)	PSU	GRUNDIGKIT2
CUC 7301/3		
(MJF18004)	PSU	GRUNDIGKIT3
HINARI		
HIT14RC	PSU	ONWAKIT
JVC		
AV29SX1EK	FIELD O/P	JVCKIT1
AV29SX1EN	FIELD O/P	JVCKIT1
AV29SX1EN1	FIELD O/P	JVCKIT1
AV29SX1PF	FIELD O/P	JVCKIT1
AV29TSIE1	FIELD O/P	JVCKIT1
C14E1EK	PSU	ONWAKIT
C14T1EK	PSU	ONWAKIT
C21E1TEK	PSU	ONWAKIT
CS21M3EK	PSU	ONWAKIT
MATSUI		
1455	PSU	ONWAKIT
1496RT (H3N90)	PSU	MODKIT43
1496RT (BUZ90)	PSU	MODKIT44
1498	PSU	ONWAKIT
2086	PSU	ONWAKIT
2096RT (H3N90)	PSU	MODKIT43
2096RT (BUZ90)	PSU	MODKIT44
2098	PSU	ONWAKIT
21V1N (BUZ90)	PSU	GRUNDIGKIT2
21V1T (MJF18004)	PSU	GRUNDIGKIT3
TVR180R/208	STANDBY	MODKIT37
TVR185T	STANDBY	MODKIT39
mitsubishi		
AV1 SERIES	PSU	MITSKIT3
CT1M5B	PSU	MITSKIT3
CT21M5BT	PSU	MITSKIT3
CT25M5BT	PSU	MITSKIT3
CT21A2STX	TDA 8178S	MITSKIT1
CT21AX1B	PSU	MITSKIT3
CT21A3STX	TDA 8178S	MITSKIT1
CT21AV1BS	PSU	MITSKIT3
CT25A2STX	TDA 8178S	MITSKIT1
CT25A3STX	TDA 8178S	MITSKIT1

MAKE & MODEL	KIT TYPE	CODE
mitsubishi..continued		
CT25A4STX	TDA 8178S	MITSKIT1
CT25A6STX	TDA 8178S	MITSKIT1
CT25AV1B	PSU	MITSKIT3
CT25AV1BS	PSU	MITSKIT3
CT25AV1BD	PSU	MITSKIT3
CT25AV1BDS	PSU	MITSKIT3
CT28AV1B	PSU	MITSKIT3
CT28AX1BD	PSU	MITSKIT3
CT28AV1BDS	PSU	MITSKIT3
CT29AS1	TDA 8178S	MITSKIT2
CT29A4	TDA 8178S	MITSKIT2
CT29A6	TDA 8178S	MITSKIT2
CT29B2	TDA 8178S	MITSKIT2
CT29B3	TDA 8178S	MITSKIT2
CT29B6	TDA 8178S	MITSKIT2
CT29B8	TDA 8178S	MITSKIT2
CT33B3	TDA 8178S	MITSKIT2
M5 SERIES	PSU	MITSKIT3
NEI/NIKKAJ		
CE25 CHASSIS	PSU	NIKKAIKIT1
C289FTXN	PSU	NIKKAIKIT1
C28F41FXN	PSU	NIKKAIKIT1
PANASONIC		
IC561	TDA 8175	PANKIT1
TX25XD60	VERT OUTPUT	PANKIT2
TC28XD60	VERT OUTPUT	PANKIT2
TX28XD70	VERT OUTPUT	PANKIT2
TX29XD70	VERT OUTPUT	PANKIT2
TX-W26D3	VERT OUTPUT	PANKIT2
PHILIPS		
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

MAKE & MODEL	KIT TYPE	CODE
SAMSUNG		
CI5944	FRAME	SAMKIT2
CI6844	FRAME	SAMKIT2
VIK310	PSU	SAMSUNGKIT
VIK320	PSU	SAMSUNGKIT
VIK350	PSU	SAMSUNGKIT
V1375	PSU	SAMSUNGKIT
V1395	PSU	SAMSUNGKIT
WINNER 1	PSU	SAMSUNGKIT
SHARP		
51CS03H	PSU	SHARPKIT1
51CS05H	PSU	SHARPKIT1
56FW53H	PSU & DOLBY	MODKIT45
59CS03H	PSU	SHARPKIT2
59CS05H	PSU	SHARPKIT2
59CS08H	PSU	SHARPKIT2
59DS03H	PSU	SHARPKIT3
59FW53H	PSU & EW	MODKIT49
66CS03H	PSU	SHARPKIT2
66CS05H	PSU	SHARPKIT2
66CS08H	PSU	SHARPKIT2
66FW53H	PSU & DOLBY	MODKIT45
66FW53H	PSU & EW	MODKIT49
66FW54H	PSU & DOLBY	MODKIT45
66FW54H	PSU & EW	MODKIT49
76FW53H	PSU & DOLBY	MODKIT45
76FW53H	PSU & EW	MODKIT49
76FW54H	PSU & DOLBY	MODKIT45
76FW54H	PSU & EW	MODKIT49
DA-100 CHASSIS	PSU & EW	MODKIT49
SONY		
SLV715HB	VCR - PSU	MODKIT40
SLV777UB	VCR - PSU	MODKIT40
THOMSON		
35029400		THOMKIT2
35065920		THORNKIT1
FV70	PSU	THORNKIT1
ICC7 CHASSIS	TDA 8178FS	THOMKIT1
ICC7 CHASSIS	FRAME	THOMKIT3
ICC8 CHASSIS	TDA 8178FS	THOMKIT1
ICC8 CHASSIS	FRAME	THOMKIT3
ICC9 CHASSIS	EAST/WEST	THOMKIT4
ICC17 CHASSIS	PSU	MODKIT41
ISS20 (TV-DVD)	PSU	MODKIT46
R3000	PSU	THOMKIT2
R4000	PSU	THOMKIT2
TX92F CHASSIS	EAST/WEST	THOMKIT4

ORDER CODE	PRICE
GOODKIT1	£ 11.00
GRUNDIGKIT1	£ 10.50
GRUNDIGKIT2	£ 10.50
GRUNDIGKIT3	£ 10.50
JVCKIT1	£ 11.00
MITSKIT1	£ 3.00
MITSKIT2	£ 15.00
MITSKIT3	£ 6.00
MODKIT30	£ 10.00

ORDER CODE	PRICE
MODKIT35	£ 9.50
MODKIT36	£ 5.00
MODKIT37	£ 6.50
MODKIT39	£ 8.50
MODKIT40	£ 6.00
MODKIT41	£ 6.00
MODKIT43	£ 7.00
MODKIT44	£ 7.00
MODKIT45	£ 4.00

ORDER CODE	PRICE
MODKIT46	£ 12.00
MODKIT47	£ 15.50
MODKIT48	£ 8.00
MODKIT49	£ 13.00
NIKKAIKIT1	£ 12.00
ONWAKIT	£ 12.00
PANKIT1	£ 15.00
PANKIT2	£ 9.00
PHILKIT1	£ 10.00

ORDER CODE	PRICE
PHILKIT2	£ 2.50
PHILKIT3	£ 4.00
PHILKIT4	£ 4.25
PHILKIT5	£ 5.75
PHILKIT6	£ 5.50
PHILKIT7	£ 7.60
PHILKIT8	£ 4.25
PHILKIT9	£ 7.50
PHILKIT10	£ 8.50

ORDER CODE	PRICE
SAMKIT2	£ 8.00
SAMSUNGKIT	£ 16.00
SHARPKIT1	£ 11.00
SHARPKIT2	£ 11.00
SHARPKIT3	£ 9.00
THOMKIT1	£ 7.00
THOMKIT2	£ 12.00
THOMKIT3	£ 9.00
THOMKIT4	£ 4.00

New Arrival !!

Philips L01.1E Chassis PSU Repair Kit

Fits the following models :

28PT4457/05 , 28PW5407/05 , 28PW6006/05

Order Code : MODKIT50

Price : £ 18.00 + vat

New Arrival !!

Vestel 11AK31 Chassis PSU Repair Kit

Fits the following brands :

Bush , Goodman , Hitachi , Toshiba
Models BD2851S , BD2951S , BD2581S , BD3251S

Order Code : MODKIT51

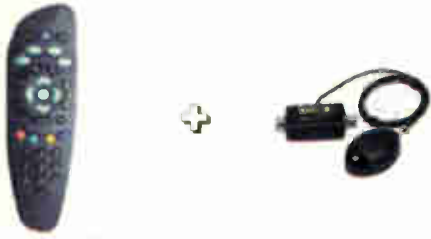
Price : £ 10.00 + vat

Grandata Ltd

distributor of electronic components

Digital Satellite Accessories

Sky™ Digital Remote & TV Link Eye Combination



Order Code : SKYPACK1

Price : £ 16.00 + vat each

5 +

£ 14.50 + vat each

Carriage Charged at £ 5.00 + vat

Sky™ Digital Remote Controls



Order Code : RCSKY

Price £ 7.95 + vat

5 or more £ 7.45 + vat each

10 + £ 6.95 + vat each

Carriage Charged at £ 5.00 + vat

Sky™ Digital Remote & SLx Link Eye Combination



Order Code : SKYPACK2

Price £ 13.00 + vat each

5 + £ 11.50 + vat each

Carriage Charged at £ 5.00 + vat

SLx Link Eye

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

Order Code

27833R

£ 5.80 + vat each

10 or more

£ 4.80 + vat each

Sky™ Digital TV Link Eye

Order Code : TVLINKEYE

Price
£ 10.00 + vat

5 +

£ 7.99 + 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

Satellite Repair / Mod Kits

Amstrad DRX100

Tuner Repair Kit

Order Code
SATKIT35

Price
£ 1.40 + vat

Amstrad DRX100

PSU Reliability Kit

Order Code
SATKIT36

Price
£ 12.00 + vat

Amstrad DRX100

PSU Repair Kit

Order Code
SATKIT37

Price
£ 13.50 + vat

Grundig GDS200

Digital Satellite Receiver Repair Kit

Early psu
MODEL : DSO - 0385 REV C

Order Code
SATKIT34A

Price : £ 10.00 + vat

Grundig GDS200 / GDS300

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

Digital Satellite Receivers Fan Kit

Suitable for

Amstrad DRX100 , DRX200
Grundig GDR200 , GDS200
Pace Digibox

plus many more analogue makes and models

Order Code : FANKIT1

Price : £ 10.00 + vat

Panasonic Digital Satellite Receiver Fan Kit

Suitable for Panasonic TU-DSB20/30 , TU-DSB31/35

Order Code : FANKIT2

Price : £ 15.00 + vat

Grundig Digital Satellite Receivers Reliability Kit

These kits contain capacitors that are generally of higher specification than those fitted by the manufacturers.

GDS200

Early PSU
DSO0385 Rev C

Kit Contains 9 capacitors

Code : RELKIT34A
Price: £ 4.00 + vat

GDS200 / GDS300

Later PSU
DSO0375 Rev A
DSO0385 Rev F

Kit Contains 11 capacitors

Code : RELKIT34B
Price: £ 4.00 + vat

GDS200 / GDS300

Later PSU
Rev 03

Kit Contains 13 capacitors

Code : RELKIT34C
Price: £ 4.00 + vat

GDS200 / GDS300

Samsung PSU
PSSH370601B

Kit Contains 12 capacitors

Code : RELKIT34D Price: £ 4.00 + vat

GDS300

Samsung PSU
PSSH370603B

Kit Contains 13 capacitors

Code : RELKIT34E Price: £ 4.00 + vat

Grandata Ltd

distributor of electronic components

105°C Electrolytic Capacitors

VALUE CODE PRICE PER PACK	VALUE CODE PRICE PER PACK	VALUE CODE PRICE PER PACK	VALUE CODE PRICE PER PACK	VALUE CODE PRICE PER PACK
6.3 Volts				
220uF CAP163 £0.70 10				
470uF CAP164 £0.80 10				
10 Volts				
100uF CAP118 £0.45 10				
220uF CAP165 £1.00 10				
470uF CAP29 £1.20 10				
680uF CAP166 £1.20 10				
1000uF CAP119 £1.50 10				
2200uF CAP120 £2.10 10				
3300uF CAP167 £1.60 5				
16 Volts				
22uF CAP121 £0.35 10				
33uF CAP122 £0.35 10				
47uF CAP123 £0.35 10				
100uF CAP124 £0.60 10				
150uF CAP168 £0.65 5				
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				
1200uF CAP169 £1.50 5				
1500uF CAP170 £1.50 5				
2200uF CAP34 £5.25 10				
3300uF CAP35 £5.00 5				
4700uF CAP36 £6.10 10				
6800uF CAP171 £4.50 5				
25 Volts				
10uF CAP37 £0.45 10				
15uF CAP172 £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				
25 Volts...continued				
1000uF CAP46 £3.65 10				
1500uF CAP47 £3.90 5				
2200uF CAP48 £2.00 2				
3300uF CAP49 £2.20 2				
4700uF CAP50 £3.65 2				
6800uF CAP51 £3.90 2				
35 Volts				
1uF CAP130 £0.40 10				
3.3uF CAP131 £0.40 10				
4.7uF CAP132 £0.45 10				
10uF CAP133 £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				
1500uF CAP173 £4.00 10				
2200uF CAP61 £2.45 2				
3300uF CAP62 £10.00 5				
4700uF CAP136 £3.50 2				
40 Volts				
2200uF CAP174 £1.80 2				
2200uF CAP175 £2.00 1				
50 Volts				
0.47uF CAP176 £0.35 10				
1uF CAP137 £0.35 10				
2.2uF CAP138 £0.35 10				
3.3uF CAP139 £0.35 10				
4.7uF CAP140 £0.35 10				
6.8uF CAP177 £0.45 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				
50 Volts...continued				
100uF CAP66 £0.85 10				
1500uF 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				
53 Volts				
0.22uF CAP145 £0.45 10				
0.33uF CAP178 £0.35 10				
0.47uF CAP73 £0.35 10				
1uF CAP74 £0.35 10				
1.5uF CAP179 £0.35 10				
2.2uF CAP75 £0.35 10				
3.3uF CAP76 £0.50 10				
4.7uF CAP77 £0.35 10				
6.8uF CAP180 £0.50 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				
56uF CAP181 £1.10 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				
2200uF CAP182 £2.20 10				
4700uF CAP183 £4.00 1				
100 Volts				
0.1uF CAP184 £0.80 10				
0.22uF CAP185 £0.80 10				
0.33uF CAP186 £0.80 10				
0.47uF CAP91 £0.50 5				
1uF CAP92 £0.85 10				
1.5uF CAP93 £0.70 5				
100 Volts...continued				
2.2uF CAP94 £0.50 5				
3.3uF CAP95 £0.50 5				
4.7uF CAP96 £0.50 5				
6.8uF CAP187 £0.80 10				
10uF CAP97 £0.95 10				
22uF CAP98 £1.05 10				
33uF CAP99 £1.55 5				
47uF CAP100 £1.75 10				
68uF CAP188 £1.30 5				
100uF CAP101 £2.10 10				
220uF CAP102 £6.00 5				
330uF CAP189 £3.00 2				
470uF CAP103 £6.00 5				
680uF CAP190 £3.00 2				
1000uF CAP191 £3.00 1				
160 Volts				
0.47uF CAP192 £0.45 10				
1uF CAP193 £0.45 10				
2.2uF CAP146 £0.45 10				
3.3uF CAP194 £1.00 10				
4.7uF CAP195 £1.00 10				
10uF CAP147 £1.40 10				
22uF CAP148 £1.80 10				
33uF CAP149 £2.30 10				
47uF CAP196 £2.20 5				
100uF CAP150 £3.25 5				
220uF CAP197 £3.00 2				
470uF CAP198 £3.25 1				
200 Volts				
22uF CAP199 £1.60 5				
100uF CAP151 £3.25 5				
220uF CAP200 £2.50 1				
330uF CAP201 £2.50 1				
250 Volts				
0.47uF CAP202 £0.60 10				
1uF CAP152 £0.60 10				
2.2uF CAP203 £1.30 10				
3.3uF CAP104 £1.75 10				
4.7uF CAP204 £2.00 10				
10uF CAP105 £2.60 10				
22uF CAP153 £2.30 10				
250 Volts...continued				
33uF CAP206 £1.75 5				
47uF CAP106 £4.35 10				
100uF CAP154 £4.50 5				
220uF CAP155 £2.00 2				
330uF CAP206 £2.50 1				
350 Volts				
1uF CAP156 £0.70 10				
2.2uF CAP207 £1.20 10				
3.3uF CAP157 £1.50 10				
4.7uF CAP208 £1.10 5				
10uF CAP158 £2.25 10				
22uF CAP159 £3.40 10				
33uF CAP209 £2.60 5				
47uF CAP210 £1.50 2				
100uF CAP211 £3.00 2				
330uF CAP212 £5.00 1				
400 Volts				
0.47uF CAP213 £0.60 10				
1uF CAP107 £2.15 5				
2.2uF CAP108 £2.25 5				
3.3uF CAP214 £2.25 5				
4.7uF CAP109 £3.15 5				
10uF CAP110 £4.00 5				
22uF CAP111 £2.50 2				
33uF CAP215 £2.50 2				
47uF CAP112 £3.50 2				
68uF CAP216 £3.50 2				
100uF CAP160 £4.00 2				
150uF CAP217 £3.20 1				
220uF CAP161 £7.00 2				
560uF CAP162 £4.00 1				
450 Volts				
1uF CAP113 £2.80 5				
2.2uF CAP114 £3.20 5				
3.3uF CAP218 £3.20 5				
4.7uF CAP115 £4.95 5				
10uF CAP116 £5.50 5				
22uF CAP117 £4.15 2				
33uF CAP219 £3.00 2				
47uF CAP220 £2.00 1				
100uF CAP221 £3.00 1				

Aerial & Satellite Installation Accessories

SLx Aerial Amplifiers

Now with built in Digital ByPass Operates with Sky™ DigiEye

Class leading noise figure of 4dB or less

6dB signal amplification on all models



Integrated Digital By Pass

Description

Order Code

Price

2 Way - No Bypass	SLX2	£ 8.00 + vat
2 Way - With Bypass	SLX2B	£ 9.25 + vat
4 Way - No Bypass	SLX4	£ 13.00 + vat
4 Way - With Bypass	SLX4B	£ 14.00 + vat
6 Way - No Bypass	SLX6	£ 18.00 + vat
6 Way - With Bypass	SLX6B	£ 19.00 + vat
8 Way - No Bypass	SLX8	£ 18.50 + vat
8 Way - With Bypass	SLX8B	£ 20.00 + 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

**15dB Amp Order Code : 27830R
Price : £ 4.30 + vat**

**26dB Amp Order Code : 27831R
Price : £ 4.50 + vat**

**SLx Masthead Amp PSU
Order Code : 27832R
Price : £ 5.00 + vat**

Postage for 2+ £ 5.00 + vat

Coax Plug Aluminium



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

Screw Type Coax Plugs



**Order Code : PLG62
Bag of 10
Price : £ 1.60 + vat
Bag of 100
Price : £ 12.50 + vat**

Twist On F Connectors



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

SLx Satellite Finder

Allows the user to find the best azimuth / elevation settings for a satellite dish, resulting in the best signal reception / picture and sound quality

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

Grandata Ltd

distributor of electronic components

Konig Replacement Remote Controls

Part No.	Code	Part No.	Code	Part No.	Code	Part No.	Code	Part No.	Code	Part No.	Code	Part No.	Code		
AKAI				ERGUSON...continued				HITACHI...continued				NOKIA			
CT2582E	IR9700	88LS2	IR9639	C24W5511T	IR9983	3126	IR9157	RC9020	IR9434	PHILIPS...continued					
CT2585	IR9700	A10R	IR9259	C2514	IR9478	3126F	IR9157	RC9030	IR9434	SHARP...continued					
CT2885	IR9700	A14R	IR9259	C2546	IR9677	C1	IR9161	RC9050	IR9556	TOSHIBA...continued					
CT2885E	IR9700	A36R	IR9259	C2546TN	IR9677	C2	IR9161	RC9057	IR9710	1480RBW	IR9593	1480BT	IR9593		
IR16	IR9700	B51F	IR9639	C2547TN	IR9677	C3	IR9161	RC9060	IR9556	1480BTB	IR9593	1480BT	IR9593		
RC556	IR9397	B51NX	IR9639	C2556TN	IR9677	C4	IR9161	RC9070	IR9434	1480TBY	IR9593	1480TBZ	IR9593		
RC85	IR9700	B59F	IR9639	C2566TN	IR9677	CM1	IR9569	RC9133	IR9710	1510RBT	IR9592	1510RDT	IR9592		
AMSTRAD				B59N	IR9639	CM D	IR9161	SAMSUNG				1510RT	IR9592		
SRD550	IR9386	B59NX	IR9639	C2567TN	IR9639	D1	IR9161	CX5312W	IR9432	RMCG1046BMSA	IR9788	1559R9B	IR9662		
SRX510	IR9386	B59NX	IR9639	C2586TN	IR9639	E1	IR9161	CX5325W	IR9432	RMCG1048BMSA	IR9788	1559R9T	IR9662		
AE6001	IR9352	B59NX	IR9639	C2650	IR9142	E2	IR9161	CX532WT	IR9432	RMCG1050BMSA	IR9788	1559R9W	IR9662		
B & Q				C2651	IR9142	EM2	IR9700	CX534WT	IR9432	RMCG2799CESA	IR9487	1559R9Z	IR9662		
Beolink 100	IR9843	C2846TN	IR9677	ES5	IR9573	FS10	IR9573	RM109	IR9546	SV2044S	IR9487	1569R9	IR9592		
BEKO				C2847TN	IR9677	FS11	IR9506	SANYO				1569R9G	IR9592		
RC51321	IR9398	C2856TN	IR9639	FS41	IR9573	FS41	IR9573	4AAAU10T092	IR9459	SV2145S	IR9487	1569R9B	IR9592		
RC51331	IR9398	C2866TN	IR9677	FS42	IR9573	FS5	IR9506	JXBA	IR9457	SV2145S	IR9487	1569R9W	IR9592		
RC61331	IR9398	C2866TN	IR9677	FS5	IR9506	FS5/1	IR9573	JXCL	IR9530	SV2577S1	IR9487	1720RB	IR9592		
BLAUPUNKT				C2866TN	IR9677	FS9	IR9506	JXCR	IR9530	SV2877S1	IR9487	1727RT	IR9592		
8669493	IR9188	CBP1468R	IR9142	IR9142	IR9142	IR9142	IR9142	JXCF	IR9457	SV2877S1	IR9487	2100RB	IR9592		
1532	IR9503	CBP2067	IR9142	IR9142	IR9142	IR9142	IR9142	JXGA	IR9139	RM604	IR9974	2100RBT	IR9592		
1570-46	IR9516	CBP2216	IR9142	IR9142	IR9142	IR9142	IR9142	JXGE	IR9139	RM607	IR9974	2101RBZ	IR9592		
8627 105 483	IR9188	CBP222	IR9142	IR9142	IR9142	IR9142	IR9142	JXGT	IR9430	RM609	IR9974	2121RD	IR9592		
8668813000	IR9516	CBP226	IR9142	IR9142	IR9142	IR9142	IR9142	JXGW	IR9460	RM615	IR9511	2121RD	IR9592		
1555-46	IR9516	CBP260	IR9142	IR9142	IR9142	IR9142	IR9142	JXGY	IR9460	RM620	IR9511	2140RB	IR9592		
1563-46	IR9516	CL2156TAN	IR9983	IR9142	IR9142	IR9142	IR9142	JXLB	IR9460	RM625	IR9511	2140BT	IR9592		
IB16	IR9504	CL24W11TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RC238	IR9974	RM630	IR9511	2145DB	IR9592		
IC16	IR9504	CL2566TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RC254	IR9974	RM631	IR9511	2145DB	IR9592		
ID32	IR9503	CL2566TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RC258	IR9530	RM632	IR9511	2145DB	IR9592		
IL32	IR9503	CL2566TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RC305	IR9974	RM633	IR9511	2150TD	IR9593		
IM32	IR9503	CL2866TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RC307	IR9457	RM634	IR9511	2152DB	IR9593		
IM55-16	IR9516	CL2866TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RC308	IR9457	RM635	IR9511	2152DB	IR9593		
IM63-16	IR9516	CL2866TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RC317	IR9457	RM641A	IR9511	2163DB	IR9593		
IM70-16	IR9516	CL2866TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RC318	IR9457	RM641A	IR9511	2163DB	IR9593		
IP32	IR9503	CL2866TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RC321	IR9457	RM650	IR9511	2169R9B	IR9592		
IQ16	IR9504	CL2866TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RC612	IR9457	RM651	IR9511	2169R9Z	IR9592		
IR32	IR9504	CL2866TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RC625	IR9457	RM652	IR9511	2173DB	IR9593		
TC106	IR9406	CL2866TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RC628	IR9457	RM654	IR9511	2180TD	IR9593		
TC143 PIP	IR9406	CL2866TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RCM42	IR9530	RM655	IR9488	2181TB	IR9592		
TC143	IR9406	CL2866TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RCM45	IR9974	RM656	IR9488	2181TB	IR9592		
TC144	IR9406	CL2866TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RCM45	IR9974	RM657	IR9488	2181TB	IR9592		
TC190	IR9529	CL2866TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RCM45	IR9974	RM658	IR9488	2181TB	IR9592		
TC192	IR9529	CL2866TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RCM45	IR9974	RM658	IR9488	2181TB	IR9592		
TC194	IR9529	CL2866TAN	IR9983	IR9142	IR9142	IR9142	IR9142	RCM45	IR9974	RM658	IR9488	2181TB	IR9592		
CROWN				GOLDSTAR				PANASONIC				SHARP			
RC51331	IR9398	105-068	IR9403	105-068	IR9403	02280227	IR9835	37AM12S	IR9788	51AM12S	IR9788	51AT15S	IR9788		
RC61331	IR9398	105-209B	IR9403	105-209B	IR9403	91005926	IR9835	51AM12S	IR9788	51AT15S	IR9788	54AM12S	IR9788		
2190T	IR9397	105-210A	IR9862	105-210A	IR9862	EUR50100	IR9826	54AT15S	IR9788	54AT15S	IR9788	54S055SN	IR9711		
DAEWOO				105-219J	IR9854	EUR51920	IR9835	5V2044	IR9487	5V2145	IR9487	5V2145	IR9487		
DMQ1414	IR9840	105-224V	IR9854	105-224V	IR9854	EUR51921	IR9835	5V2145	IR9487	70C503S	IR9711	72C503S	IR9711		
DMQ14A1	IR9397	105-229H	IR9854	105-229H	IR9854	EUR51922	IR9835	70C503S	IR9711	72C503S	IR9711	72C503S	IR9711		
DMQ20A1	IR9840	105-230C	IR9862	105-230C	IR9862	IR3592	IR9826	C1421	IR9487	72C503S	IR9711	C2021	IR9487		
DMQ2195	IR9840	CB20E40X	IR9854	CB20E40X	IR9854	TC1485DR	IR9826	C2021	IR9487	C1421	IR9487	CV2121	IR9487		
DMQ2595	IR9840	CB27190E	IR9403	CB27190E	IR9403	TC1451R	IR9834	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
DMQ2895	IR9840	CB27902E	IR9403	CB27902E	IR9403	TC1505E	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
FERGUSON				CB29505	IR9403	TC1556PFR	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
20H3	IR9594	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
22B5	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
22H3	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
2415	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
2422	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
2423	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
2445	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
2452	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
2453	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
2463	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
2475	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
26H3	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
29132	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
36K2	IR9594	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
41H3	IR9594	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
4233	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
4414	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
4415	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
4423	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
4430	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
51A0	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS	IR9826	CV2121	IR9487	CV2121	IR9487	CV2121	IR9487		
51A2	IR9584	CB29505	IR9403	CB29505	IR9403	TC1785DRS									

Grandata Ltd

distributor of electronic components

Transistors / Linear IC's

Part No.	Price	Part No.	Price	Part No.	Price	Part No.	Price	Part No.	Price	Part No.	Price	Part No.	Price	Part No.	Price		
BU208A	£0.75	IRF5450	£5.00	MJE350	£0.80	STK4191	£9.00	STK5464	£3.00	STR371	£4.00	TDA2450-3	£10.00	TDA4865	£2.50	TDA8138	£2.00
BU208DF	£0.90	IRF5740	£3.00	MJF		STK4191 X	£14.00	STK5466	£5.00	STR380	£3.50	TDA2460-2	£0.70	TDA4870	£4.75	TDA8138A	£1.30
BU2308DX	£1.00	IRF5840	£3.00	MJF16206	£4.50	STK4191-130	£15.00	STK5467	£4.00	STR381	£3.90	TDA2501	£3.00	TDA4671	£5.00	TDA8138E	£2.00
BU2508A	£1.00	IRF610	£0.80	MJF18004	£1.75	STK4191-140	£16.00	STK5468	£3.00	STR383	£4.10	TDA2506T	£3.00	TDA4680	£3.50	TDA8139	£2.00
BU2508AF	£1.10	IRF611	£1.20	MJF18006	£2.00	STK4192	£7.00	STK5471	£9.00	STR384	£3.50	TDA2507	£4.50	TDA4681	£4.50	TDA8140	£2.00
BU2508AX	£1.30	IRF620	£1.00	MJF18008	£1.75	STK4197 II	£9.50	STK5472	£3.75	STR40090	£3.50	TDA2510	£4.50	TDA4685	£2.75	TDA8143	£1.60
BU2508D	£1.30	IRF630	£0.75	MJF18204	£2.50	STK4199 II	£10.50	STK5473	£4.80	STR40115	£6.00	TDA2514A	£5.00	TDA4686	£5.00	TDA8145	£1.20
BU2508DF	£1.20	IRF634	£1.25	STK0025	£4.20	STK4200	£10.50	STK5474	£5.00	STR4090A	£6.50	TDA2515	£4.50	TDA4687	£5.00	TDA8146	£2.00
BU2508DX	£1.50	IRF640	£1.50	STK0039	£6.00	STK4204 II	£10.50	STK5475	£3.50	STR4190	£3.30	TDA2520-1	£9.00	TDA4700A	£7.50	TDA8153	£10.00
BU2520AF	£1.70	IRF640F	£2.00	STK0086	£10.00	STK4211 II	£10.00	STK5477	£4.50	STR4142	£4.50	TDA2522	£12.00	TDA4710H	£7.00	TDA8170	£1.70
BU2520DF	£2.25	IRF630S	£2.00	STK1039	£4.50	STK4204 III	£10.50	STK5478	£2.50	STR4211	£3.15	TDA2522	£12.00	TDA4714C	£3.50	TDA8171	£2.30
BU2520DX	£2.00	IRF644	£2.00	STK1040	£6.40	STK4211 V	£8.00	STK5479	£3.00	STR4311	£9.50	TDA2523	£8.50	TDA4716C	£4.50	TDA8172	£2.00
BU2522AX	£1.50	IRF650	£2.00	STK1050	£6.50	STK4221 II	£12.00	STK5481	£4.70	STR440	£8.00	TDA2525	£4.50	TDA4720	£6.60	TDA8173	£1.75
BU2525A	£3.25	IRF710	£1.50	STK1060	£7.00	STK4231 II	£10.50	STK5482	£2.85	STR441	£9.50	TDA2530	£3.00	TDA4725	£7.50	TDA8174	£2.00
BU2525AF	£2.20	IRF720	£0.85	STK12029	£6.00	STK4241	£10.50	STK5483	£4.40	STR4415	£4.75	TDA2548	£2.00	TDA4780	£6.00	TDA8175	£7.00
BU2525AX	£1.90	IRF730	£1.25	STK2028	£5.00	STK4241 V	£14.00	STK5486	£4.50	STR4422	£16.00	TDA2558	£4.00	TDA4780	£3.00	TDA8177F	£3.50
BU2525D	£2.40	IRF740	£0.90	STK2029	£6.00	STK4242	£10.50	STK5487	£5.25	STR4501	£7.00	TDA2558	£4.00	TDA4810	£5.00	TDA8177F	£3.50
BU2525DF	£1.75	IRF740F	£3.00	STK2030	£10.00	STK4272	£5.00	STK5490	£4.50	STR4511	£5.50	TDA2560Q	£7.00	TDA4850	£4.75	TDA8179S	£7.50
BU2527AF	£4.00	IRF820	£0.90	STK2038	£7.00	STK4273	£5.50	STK561	£4.00	STR4512	£4.50	TDA2563V	£3.50	TDA4851	£3.25	TDA8180	£12.50
BU2527AX	£2.50	IRF830	£0.85	STK2048	£9.50	STK4274	£5.00	STK563	£4.15	STR452	£4.75	TDA2576A	£9.00	TDA4852	£3.25	TDA8205	£12.50
BU2527DF	£2.00	IRF830F	£1.60	STK2058 IV	£16.00	STK4275	£5.00	STK5632	£3.00	STR453	£5.00	TDA2577A	£2.00	TDA4855	£5.00	TDA8212	£3.50
BU2527DX	£2.00	IRF840	£0.85	STK2101	£10.50	STK4300	£5.00	STK5720	£4.00	STR454	£13.00	TDA2578A	£7.00	TDA4856	£5.00	TDA8215H	£3.00
BU2532AL	£3.25	IRF840F	£1.75	STK2110	£5.50	STK4301	£5.00	STK5725	£3.50	STR455	£5.50	TDA2579A	£2.10	TDA4858	£3.50	TDA8217	£2.25
BU2708AF	£2.00	IRF9140	£10.00	STK2139	£6.75	STK4311	£6.50	STK5730	£3.00	STR456	£4.70	TDA2579B	£3.25	TDA4860	£2.00	TDA8303	£2.50
BU2708AX	£2.00	IRF9230	£4.00	STK2155	£9.00	STK4333	£4.00	STK5830	£4.00	STR457	£6.00	TDA2652	£4.00	TDA4861	£3.50	TDA8304	£4.00
BU2708DF	£2.00	IRF9510	£1.50	STK2230	£4.70	STK4332	£3.65	STK5831	£3.00	STR470	£3.00	TDA2653A	£4.50	TDA4866	£2.75	TDA8305	£5.00
BU2708DX	£2.00	IRF9511	£1.50	STK3102 II	£5.30	STK4335	£3.75	STK6324B	£5.00	STR50020	£3.50	TDA2710-1	£4.00	TDA4868	£4.50	TDA8305A	£5.00
BU2720AF	£2.00	IRF9520	£1.50	STK3106	£25.00	STK4352	£5.00	STK6327	£12.00	STR50092	£5.50	TDA2820M	£1.00	TDA4918A	£17.00	TDA8310	£6.00
BU2720DF	£2.00	IRF9530	£1.25	STK3122 III	£7.25	STK4356	£4.30	STK6328A	£4.00	STR50103A	£2.60	TDA2822M	£1.00	TDA4930	£5.00	TDA8350Q	£2.75
BU2720DX	£2.00	IRF9531	£2.00	STK3152 II	£9.00	STK4362	£4.50	STK6431	£6.00	STR50112A	£6.50	TDA3190	£2.00	TDA4935	£3.00	TDA8351	£2.00
BU2722AF	£3.30	IRF9540	£1.75	STK3156	£5.00	STK437	£6.00	STK6607	£4.00	STR50113	£5.00	TDA3301B	£16.00	TDA4940	£3.00	TDA8354Q	£2.75
BU2725AF	£2.00	IRF9541	£2.00	STK350-030	£7.00	STK4372	£4.90	STK6712BIV	£5.50	STR50115	£5.00	TDA3303	£7.00	TDA4941	£2.80	TDA8356	£2.00
BU2725DF	£2.00	IRF9610	£0.95	STK392-040	£12.00	STK4379	£5.00	STK6722	£6.50	STR50213	£4.00	TDA3305	£3.00	TDA4942	£2.00	TDA8360N3	£8.00
BU2725DF	£2.00	IRF9620	£2.00	STK401-050	£8.00	STK4392	£5.00	STK6732	£10.00	STR50330	£4.75	TDA3502	£3.60	TDA4950	£1.00	TDA8361AN3	£8.00
BU2727AF	£2.00	IRF9622	£0.85	STK401-080	£9.00	STK441	£6.80	STK6822	£7.50	STR51041	£5.00	TDA3504	£3.00	TDA4951	£1.50	TDA8361AN3	£9.00
BU2727AF	£2.00	IRF9630	£1.30	STK401-120	£10.00	STK4412	£4.50	STK6875	£6.50	STR51213	£5.00	TDA3507	£4.50	TDA5010	£3.00	TDA8362AN	£12.00
BU2727AF	£2.00	IRF9640	£2.30	STK401-140	£12.00	STK442	£7.00	STK6922	£10.00	STR51424	£7.00	TDA3521	£7.50	TDA5400	£6.00	TDA8362AN3	£7.50
BU506DF	£1.00	IRFBC20	£1.10	STK4017	£4.00	STK4432	£6.00	STK6932	£4.50	STR53041	£4.00	TDA3560	£6.00	TDA5500	£9.00	TDA8362BN3	£8.50
BU508AF	£1.00	IRFBC30	£1.20	STK4019	£4.80	STK4437	£4.70	STK6962	£2.75	STR54041	£3.20	TDA3561	£3.00	TDA5600	£4.50	TDA8362N3	£12.00
BU508APH	£0.60	IRFBC40	£2.10	STK402-040	£7.00	STK4459	£5.60	STK6972	£3.00	STR5412	£2.80	TDA3561A	£3.00	TDA5610-2	£7.50	TDA8362NA	£9.00
BU508AX1	£0.90	IRFBC50	£2.25	STK402-070	£7.00	STK450	£6.60	STK6981B	£5.00	STR55041	£4.50	TDA3562A	£2.60	TDA5620	£4.50	TDA8362N5	£12.00
BU508D	£0.75	IRFD120	£1.00	STK402-070	£7.00	STK461	£6.00	STK6982	£6.00	STR56041	£5.50	TDA3563	£3.50	TDA5702	£13.00	TDA8366N2	£15.00
BU508DF	£0.85	IRFD9120	£1.20	STK402-071	£7.00	STK463	£9.50	STK6982H	£6.00	STR56041	£2.50	TDA3563A	£4.00	TDA5830-2	£11.00	TDA8366N3	£11.50
BU508DR	£1.30	IRFD9220	£1.00	STK402-090	£8.00	STK465	£9.00	STK7216	£4.20	STR59001	£3.00	TDA3564	£3.25	TDA6100Q	£1.50	TDA8370	£11.50
BUH1015	£4.25	IRFF120	£3.00	STK4021	£3.80	STK4773	£8.20	STK7217	£2.50	STR60001	£5.25	TDA3565	£2.20	TDA6101Q	£1.20	TDA8372A	£16.50
BUH1215	£4.50	IRFBC40	£1.00	STK402-100	£9.00	STK4793	£8.00	STK7225	£5.00	STR6008X	£5.75	TDA3566	£2.80	TDA6103Q	£2.25	TDA8374	£10.00
BUH515	£2.00	IRFBC40G	£2.00	STK402-100	£9.00	STK4803	£10.00	STK7226	£17.00	STR6200	£2.70	TDA3566A	£3.00	TDA6106Q	£1.25	TDA8375A	£12.50
BUH515D	£2.50	IRFP054	£4.00	STK402-120	£9.00	STK4813	£8.00	STK7233	£7.00	STR61001	£4.75	TDA3567	£3.00	TDA6107Q	£3.00	TDA8376	£15.00
BUH517	£2.75	IRFP064	£5.00	STK4024 II	£5.50	STK4833	£8.50	STK7251	£5.00	STR7001	£6.00	TDA3569	£3.00	TDA6108JF	£3.00	TDA8380	£2.00
BUH517D	£1.75	IRFP140	£2.50	STK4025	£5.30	STK4843	£7.20	STK7253	£6.50	STR80145	£4.75	TDA3570	£3.75	TDA6110Q	£2.25	TDA8424	£4.00
BUH715	£4.25	IRFP150	£2.40	STK4026	£4.80	STK4853	£17.00	STK730-060	£6.50	STR81145	£3.75	TDA3576B	£7.00	TDA6112Q	£5.50	TDA8425	£5.00
BUL310	£1.25	IRFP240	£3.00	STK4026II	£4.80	STK4863	£7.00	STK730-080	£6.00	STR81159	£4.00	TDA3570	£3.75	TDA6112Q	£5.50	TDA8426	£4.00
BUL381	£1.50	IRFP250	£2.80	STK4026V	£5.00	STK4873	£11.00	STK730-070	£7.00	STR81224	£10.00	TDA3571	£4.00	TDA6160-2S	£4.75	TDA8432	£5.50
BUL381D	£1.25	IRFP340	£2.50	STK4028	£5.50	STK488-010	£8.00	STK7309	£4.00	STR83145	£5.00	TDA3572	£4.00	TDA6160-2X	£2.50	TDA8433	£6.00
BUT11A	£0.35	IRFP350	£3.25	STK4032 II	£5.10	STK488-050	£8.00	STK7310	£3.20	STR83159	£7.00	TDA3573	£4.00	TDA6160-2S	£2.50	TDA8440	£3.00
BUT11AF	£0.35	IRFP360	£8.00	STK4034 X	£9.25	STK4893	£10.00	STK7340 II	£5.00	TDA1420	£8.00	TDA3574	£4.00	TDA6160-2S	£2.50	TDA8443	£3.50
BUT11AX	£0.50	IRFP450	£2.70	STK4036	£4.70	STK4913	£9.00	STK7340 II	£3.50	TDA1470	£12.00						

Grandata Ltd

distributor of electronic components

Line Output Transformers

Part No	Code	Price	Part No	Code	Price	Part No	Code	Price	Part No	Code	Price			
ALBA			HITACHI..continued			PANASONIC..continued			PHILIPS..continued			THOMSON..continued		
3714002	LOT02	£12.00	2433453	LOT82	£12.50	TLF 14568 F	LOT40	£15.00	AT 2079 / 21	LOT395	£12.00	10588080.P2	LOT1505	£19.00
043714002J	LOT02	£12.00	2433751	LOT01	£13.00	TLF 14584 F	LOT41	£17.00	AT 2079 / 24	LOT392	£15.00	151128140	LOT1505	£19.00
43700000	LOT02	£12.00	2433752	LOT01	£13.00	TLF 14586 F	LOT42	£17.00	AT 2079 / 40	LOT73	£11.50	151281.4	LOT1505	£19.00
AMSTRAD			2433891	LOT23	£12.50				AT 2079 / 99	LOT276	£14.00	15128140	LOT1505	£19.00
1810951	LOT55	£14.00	2433892	LOT84	£14.50				AT 2079/30 01	LOT106	£12.50	153144.6	LOT1505	£19.00
3714002	LOT02	£12.00	2433893	LOT23	£12.50	PHILIPS			AT 2079/30102	LOT106	£12.50	15314460	LOT1505	£19.00
043714002J	LOT02	£12.00	2433952	LOT33	£10.00	3119 108 31260	LOT90	£12.50	SAISHO			1531447 A	LOT1505	£19.00
43700000	LOT02	£12.00	2434002	LOT226	£14.50	3119 108 31290	LOT73	£11.50	3714002	LOT02	£12.00	1532873 A	LOT1505	£19.00
AM152591	LOT55	£14.00	2434141	LOT33	£10.00	3119 108 31440	LOT433	£16.00	043714002J	LOT02	£12.00	3233500	LOT244	£14.50
FERGUSON			2434274	LOT44	£10.50	3119 108 31442	LOT433	£16.00	43700000	LOT02	£12.00	3233900	LOT244	£14.50
00 D-3-508-002	LOT381	£15.50	2434393	LOT405	£22.50	3119 198 62930	LOT57	£11.00	7140021	LOT02	£12.00	40011200	LOT244	£14.50
06 D-3-083-001	LOT82	£12.50	2434593	LOT44	£10.50	3122 108 10246	LOT111	£15.00	SHARP			40148300	LOT244	£14.50
06 D-3-083-002	LOT82	£12.50	2435006	LOT401	£17.00	3122 138 36070	LOT111	£15.00	RTRNF 1220	CEZZLOT39	£18.50	TOSHIBA		
06 D-3-084-001	LOT23	£12.50	2435131	LOT251	£14.50	3122 138 36072	LOT111	£15.00	RTRNF 2001	CEZZLOT338	£17.50	1810951	LOT55	£14.00
06 D-3-087-001	LOT23	£12.50	2436201	LOT90	£12.50	3122 138 36920	LOT57	£11.00	RTRNF 2006	CEZZLOT308	£13.50	2433751	LOT01	£13.00
06 D-3-088-001	LOT84	£14.50	23236465	LOT392	£15.00	3122 138 36922	LOT57	£11.00	RTRNF 2023	CEZZLOT310	£15.00	23236098	LOT288	£14.00
06 D-3-093-001	LOT204	£16.00	2433891H	LOT23	£12.50	3122 138 37050	LOT132	£15.00	SONY			23236198	LOT288	£14.00
06 D-3-508-003	LOT276	£14.00	45150504	LOT362	£16.00	3122 138 37620	LOT90	£12.50	1-439-286-00	LOT46	£13.00	23236201	LOT395	£12.00
06 D-3-512-001	LOT204	£16.00	MATSUI			3122 138 37771	LOT129	£14.00	1-439-286-11	LOT46	£13.00	23236245	LOT395	£12.00
29201-022-01	LOT63	£17.00	20070	LOT438	£16.00	3122 138 37992	LOT1116	£19.00	1-439-286-12	LOT46	£13.00	23236255	LOT289	£15.00
473197	LOT304	£15.50	20071	LOT438	£16.00	3122 138 38040	LOT773	£11.50	1-439-286-13	LOT46	£13.00	23236427	LOT395	£12.00
D 059 / 37	LOT200	£14.00	20072	LOT438	£16.00	3122 138 38123	LOT395	£12.00	1-439-363-10	LOT46	£13.00	23236428	LOT289	£15.00
GOODMANS			20073	LOT438	£16.00	3128 138 20200	LOT433	£16.00	1-439-363-11	LOT268	£14.00	23236428	LOT289	£15.00
1142.5057	LOT1164	£15.00	20074	LOT438	£16.00	3128 138 20201	LOT433	£16.00	1-439-363-21	LOT268	£14.00	23236428	LOT289	£15.00
1142.5077	LOT1164	£15.00	20075	LOT438	£16.00	3128 138 20202	LOT433	£16.00	1-439-363-22	LOT268	£14.00	TFB 4090 AD	LOT395	£12.00
1142.5079	LOT1164	£15.00	3714002	LOT02	£12.00	3138 108 30100	LOT106	£12.50	1-439-387-11	LOT311	£14.50	TFB 4124 AE	LOT392	£15.00
1142.5081	LOT1164	£15.00	3221008	LOT438	£16.00	3138 108 30101	LOT106	£12.50	1-439-387-21	LOT311	£14.50	TFB 4124 AP	LOT392	£15.00
1152.5016	LOT1934	£19.00	043714002J	LOT02	£12.00	3138 108 30103	LOT106	£12.50	1-439-416-11	LOT255	£16.00			
1179.0387	LOT1147	£16.00	043221088P	LOT438	£16.00	3139 128 30400	LOT90	£12.50	1-439-416-12	LOT255	£16.00			
1192.0527	LOT1147	£16.00	43700000	LOT02	£12.00	40348-08	LOT1577	£18.00	1-439-416-21	LOT255	£16.00			
1352.5008	LOT1167	£15.00	7140021	LOT02	£12.00	40348A-08	LOT1577	£18.00	1-439-416-23	LOT255	£16.00			
1352.5008E	LOT1167	£16.00	mitsubishi			4812 140 10246	LOT111	£15.00	1-439-416-51	LOT255	£16.00			
1352.5016	LOT1934	£19.00	731003	LOT51	£15.50	4812 140 10349	LOT106	£12.50						
1352.5027	LOT1270	£16.00	334 P 18506	LOT51	£15.50	4812 140 10369	LOT90	£12.50						
1352.5033	LOT1270	£16.00	OREGA			4812 140 10421	LOT90	£12.50						
			40153201	LOT349	£17.50	4822 140 10246	LOT111	£15.00						
			ORION			4822 140 10274	LOT123	£14.50						
3714002	LOT02	£12.00	3714002	LOT02	£12.00	4822 140 10306	LOT57	£11.00						
043714002J	LOT02	£12.00	043714002J	LOT02	£12.00	4822 140 10349	LOT106	£12.50						
43700000	LOT02	£12.00	43700000	LOT02	£12.00	4822 140 10381	LOT128	£13.00						
CF 124 B	LOT67	£14.50	PANASONIC			4822 140 10384	LOT127	£15.50						
CF 124 E	LOT67	£14.50	TLF 14512 F	LOT39	£18.50	4822 140 10406	LOT73	£11.50						
			TLF 14520 F	LOT40	£15.00	4822 140 10544	LOT433	£16.00						
			TLF 14521 F	LOT39	£18.50	4822 140 10566	LOT433	£16.00						
			TLF 14567 F	LOT39	£18.50	AT 2076 / 10	LOT57	£11.00						
						AT 2077 / 81	LOT121	£15.00						
						AT 2078 / 21	LOT395	£12.00						
						AT 2079 / 15	LOT129	£14.00						

We are stockist of both
Konig
 and
HR Diemen
 LOPT's
 This is just a selection
 of the LOPT's that we
 stock....Please call on
 020 8900 2329 for copy
 of our LOPT catalogue

CD Pick Ups and Mechanisms

Part No	Price	Part No	Price	Part No	Price
CDM12.1 Mechanism	£14.00	KSS 213 B	£8.75	OPTIMA 6 S	£11.50
KHM220AAA		KSS 213 C	£9.50	OPTIMA 5	£11.50
DVD Laser	£ 40.00	KSS 213 D	£16.00	RCTRTH8151	£20.00
KSS 210A Original	£11.00	KSS 213 F	£12.00	RCTRTH8112	£14.00
KSS 210A Replacement	£9.50	KSS 240 A	£30.00	RCTRTH8147 Mech	£ 10.00
KSS 210 B	£15.00	NKS 240 A			
		Replacment for KSS240A	£20.00		

Check out our Online Catalogue at
www.grandata.co.uk

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 availability 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 : www.grandata.co.uk

A laptop video out problem

A customer bought a laptop PC with a 15in. screen because it could be used with photo CDs and DVDs and had a video output. There were problems with commissioning the 'TV out' feature however. Ray Porter explains the problem and its solution

A customer had recently bought a new HP ZE4258 laptop computer because it had a 15in. screen and could play photo CDs and DVDs with displays on its own screen and, via its video output, a domestic TV set's screen. A high-street computer shop had already sold her a scart to two phonos plus S-video adapter, also a stereo mini-jack to Y-split phono cable for the left and right audio channels and a 4-pin S-video mini-DIN to 4-pin S-video mini-DIN cable. She had connected it up. The laptop's internal speakers produced sound when a DVD was being played, while nicely-coloured pictures appeared on the screen with both DVD and photo-CD sources. But nothing came through on her Sony KV21T3U TV set (BE4A chassis).

Initial checks

The first thing I checked was the cable connections. The plugs and sockets were all colour-coded, and the mini-jack was definitely in the laptop's headphone socket. How could there be a problem when all seemed to be in order? It had to be something simple! When the scart to two phono plus S-video adapter was unplugged at the TV set to check for bent pins, the black and therefore invisible in/out switch was revealed. It was set to 'out' of course.

Alter the switch to 'in' and everything will work is what one tends to think. It did, partially: the TV set now produced audio, but there was no picture. The TV set's remote-control unit provides switching between normal TV, scart input suitable for VCR playback, and PlayStation, i.e. RGB, playback. Cycling through these modes produced a black screen,

except with normal TV operation.

It was time to start pressing buttons on the laptop randomly or read the user manual. The latter provided little help. The single sheet of A4 seemed to relate to a different laptop model: either that, or a different operating system or different keyboard or, more likely, you had to know the answer in order to ask the question. Computer manuals always seem to be like that to me . . .

Monochrome comes through

The keyboard has a button that's labelled with a monitor screen symbol. It's nicely illuminated in blue, so it's supposed to attract the attention of Silver Surfers who can't read normal keyboard markings any more. When you press this and hope, a message about 'TV now' and the usual 'do you really want to do this?' message routine appear on the laptop's screen. A few mouse clicks and 'TV mode' appears on the laptop's screen.

This is in colour, but the TV set's screen is in miserable monochrome.

The laptop runs with Windows XP. This has a settings/control panel/display menu that's not so different from older versions of Windows, except that in a deep sub-menu there's a choice of PAL/NTSC, which can be selected by country or system. It was set to NTSC – but the power supply had a 13A plug fitted so, HP, what about hardware/software compatibility? Selecting PAL I or UK still didn't produce a colour picture on the TV set of course.

Back to first principles

The Sony TV set has no S-video 4-pin mini-DIN input connector. If it had one, it would surely work when I plugged the laptop's video output in there, wouldn't it? Of course it would! With S-video there are separate chrominance and luminance signals, the sync being added to the luminance. So it must be that the S-

video to scart adapter has nothing in it to add together these separate signals to produce good old combined video, blanking and sync (CVBS). This is the usual format with a normal VCR output via a scart connector.

An internet search indicated that a 470pF capacitor or 100Ω resistor would probably do the job, but Maplin sells a poorly-named "S VHS to Phono converter" (order code QM52G) that does the job and leaves the presence of this combiner easy to see afterwards. CPC sells similar items.

Colour, but DVD output missing

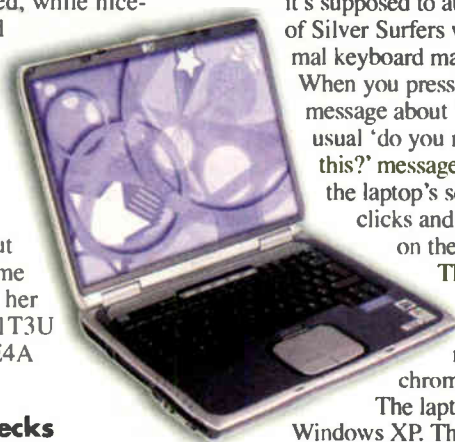
With the Maplin combiner in use photo CD video appeared in colour on both the laptop and the TV screens, as long as the TV set's remote-control unit had selected aux input (non-RGB) to the scart at the TV.

Looking forward to complete success, I played a DVD. The laptop showed it perfectly, but I was amazed to see the frame and virtual-control buttons of the DVD player in colour on the TV screen with a completely blank central playback area. This had to be a HP problem now. The DVD playback data wasn't being piped to the 'TV out' port.

Success at last??

I called the HP helpline. After the helper had asked for advice at his end, and half an hour of display settings trials to his instructions had been done, the DVD played back in colour via the TV set. Under these circumstances however the laptop's screen is blank.

Perhaps if the laptop had a faster processor or graphics driver all would be as expected. Perhaps next year's model will drive two screens at once. I am surely grateful that the system, after power down, came up again and worked identically. When playing DVDs or photo CDs the colour of the picture on the TV screen is slightly weaker than that on the laptop's screen. But the customer accepts this. Thank goodness!



mediacast 2004 REPORT

J. LeJeune describes what was new at the recent Mediacast show



Mediacast 2004 was held in late May. It drew sizeable crowds interested in the latest offerings from the manufacturers of cable, satellite and terrestrial TV reception equipment. Exhibitors and visitors from Korea and China were very much in evidence this year: some quality products from these countries attracted international attention.

The exhibition was smaller than

in previous years, but the content and quality took a step forward with the latest offerings. The predominant themes were 1,080-line high-definition TV; set-top boxes for cable, satellite and terrestrial TV; and, in the world of cable TV, the choice of signal-delivery system – IP (Internet Protocol), xDSL, DOCSIS, Ethernet or a mixture of compatible bedfellows – also the choice of using coaxial or optical-fibre cable to supply homes and business premises. There was also a lot of interest in implementing the DVB-H standard for video viewing via a mobile phone.

Products on display ranged from silicon chipsets to complete CATV head-ends, satellite reception equipment ranging from LNBS to set-top boxes with PVRs. There were DTTV systems with improved impulsive-noise rejection and enhanced mobile reception. One UK company, Fusion Digital Technology (DigiFusion), had a large stand with a wide range of set-top boxes and PVRs. Of particular interest was the company's pPVR, a portable personal video recorder. This hand-held unit can store up to forty hours of video on its 20GB hard drive for viewing on the move, via its integrated 3.5in.

LCD screen, or at home through a domestic entertainment system. It can record music and video from any analogue source in addition to downloading from the internet via a PC and accepting MPEG-2 data from a DigiFusion set-top box.

TV systems

The Digital TV Group ran a regular hour-long demonstration of HDTV. This was of absorbing interest: the quality of the pictures was superb, though some artefacts caused by digital processing were evident in scenes that contained rapid movement.

Flat-panel displays were everywhere, and many exhibitors seemed to regard the conventional CRT as being outmoded. But comments from devotees suggest that there is still some mileage left with CRTs.

The emphasis at the show was on digital technology. A major objective is reduction of the data rate for digital TV signals. Tandberg ran a continuous demonstration that showed the same HDTV scenes first with standard MPEG-2 encoding at 15Mbits/sec then with MPEG-4 encoding, AVC and Windows Media 9 at 8Mbits/sec. The demonstration was very convincing, with the differ-

The Fusion Digital Technology stand.



ence in picture quality barely noticeable.

Hardware

The numerous displays of set-top boxes for satellite, cable and terrestrial TV reception highlighted the growing competition in his field. Pace, probably the No. 1 set-top box manufacturer in the UK, was conspicuous by its absence – as were many of the big names in the cable and satellite industry. One had the impression that this was a show for newcomers aiming to gain a foothold in the European and Middle-Eastern markets. Chinese manufacturers were present in large numbers, along with many Korean companies, displaying everything from F connectors and cable to MPEG-2 encoders for cable TV.

Homecast of Seoul had on display some handsome multi-featured PVRs with facilities such as twin tuners; simultaneous recording and playback; Multimedia support including MP3, Juke Box, VCD, and MSX emulation.

Technomate showed the Satlook range of spectrum analyser/signal analyser instruments, along with the Digisat and Combolook units. This Swedish-made test gear provides a comprehensive range of measurements that are becoming essential for the successful alignment of dishes in the increasingly congested broadcasting bands. Technomate set-top boxes include models that are dual system (analogue/digital) and have a fibre-optic digital audio output.

The French company DiBcom showed some interesting silicon chips and a couple of modules that feature its new DIB3000-P IC. This 80-pin COFDM demodulator for DTTV signals uses 0.18µm CMOS technology and provides easy connection to a TV receiver or a PC via USB 1 and 2 interfaces. A variation, the DIB3000-MC, provides diversity reception: the claim is that because connection of the various circuits is so simple only n chips are needed to operate in the Diversity N mode. Two development modules were shown. One drives a laptop PC via its USB connection. The other is a build-in receiver module for mobile use, with the claim that it can operate while travelling at 250km/hr (156 MPH!).

The Telelynx TS6300 stood out amongst the plethora of digital satellite receivers on show. It has 4,000 programmable channels for TV and radio; teletext; subtitles; scarts for TV and VCR connection; and a UHF output tuneable over 470-860MHz with PAL I/G/B/D/K or NTSC M/N signal encoding.



The Telelynx TS6300 satellite receiver.

Driving it could prove to be a life-changing experience! It has a multi-language menu that includes Turkish, Arabic, Persian and Russian; support for DiSEqC 1.0 and 1.2; C- and Ku-band reception; and a widely adjustable symbol rate from 1 to 45 MegaBauds. The manufacturer is located in Taiwan.

Korean manufacturer Humax Digital showed an integrated Freeview TV receiver with 17in. LCD screen, Model LB17E, to sell at about £650. It has tuners for both analogue and digital reception and an interface slot that can operate with Top-Up TV. The John Lewis group will be selling it. Humax Digital also showed a PVR, Model PVR8000T, to sell at under £200. This is for Freeview use: its 40GB hard drive can store about twenty hours of programming. It also has an MHEG-5 engine that provides digital teletext reception and interactive services, and a high-quality Dolby Digital audio output.

Cable TV

The buzz word in the cable TV section was 'triple-play', which means the supply of video, telephony and data services to the subscriber.

How this is to be done is not too clear, with many technologies jostling for acceptance. The contestants include Gigabit Ethernet,

VDSL, Synchronous Digital Hierarchy, IP/MPLS and ATM. In fact 'triple-play' is not unique to cable: there are other transmission systems that

provide broadcast TV, video on demand, video conferencing, IP data, conventional switched telephony, voice over IP, security monitoring, gaming and Metro WiFi. Nevertheless cable can provide a multitude of choices.

Summary

The exhibition was smaller than in previous years, but the 117 stands displayed a very wide range of products and services. It was compact enough to delay the onset of fatigue, with relaxation facilities that were effective and helped. Some of the big names in the cable and satellite fields were missing, but this could have been because a number of such exhibitions were held in Europe during the April/May period, with more scheduled for the autumn. They'll probably be back next year.

Next Year

24-26 May are the dates for Mediacast 2005.



DigiFusion's innovative portable personal video recorder (pPVR).

LETTERS

Send letters to "Television", Highbury Business, Media House, Azalea Drive, Swanley, Kent, BR8 8HU or e-mail t.winford@highburybiz.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.



TV transmitting masts

I read with interest the note on the Belmont, Lincolnshire transmitter mast in Roger Bunney's column (July). At 1,265ft this mast is now the highest in the UK. When it was built it was new and novel, with its cylindrical body and solid base instead of the usual open-lattice mast with ball-bearing base.

ITV was indeed a regional operation back in the Sixties, with each company responsible for the programmes in its own area. Each station had its own identification (logo) and opening music with a simple tuning caption. In those days my hobby was visiting the various transmitters and collecting the opening music and announcements. I still have a complete set of these tuning captions and test-card slides, with the various transmitter names on them. I also have a complete set of the later regional tuning captions with the ITV company names on them, both black-and-white and colour.

It's quite interesting to listen to the opening music and announcements these days, especially Rediffusion London, TWW, Southern TV, Westward TV, ATV and Teledu Cymru. They certainly bring back the days when ITV was worth watching. As Roger says, these days ITV is bland and uninteresting, with its national identity and crap programmes – soap, reality and endless trash from America.

I was fortunate to be given a trip, back in 1966, to the top of the Belmont mast, and have black-and-white photos I took at the time, using a little Brownie 127 camera that cost about 25 shillings (£1.25). I've taken thousands of photographs of ITV transmitter masts around the country, from Chillerton Down, IOW to Rumster Forrest near Wick. During the Sixties and Seventies I visited all the then main transmitters and most of the local relays.

Roger mentioned some of the ITA/IBA publications from those days. Some booklets and publications were also issued by BICC, which designed and built the cylindrical masts at Belmont, Emley Moor, Winter Hill and others for the BBC. The ITA yearbooks from 1962-1986 are of interest: I didn't bother with those after 1986 as they contained little or no information on transmitters, masts etc.

I am at some 720ft ASL here in South Shropshire and could receive the following Band III transmitters: Lichfield (local), Winter Hill ch. 9, St Hilary chs. 7 and 10, Mendlesham ch. 11, Caradon Hill ch. 12 (until the BBC opened on ch. 12 from Winter Hill), Sandy Heath ch. 6 and Moel-y-Parc ch. 11. The difference between Mendlesham and Moel-y-Parc ch. 11 was polarisation and screening of aerials. During good conditions many other stations were received – the result could be a mess, with massive co-channel interference. On one occasion I even picked up Durris ch. 9 (Aberdeen).

Bring back 405 lines and black-and-white TV I say. It was much more interesting!

*K.V. Cuntiffe,
Stottesdon, Kidderminster.*

ESR meter

Alan Willcox's ESR meter design (March 1999 issue) is excellent. I have made many of them for local and some for fairly distant shops. But something which often happens is that users connect a charged capacitor across the test leads. It discharges via R3 (1 Ω) and R4 (2.7 Ω), which may burn out or, worse still, their values may alter. Even a change of 10 per cent will alter the readings a lot.

To prevent burn ups I decided to add a choke across test points X. A suitable value is 150 μ H. It will produce a minute meter deflection at switch on – this can be zeroed out with the mechanical set zero on the meter movement.

*Jim Littler,
Wigan, Lancs.*

Let's go digital

In his article last month Ray Porter writes: "Most readers will know that to record a programme you are not watch-

ing live, the TV set must use the digi-box's UHF output in order to bypass the VCR's scart output." In very few cases (such as when no baseband AV inputs are available, or it is required to distribute the received signal to one or more remote TV sets and mono sound is insufficient) is it necessary to use the RF modulated signals from a set-top box or VCR. In fact it's best to disable all modulators if possible, in order to remove the possibility of interference with analogue reception via the TV set or VCR.

Problems can arise when interconnecting older equipment but, in general, where a set-top box is equipped with two scart sockets it should be connected between the VCR's 'TV' scart and the TV set's 'RGB' scart, with the pin 8 and 16 scart switching signals taking care of source selection. Where the set-top box has only one scart socket, the VCR can be connected in the middle of the chain instead of at the beginning. Depending on the VCR, RGB signals may or may not be passed, but the digital TV signal will often find its way through to the TV set even when the VCR is recording from its own internal analogue tuner.

If Ray Porter's problem was that he was unable, when the VCR was recording programmes from the set-top box, to change the TV set to an analogue channel because of the scart switching signal, the solution is in most cases to use the timer function on the set-top box. When most set-top boxes 'wake up' in the timer mode, the scart switching signals are generally not asserted and the RGB picture is not sent to the TV set.

Ray's vision buzz on sound problem is worrying because it implies that the set-top box is not generating a correctly-formatted System I PAL signal. I would guess however that the fault lies in over-modulation of the vision carrier rather than excessive bandwidth. The sound carrier, being frequency modulated, should be immune to interfering AM signals: in fact the intercarrier signal is produced by mixing the sound and vision carriers and thus carries vision modulation until it is clipped prior to demodulation. Intercarrier buzz occurs when there is insufficient vision carrier, because of

peak white and/or a saturated colour sub-carrier, for the FM demodulator to function correctly. The minimum vision carrier levels specified for PAL I are 20 per cent peak white and a 1.3 per cent chrominance excursion limit. This doesn't allow much latitude in setting up a cheap RF modulator.

*Alan Pemberton,
Sheffield, South Yorkshire.*

Is Sky worth it?

Dave Sullivan (letters, July) asks for views about the shambles that ITV and others are experiencing over transmission with Sky. I am beginning to wonder whether the service I receive via my Sky dish is worth it. I pay £40 a month and quite often can't find anything worth watching. The other evening I put a stop-watch on Sky 1 from 5 p.m. to 6 p.m. During that one hour there was 16 minutes, 23 seconds of advertising!

The £116 I pay for my TV licence to get BBC services etc. looks like very good value indeed. I am giving serious consideration to cancelling Sky. It just doesn't seem worth the £480+ a year I am paying.

*Charles Coultas,
Wokingham.*

Mains plugs/sockets

Keith Cummins' article (May) on DC mains supplies was certainly an interesting read, also the subsequent letters. What particularly captured my interest was mention of the different types of mains plugs/sockets that have been used. I am too young to remember anything but AC supplies for domestic use, but certainly remember the Wylex plugs. In his letter Bill Wright mentions that you could 'piggyback' the 5A plug on to the 13A one (I think that the 13A one was perhaps 15A, but am not too sure about that). What I do remember is that a friend of my grandmother had Wylex sockets in her kitchen right up to about 1970! Also that you could fit the 5A plug into either the 5A or 15A socket: the 15A plug mated with only the 15A socket of course.

From the photograph Bill Wright sent in I noticed that the Wylex plug was fitted with a 20mm ceramic fuse. I also seem to recall that some of these plugs had sleeved pins: could they have been the first domestic plugs of this type?

How many of you can remember the D&S (Dorman and Smith) 13A plug and socket? This was a round-pinned 13A plug with the pins spaced similarly to the 5A three-pin plug. What was 'special' about this particular plug was that the live pin was in fact the fuse. The pin/fuse was threaded at one end to enable it to be

changed, and the value of the fuse was embossed on the end of the pin. The D&S socket was available only in single style, so an adapter that also doubled up as a plug was introduced: you could wire one appliance directly to the adapter and have two extra socket outlets. The council estate in my home village had these sockets fitted right up the mid-Seventies. They were replaced only when the council rewired the homes.

As a collector of vintage plugs and sockets I have acquired quite a lot of different ones over the years, but have yet to find D&S ones. I did have some many years ago but, sadly, they were lost during one of the many house moves I have endured.

*Andrew Tebbutt,
Saltburn-by-the-Sea, Cleveland.*

Servicing info for digiboxes

I was recently asked to repair two terrestrial digital receivers, one a Philips model and the other a Nokia type. Both companies gave me the same answer when I tried to obtain service information: we do not support self-employed engineers and, for 'safety' reasons, no service information can be provided.

I was unable to proceed, and advised both customers not to buy products from these companies in future. It won't help me, or for that matter other engineers, but could maybe put pressure on companies to offer help, if only by way of supplying service information.

*A. Lloyd,
St Judes, Plymouth.*

Comment

With reference to your "high-street gloom" comment in the June issue (page 451), I think the rot started with the abolition of retail price maintenance in the Fifties. Before that, set manufacturers fixed the retail prices of their products and those were the prices you sold them for – or you risked losing your agency. The profit margin was fair for the manufacturer and the retailer, and allowed both to provide a good back-up service. They generally did so, otherwise they would not have remained in business.

I worked for a shop that had been established before the war, initially selling radio sets (and bicycles). It progressed to TV sets and various domestic appliances as they came along, and was very successful for a number of years. Then one of the first Comet shops opened on the other side of the street. This virtually killed off the TV part of the business. The shop staggered on for a few more years, relying mostly on servicing, but eventually went under.

Quite a number of local shops sur-

vived however, including mine. But I no longer sold new sets, the business being based on reconditioned sets for sale or rental. This served me well until the Eighties, when the transistor came of age. With valve sets a repair would be required on average every six months. The sets were still relatively expensive, so people would have them repaired: they were quite good earners. With transistor sets however you might get one fault in five years. This, together with rapidly falling prices for new sets and increased competition, reduced our work by about 90 per cent over a period of some five years.

A strange reversal has occurred during the last couple of years. Because virtually all the TV shops in surrounding towns have closed, I have become quite busy again, even selling new TV sets. But I'm not holding my breath. The sets are becoming cheaper and are more complicated and difficult to repair, particularly for someone of my age who can't even see some of the components let alone replace them! I am pleased that I now have my pension, as I can pick and choose what work I take on.

To illustrate the change in profit margins over the years, when I started to sell refurbished colour sets in the Seventies the proceeds of a single sale would fill the bulk diesel tank I had installed for our vehicles. Today, it would be a very profitable sale that would fill the tank in my car!

I must say that I found the article on DC mains supplies (May) and the subsequent letters very interesting and evocative. My first place of work, in the City of London, had a two-phase, three-wire system. I have always been puzzled about this. Could it have been a remnant from DC? Also the lights at Cannon Street station had a pronounced flicker. Could this have been 25Hz?

At my second place of work I can remember a radiogram that had an eddy-current motor (like an electricity meter). It was driven by a two-valve inverter at the base of the cabinet. Presumably this was the only way to use an AC motor in a DC radio.

On the subject of different types of plug, no one has so far mentioned the 13A round-pin type. In the late Forties/early Fifties a large estate was built near me in SE London: these plugs/sockets were fitted exclusively. The plug was about the size of a three-pin 5A type, but the pins were thicker. The live one was a screw-in fuse. Customers complained bitterly about the cost of replacements.

*Peter Nutkins,
Charmouth, Dorset.*



WHAT a LIFE!

Feedback from readers and a miscellany of TV and video faults.
Donald Bullock's monthly commentary

“My wordprocessor was playing up last night” I said to Steven, “so I’ll have to do my article in the workshop. Do you think you could try to keep the customers away until I’ve finished it?”

“I’ll do my best” he replied, “but it would be easier if they couldn’t see you sitting at the desk at the back of the counter.”

“I’ve no choice” I said, “that’s where the machine is!”

So I settled down and began by looking through my mailbag. Quite a large one this month.

A Thomson 426

“Hello Mr Bullwork!” screeched a voice. It sounded like a saw on a sheet of tin. “Just the chap! Have a look at Old Pukey’s telly will you? He’s my lodger. Remember ‘im? Bit of a prat. He plugged ‘im in wrong.”

I put my letters down. “Plugged him, er, it in wrong? I said, “what do you mean?”

“Well, ‘e plugged the mains into this little hole with ‘12V DC’ wrote by it.”

“Can I help?” intruded Steven, taking the set. “Give us until later this afternoon, will you?”

The set was a 10in. portable, Thomson Model 426. Steven began to open it up and reached for his meter. I picked up my letters again.

“Hm” he said a few minutes later, “two transistors, TD15 and TD20, have blown their tops. They’re both W6 One 10s. And FD01 has blown too. That’s the sugar fuse of course.”

I stopped, put down my letters and looked at him. “W6 One 10s?” I said, “an odd number for a transistor. And whatever are you talking about, sugar fuses?”

“Don’t you know them?” he asked, as though I was a slip of a lad. “They are very small, yellow and highly rated. This one’s a 15A fuse.”

“Well, I must get on” I replied,

picking up my letters. Steven soon had the set working merrily.

Carpet cleaners and local commercial radio stations

The first two email printouts were from Martin McCluskey, who hails from Co. Durham. One referred to my trouble with a Goblin carpet cleaner. He recommends the Numatic George, from Machine Mart, as being very well made. “What’s more they sell the spares” he adds, “not that we’ve ever needed any.”

In his second email Martin comments on local commercial radio stations, saying that they are ruined by phone-ins, competitions and the childish jabbering of the presenters. “Even the BBC station plays music over the news bulletins” he adds.

“But,” he continues, “while travelling through the Midlands I found a station called Saga FM, with tasteful music, well spoken English and no pulsing rhythms that drown the news. They have stations in other areas as well.” Further details can be obtained from the website ‘Saga.co.uk’.

Mr Fussie

Steve Cook, from the Isle of Wight, keeps a few old TV sets for nostalgic reasons. He also has a huge collection of test-card music dating from the Sixties to the Nineties. I wonder whether he has the strict-tempo piece called, if I remember correctly, Sylvia? It was played in the late Fifties or early Sixties by what I assumed to be a trio or quartet. I haven’t heard it for fifty years but am sure that if I did it would take me back again to that sunny and dusty workshop over the furniture store!

Steve recalls his days working for a Cirencester dealer called Ettles and Bumford. They had a customer whom we’ll call Mr Fussie. He owned a massive 25in. Deccacolour console set complete with doors and, being a perfec-

tionist, had talked the BBC into supplying him with a colour slide of Test Card F. He used this frequently and religiously to compare with his set’s test-card picture. “If the picture geometry drifted even slightly” writes Steve, “he would have us along to adjust it as per the slide.”

“One day we had to have his set in. That evening we rested it on the workshop floor with its back off. Our shop manager, checking the workshop before he left, managed to catch the tube’s neck with his backside as he leant over something else. The following day he came to us a bit sheepishly to confess. ‘I accidentally gave that big set a slight tap last night’ he said, ‘and it went pshsssssh. I hope I didn’t damage anything’.”

“It took us a week or more to get and fit a replacement tube, and no fewer than four men to carry the set from the van to Mr Fussie’s lounge. When it came to switching on, he hovered about squinting at his test-card slide. We were worried in case the set’s test card failed to match the slide!”

John Berryman’s Hitachi

Our next visitor was John Berryman, who strode in with a 25in. Hitachi set. He’s a big chap, and is also the undertaker from a local village. He is always looking for extra trade. After putting the set on the counter he looked over at me.

“Hello there Don” he called over, “how are you keeping?”

“Very well, John” I replied. “Just had a thorough check up, and was pronounced very fit indeed. You’ll just have to wait.”

His set was an Hitachi C2519T. “What’s up with it?” asked Paul.

“Aw, he’s terrible. Soon be ready for the long box, I reckon. You plug him in and see.”

Paul did. The picture had shifted to the right by a third,

was in black-and-white and rolling, and there was little line sync – also no sound.

He took the back off and settled down to find out why. The TDA2579A timebase generator chip IC501 seemed to be a logical place to start. Scope checks at its pins revealed incorrect waveforms. Freezing the IC made no difference, but heating it did. Sync was restored, and all the troubles were cured. A replacement put the set to rights.

Service info

I turned back to my letters. Allan Haskins had written to say that he was having difficulty getting a service sheet for a Philips K40 TV set with two scart sockets at the back. Personally I'd run a mile if someone confronted me with such a set. I reckon Allan should consult the Fryerns advertisement in the back pages of the magazine. I've used the company's services on a number of occasions, and can vouch for its speed and the quality of the service information provided. The phone no. is 01206 211 570.

An Amstrad CTV3128

"I say!" bawled a tweedy-looking chap who had just bounded in, "which of you chaps is going to help me in with my TV set, eh?"

Paul strode forward, and the two subsequently struggled back with a 28in. Amstrad CTV3128. They heaved it on to the bench.

"What's wrong with it?" asked Paul.

"Dunno" breezed Tweedy, "if I did I'd mend the blighter myself!" At that he slapped his thigh, stamped his foot and doubled up over his great joke.

We waited patiently. When he had settled down, Paul asked him what the symptoms were.

"The picture's like this" said Tweedy, waving his arms in the air in big curves.

Paul rubbed his chin. "Picture's like an hour-glass?" he asked.

"Got it in one!" Tweedy bawled. "Now mend it and I'll be back!" At that he stomped off.

Paul reached for his tools and got to work. It didn't take him long to find the cause of the trouble. In fact we've had EW bowing

before with this model. The cause has always been the two 2kV ceramic capacitors C599 and C592 in the line output stage. C599 had cracked open, and C592 had a nasty bulge in its side. It read all right when checked with a capacitance meter, but both capacitors have to be replaced for correct operation. Once this had been done the set's geometry was OK.

Horace Price and his Philips VCR

Our next caller, Horace Price, looked the picture of misery as put a Philips VCR on the counter.

"Ello Mr. Bullock" he said flatly, "don't feel so good today."

"What's up?" I asked.

"Think I've got the flu coming on, I've got a raging toothache and I got the screws in me arms" he replied.

"Didn't your missus leave you a while back to settle with that tall, thin man from Snoddies?" I said.

"Yeah, but 'er's come back.

Reckons he's screwy. Tried to get her to go back, but 'er won't."

"Too bad" I sympathised.

"what's up with the recorder?"

It turned out to be a VR6761, and was dead.

Paul knows these things inside out, and made straight for the thermal cut-out in the power supply. Once he'd fitted a replacement the VCR worked.

Remote extenders

I turned to my letters again. Back in the May issue I mentioned my need for a remote extender to operate my Technics audio system in an adjacent room. I've received a great many emails about this, and will reply to each.

Jack Paterson recommends the Multi Link kit from Maplins, Model BV28F, at £40. You can get an extra infra-red eye. Bill Leonard of SEME mentions the One For All at £29.50 and made me a special offer. Mike McNeill of Global Communications, Essex told me about the one his firm supplies, the TV Link Plus.

Richard Schroder was one of several who wrote to recommend the Powermid. "I've used a pair of these for years" he writes, "and can thoroughly recommend them."

The choice is overwhelming!

In this connection I suppose I ought to mention my son James, who is a computer wizard. He did a search of the internet and came up with the website www.satcure.co.uk, which he describes as being quite astonishing in its scope.

Incidentally I welcome emails from readers – you can contact me at donald@wheatleypress.com

Ristic

Finally this month, a sad note. Those who have never heard of John R.T. Davies, who died recently, are almost certainly unknowing beneficiaries of his skills if they listen to the radio. An enthusiastic and highly-skilled sound engineer, he was frequently called upon by most of the major record companies to re-master their old or imperfect records for dubbing to LPs or CDs. He also specialised in reassembling and re-mastering 78s that had been broken into pieces, using a variety of devices he had invented. Just tapping his name into Google will gain access to his website, which his wife Sue is continuing "for a few weeks".

A keen classic jazz enthusiast, he played no fewer than fourteen instruments. He was a founder member of the Temperance Seven, which actually had nine members (one over the eight!). He played with many other groups over the years, including the Crane River Jazz Band and the Cy Laurie and Acker Bilk bands.

Ristic, as he was affectionately known, re-mastered many of the early Bing Crosby 78s on the Jonzo CD series produced by a friend of his and mine, John McNicholas, so that those who were familiar with the original 78s heard them as never before.

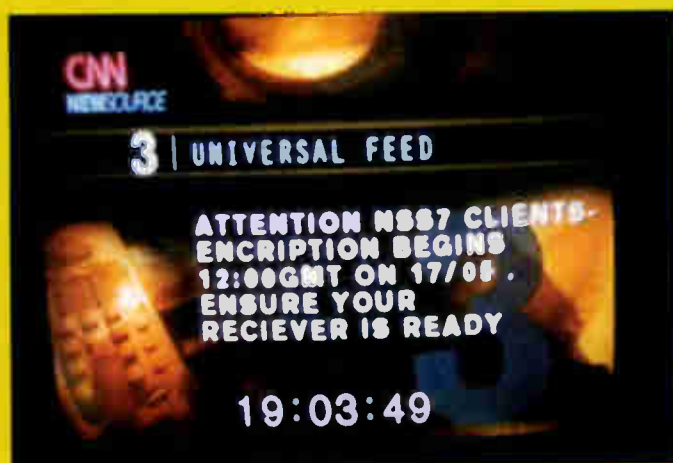
He had worked through the classic recordings of King Oliver, Jelly Roll Morton and Louis Armstrong, and produced an eight CD set of all the known recordings of Bessie Smith. When he died he was working on a complete re-mastering of his large collection of Bix Beiderbecke records. He made a huge contribution to interest in the music of the Twenties and Thirties.

I for one will sadly miss Ristic. ■



DX and Satellite Reception

Terrestrial DX and satellite TV reception reports. Broadcast and satellite TV news. Reception from low-elevation satellites. Whatever happened to Channel 1? Roger Bunney reports



The end of FTA CNN NewsSource feeds via NSS 7 (21.5°W).

At last there has been some Sporadic E signal propagation, including reception from Spain, TVE still being transmitted in all Band I channels – until June 30 when, in theory, most of TVE's VHF transmitters will close down. Conditions couldn't be described as fantastic: there was a rapid rise in signal activity from about the 6th, tailing off again from the 15th. This has happened before, a second phase occurring in June with several weeks of good reception. But SpE is by its nature sporadic: few seasons are the same. Here's a collated listing of SpE reception during the period:

- 3/5/04 ORT (Russia) ch. R1.
- 6/5/04 ARD (Germany) ch. E2; UT-1 (Ukraine) R1; MTV (Hungary) R1; CT-1 (Czech Republic) R1.
- 7/5/04 NRK (Norway) E2. 3.
- 8/5/04 UT-1 R1; ETV (Estonia) R2; LTV (Lithuania) R1; LRT (Latvia) R2; BTV (Belarus) R1; SVT (Sweden) E2.
- 10/5/04 RAI (Italy) IA; TVE (Spain) E2-4; RTP (Portugal) E3; BTV R1; TVR (Romania) R2; LRT R2; UT-1 R1.
- 11/5/04 TVE E2, 3; RAI IA, B; MTV R1; TVR R1, 2; ORT R1.
- 12/5/04 RAI IA; TVE E2; UT-1 R1; Tele-A (Italy) E2-.
- 14/5/04 TVE E2.
- 15/5/04 ETV R2; LTV R3; UT-1 R1; RAI IA; SVT E4.
- 16/5/04 RAI IA.
- 17/5/04 ETV R2.
- 18/5/04 +PTT (Switzerland) E2. 3; RAI IA, B; TVE E2.
- 26/5/04 RAI IA plus many unidentified signals on all channels.

Good news too from Hugh Cocks (Algarve, Portugal) who reports a transatlantic opening on May 14 at 2000-2300 hours GMT. US radio amateurs in southern New Jersey were audible in the 50MHz (6m) band. Ch. A2 (55.25MHz video nominal) was received at 2200 hours, with CBS news then a quiz show at 2300 hours. There was a brief reference to the Washington DC area, but it was possibly a network programme. On the 15th ch. A2 was again received, at 2000 hours. The measured offset was at 55.26MHz, suggesting either WCBS New York or the Washington transmitter.

Overall then a reasonable start to the 2004 SpE season, with the hope of more to come.

Satellite sightings

Radio 5 news at 0730 hours on Sunday May 23 reported that a building at the Charles de Gaulle, Paris airport had collapsed. Quick checks at Telecom 2D (8°W) and Intelsat 801 (31.5°W) provided little by way of live news coverage: it was not until later in the morning that a satellite uplink appeared at 8°W. The airport authorities and police were restricting media coverage, initial thoughts being of terrorist action. Only one feed seemed to be active, 'France 3 4214+', which carried colour bars and 'Car France 3 CRA 106T' alternating with 'Car France Redac, Nationale'. This was at 12.733GHz H (SR 4.214, FEC 5/6). First pictures showed quite dramatic damage, with rescue teams checking over the debris of the wrecked section of terminal E2, which had been opened only a few months previously. The France 3 truck remained on site until mid-evening, uplinking reports for French and overseas broadcasting networks.

While checking satellite activity at 0830 on Sunday morning I found a German transmission at 31.5°W, not breaking news this time but a version of the Big Brother programme. This was being uplinked by 'A-Medialynx-M' at 10.922GHz V (6,100, 3/4). During the evening through to very late Syrian TV programmes are available from Telecom D at 12.749GHz H, with the very low SR of 2.894 and 3/4 FEC.

There was unrest across parts of India during the 17-19th following the elections there. Large crowds protested loudly outside the Congress Party HQ in New Delhi when Sonia Ghandi

announced that she would not take up the position of prime minister. Live Newslink pictures showing the unrest in New Delhi streets were relayed via Europe*Star-1 (45°E) at about 2100 BST, with a reporter updating a US TV network about local developments. This was at 11.538GHz V (5,632, 3/4). The same uplink was being used the following morning, still with NTSC, the same reporter avidly listening to a local radio station for the latest news which he then filed in his own reports back to the US! It was the first time I've seen an SNG feed from India.

Angry crowds were also seen in a Sky News feed from the Cannes Film Festival on the 12th. The French government had cut benefits for film production workers, who were far from happy. Live pictures were transmitted via Eutelsat W2 (16°E) at 12.556GHz H (5,632, 3/4), courtesy of UKI-818.

Telecom 2D has been carrying live French theatre on the second Friday of each month, using widescreen MPEG 4:2:0 with very high-quality pictures. Check at 11.576GHz H (27,500, 3/4). Edmund Spicer (W. Sussex) notes that there are two video channels, vthr1 and vthr2, the former with recorded material and the latter with the live action. The theatre opens with promotions and computer animations from 1900, going to stage action from 1930 hours UK time. Edmund also mentions the Ocko TV programmes from the Czech Republic via Astra 2C (28.2°E) at 10.832GHz H (22,000, 5/6): not to be missed are the Happy Hour and Hitzone programmes at 1900-2100 hours BST during the week. Edmund is about to install a Raven elliptical 70cm dish with DiSeqC-switched LNBs for 28, 19 and 13°E.

Alan Richards (Skegness) draws attention to the British Forces Broadcasting Service (BFBS) downlink via Eutelsat W3A (7°E) at 11.612GHz H (27,500, 1/2). There are some odd offerings here, such as p869 where you will find a listing of the cable channels and programmes available in Gibraltar – the BBC supplies much of the text content. The Arabic news channel al-Jazeera is present via W3A at 11.472GHz H (27,500, 3/4), with occasional news feeds either clear or encrypted. The Showroom channel via W3A carries programme content in FTA form for long periods as a promotion, though the Playboy and Blue content is encrypted! The frequency is 11.640GHz H (30,000, 3/4). An unnamed reader has been logging "soft FTA adult" offerings via Hot Bird at 13°E. Just for the record, you understand, he gives the frequencies as 11.200GHz V, 11.627GHz V, 12.092GHz H, 12.241GHz H, 12.305GHz V and 12.476 H. All have a SR of 27.500 but the FEC varies – most receivers will lock any FEC setting.

The 17th produced a Europe*Star signal from an unidentified African country. Use of 11.515GHz V suggests that it may have been a GlobeCast Africa hook-up, though the service ident merely said 'Manasatfly' while the unusual SR of 6.664 with 2/3 FEC varies from what GlobeCast has previously used. The transmission lasted until after 2200 hours BST, with two white-suited presenters speaking in an unidentified language and, behind the set, Sixties-style African artwork. At the end of the programme feed the sat truck simply switched off.

Broadcast news

Digital: Tampere (Finland) is going digital, initially via a local cable service but with plans for terrestrial transmissions to reach the non-cabled parts of the city. The Polish TVP, TVN and Polsat services plan to start a digital terrestrial TV channel under common management. The Dutch government has announced its intention to close down analogue TV transmissions prior to 2008.



NASA is still using its 45th Anniversary logo (1958-2003) in 2004.

Australia: A fourth commercial TV channel may be started when the present franchises end in 2006.

Lithuania: The present Band I/II transmitter list is as follows: Raseniai ch. R2 100W H, Vilnius ch. R2 25kW V, Jurbarkas ch. R3 100W H (all LTV); Vilnius ch. R4 25kW V (LNK).

Iraq: A new terrestrial TV channel, Nahrayn, is due to start broadcasting in June.

Belgium: Active BRT DVB-T transmitters are as follows: Saint Pieters-Leeuv ch. 22 H, 20kW 920m; Velthem ch. 22 V, 20kW 92m; Egem ch. 40 H, 20kW 290m; Genk ch. 41 H, 20kW 200m; Schoten ch. 59 H, 20kW 165m; Antwerpen ch. 59 V, 10kW 85. Transmitter powers in ERP, transmitting mast height in m. These transmitters should be easily receivable in eastern parts of the UK. Each transmits three channels – TV1, Ketnet/Canvas. Sporza – with Nicam. Radio programmes are Nieuws+, Sporza, Radio 2, Klara, Klara continuo, Studio Brussel, Radio Donna and Donna Hitbits.

South Africa: The South African Broadcasting Corporation (SABC) is expected to become a part commercial, part public service by early 2005. This is as laid down in the Broadcasting Act of 1999.

Myanmar (Burma): The government-run national TV service MRTV has opened a new channel, MRTV-4, which will operate over 24 hours with general entertainment, films, news and music. The military also runs a TV service, Myawaddy-TV, in the larger towns and cities.

Satellite News

Eutelsat has confirmed that its new satellite W3A started full operation at 7°E on May 17, when the services formerly carried by W3 were transferred seamlessly. W3A has expanded capacity to serve Asia, Africa and all of Europe. W3 is being moved to 48°E, where it will improve the services provided by the 2F2 satellite.

The Africa-wide Multichoice Pay-TV service is changing its transmissions to Uganda from analogue to digital to increase the number of channels available – there will be up to thirty channels. Viewers will need to



Sislink identification received from a racecourse via Eutelsat 2F3 (21.5°E).



Caption received prior to a sports outside broadcast via Atlantic Bird 1 (12.5°w).

upgrade with a new dish, IRD and a subscription costing \$470.

Reception from low-elevation satellites

A recent article in the New Zealand trade magazine *SatFACTS* described reception from C- and Ku-band satellites that are close to the horizon, using a solid 3m Patriot dish with a Gardner 0.7dB noise-figure LNB and a substantially-modified feed support system. Bob Cooper's C-band achievements are of little relevance in the UK, where the authorities frown on large dishes, but his Ku-band results are of interest. Looking west from his Mangonui (north of Auckland) location, NSS 6 (95°E) is at 0.5° above the 'look' horizon. Reception is therefore affected by the long signal path through the Earth's atmosphere – and anything the troposphere can throw up.

Bob found three signals here, two with vertical and one with horizontal polarisation. Because of polarisation warping however all three were at optimum horizontally – the further east or west from the satellite's longitudinal slot, the more the polarisation twists. The Ku-band signals suffer from variations in the weather, in particular rain fade, and fading – Bob compares the latter to that with long-haul tropospheric reception. Whereas C-band signals usually 'get through', those in Ku band can be

subject to total dropout or severe fading.

Encouragement is available here in the UK from a recent Skywaves *SatScan* bulletin, where Mike Fallon reports on reception at his location on the Sussex coast. He receives the ART Beirut streams from PAS 4 at 74°E easily. These streams are at 11.560, 11.524 and 11.532GHz V, but are encrypted for much of the time. PAS 7 and PAS 10 at 68.5°E give him a wide range of South African radio and TV. His most extreme low-elevation access has been Dubna TV from LM-1 at 75°E, with an elevation angle of approximately +1°. Mike comments that ground noise has not been a problem using his solid Precision 1.2m prime-focus dish with an MTI Blueline 0.6dB noise-figure LNB. Mike is lucky: his E and W horizons are across sea paths!

Whatever happened to Channel 1?

I was recently asked by Garry Smith of HS Publications, Derby about the European TV channel E1 – if I knew about its use and demise? I have certainly heard of the European ch. 1 (E1) and the American ch. 1 (A1), which are no longer official allocations, the lowest being ch. E2 in Europe and A2 in the US. Further investigation proved to be an interesting project. The internet provided answers to ch. A1, but ch. E1 is rather more elusive.

In *How to Listen to the World* (1959) Gordon E. Simkin, international DX editor of the AIPA DX club (now the WTFDA), wrote an article on TVDX. This was at the peak of the greatest sunspot cycle ever. The article included a listing of low-band TV channels and their video carrier frequencies, the first six being relevant here:

- Europe 1 41.25MHz +5.5MHz sound-vision spacing (system B/G).
- Europe 1A 42.25MHz +5.5MHz sound-vision spacing (system E).
- BBC ch. 1 45MHz –3.5MHz sound-vision spacing (system A).
- France 1 46MHz –4MHz sound-vision spacing (system C, 441 lines).
- Europe 2 48.25MHz +5.5MHz sound-vision spacing (as chs. E1, E1A).
- Australia 1 49.25MHz +5.5MHz sound-vision spacing (as chs. E1, E1A).

It's interesting that pre-war Moscow TV operated at 343 lines, Leningrad at 240 lines. These transmitters reopened on 7 May 1945, moving to 625 lines from 5 November 1948 (full service 16 June 1949).

The Europe TVDX Club bulletin No. 2, 1964, mentions ch. E1 at 41.25MHz, though a Philips aerial technical book dating from the same year suggested that ch. E2 was the lowest Band I channel then in use in Europe.

A TV archive site led me to the Deutscher Fernseh and the 1939 Telefunken TV receiver Einheitsempfänger E1, which set impressively high standards for the time. Intended production was 10,000 sets for the Berlin area, but the outbreak of war limited production to only 50. German TV continued 441-line transmissions from the Witzleben transmitter however, until American bombing put an end to it. The E1 set was devised as a standard design to be produced by several companies, and was also known as the Volkfernseher (people's TV), in similar manner to the Volkswagon. The site (www.earlytelevision.org) also says that the Philips TV Model 2405 sold in the UK was similar to the E1, an interesting pedigree!

The technical specification in the Einheitsempfänger

E1 Telefunken site is very detailed, but the relevant point here is that its VHF tuner was internally adjusted to receive a single channel in the range 40-50MHz, to suit the local TV transmitter, i.e. ch. E1. This must have been used by the Berlin transmitter.

Radio News, July 1935 included an article on German TV. The Berlin radio tower was described as carrying "golden rings". These were the aerials for the Berlin TV station, at 435ft AGL. The station is described as transmitting at 15kW to cover an area of 50 miles diameter. Apparently there had been 180-line transmissions daily from September 1934 on a wavelength of 7m (approximately 45MHz). I hope to provide more information on the Berlin transmitter and ch. E1 shortly – stay tuned!

Meanwhile our friends across the Atlantic were also moving frequency allocations about to suit the emerging technologies. There's much information on the broadcasting of the past at www.museum.tv/archives. To find out more about the American ch. 1, tap "channel 1 tv" into Goggle and an offering called "What became of TV channel 1" should appear! It includes a frequency allocation chart that goes up to ch. 19 at 294MHz. There are many gaps however, but this was cutting-edge microwave technology in 1937. The low band is listed as:

41-44MHz Apex Radio.

44-50MHz Channel 1 (NY assignment, W2XBS, NBC).

50-56MHz Channel 2.

66-72MHz Channel 3 (CBS).

With the move to FM radio broadcasting in 1940, covered in this column some years ago, the 42-50MHz band was allocated to radio. So the TV allocations were shifted to higher frequencies. We now find the allocations as:

42-50MHz FM radio.

50-56MHz Channel 1 (NY NBC, Buffalo WEBR, Rochester Stromberg-Carlson).

There was considerable debate about the positions of the American TV channels 1 and 2 after the war. In January 1946 WCBS (NY) was operating in the spectrum 60-66MHz but was to move to the "modern Channel 2 on March 1st". Also in 1946 the FCC decided to shift the FM radio broadcast band to 88-106MHz (108MHz later). On 25 February 1946 the definitive FCC channel/frequency list appeared as:

44-50MHz Channel 1.

54-60MHz Channel 2.

60-66MHz Channel 3.

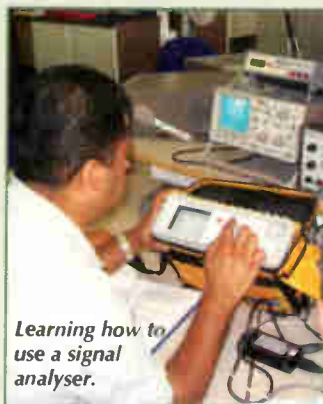
Channel 1 was allocated to several TV stations but, as FM radio was still being transmitted in the 42-50MHz spectrum, none of them ever used it. By the time that FM radio had vacated this spectrum the TV stations seem to have found frequency space elsewhere. So the band was again reallocated, this time to services such as police mobiles, utilities etc., with TV using the 25 February 1946 FCC allocations from ch. A2 upwards.

On 17 November 1947 the FCC debated removal of ch. A1 from the TV channel table. It was deleted during the following spring, when the American channel 1 passed peacefully into media history. ■

College of NW London

PLASMA TV

SERVICING COURSE



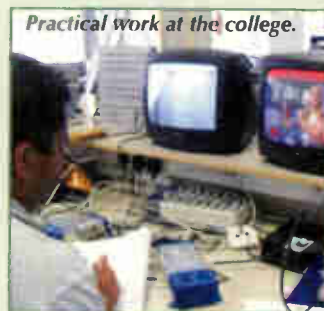
Learning how to use a signal analyser.

The College of North West London has added a plasma television servicing course to its extensive list of courses, which include digital television, DVD servicing, satellite and terrestrial reception and integrated reception systems. The course,

which starts in September, is designed for practising engineers as well as those studying electronics and telecommunications, and leads to a Level 3 City and Guilds qualification.

Fawzi Ibrahim, senior lecturer and course tutor, points out that the course is the only one of its kind apart from those run by manufacturers for training purposes. During three hours a week over a period of 36 weeks, participants will learn the basic principles and operation of plasma screens, review the principles and practice of terrestrial and satellite digital television, and carry out testing and fault-finding with popular models.

The college also plans to provide short plasma TV courses for industry, and is developing these.



Practical work at the college.

To find out more and/or enroll, contact Fawzi Ibrahim at the College of North West London, Denzil Road, London NW10 2XD, or email: Fawzi.Ibrahim@cnwl.ac.uk

The college is conveniently situated near Dollis Hill tube station in Willesden

Hughes and Kettner 15W guitar amplifier (purple version)

There must be hundreds of these small practice amplifiers out there just waiting to go wrong. Their build is nothing special, but they are easy to work on and take apart. Unfortunately they were imported from Korea and there is now, to my knowledge, no UK agent. If the fault is electrical/electronic however parts can easily be obtained and fitted. The soldering leaves something to be desired, so a good blanket resoldering job should be undertaken before a repair is carried out.

This particular amplifier emitted a loud hum from the speaker when it was switched on, so I suspected an output stage fault. This is based on a TDA2050V amplifier IC, which proved to be faulty. When a replacement had been fitted the hum had disappeared but there was no response to any input.

The preamplifier uses op-amps that are marked JRC. This means nothing to me, but when I drew out the circuit I reckoned that an LM358M would probably do the job. As a precaution I replaced all the chips marked JRC with the LM358M type. I was then rewarded with a fully functioning amplifier. The cost of the replacements was less than £5 in total, so it's worth taking on repair of these amplifiers.

I can't say definitely how the output-stage failure occurred, but my guess would be the connection of an extension speaker of incorrect impedance to the external speaker socket. As for the failure of the preamplifier op-amp, I would suspect an overpowering effects pedal or something similar. I have on a number of occasions come across faults of this type where op-amps are used in the preamplifier circuitry. **S.R.**

Sony HCD-EX100

This unit wouldn't eject discs. I found that the loading belt, item 111, part no. 4-999-537-01, slipped on the motor pulley because it was covered with grease. Once I had fitted a new belt and cleaned the pulley there was normal eject operation. **C.B.**

Sony TA-H3600

The display flickered on and off. Checks on the front panel board revealed that a number of the display tube's pins were open-circuit because of dry-joints. A quick resolder cured the intermittent light problem. **C.B.**

Sony STR-KSL5

The speakers produced a hissing sound on all functions. I found that a small amount of freezer applied to the digital audio/if receiver chip IC1101 on the digital board

would clear the fault. Normal sound output was restored by replacing this IC. **C.B.**

Sony MZ-E510

This MiniDisc player wouldn't play discs. When I checked the sled mechanism I found that there was insufficient play between the SSA gear (part no. 3-244-868-01) and small plastic washer (part no. 3-338-645-31) and the screw block assembly. Replacement of these two items restored normal operation. **C.B.**

Sony HCD-SE1

This unit wouldn't play CDs. It just made a scraping noise and showed "no disc" in the display. When I checked the CD-loading assembly I saw that the small gold screw washer that holds the chassis MD assembly to the holder BU assembly was missing. As a result, the CD mechanism didn't rise sufficiently to spin a disc freely without catching and scraping on the CD drawer. A new screw washer restored normal loading and playback operation. **C.B.**

Sony DTC1000ES

This data recorder snapped the tape. When I looked inside I saw that the right-hand tape guide didn't return to the rest position. The problem was cured by increasing the tension on the hair-spring that acts on the guide. **P.R.**

Technics SE-A2000

This monster worked OK except that the large display lights didn't. It looked like "a couple of bulbs required". In fact there are 16 of them, connected in series in banks of four. 14V, 40mA wire-ended bulbs fit OK. **P.R.**

Akai GX912

This professional cassette deck dates from the late Eighties. One VU level display kept going off. The cause was dry-joints behind the display tube, at the pins for the level segments. **P.R.**

JVC CA-MXS3BK

I decided to replace the laser unit as poor performance was not improved by internal cleaning, a rare event. The laser is nothing special, just an ordinary Optima 150S, and is easy to fit. When the replacement was installed however the CD player didn't work at all, with a "no disc" message appearing in the display. After a couple of false starts I discovered a short on the laser PCB: two points were bridged by a solder blob.

"Ha!" I hear you cry, "how could he be so stupid?" Well, quite easily actually. I have never before known one of these



AUDIO FAULTS

Reports from
Steve Roberts
Chris Bowers
Philip Rosbottom and
Geoff Darby

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

Reports can be sent by post to:

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

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

lasers, whatever the source, to be shorted in any way other than by the thin metal plate that's inserted in the flexiprint connector. This one was no exception on that score: it had the plate as well, and I had of course removed it in order to be able to fit the flexiprint.

The laser was a genuine JVC replacement part – it had a JVC sticker on the box – and had been obtained from a well-known supplier. Another of life's little mysteries, but one to be looked out for in future. **G.D.**

Samsung MAX-N75

There was no output from this unit. A 'wet-finger' test around the main PCB proved that the output stages were working, a loud buzz being produced from each speaker. I then switched to radio and tuned in a local station. With the help of a scope it was easy to find the audio outputs from the tuner module and follow the print tracks down to FIC1. As far as I could see, nothing emerged from this 80-pin flatpack IC.

Suspecting that the device's supply might be missing, I carried out some meter checks. There were reasonable positive voltages at several pins. I then

noticed a zener diode symbol silk-screened on the PCB, near the IC, and found that there was no voltage at either end of it. After switching the unit off I checked the diode with an ohmmeter and got a dead short reading. An electrolytic decoupling capacitor, FC8 (220 μ F, 10V), is also present here. More on a hunch than anything else, I unsoldered and lifted one end. This proved that it was the cause of the fault. A replacement, rated at 16V, restored the negative 6V supply at pin 72 of FIC1 – and normal audio. **G.D.**

Sony HTC-H2800

I've mentioned before the one, two or three 47 μ F, 4V surface-mounted electrolytic capacitors on the CD servo board in many Sony models – the number depends on which board is fitted. What I haven't mentioned is that the type of replacement is critical for correct operation.

This unit came in because of a poor tray belt, made worse by the owner who had oiled it. Once this had been dealt with I cleaned the laser, relubricated the motors and slides then refitted the deck. On test, playability was poor. But before condemning the laser unit I checked the

servo board electrolytics. There were three, and this version is usually one of the worst for trouble with them. When their ESRs were checked two read off the scale and the third produced a reading of 39 Ω . Capacitance checks showed that they were all close to 47 μ F however, proving once again that ESR is the only true test of an electrolytic capacitor's 'goodness'.

Things went wrong when I went to the drawer to get replacements. It was empty, though I can't remember using the last of them. As the job was urgent, I fitted three conventional sub-miniature electrolytics rated at 16V. When the system was tried out, the performance was worse than ever. Puzzled, I tried a replacement laser unit, just in case. This made no difference.

A phone call to another repairer in the area brought me three surface-mounted electrolytics rated at 6.3V. This is the type I normally use, as the 4V originals are hard to obtain. They are slightly larger, but fit well. Once they had been fitted a retest showed that the servo performance was back to normal. I was then able to refit the original laser unit, after which there were no further problems. **G.D.**

TEST CASE 500

Wow, Test Case 500! At its rate of once a month this series has now been running for over forty one years. Starting with valve-operated VHF sets it has embraced, progressively, monochrome TV, colour TV, VCRs, satellite and digital equipment. Although we didn't appreciate it at the time, the product range of the early Sixties was very limited and the technology level, in today's terms, very low.

A fundamental piece of hardware that was present then and is still present in most TV sets is the picture tube. It has been subject to much development, but its operation remains simple to understand. It is also easy to service, along with its peripheral components. The reliability of these is not as good as that of the later flat-panel display systems, because of the need for high voltages, fast-changing scanning currents and, in some cases, manufacturers' cost constraints on the components used. A particular need with colour tubes is an auto-degaussing circuit to neutralise, at each switch on, magnetic fields in and around the tube.

And so we come to George Cooper's widescreen Sony Model KV32WF1U

(BE3D chassis). It had worked well during the five or six years since he had bought it from us, but there was now a problem: colour staining on the screen. Could we come and have a look? Of course, that's what we are here for!

Todd went off next morning with instructions to check for local magnetic influences such as large home-cinema loudspeakers and to degauss the set, for which purpose he was given a portable mains-operated degaussing coil. When he arrived Todd switched the set on and found that the picture was perfect. There was no sign of colour staining, even with the pure colour fields provided by the little pattern generator that forms part of Todd's hand luggage. And there were no big speaker cabinets or anything likely to have an effect near the TV set. Manual degaussing, though it seemed pointless, was carried out, accompanied by the impurity effect George claimed to have seen – a pretty rainbow-like effect, sometimes moving slowly over the screen, with very gradually-changing hues.

Since he couldn't guarantee that he had provided a cure, Todd had to leave without making any charge – for the use

of the equipment, for the twenty minutes on-site session, or for the travelling expenses incurred. Such is the nature of TV service...

Two days later George was back on the phone. The problem had occurred again, though when he spoke the picture was once more OK. Cathode Ray was dispatched with a service manual, a soldering iron and a replacement degaussing posistor that had been robbed from a similar set in the workshop. Posistors can be unreliable, and have certainly been known to cause this sort of symptom. When we subsequently checked the one he had removed, it didn't rattle and looked OK. It was fitted to the workshop set and left to run as a test.

It was still running, without any problem, when George came back on the phone. His problem hadn't gone away! So the degaussing posistor couldn't have been responsible. What else could have caused this nasty, intermittent effect?

The culprit was found without need to transport this large, heavy set to and from the workshop. What was it? Give this some thought before you check the solution, which is on page 635.



DVD

**Fault reports from
Geoff Darby
Philip Salkeld
and
Chris Bowers**

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

Reports can be sent by post to:

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

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

Panasonic DVD-LA95

The owner of this personal DVD player complained about "laser drive sticking". This turned out to be uncannily accurate. If the machine could be persuaded to play at all, it certainly wouldn't move on to another chapter on a DVD disc, or another track on a CD, when asked to do so.

Once it had been dismantled, the cause of the problem was easy to see – fluff! The unit was full of it. I guess that the owner probably uses it a lot in the bedroom (this is certainly the norm with my daughter, who has a similar model). Two screws enable the sled motor cover plate to be removed. Once this is off the laser, complete with its worm drive, can be lifted clear of the deck. Careful removal of the dry fluff, and the fluffed up grease, followed by relubrication, restored full operation once the unit had been reassembled. **G.D.**

Sony HCD-S800

The owner of this home-cinema system complained that there was no DVD sound, though aux was OK. In fact all other modes, including tuner, produced normal audio. But, as claimed, the DVD section stubbornly refused to produce audio – most of the time, that is... Twice while I was carrying out initial tests sound did appear. But as soon as a chapter search was carried out it had gone again.

If, when there was no disc sound, I went into the audio setup menu and invoked the six-channel test tones they were reproduced correctly. All this suggested a software problem. The output stages were certainly working correctly, and the unit was capable of decoding a multi-channel audio stream being produced internally.

I next tried switching the decoding options manually with the front-panel 'sound field ±' buttons. This resulted in correct, uninterrupted audio, even after a chapter search, for all modes except the default AFD (audio format decode). I have

to say that the chapter search didn't feel right, although it was nothing that I could put my finger on. So my next move was to go into the test mode (depress the front-panel display and stop buttons simultaneously, together with a clockwise twist of the volume knob) and review the setup data stored in the EEPROM. I followed this by a full auto setup (option 1 followed by option 0).

As a result of this operation the machine made significant alterations to its stored servo data, the final result being closer to the values you normally see. These are usually within a few hexadecimal digits of the centre of range for each parameter.

While the unit was in the test mode I ran a system-wide diagnostic test (option 0 in the first menu), which includes audio tests. As these all came back clean I exited the test mode (power off) and restarted the system, putting it back into the auto format decode mode. This time the correct mode for the owner's disc was selected, and normal sound was present at all times. I also tried a variety of other discs in the machine, which now performed faultlessly. **G.D.**

Bush DVD1005

This DVD player produced no sound. Investigation inside revealed that R8 (220Ω, 0.5W) in the power supply was burnt. When I checked with Bush technical I found that it's a common fault. The action required is to replace R8, the 12V zener diode D4, R9 (1kΩ, 0.5W) and the three 220μF, 25V capacitors C6, C12 and C31. The capacitors leak and short-circuit D4. Many thanks to Bush technical. **P.S.**

Sony DVP-LS500

Only the power button seemed to work: the remote-control handset failed to produce any response from the unit. A check inside revealed that the seven-core flat-wire which connects the function switch board (SW384) to the interface control audio/video out board (AF26) had not been placed into the connector (CN402). Normal functions were restored once this flat wire had been pressed in. **C.B.**

Sony HCD-S300

There was no sound in the DVD mode. A check on the DVD board showed that there were dry-joints at the digital processor IC904. There was normal DVD sound when this IC had been resoldered. **C.B.**

Sony HCD-M700

There was no DVD playback and the error message 'C81' would sometimes appear in the display. Inspection inside the unit revealed that IC503 on the DVD board had blackened pins, which is a sign of corrosion. All was well once a replacement IC (part no. 8-752-409-87) and a new CMD cushion had been fitted. The latter should be the improved type, part no. 4-241-284-02. **C.B.**



Horizon Digital Satellite Meter

HDSM

- Signal Strength and BER displayed together
- 32 Transponders or 16 satellites, horizontal & vertical
- Audible tune-in, with back light
- DVB, C&Ku band, Meng, V Sat compatible
- Input dynamic range -65dBm--25dBm
- Input connector F-female. Input imp 75 ohms
- Symbol Frequency rate from 1 Msps-45Msps
- Universal charger 100 V - 240 V AC/ 12 W Intelligent Charger (CE approved) with delta V delta T detection Fast charge, then Trickle
- Run time with full charge (single LNB): Minimum 3 hours from 2.4Ah NiMH battery
- Figure of 8 mains input connector 2.1 mm Female PSU plug for external charge via supplied car charger
- LNB short circuit protection 500 mA automatic limiter
- RF input range 950- 2150 MHz
- Computer Interface: Serial Port (COM 1,2,3 or 4) for
- Upgradable software on satellite settings
- RF level can be displayed in dBuV (accurate to +/-1dB) or linear scale (256 steps) Feature available in set up mode
- C/N (carrier noise) is displayed in dB
- Quality (Pre B.E.R or bit error rate) locks on faster making it easier to lock on to the satellite initially typical lock in less than 100 ms
- Instead of "found" to indicate lock of correct satellites actual B.E.R can be displayed. Feature available in set up mode
- The quality (Pre B.E.R) bar graph can be logarithmic rather than linear. Making it easier to peak the dish and helps with weak satellites. Feature available in set-up mode
- Dseqc switch commands available in submenu



Horizon Digital Terrestrial Meter

HDTM

- Displays Signal Strength (R F level) and Pre and Post BER together
- Fast and accurate Pre BER in real time for easy pointing of aerial via built in COFDM. PASS and FAIL indication in real time
- 32 pre programmed transmitters (via website) or all channel step through
- Audible tune-in, with back light
- 7 or 8 MHz channels
- 2K and 8 K mode
- Automatic constellation
- VHF (band3) and UHF bands
- RF input range 167-862 MHz
- Input dynamic range -72dBm--20dBm
- Input connector BNC. Input imp 75 ohms. Loop through
- Built in universal charger 100-240 V AC / 12 W Intelligent charger (CE approved) with delta V delta T detection. Fast charge, then Trickle
- Run time with full charge: Minimum 5 hours from 2.4 Ah NiMH battery
- Figure of 8 mains input connector 2.1 mm Female PSU plug for external charge via supplied car charger
- Computer interface: Serial port (Com 1-4) for upgradeable software on transmitters
- Supplied with leather case, mains lead, programming lead, car lead, IEC to BMC adapter and 2 off 10db attenuators

We are moving to
 No 8 Kinetic Crescent
 The London and Office Science Park, Enfield EN3 2XX

For a reliable solution!

www.horizonhge.com



MiniSAT

- Cost effective
- Small and Compact
- Self powered via rechargeable NiMH batteries
- Measure two sats at same time
- Powered via built in batteries, charger or receiver
- Large graphic LCD display for all information
- Quick access keys for most functions
- Digital accurate and sensitive
- Built in backlight
- Built in sounder
- Measure voltage current and RF signal level, 22 K tone and DiSeqC
- Can generate 22 K tone and DiSeqC and high or low voltage for LNB
- Supplied with NiMH batteries, mains charger, car charger, 2 x F to F leads and leather carrying case
- Option in setup for various defaults including different languages

Specification

- Input frequency 2K, 950 to 2150 MHz
- Input level 40 to 100 dBuV
- Voltmeter up to 30 V
- Current up to 1000mA
- 22 KHz detection and generation
- DiSeqC 1.0 and 1.1 detection and generation
- Run time up to 2 hours
- Dimensions 140 x 70 x 40mm
- Weight 0.6 Kg



Speed up your installations call now on +44 (0)20 8344 8230 or email sales@horizonhge.com for a reliable solution

EXPORT ENQUIRY'S WELCOME!!

WE SELL TV'S,DVD'S,VCR'S,HIFI AUDIO

SMALL APPLIANCES AND WHITE GOODS

HITACHI SONY BEKO PANASONIC BUSH LG PHILIPS

SVA TRADEX TXL DAEWOO MORPHY RICHARDS AKURA

LUKER AND MANY MORE TOP NAME BRANDS!!

14" CTV R/C



From
£29.99

BASIC MICROWAVE



From
£14.99

BASIC MULTIREGION



DVD
From
£17.99

Trade
Electronix

30/34 River street Digbeth B'ham B5 5SA

Tel:0121 773 3300 Fax 0121 773 2300

WWW.TRADEELECTRONIX.CO.UK INFO@TRADEELECTRONIX.CO.UK



VCR CLINIC

Reports from
Brian Battams
J.S. Ogilvie
Bob Flynn
Bob Longhurst
and
George Cooper

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

Reports can be sent by post to:

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

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

Panasonic NVSD200 and similar VCRs

I have found a simple way of removing an almost fully laced-up tape where the loading motor struggles to provide enough power to engage the pinch roller fully and F03 appears in the display. Remove the pinch-roller tension spring, then press the power button. The machine will continue into the play or stop mode. Immediately press eject.

With the tape removed, unscrew the deck in the normal manner and replace the loading-motor coupling, which you will find has split. Clean the mode-switch touch-contacts at the same time.

This procedure avoids creasing a good tape and saves a lot of time that would be required to dismantle and retime the mechanism.

Don't forget to reconnect the pinch-roller spring. I did on one occasion and ended up with a mangled tape, which completely defeated the object of the exercise! **B.B.**

Philips VR6547

This machine produced the symptoms of an AGC fault, with the contrast level too high in the record mode. I cured it by replacing all the low-value capacitors in the RF module. Some of the 0.1µF capacitors were completely open-circuit. **B.B.**

Panasonic NVHD630

The loading mechanism was jammed with a tape stuck inside. When I finally got the tape out and removed the deck I found that a couple of teeth on the take-up gear arm assembly were missing. A replacement, part no. VDC7880 from SEME, cured the fault. **J.S.O.**

B&O V6000 (Turbo deck)

The complaints with this machine were "damages tapes and bad sound". When I opened it up I found that it was fitted with the **Philips Turbo deck**. A replacement pinch-roller assembly cured the faults. **J.S.O.**

Samsung Ti14BS

This TV/VCR combi unit uses the same deck as several **Toshiba** and **Aiwa** machines. The complaint was that the video section was wrecking tapes. A replacement centre gear assembly from SEME, part no. VDC7720, cured the fault. **J.S.O.**

Sharp VCMH64HM

Here's a quickie on this VCR. If the power supply is pulsing, replace C925 (470µF, 10V). **J.S.O.**

Ferguson FV77HV

Dead after a power cut normally means that the electrolytics on the primary side of the power supply need to be replaced. With this

machine however the cause was on the secondary side, where TP91 (2SA1020Y) was short-circuit and RP91 (1.5Ω, 0.3W fusible) was open-circuit. You may also find that RP86 has overheated. If it needs to be replaced, it's a 27Ω, 0.3W fusible resistor. **B.F.**

Hitachi VTM720E

Tape ejection was incomplete, with a grating sound of unmeshed gears. I suspected the clutch base but the cause was in fact the worm gear (item 405) on the cassette housing. There's a small piece of plastic at the top of this gear: it had worn away, allowing the gear to rise upwards and unmesh itself from the drive gear on the clutch base. **B.F.**

JVC HRJ755EK

This VCR was dead with the 1.6A input fuse FC5001 blown. I found that Q5102 (2SD2144S) had blown apart and Q5101 (2SK2632-CB14) was short-circuit. Other items that had to be replaced were Q5305 (2SC1740S), R5106 (0.39Ω, 1W), PC5101 (PC123F2) and C5104 (1µF, 50V). **B.F.**

Panasonic TX14GV1

This TV/VCR combi unit was brought in because a tape had jammed and couldn't be ejected. When I applied power the only response I got was a 'chattering' relay in the TV section power supply. Time was wasted because I thought the jammed tape was the cause. But, after winding out the tape manually, I found that the relay still clicked away as soon as power was applied.

Suspecting a short of some sort in the line output stage, I wasted more time carrying out fruitless checks. After a bit more thought I came to the conclusion that the chattering relay was not an indication of excess current etc., in fact the opposite. The prime suspect was a suspicious-looking electrolytic, C840 (47µF), whose value proved to be very low. Once a replacement had been fitted the unit powered up normally.

This capacitor fault had shown up only because the unit had been unplugged and had therefore cooled down. If the unit is left in standby everything works normally.

A sticky tape was the cause of the jam-up.

You get the same relay-clicking fault with the **Goodmans TVC14GT** and **Daewoo GB20F8T2** combi units. **B.L.**

JVC HR-S8700EK

This high-specification S-VHS machine appeared to be dead, though a very faint ticking from the power supply could be heard. The cause was not hard to trace – C1502 (27µF, 35V) on the primary side of the power supply. Yes, that unusual value is correct! **G.C.**

Grandata Ltd
distributor of electronic components

16" Oscillating Pedestal Fan



- Adjustable Height**
- Adjustable Tilt**
- 3 speed Settings**
- Easy to Assemble**
- Available in boxes of 6**

Order Code : PF16
Price : £ 71.94 + vat per box
(£ 11.99 + vat each)
Carriage charged at £ 5.00 + vat

2 Stroke 850W Electricity Generator

Ideal for powering Small Power Tools, Lighting ...etc

Small, Compact & Lightweight

Quiet Runnig (65dB at 7 metres)

Overload Circuit Breaker

5.8 Hours Running Time

Anti - Vibration Feet

4 Litre Fuel Tank

BS Output Socket

Carrying Handle

Recoll Starter



Order Code : G850
Price : £ 100.00 + vat
Carriage charged at £ 5.00 + vat

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

Tel: (020) 8900 2329 Fax: (020) 8903 6126

Email: sales@grandata.co.uk

**WATCH SLIDES ON TV
MAKE VIDEOS OF
YOUR SLIDES
DIGITISE YOUR
SLIDES**

(using a video capture card)



"Liesgang diatv" automatic slide viewer with built in high quality colour TV camera. It has a composite video output to a phono plug (SCART & BNC adaptors are available). They are in very good condition with few signs of use. For further details see www.diatv.co.uk
.....£91.91+ vat = £108.00

Board cameras all with 512x582 pixels 8.5mm 1/3 Inch sensor and composite video out. All need to be housed in your own enclosure and have fragile exposed surface mount parts. They all require a power supply of between 10 and 12v DC 150mA.

47MIR size 60x36x27mm with 6 infra red LEDs (gives the same illumination as a small torch but is not visible to the human eye).....£37.00 + vat = £43.48

30MP size 32x32x14mm spy camera with a fixed focus pin hole lens for hiding behind a very small hole.....£35.00 + vat = £41.13

40MC size 39x38x27mm camera for 'C' mount lens these give a much sharper image than with the smaller lenses.....£32.00 + vat = £37.60

Economy C mount lenses all fixed focus & fixed iris
VSL1220F 12mm F1.6 12x15 degrees viewing angle.....£15.97 + vat = £18.76

VSL4022F 4mm F1.22 63x47 degrees viewing angle.....£17.65 + vat = £20.74

VSL6022F 6mm F1.22 42x32 degrees viewing angle.....£19.05 + vat = £22.38

VSL8020F 8mm F1.22 32x24 degrees viewing angle.....£19.90 + vat = £23.38

Better quality C Mount lenses

VSL1614F 16mm F1.6 30x24 degrees viewing angle.....£26.43 + vat = £31.06

VWL813M 8mm F1.3 with iris 56x42 degrees viewing angle.....£77.45 + vat = £91.00

1206 surface mount resistors E12 values 10 ohm to 1M ohm 100 of 1 value £1.00 + vat

1000 of 1 value £5.00 + vat

866 battery pack originally intended to be used with an orbitel mobile telephone it contains 10 1.6Ah sub C batteries (42x22dia the size usually used in cordless screwdrivers etc.) the pack is new and unused and can be broken open quite easily..... £7.46+vat = £8.77



Please add 1.66 + vat = £1.95 postage & packing per order

JPG ELECTRONICS

Shaws Row, Old Road, Chesterfield, S40 2RB

Tel 01246 211202 Fax 01246 550959 Mastercard/Visa/Switch

Callers welcome 9:30 a.m. to 5:30 p.m. Monday to Saturday

SPARES DIRECT



**Why go any-
where else for
Panasonic
spares?**

From phones to cameras, home cinema systems to DVD players, Panasonic brings ideas to life. If you service or repair any of our products, we can make your life easier too, thanks to the new Panasonic Spares Direct website.

Specially developed for smaller companies who only need parts or advice occasionally but still want genuine discounts on guaranteed spare parts, it's now open for business.

Register on the site now and you'll find the most competitive prices, online technical information and repair manuals, special offers and immediate part number identification.

It's fast, it's easy, it's trouble-free and it's the only place you need to visit when you need to service or repair any Panasonic product.

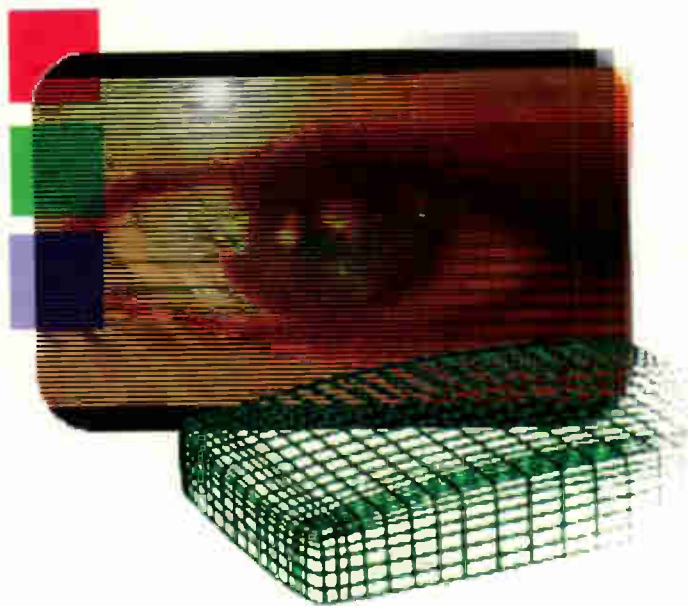
So why call us for spares when you can now visit us 24 hours a day?

Visit www.panasonic-spares-direct.co.uk for more information.

Panasonic

Panasonic CS UK
Willoughby Road, Bracknell, Berkshire. RG12 8FP

www.panasonic-spares-direct.co.uk



TV FAULT FINDING

Reports from
Michael Dranfield
Philip Salkeld
Andrew Duggan
Dave Packham
Larry Shelbourn
Peter Tennant
Mark Tyerman
Bob Flynn and
Jerry Fedorak

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

Reports can be sent by post to:

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

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

Alba CTV3419SIL (11AK36 chassis)

This very new portable TV set had failed. All that happened when it was switched on was that the red standby LED flashed on and off. I suspected a fault in the line output stage but, when the back was removed, I spotted two electrolytic capacitors with bulging tops. C604 and C822 (both 470µF, 16V). They are on the secondary side of the power supply. Once replacements had been fitted the set worked normally. I was surprised to see faulty electrolytics in such a new set – but welcome such easy money makers! **M.D.**

Bush 2134TSIL

There was sound but no picture with this fairly new set. I noticed that the line time-base started up initially, then faded off, but became frustrated when checking and disconnecting components in the line output stage. We had another one of these sets in the workshop at the time, so I decided to fit the chassis from this one into the other one. To my delight the set then burst into life. The scan coils must have been short-circuit or with shorted turns. **P.S.**

Sony KD32DX40U (FE2 chassis)

This big, heavy monster was dead apart from the LED flashing twice, which normally means that the set is in the overvoltage protection mode. The first item to

check is the BU2515DX-127 line output transistor Q533 (part no. 872904908) which, as expected, was short-circuit. Failure of the transistor is caused by the output transformer T511 (part no. 859883440) however. It develops shorted turns. Never be tempted to replace the transistor without also replacing the transformer. **P.S.**

Toshiba 28W33B (11AK37 chassis)

The symptom with this set was line collapse. My first suspicion was a dry-joint on the scan-coil plug, but this was OK. I then noticed that R612 (2.7Ω, 0.5W) was completely burnt out. Something similar happens in the earlier 11AK19 chassis, the usual cause being an open-circuit capacitor or dry-joint. The cause was the same with this set, but with a slight difference: C627 (820nF, 250V) is on a small sub-panel that's beside the line output transformer. The print that runs up to it was burnt out. Replacement components plus a small link put matters right. **P.S.**

Black Diamond BDS2851HD

These sets are manufactured for Mitsubishi. There is no circuit information, so servicing could be a problem. This one was stuck in standby. Checks revealed that C617 (12nF, 1.6kV) was short-circuit. When I replaced it and switched the set on there was an EW/lack of width fault. While checking in the line output stage I discovered that R613 was burnt out. I replaced it with a 2.7Ω, 0.5W resistor which cured the problem. **P.S.**

Sony K VX2552U (AE1C chassis)

I've had field collapse many times with these sets. You usually find that R802 (0.47Ω) in the 27V supply to the TDA8170 field output chip IC502 is open-circuit and that the IC is short-circuit. This time however R802 went open-circuit again after fitting replacements. A short-circuit reading was still present, so it was time to look elsewhere. After consulting the circuit diagram I checked the TEA2013A EW chip IC1501, which had a short at pin 6. A replacement restored normal operation. **P.S.**

Thomson 32WT45US (ICC20 chassis)

This set sparked and made noises. It was not difficult to discover that the line output transformer was the cause of the sparking. But there's a problem when you come to order a replacement. There are two different types of transformer, depending on the type of tube fitted. One transformer has two focus controls, the

other has one. In this case the tube was type W76EJY011X121, for which the correct transformer has part no. 10675710. Happy days! P.S.

JMB 66W (11AK19 chassis)

When I switched this set on there was a harsh tripping noise. It was not like when the line output transistor is short-circuit. On investigation I found that one of the LT rectifier diodes on the secondary side of the power supply was short-circuit. When this had been replaced smoke came from the TDA2615 audio output IC. All was well once this had been replaced. P.S.

Bush 2867NTX

This set was dead. It was a common stock fault, with the chopper transformer shorted. The replacement comes with R812 (47Ω) and C809 (220nF) that have to be fitted. But the set remained dead when the replacements had been installed. After some further checks I found that D806 (1N4148) was leaky. All was well once a new diode had been fitted. A.D.

Sanyo CE28WN3B

This set was dead with R810 (0.33Ω) open-circuit and the STRF6653 chopper chip IC800 short-circuit. There were no problems with any other components and, after ordering and fitting replacements, the set ran with no problems. The replacements were obtained from Charles Hyde and Son under stock codes 11936BX for IC800 and 119936TH for R810. A.D.

Bush WS6671SIL (11AK37 chassis)

This widescreen set was dead with the 2.5AT mains fuse F801 blackened. The 2SK3115 chopper FET Q801 (part no. 30001386) was short-circuit, IC800 (MC44608P40, part no. 45248701) and IC801 (ET1102, part no. 30007069) were both faulty, and R805 and R852 (both 33Ω) had burnt out. After replacing these items many other components in the power supply were checked before I came to D894, a surface-mounted 1N4148 type, that had a reverse leak when measured in-circuit with its cathode disconnected. Out it came, and when checked out-of-circuit it read OK. But the best course was obviously to replace it.

When the set was switched on it sprang to life with the HT steady at just under 150V. After a long soak test it was returned to the customer. A.D.

Bush 1497ITV/3 (11AK20 chassis)

Two of these sets that came in for repair

were stuck in standby. When a new memory chip (IC502) was fitted to the first set it sprang to life as soon as the programme button was pressed. The picture was fine once the set had been tuned, but was shifted down. Going into the service mode enabled me to sort that out. The second set was also fitted with a new memory chip, but still refused to come out of standby. I didn't have to look far: the crystal (X502) near the micro was the cause. I left the new chip in just in case, and again the picture was shifted down. There were no problems after adjusting it in the service mode.

I always listen to the line output transformer for any arcing or static charges with this chassis, and replace it if necessary. A.D.

Proline 28M1

"No sound" came the cry from the customer. Could be a blessing I thought. Anyway a signal injected in the output stage produced a buzz from the speakers, so that was OK. Then I noticed that the on-screen display didn't alter when the volume button was pressed. It turned out that the 24C04 NVM was faulty. When I returned the set to the customer the video also needed retuning, so it seems that a mains surge may have been to blame. D.P.

Audio Logic P1430

This 14in. TV/DVD combi unit is an Asda special. It came in dead with the 2A mains fuse blown. On investigation I found that the chopper transistor was short-circuit, also the 2SC1815 and 2SA817A sensing transistors and the associated 9.1V zener diode. Replacement of these items and the line output transistor restored normal service. D.P.

Sharp 66FW-53H (DA100 chassis)

The reported fault was "dead". As usual the 560nF S-correction capacitor was dry-jointed, and the heat had made it bulge. A replacement got the set going again, but with excessive width and EW bowing. The EW drive transistor Q506 (2SD2391) was open-circuit and L603 had shorted turns (it should read 11.7mH). Replacing these items completed the repair. D.P.

Goodmans 2053T (Tatung A series chassis)

The cause of intermittent colour, vision smearing and no pictures turned out to be a dry-joint at XL551 on the luminance/chrominance subpanel. When I plugged the panel back in the set was stuck in standby! This time the cause was

a dry-joint at the auxiliary contacts on the switch. D.P.

Hitachi C28W440N (11AK33 chassis)

The complaint with this set was unstable audio output. When we gave the set a good test in the workshop for a couple of hours the problem turned out to be intermittent Nicam break up with stereo/mono OSD. The culprit was the 64-pin MSP3410DC5 processor chip IC700. L.S.

Sanyo C21EF25NB (EB2A chassis)

This set would trip at switch on or trip intermittently after some time. The cause was found to be a dry-joint at the black-covered link wire near the chopper transformer. L.S.

Goodmans TVC141/Daewoo DVT14F6 (CP420 chassis)

If one of these combi units is dead, check for 20V at R831 – it's on the top panel to the right of T802. If this is OK, check for dry-joints at the power switch SW08 on the bottom panel. It's a full strip-down job, and if the deck is loaded with a cassette you will need your regulated power supply to provide about 7V to power the loading motor for access to the deck screw under the cassette house. This has become a common fault. L.S.

Nokia Mono Plus chassis

The complaint was no video, sound OK. The fault had been intermittent but had become permanent. It was cured by replacing the TDA8362 jungle chip DD01. L.S.

Philips 28PT4494 (L6.3AA chassis)

The complaint was "set dead after a burning smell". On inspection I found that the 2.2nF, 2kV disc ceramic capacitor C2912 on the deflection module had burnt up. Fortunately there were no other problems – I have known the line output transistor to go short-circuit and EW problems to occur. L.S.

Goodmans 1410 (Thomson TX805 chassis)

This set was dead with the fuse in the plug blown. The customer said that the set blew the cut-out in the mains supply when it went off. One of the 1N4006 mains bridge rectifier diodes (DP28) was short-circuit to chassis. P.T.

Goodmans GTV69W3 (11AK19 chassis)

This widescreen set usually displayed a

blue raster, though it could be any colour. The fault was cured by replacing the TDA6108 RGB output chip on the tube base panel. It's important to check for dry-joints on this panel and at the line output transformer connections. In this case the Aquadag connection was dry. You can also have a faulty tube base socket. **P.T.**

Hitachi C28W430N (A7 chassis)

The symptoms with this set were very intermittent picture and sound or no start up at all. You will hear the relay click twice. I've had the problem with many sets in this range. The cause has always been dry-joints at the HT preset VR950 and at the 5V regulator IC951. **P.T.**

Matsui 2107R

If the set is dead apart from a bleeping noise, replace the 2SC5250 line output transistor (you'll find that it is short-circuit), also C444 and C437. Also check for dry-joints, especially at the line driver and output transformers. **P.T.**

Hitachi C24W511TN (A7 chassis)

This fault tested me. Very intermittently the set would go back to standby. The fault could be made to come and go by flexing the PCB. After resoldering many connections I still had a set that was playing up. While carrying out some more resoldering a leg of R959 in the protection circuitry moved too freely: it had been snipped in the factory but had been making contact intermittently. For some reason R962 had been snipped and removed completely. I think R959 had been snipped by mistake and not replaced. After fitting a 15k Ω replacement (it says 11k Ω on the circuit diagram, but 15k Ω was fitted) the set worked fine. **M.T.**

Philips 21PT522A (GR2.2 chassis)

The 2A input fuse F1600 was open-circuit because the BUT12AF chopper transistor Tr7625 was short-circuit. I fitted the power supply repair kit that includes all the parts needed when this fault occurs – in this case the cause was later found to be the CNR50 optocoupler IC7614.

At switch on the power LED was flashing and smoke came from the power area. I found that D6646 (BYD33D) had split in half because C2646 (15 μ F, 25V) was short-circuit. Once these components had been replaced there was a flashing power LED which, after a short period,

would settle down. All was then OK. This happened every time the set was first switched on. The cure was to replace C2559 (100 μ F, 25V).

As a final twist of the knife I then found that when standby was selected the power LED went orange instead of red and the picture and sound remained. A replacement standby thyristor (Thy6670, type TAGE0102AA) finally restored my sanity.

The only clue I have as to why these extra problems occurred is that the customer said he leaves the set in standby when it's not in use. **B.F.**

Grundig MW70-2690 (CUC2059 chassis)

After a few minutes the picture became very blue with flyback lines and shifted to the right, as if there was a false line lock. The cause of the fault lay inside a screened can, where the TDA8843 jungle chip IC34015 was found to be thermally sensitive. The correct part can be obtained from CPC under order code GR8305-338-843. **B.F.**

Mitsubishi CT28AV1BD (EE3 chassis)

There was no sound because circuit protector Z952 had failed, but why? There was a very low resistance reading across this supply rail: it vanished when a two-pin plug to the audio output board was disconnected. The cause of the problem was traced to one of the output chips, IC3A2 (TDA7263) – the other one was OK. A replacement restored normal operation, and I warned the customer about correct connection of the external speakers just in case. **B.F.**

Wharfedale 550

After a few minutes the picture would collapse to just a dot at the centre of the screen, after which there was nothing except for the sound. If the set was left alone the picture would return after about thirty seconds, this cycle being repeated every minute or so until the set settled down for the rest of the day. Many poor connections were found, especially at the resistor in the HT feed to the line output stage, but the answer lay in replacing Q580 (2SC1537A). **B.F.**

Thorn P1482T (Tatung D chassis)

This set appeared to be in the child-lock mode. The volume couldn't be increased, a key symbol or a clock display appeared when various functions were selected, and none of the front controls worked.

The reason for all this was that the EEPROM had been corrupted, the answer being to reset it. To do this turn the set on, short together the two pins of PL701 and press any control at the front. The set then goes to standby. Remove the short and turn the set on again. You will have cleared the problems but will have to retune all the channels. **B.F.**

Philips 14TVCR240

There was perfect sound but no picture with this TV/VCR combi unit. I found that R3511 (2.7 Ω , safety) was open-circuit, but could find no reason for its failure. A long test after fitting a replacement proved that the unit was now OK. The part no. is 4822 052 11278. **B.F.**

Matsui TVR141

The cause of an intermittent bright raster with flyback lines was on the CRT base panel, but no dry-joints could be found. The wiring of CP803 was suspect however and rewiring this socket cleared the fault. **B.F.**

Matsui 1436XA

This set produced a whining noise and appeared to be stuck in standby. Cold checks revealed that the 2SD1554 line output transistor was short-circuit. After fitting a replacement I switched the set on and it came to life, but a second later arcing was seen from the line output transformer. I switched off quickly, and saw that there was a hole in the side of the transformer. There were no further problems once a replacement had been obtained and fitted. **J.F.**

Samsung C15012Z (P58SC chassis)

There was sound but no picture. Cold checks revealed that the 2.2nF, 1kV ceramic disc capacitor C816, which is connected in parallel with the chopper transistor, was faulty. A replacement was fitted, after which I checked for shorts before switching on again. Quite a few dry-joints were found. After dealing with these the set was switched on and a good picture came up. A soak test confirmed that all was now OK. **J.F.**

Panasonic TC21S3R (Z7 chassis)

This 21in. set was brought in because the picture would fade away after a few seconds then return. On inspection I found that the tube's heater connections were dry-jointed on the base panel. After resoldering them the set was given a soak test: the picture now stayed there. **J.F.**

Campion Electronics Ltd.

SUPPLIERS OF QUALITY EX-RENTAL TV'S

and video equipment to independent retailers across the UK and EIRE.

FREE DELIVERY SERVICE to most areas of UK

WORLDWIDE EXPORT SERVICE

Large stock of TVs suitable for export
Experts in UHF/VHF conversion

Visit our large warehouse at:

Units 1 & 2 Tenat Works,
Worcester Rd, Kidderminster,
Worc, DY10 1JR

Tel: **(01562) 746000** (2 Lines)

Just 20 miles from Birmingham City Centre

Tuner Repairs

IC Fitting Service

Digital

set top box repairs

For more information and latest prices
See our web site

www.mces.co.uk

MCES Digital

15 Lostock Road Davyhulme Manchester M41 0ES

E-mail: sales@mces.co.uk

Phone: 0161 746 8037

Fax: 0161 746 8136

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 100ms with probes £525
H.P. 54501A Digitizing Oscilloscope 100MHz, 4Ch £425
CIRRUS CRL254 Sound Level Meter with Calibrator, 80-120dB, LEQ £95
BECKMAN HD110 Handheld 3 1/2 digit DMM, 28 ranges with battery, leads and carrying case £30
WAYNE KERR B424 Component Bridge £50
RACAL 9300 True RMS Voltmeter 5Hz-20MHz usable to 60MHz 10V-316V £50
RACAL 9300B as above £75

HP 3312A Function Gen 0.1Hz-13MHz AM/FM Sweep/Trv/Gate/Burst etc £300
FARNELL AMM255 Automatic Mod Meter 1 5MHz-2GHz Unused £300
FARNELL DSG1 Low Frequency Syn Sig Gen 0.001Hz to 99.99kHz, Low Distortion TTL/Square/Pulse Outputs etc £125
FLUKE 8060A Handheld True RMS DMM 4 1/2 digit 1000 Counts 10Hz-560MHz, 9-digit £200

HP 3310A Function Gen 0.1Hz-10MHz AM/FM Sweep/Trv/Ramp/Pulse £300
FARNELL FLM4 Sine/Sq Wave Gen 100Hz-10MHz 10V, 0.1% distortion TTL Output, AM £125
H.P. 5454 Logic Probe 36A Logic Pulses and 547A Current Tracer £90
FLUKE 77 Multimeter 3 1/2 digit Handheld £60
FLUKE 77 SERIES II £70
HEME 1000 LCD Clarifier Meter with Carrying Case £60

Racal 900B
Automatic Modulation Meter AM/FM
1.5MHz - 2GHz
£95

Oatron 1061A
High Quality 6 1/2 digit Bench Multimeter
True RMS/4 wire Current Converter
£225

BLACK STAR ORIGIN PAL/TV Colour Pattern Generator from £75-£125
THURLBY/THANDER TG210 Function Generator, 0.002Hz-2MHz, TTL etc £80-£95
THURLBY THANDER P.S.U. PL3200MD, 0V-32V 0A-2A Twice (late colours) £200

JUST IN

HP 8640A Signal Generator AM/FM 500kHz-512MHz £250
KENWOOD C54025 Oscilloscope Dual Trace 20MHz £125
LEADER LB0523 Oscilloscope Dual Trace 35MHz £140
GOULD OS300 Oscilloscope Dual Trace 20MHz £95
NATIONAL PANASONIC VP7705A Distortion Analyser £125
KENWOOD VT176 Millivoltmeter 2 Channel £50
KENWOOD FL140 Wow & Flutter Meter £75
KENWOOD FL180A Wow & Flutter Meter Used £125
BIRD 43 Watt Meter £75
Elements for the above £25

MARCONI 893C AF Power Meter, Sinad Measurement Unused £100 Used £60
MARCONI 2610 True RMS Voltmeter Autoranging 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
GOODWILL GVT427 Dual Ch AC Millivoltmeter 10mV 10 Ranges Freq 10Hz-1MHz £125
SOLARTRON 7150 DMM 6 1/2 digit True RMS 1000 Counts 10Hz-560MHz, 9-digit £200

SOLARTRON 150 PLUS 1000 Counts 10Hz-560MHz, 9-digit £200
QUALITY RACAL METERS
990A Super Counter 50MHz £50
990B Super Counter 50MHz £70
RACAL 9343M LCR Databrid, LCR, Inductance, Capacitance, Automeasurements of R, L, C, D £200
HUNTRON 1000 True RMS DMM 4 1/2 digit 1000 Counts 10Hz-560MHz, 9-digit £125
MARCONI 2610 True RMS Voltmeter 5Hz-25MHz £195
Power Supply HPS3010 0-30V, 0-10A £140
FARNELL AP60/100 True RMS DMM 4 1/2 digit 1000 Counts 10Hz-560MHz, 9-digit £2000
FARNELL AP100 True RMS DMM 4 1/2 digit 1000 Counts 10Hz-560MHz, 9-digit £2000
H.P. 6012B DC Power Supply 0-50A 1000W £1000
FARNELL AP60/50 True RMS DMM 4 1/2 digit 1000 Counts 10Hz-560MHz, 9-digit £750
FARNELL H60/25 0-60V 0-50A £400
Power Supply HPS3010 0-30V, 0-10A £140
FARNELL Dual PSU XA35-2T 0-35V 0-2A Twice QMD LCD Display £180
FARNELL L30-2 0-30V, 0-2A £80
FARNELL L30-1 0-30V, 0-1A £60
Many other Power Supplies available.
Insulating Transformer 240V In/Out 500VA £40

FARNELL DTV 12-14 OSCILLOSCOPE

DUAL TRACE 12 MHz TV COUPLING
ONLY **£75**
FARNELL LFI 12-14 Sine/Sq OSCILLATOR
10 MHz - 1 MHz
ONLY **£75**

OSCILLOSCOPES

TEKTRONIX TDS350 Dual Trace 200MHz 16/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 £750
HITACHI VC6523 Dual Trace 20MHz 20M/S unused £500
PHILIPS PM309Z 2+2Ch 200MHz Delay £800 As New £1000
PHILIPS PM308Z 2+2Ch 100MHz £800 As New £1000
TEKTRONIX TDS350 Dual Trace 200MHz 16/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 £750
HITACHI VC6523 Dual Trace 20MHz 20M/S unused £500
PHILIPS PM309Z 2+2Ch 200MHz Delay £800 As New £1000
PHILIPS PM308Z 2+2Ch 100MHz £800 As New £1000
TEKTRONIX TDS350 Dual Trace 200MHz 16/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 £750
HITACHI VC6523 Dual Trace 20MHz 20M/S unused £500
PHILIPS PM309Z 2+2Ch 200MHz Delay £800 As New £1000
PHILIPS PM308Z 2+2Ch 100MHz £800 As New £1000

JUST IN

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
KETHLEY 2010 DMM 7 1/2 digit £950
KETHLEY 617 Programmable Electrometer £1250
H.P. 4330A DMM 6 1/2 digit £1500
H.P. 4330B DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330C DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330D DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330E DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330F DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330G DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330H DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330I DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330J DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330K DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330L DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330M DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330N DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330O DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330P DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330Q DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330R DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330S DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330T DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330U DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330V DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330W DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330X DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330Y DMM 6 1/2 digit 1999 2.6 GHz £500
H.P. 4330Z DMM 6 1/2 digit 1999 2.6 GHz £500

SPECTRUM ANALYSERS

H.P. 8561B 50Hz - 6.56Hz £5000
H.P. 8560A 50Hz - 2.96GHz Synthesised £5000
H.P. 8594E 9kHz - 2.96GHz £4500
H.P. 8591E 1MHz - 1.8GHz 75 ohm £2750
H.P. 853A with 8559A 100kHz - 21GHz £1750
H.P. 8558B with Main Frame 100kHz - 1500MHz £750
H.P. 3585A 20Hz - 40MHz £2500
H.P. 3580A 5Hz - 50kHz £1600
ADVANTEST RA131B 10kHz - 3.5GHz £2750
EATON/Altech 7570 0.01 - 22GHz £750
MARCONI 2382 100Hz - 400MHz High Res £2000
MARCONI 2370 30Hz - 110MHz £500
H.P. 182 with 8557 10kHz - 350MHz £500
H.P. 141T Systems
8553 1kHz - 110MHz £500
8554 500kHz - 1250MHz £750
8555 10MHz - 18GHz £1900
H.P. 8443 Tracking Gen/Counter 110MHz £250
H.P. 8444 Opt 059 £750
B & K 2033R Signal Analyser £650
H.P. 8754A Network Analyser 4MHz - 1300MHz £1250
H.P. 3577A Network Analyser 5Hz - 200MHz £3000
H.P. 53310A Modulation Domain Analyser Opt 010/003 £5000
ONO SOKKI Portable FFT Analyser £1500
H.P. 8720C Microwave Network Analyser 50MHz-20GHz £12500

RADIO COMMUNICATIONS TEST SETS

MARCONI 2955/2955R from £1000
Rohde & Schwarz CMT 0 1 - 1000MHz £1500
Schlumberger 4040 £750

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.

STEWART OF READING

110 WYKEHAM ROAD, READING, BERKS RG6 1PL
Telephone: (0118) 9268041 Fax: (0118) 9351696
www.stewart-of-reading.co.uk

Callers receive 9am-5.30pm Monday to Friday (other times by arrangement)



TELEVISION BOOKS

AND HOME ELECTRONICS REPAIR

The Television Book Service offers access to our team of specialist publishing experts. We can order any book or CD-ROM currently in print from *War And Peace* to the *Newnes Guide to Television and Video Technology*. All books are delivered free of charge within the UK unless otherwise stated. Contact us at the numbers below:

Telephone: **01737 812727** or **01737 812676**

Fax: 01737 813526

Email: salesteam@boffinbooks.demon.co.uk

CLOSED CIRCUIT TELEVISION: CCTV INSTALLATION, MAINTENANCE AND OPERATION



Joe Cieszynski

CCTV surveillance is one of the fastest growing areas in the security industry, and this is a thorough guide to the technical side of CCTV – including installation, maintenance, video recording, cameras and monitors. The second edition is fully dual-standard for PAL and NTSC systems.

2nd edition ▲ Sept 2003 ▲ 256 pages
Glossary ▲ Index ▲ PB ▲ Published in UK
Code 0-7506-5728-6 **£24.99**

DICTIONARY OF VIDEO AND TELEVISION TECHNOLOGY



Jack Tsatsoulis

This work provides comprehensive and contemporary information on the essential concepts and terms in video and television, including coverage of test and measurement procedures. The CD accompanying the text includes an electronic version of the book.

Sept 2002 ▲ 365 pages & CD-Rom
Published in UK
Code 1-878707-99-X **£29.99**

DVD PLAYERS AND DRIVES

K F Ibrahim
(College of North West London)



This text is based on hands-on experience and acts as a guide to DVD technology and its application, with a special focus on design issues. The principles of the subject are introduced from the basics, and DVD applications are illustrated by genuine technical information.

Aug 2003 ▲ 256 pages ▲ Glossary ▲ Index
PB ▲ Published in UK
Code 0-7506-5736-7 **£24.99**

ELECTRONIC CLASSICS: COLLECTING, RESTORATION AND REPAIR

Andrew Emmerson



This text encompasses all aspects of buying, collecting, restoring, repairing, sourcing parts, professional services, clubs and societies. The first part covers technical aspects of restoration and details where components can be found; the second presents useful information for collectors.

Aug 1998 ▲ 256 pages ▲ Index
10 halftones ▲ 50 line illustrations ▲ PB
Published in UK
Code 0-7506-3788-9 **£21.99**

INTRODUCTION TO DIGITAL SYSTEMS

John Crisp



This self-study text introduces digital electronics from first principles, before going on to cover all the main areas of knowledge and expertise. It covers the practicalities of designing and building circuits, including fault-finding and the use of test equipment.

Feb 2000 ▲ 302 pages ▲ Glossary ▲ Index
PB ▲ Published in UK
Code 0-7506-4583-0 **£18.99**

NEWNES DICTIONARY OF ELECTRONICS

S W Amos; R S Amos



Aimed at engineers, technicians and students working in the field of electronics, this dictionary provides clear and concise definitions, including TV, radio and computing terms, with illustrations and circuit diagrams.

4th edition ▲ Mar 2002 ▲ 394 pages
100 illustrations ▲ PB ▲ Published in UK
Code 0-7506-5642-5 **£12.99**

NEWNES GUIDE TO TELEVISION & VIDEO TECHNOLOGY

Eugene Trundle



An exploration of television and video technology. It covers the fundamentals of digital television (satellite, cable and terrestrial) and digital video, as well as providing a grounding in analogue systems.

3rd edition ▲ Feb 2001 ▲ 432 pages ▲ Index
PB ▲ Published in UK
Code 0-7506-4810-4 **£17.99**

NEWNES GUIDE TO DIGITAL TV

Richard Brice



Covering all aspects of digital television, this text encompasses the electronics of the equipment, data compression, television production, servicing and the different transition methods – terrestrial, satellite and cable. The text has been updated with developments since the 2000 edition.

2nd edition ▲ Oct 2002 ▲ 304 pages ▲ Index
45 illustrations ▲ 15 photographs ▲ HB
Published in UK
Code 0-7506-5721-9 **£24.99**

PRACTICAL ELECTRONIC FAULT FINDING AND TROUBLESHOOTING

Robin Pain (Design Engineer, Cotag International Ltd)



A text using simple circuit examples to illustrate principles and concepts fundamental to the process of analog and digital fault finding. It aims to help the reader tackle any job, from fixing a TV to improving the sound of a hi-fi. A digital multimeter and oscilloscope are needed for these jobs.

Apr 1996 ▲ 284 pages ▲ Index
50 line illustrations ▲ PB ▲ Published in UK
Code 0-7506-2461-2 **£21.99**

PRACTICAL ELECTRONICS HANDBOOK

Ian Sinclair



A collection of all the key data, facts, practical guidance and circuit design basics needed by a spectrum of students, electronics enthusiasts, technicians and circuit designers. It provides explanations and practical guidance, and includes new sections on SHF techniques and intruder alarms.

5th edition ▲ Feb 2000 ▲ 571 pages
Illustrations ▲ PB ▲ Published in UK
Code 0-7506-4585-7 **£16.99**

RSGB RADIO & ELECTRONICS COOKBOOK

Radio Society of Great Britain



Only a basic knowledge of electronics is assumed for this collection of electronics projects, and it is ideal for all electronics and DIY enthusiasts and experimenters. Designed by the RSGB, the UK radio amateurs federation, the projects are clearly explained step by step.

Nov 2000 ▲ 336 pages ▲ PB ▲ Illustrations
Published in UK
Code 0-7506-5214-4 **£17.99**

REFERENCE DATA FOR ENGINEERS: RADIO, ELECTRONICS, COMPUTERS AND COMMUNICATIONS

Mac E Van Valkenburg; Edited by Wendy Middleton



Written by professionals for professionals, this is a complete reference for engineers. As well as addressing radio technology data, it covers digital electronics, computers and communications.

9th edition ▲ Aug 2001
1568 pages & CD-Rom ▲ 1385 line illustrations
HB ▲ Published in UK
Code 0-7506-7291-9 **£90.00**

SERVICE ENGINEER'S POCKET BOOK

Lewis & Sinclair



This title aims to provide the service engineer with all the necessary information to carry out work on domestic electronics equipment. The coverage ranges from satellite reception to NICAM. Both analogue and digital equipment are covered, and there are chapters on common problems.

Jan 1998 ▲ 238 pages ▲ HB
Code BUTD 7506-3448-0 **£14.99**

SERVICING TV, SATELLITE & VIDEO EQUIPMENT

Eugene Trundle



A practical hands-on guide for service engineers, installation technicians and servicing students, this text emphasises the practical business of fault diagnosis and repair of TV, satellite and video equipment.

Revised 2nd edition ▲ Nov 2001 ▲ 336 pages
Symptom index ▲ PB ▲ Published in UK
Code 0-7506-5507-0 **£21.99**

Extended Fault Reports

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

**Reports from
Gordon Haig
James Grant
and
Arthur Jackson**

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

Reports can be sent by post to:

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

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

Goodmans W280NS (F19 chassis)

Goodmans W280NS (F19 chassis)

The picture produced by this widescreen set had a vertical column of what appeared to be superimposed video at the left-hand side of the screen. It wasn't really foldover. When the set was displaying a picture with reduced height, i.e. with black strips at the top and bottom, what should have been black in the column was brightened up, see Fig. 1.

To remedy this, remove the back (eight fixing screws) then slide out the PCB after releasing the semi-concealed plastic 'barbs'. There is one of these at each side of the board, about four inches from the front of the set. To work on both sides of the board disconnect the plug/socket for the speakers, also the degaussing plug/socket, and remove the CRT's base panel.

I spent a lot of time with my ESR/capacitance meter trying to find the cause, to no avail. Unfortunately I didn't have a circuit diagram. I then turned to checking resistors and came across R90 (150k Ω , about 0.5W) which was open-circuit. R90 is in series with R91, which has the same value and wattage rating. To find these resistors, go to pin 3 of the line output transformer and follow the print a little way along the board.

I decided to replace both these resistors, after which a correct display was produced. G.H.

Daewoo GB2898ST (CP775 chassis)

This set had been in the workshop three months previously for a new line output transformer and 2SD1880 output transistor. The transformer had been arcing at the EHT lead, and this had as usual destroyed the transistor. A nice, simple job. But the set was now back with a

shorted 2SD1880 transistor. It was short-circuit base-to-emitter, and a replacement ran very hot – after running for only five minutes it was too hot to touch.

All the associated capacitors and diodes were proved to be innocent by substitution, including the boost reservoir capacitor C409 (100 μ F) and C401 (10 μ F) which decouples the supply to the line driver stage – these capacitors can cause the problem. The line drive waveform looked OK, and the few components in the line driver stage all proved to be in order. So what could have been causing the line output transistor to overheat? You could have boiled a kettle on it.

After some serious head scratching I decided to check my stock of 2SD1880 transistors. There were transistors from two different manufacturers in the drawer. Comparing them, I found that the base-emitter resistance of one make was 50 Ω while that of the other make was 33 Ω . The one I had fitted in the set was a 50 Ω type. Fitting a 33 Ω replacement cured the problem. This transistor ran as cool as a cucumber – even after a couple of hours it was only warm.

I would have expected a 2SD1880 to be the same from any source, but obviously not. So beware, engineers out there. The transistor I had fitted three months earlier had been from the 50 Ω batch. Goodness knows how it had lasted for three months. J.G.

Ferguson T59N/68N (TX92 chassis)

We see a lot of these sets. The customer usually describes the fault as stuck in standby, because the intensity of the LED briefly changes when start-up is attempted but the set remains off. When confronted with this problem we find it best to turn the chassis up and check whether the 10k Ω surface-mounted resistor RL08, which is mounted below the line output transformer, is burnt. If it is, the line output transformer LL05 is faulty and, generally, replacement of these two items will restore normal operation.

But we have had cases where the customer has tried to switch the set on repeatedly, until it goes dead because he has blown the line output and chopper transistors.

Once the repair has been completed it's usually necessary to start the set with a prolonged press on a numbered remote-control unit button, as the set seems to enter the child-lock mode. A.J.

Sanyo CE32WN5-B (EB6-A28 chassis)

A few of these sets, and other models that are fitted with this chassis, have come our

way with a very sensitive and intermittent field scanning problem: the top and bottom of the picture jitter and start to cramp up and down slightly – the picture may close in by about 2in. at the top and bottom.

The symptom clears with movement almost anywhere on the chassis, but the cause has been traced to very poor soldering of a small cluster of surface-mounted components under a screening plate on the underside of the chassis. The items concerned are transistors Q521, Q522 and Q531 and their associated components, particularly R522 and R532.

This circuitry is connected in the V drive path, between IC201 and the field output chip IC501. Reflowing this area carefully clears the problem. A.J.

Philips 28PW6005 (A10E chassis)

The complaint with this set was no sound or picture. When I tested it the set powered up and produced a dull, snowy raster. As a start I checked the menus and found that the picture setting levels were correct, also the channel frequency and country selections. But no stations were available.

No common cause of these two symptoms came to mind, so I decided to start with the tuning fault and found that the 33V tuning supply was missing at pin 9 of the tuner. This supply comes from the line output stage (A2), where the supply to the 33V stabiliser D6481 was missing. It comes from the 142V HT rail (called Vbat) which, unusually, feeds the emitter of a pnp transistor, Tr7408. When this transistor is biased on, its collector feeds R3409 (68k Ω) which in turn feeds D6481, producing the 33V supply.

Tr7408 was switched off. Before looking for the cause, I noticed that its collector goes to another line which takes the HT supply via a potential divider network (R3435/6/7). This sets up a positive bias for the beam limiter, which explained the second symptom – the dull screen.

The cause of the trouble was the 100k Ω resistor R3414, which is connected to the base of Tr7408. It was open-circuit. I can't see the purpose of this transistor arrangement – in fact the circuit diagram shows a dotted link across the collector and emitter of Tr7408. A.J.

Thomson 32WS23U (ICC17 chassis)

This large set had come from another dealer who told me that it would originally try to start up then quickly shut down, producing error code 27. He had

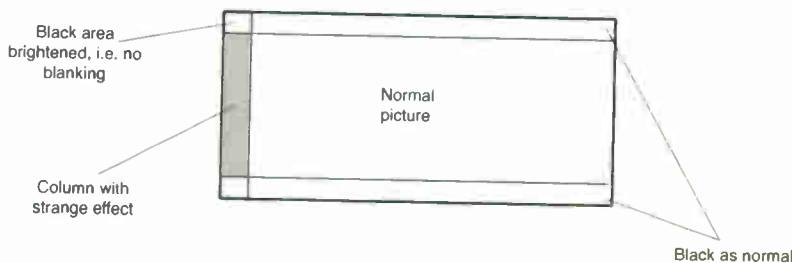


Fig. 1: Distorted display produced by a Goodmans Model W280NS.

been advised to fit a new line output transformer and modification kit (part no. 35175720). When these parts had been fitted however the set failed to start up fully, and the dealer believed it still produced error code 27.

Before I switched the set on I checked the previous work and found that all the parts had been neatly fitted. I also checked protectors ZL11 and ZL13 in the field timebase supplies, as a field deflection fault produces error code 27. Both protectors were OK.

I switched the set on, watched the LED and listened carefully. EHT was heard clearly, and the LED turned to amber quickly. Normally the amber remains on for about eight seconds, until a picture appears, then the LED goes green. But in this case it remained amber for twenty seconds then produced an error code, which was 26, not 27! This indicates that the "tube does not get warm in time". Further checks showed that there was no heater supply because of a hairline print crack at one end of the series heater coil LB02 on the CRT base panel. This coil is part of the modification kit, and the damage had obviously occurred during its replacement.

Note that loss of the A1/G2 supply produces identical symptoms. A.J.

Sanyo CE28WN5-B (EB6-A28 chassis)

This popular widescreen model tends to suffer from premature tube failure but has otherwise proved to be very reliable. Recently however we have had a few of these sets with the dead-set complaint. When I carried out the usual cold checks with the first one there was nothing obviously wrong, but I noticed two things when the set was powered: first the degaussing was clearly heard, and secondly no LED indication appeared.

Voltage checks showed that the HT voltage was low and was pulsing between 25-30V. Subsequent checks, disconnections etc. led me back to a

power-control problem. It seemed that the set was stuck in standby. Moving to the power-control line from the microcontroller chip I found the simple cause of the trouble. There was no 5V supply at the microcontroller chip, because the mains transformer from which this is derived (T681) was open-circuit.

The primary section of the power supply was receiving voltages, but the optocoupler was being misinformed. The main clue is the no red LED illumination.

The dead sets we have subsequently had in have all suffered from the same problem. Unusually, it's the secondary winding on the transformer that goes open-circuit. A good transformer reads 2.3k Ω across the primary winding and 13.9 Ω across the secondary winding. The part no. is 610 033 3758. A.J.

Philips 25ST1750 (GR2.2AA chassis)

Our aerial rigger diagnosed the cause of this set's problem at the customer's house and gave an estimate for tuner replacement. When we checked the set next morning in the workshop it refused to start – a low tripping sound could be heard. As we were making checks the set started up and continued to run, confirming the tuner problem. A new tuner was fitted and a general service was given, then the set was put on test for the rest of the day.

Next morning it failed to start and was tripping again, but came on after a few minutes and continued to operate perfectly. This suggested capacitor trouble, and much time was spent checking various suspects.

The problem was finally cured by replacing the two start-up resistors R3624 (330k Ω , 1W) and R3625 (560k Ω , 0.5W), though they were only slightly out of tolerance. The customer denied any knowledge of this second problem. Maybe his mains supply voltage is higher than ours. A.J.

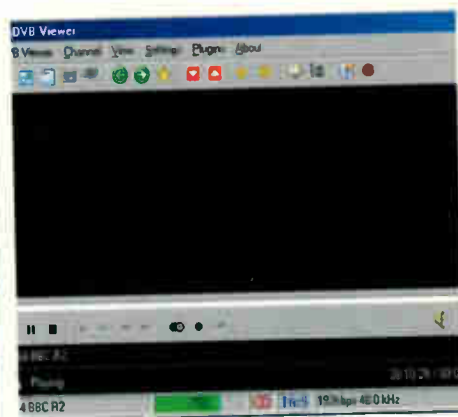
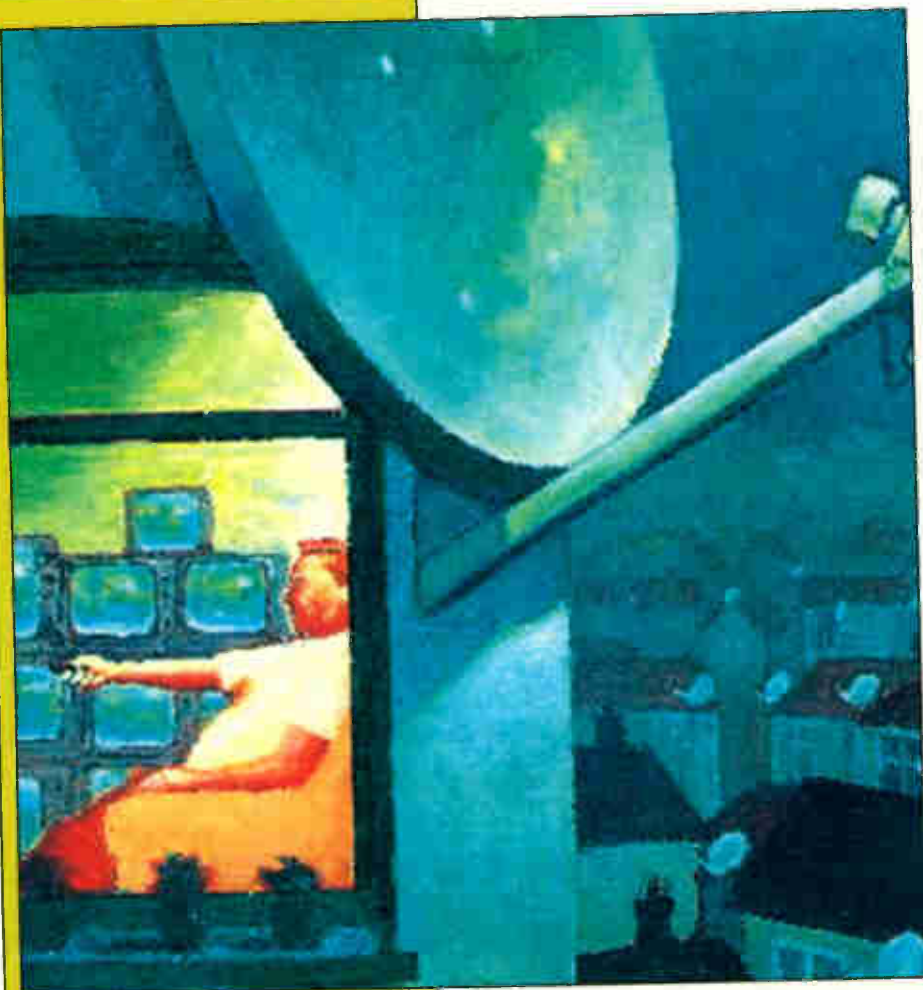


Photo 1: The DVB Viewer program.

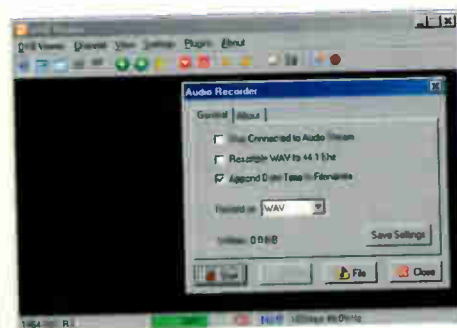


Photo 2: The Audio Recorder 'plugin' for the DVB Viewer program.

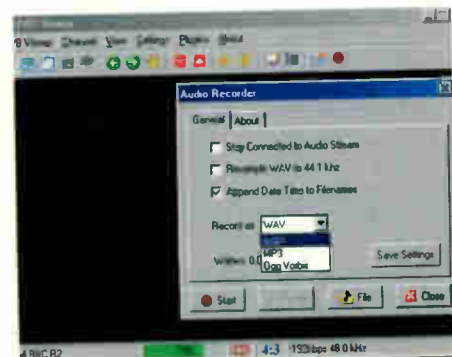


Photo 3: The Audio Recorder 'plugin' for the DVB Viewer program – alternative record modes.

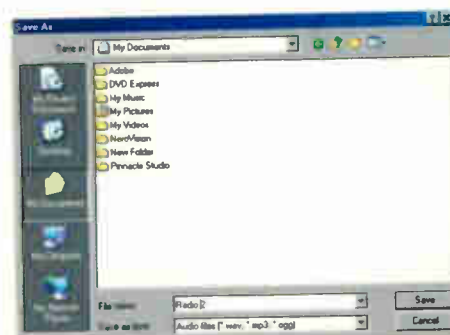


Photo 4: Before you start a recording, choose a name and place to store it.

place for storing the recorded file, see Photo 4. All that has to be done to record the programme is to click on the red

SATELLITE NOTEBOOK

Reports from
Christopher Holland
Hugh Cocks
 and
Michael Dranfield

Matched digiboxes

Kesh Electrics is now able to supply Panasonic digiboxes in matched pairs. This is handy for customers who travel and have a digibox at a second address, for example a second home, as they can take the viewing card with them for use in either box with the facility to receive all channels. Matched digiboxes of other makes can be supplied to order. More details are available at the website www.pacelink.co.uk, or phone Kesh on 02868 631 449. C.H.

Recording satellite radio on CD

In the June issue (page 498) I discussed recording satellite radio on CD. I've recently come across an alternative approach, using a very handy 'plugin' for

the DVB Viewer program (this works in conjunction with the SkyStar 2 satellite receiver card). DVB Viewer (see Photo 1) is available from www.dvbviewer.com and can be downloaded from the internet site. If you wish to register the program, this costs 15 Euros (about £10); it gives you access to the latest version, with free updates. As mentioned before in these pages, it's easy to record incoming signals on a PC's hard disk before transferring them to a DVD or CD if required. Once you've registered the DVB Viewer program you also have access to all the 'plugins' on the website, including the Audio Recorder one (see Photos 2 and 3).

Installation of the Recorder 'plugin' is straightforward – just follow the instructions provided. Access is then via the main program's 'plugin' options.

To use the Recorder, select the WAV option (Photo 2) but be careful not to choose the resample WAV at 44.1kHz option. Though resampling is required, the Nero CD burning program does it much more effectively. The recording can sound rather 'gritty' if this box is ticked.

Before you start the recording, click on the 'file' option and choose a name and

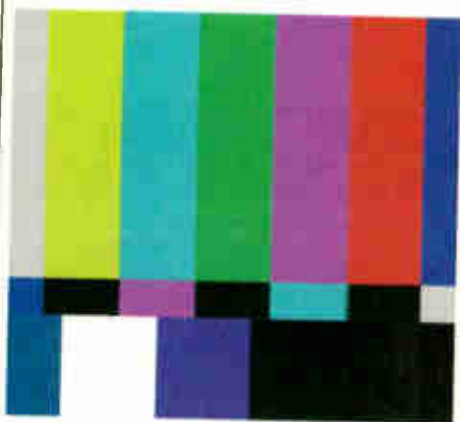


Photo 5: American-style colour bars via Eurobird transponder D10S.



Photo 6: Saudi Arabia ch. 1 from Arabsat 3A at 26°E.



Photo 7: Oman TV from Arabsat 3A at 26°E.



Photo 8: Arabsat Beirut colour bars from the 3A satellite.

Table 1: Latest digital channel changes at 28.2°E

Channel and EPG no.	Sat	TP	Frequency/pol
Choice FM (939)	2B	32	12.324GHz/H
Musicians' Channel (475)	EB	C1	11.223GHz/H
NHS tests (see text)	EB	D10S	11.642GHz/V
Pure Dance (938)	2B	32	12.324GHz/H
Pure Dance Radio	EB	D2S	11.488GHz/V

TP = transponder. 2B = Astra 2B. EB = Eurobird.

record button. Remember to start and stop the recording on time, and that the maximum length for a CD recording is either 74 or 80 minutes depending on the type of disc used. Once the recording has been completed, simply drop it into the Nero CD burning program and start the burning process.

You can save the recorded programme directly as an MP3 instead of a WAV type, but to do so an additional MP3 encoding file has to be downloaded from the website. I've not tried this. The WAV file could also be saved as an MP3 type using an audio editing program such as Cool Edit Pro (see the June column). **H.C.**

Digital channel update

The latest channel additions at 28.2°E are listed in Table 1. Where allocated, the EPG number is shown in brackets after the channel name.

Four American-style colour bars labelled NHS are being transmitted via Eurobird transponder D10S, see Photo 5.

BBC Radio 2 and 4 FM are now being transmitted via Astra 2D transponder 47 (10.803GHz/H). A few months ago they moved to transponder 38 (12.442GHz/V). Currently they are running in parallel via both transponders. **C.H.**

EPG number changes

Some of the sports channels in the Sky EPG were shuffled in the middle of May as follows – the Sky Sports channel numbers remain the same. **C.H.**

410	Eurosport	419	Extreme Sports
411	Eurosport News	421	Chelsea TV
413	Motors TV	423	The Golf Channel
415	At The Races	425	1 Sports TV
417	NASN	427	The Wrestling Channel

Arabsat 3A (26°E)

This month we'll take a look at the Ku-band output from Arabsat 3A at 26°E. Its footprint provides good coverage of Western Europe as well as the Middle East. As the satellite is very close to the Astra group at 28.2°E, dish positioning is critical to avoid picking up adjacent-satellite interference.

Table 2 lists the Ku-band transmissions

available. MBC2, Saudi Arabia ch. 2 and Bahrain ch. 55 include a large number of English-language programmes. **H.C.**

Arabsat 2D (25.8°E)

Arabsat 2D is adjacent to 3A at 25.8°E. Unfortunately the signal levels in Western Europe are not very high, as the beam is optimised for Middle East coverage. Some channels can be received in Southern Portugal using a 2m dish. A look at the footprint shown at the Arabsat website shows that the UK has similar weak-signal coverage. Signal strength varies, but the strongest channels are:

11-100GHz/V	Al Iraqiyah TV (SR 3,000, FEC 3/4)
11-560GHz/H	Kuwait TV (SR 3,000, FEC 3/4)
11-590GHz/H	Dubai TV (SR 6,000, FEC 3/4)
11-688/11-692GHz/H	Rotana TV (SR 3,300, FEC 3/4)

A very weak multiplex at 11.623GHz/V (SR 27,500, FEC 3/4) includes BBC World India. At best this produces a pixelated picture, see Photo 14. **H.C.**

Pace 2600

Lightning via the telephone line had struck this digibox, which was now stuck in standby. Data was being sent via C802 and C804 to the CX22496 line-side interface chip U8200, but the chip wasn't responding.

As this IC is on the line side, it gets its DC supply by rectifying the 4MHz square-wave clock signal fed to transformer T8200. The result should be a 4MHz refer-



Fig. 1: A CX22496 line-interface chip beside a one-penny piece for size comparison. The chip measures 5mm square, has 28 pins and is housed in a QFN package.



Photo 9: Bahrain Sports from Arabsat 3A at 26°E.



Photo 10: Bahrain TV ch. 55 from Arabsat 3A at 26°E.



Photo 11: Emirates TV from Arabsat 3A at 26°E.



Photo 12: Saudi Sports from Arabsat 3A at 26°E.

ence clock signal at pin 28 and a 3.5V DC voltage at pin 7. I found that the voltage at pin 7 was low (2.9V), which confirmed my suspicion that the IC was dud.

Replacement of this IC is not for the faint-hearted. It's housed in a 28-pin QFN package: all the pins are underneath, and the ground plane of the PCB has to be soldered to the underside of the chip. Furthermore the IC is only 5mm square! Fig. 1 shows a CX22496 IC beside a one-penny piece for size comparison. Once the replacement had been installed the digibox came on and all was well. M.D.

Grundig GDS2000

After ten minutes' operation the sound would cease and the picture would freeze and remain on the screen. A check in the services menu showed that the transport stream had gone to 0962, so the fault was clearly tuner-related. I found that the fault occurred when the slightest amount of heat was applied to the TDA8060 down-converter chip, but a brand-new replacement made no difference. So I decided that it would be best to replace the whole tuner. After doing this the digibox worked normally. M.D.

Amstrad DRX100

This digibox took at least ten minutes to come on: it would just sit there in stand-by. When it did eventually decide to come on, the picture would be pixellated and the info banner would be flashing, with broken sound. The fault could be made to come and go by scoping around the AV RAM chips U601/2. Inspection with a microscope then revealed that the solder around some pins had not melted fully from new. A reflow of all pins cured the fault. M.D.

Sky Plus BSKB3000

For 'no satellite signal received' via the second tuner, go to the installer menu and do a full system reset. You may save yourself an unnecessary repair bill. M.D.

Pace 2500S3

This digibox produced no sound output but was OK in every other respect. L and R analogue signals were present at pins 11 and 10 of the DA converter chip and at pins 12 and 2 of the TL084CD buffer chip U1006, but the outputs were missing at pins 14 and 1 of this chip. This IC has split supplies. +8V and -8V, and it turned out that the negative supply at pin 11 was missing.

I traced the source right back to the power supply and found that there was no voltage at the anode of rectifier diode D2503. Further checks showed that the chopper transformer had an open-circuit

winding, between pins 14 and 13. When I removed the transformer the cause of the fault was found to be a poor soldered connection where the copper wire is wrapped round the leg. Resoldering cured the fault, so a new transformer was not needed. M.D.

Sony VTSX750U

This digibox was dead except for a whistling noise that came from the chopper transformer. These symptoms are usually caused by a leaky diode in the snubber network or a short-circuit, surface-mounted diode associated with the 12V supply. Not this time however. The cause was C807 (47µF, 50V) on the primary side of the power supply. It had dried up. M.D.

Amstrad DRX400

This digibox was dead with a blow up in the power supply. The fuse was black and the top had blown off the TOP243P 7-pin chopper chip. As I didn't have this device in stock I decided to order ten, which was just as well because the replacement blew up at switch on. The cause was found to be the mains bridge rectifier's reservoir capacitor C5 (33µF, 400V). It had dried up.

I also decided to replace the four bridge rectifier diodes D2, D3, D6, D7,



Photo 13: Orbit TV from Arabsat 3A at 26°E.



Photo 14: BBC World India from Arabsat 2D at 25.8°E.

Table 2: Ku-band transmissions available from Arabsat 3A at 26°E

Frequency/pol	SR	FEC	Services
11.747GHz/V	27,500	3/4	Saudi Arabia ch. 1 (see Photo 6), Saudi Arabia ch. 2, Oman TV (see Photo 7), Sudan TV, Al Majd TV, ERI TV and some twelve radio stations.
11.785GHz/V	27,500	3/4	LBC TV, Tele Liban, Al Arabiya, New Sat, Future International, MBC, MBC2 plus two radio stations and colour bars (see Photo 8).
11.843GHz/H	27,500	3/4	Bahrain TV, Bahrain Sports (see Photo 9), Bahrain TV channel 55 (see Photo 10) plus five radio stations and some colour bars.
11.862GHz/V	27,500	3/4	Emirates TV (see Photo 11), Abu Dhabi TV, Abu Dhabi Sports (encrypted) and five radio stations.
11.938GHz/V	27,000	3/8	Syria TV, Tunisia TV, Yemen TV, Sharjah TV, Al Jazeera TV, Algerian TV, Jordanian TV, Mauritanian TV and seventeen radio stations.
12.010GHz/V	18,500	3/4	Saudi TV 1, Saudi TV 2, Saudi Sports (see Photo 12), Al Ekhbaria and six radio stations.
12.026GHz/V	7,500	7/8	Saudi TV 1, Saudi TV 2 and eight radio stations
12.073GHz/V	27,500	3/4	Orbit promo channel* (see Photo 13)

*Orbit services are scrambled and can also be found at 11.919, 11.958 and 11.996GHz/H.

using type 1N4007, and the optocoupler IS01 (type PC123). When these replace-

ments had been fitted the box came on correctly with no further damage. I was

surprised to find capacitor failure in such a new digibox. **M.D.**

HELP WANTED

Wanted: Chopper transformer for the Panasonic Model TX25W3 etc. (EURO-1 chassis). The part no. is 545 170 8900, circuit reference no. T639. I repaired original fault in customer's set then lightning strike took this out. Help! Phone Rod Tyler on 01798 342 210 or email r@rtyler60.fsnet.co.uk

For disposal: Free to a good home, three working Philips CTV sets fitted with the G8 chassis, two with original tubes, plus spares. Two 500VA isolation transformers. A Telequipment D54 dual-beam oscilloscope. A Philips reel-to-reel recorder Model N4520 (takes 10in. tapes) with twenty tapes; there's a slight fault at 15in./sec. Various TV and audio valves. Motorola and Pye hybrid car radios. N1500 video heads, N1520 video heads and VCC video tapes. For more details phone Steve Ball on 01733 347 678 or email steve@ball7750.freerve.co.uk

Help please: Does anyone know the reason for a small red square appearing on the right-hand side of the TV screen, about half way up, when using the Philips ONdigital Model DTX6370? The unit will change stations using the remote-control handset, but there's

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.

no picture or sound. The box can work normally for several hours before this happens. Brian Battams, 23 Dudley Drive, South Ruislip, Middlesex. HA4 6QN. Phone 020 8845 5123 or email BrianBattams@aol.com

For disposal: Service manuals/circuit diagrams for TV sets and VCRs over a range of sixty years, also components, valves and test equipment. Now retired, had service bay and component company for the trade and retail. B. Ardel, Pinner, Middx. Please phone 020 8429 3400 or 07752 059 568.

Wanted: Circuit diagram for the Farnell dual-trace oscilloscope Model DT12/5, or any information on it. Chris Rayner, 2 Chantler Avenue, Warrington, Cheshire, WA4 1QP. Phone 01925 822 673.

For disposal: A Thomson projection unit, Model TVP01, for spares. The green tube is faulty, the red and blue ones being OK. Otherwise complete. Howes Television Services, 5 The Firs, Worlingham, Beccles, Suffolk. NR34 7DP. Phone 01502 713 942.

Help please: Does anyone know where I can obtain spares and circuit diagrams for Heoki colour TV sets? One, a 14in. Model HE319R, is fitted with the standard Vestel 11AK19P4 chassis. The chassis type in the other set, a 5.5in. Model HE801, is not known. The latter is the problem set: it was made in Taiwan and has the numbers 4551-

2076 and 4551-2077 on the main PCB. Please email S. Palmer (Mrs) at salann@freeola.net

Wanted: Used but working EHT splitter for the Philips Model 41GR8841/05B projection TV. The Philips part no. is 4822 218 20809. A working item from a scrap set would be OK. Phone/fax Bob Peters on 00 34 96 671 9902 or email bob.pbravo@tiscali.es

Wanted: Does anyone know how to repair or have circuit information for the BT Contour 50 payphone? Information seems to be impossible to obtain. Please phone Steve Roberts on 01687 462 189 (Mallaig, Scotland).

Wanted: Circuit diagram for the Eagle Products multimeter Model KEW-6620KOPV, or does anyone know the value of resistors R14, R15 and R19 which are missing in this unit? Please phone Jules Neujean on 01253 876 872 (Fleetwood, Lancs).

Wanted: Video heads for the Philips N1700 VCR; scan coils for the Samsung Model CI6229T (28in. tube type A59KPR84X03); a circuit diagram for the Sansui audio amplifier Model AU-D22; and a working top PCB for the Panasonic VCR Model NV-D80 – a scrap machine would be OK. Les Mawdsley, 82 Sandhurst Road, Rainhill, Prescot, Merseyside. L35 8NQ. Phone/fax 01514 264 152.

WEB SERVICE

To reserve your web site space telephone
Tel: 01322 611254 Fax: 01322 611339
E-MAILS S.Morley@highburybiz.com



Alban Electronics

<http://www.albanelectronics.co.uk>

Alban stocks, supplies and provides technical support for a range of terrestrial/cable/satellite and analogue/digital TV equipment. PROMAX (manufacturers electronic test equipment including signal level meters, spectrum analysers, BER/CSI/MER analysers for QPSK, QAM & COFDM, optical fibre light sources and power meters, 16:9 test pattern generators), ALCAD (manufacturers of R.F. wide band and adjacent channel amplifiers, aerials for MATV, SMATV & IRS systems) and ANTARES (cascadeable multi-switches). ALBAN has a complete after sales repair and calibration service that is fully supported by the manufacturers, in addition provides a free system design service using only reliable high quality components.

Irwin Electronics

<http://www.irwinelectronics.co.uk>

As Classic Distributors we complement our existing mail and trade counter business with our website. You can order parts on-line quickly and easily. We intend to explore alternative ways of assisting engineers to run their business successfully.



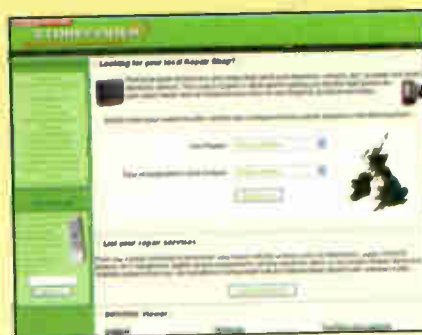
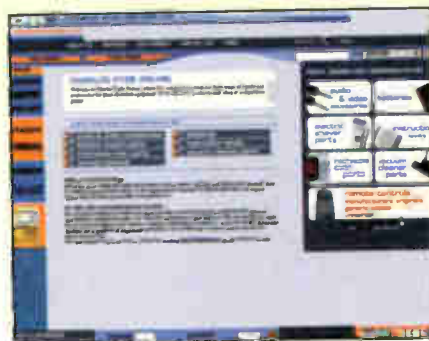
Alltrade Aerial & Satellite Ltd

www.alltrade.co.uk

Leading distributor to the trade 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.
Phone 0845 075 0751
Fax 0870 770 9151



The 'New Look' Storefinder UK

www.storefinder.repairhelper.co.uk

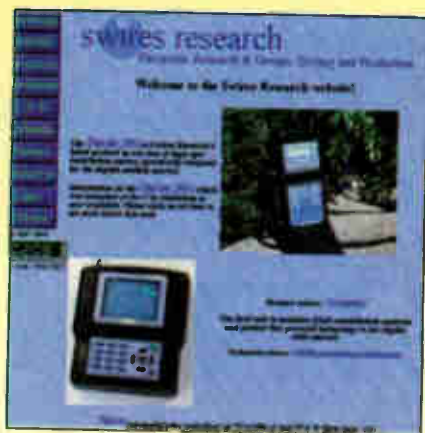
We specialise in promoting electronic repair services throughout the Internet. The Storefinder Site is a UK Search Engine dedicated to the electronic repair trade (i.e. TV, VCR, DVD repair etc).

Register with Repairhelper's Storefinder and you get your own optimized pre-built web page and complete listings within the Repairhelper Network of sites as well as high ranking listings within the Major search engine such as Google, MSN and Yahoo!

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, Laptops, Remote controls and Semiconductors may be accessed.



Swires Research

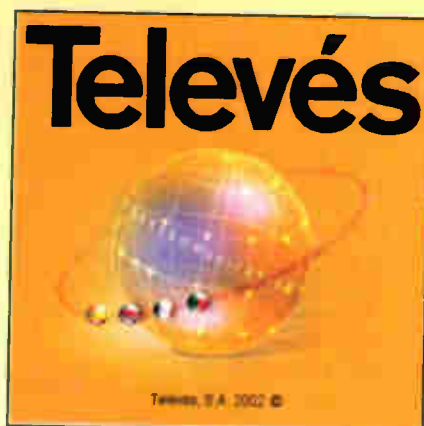
<http://www.swires.com>

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.

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



Televés

<http://www.televes.com>

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.



Wiltsgrove

<http://www.wiltsgrove.co.uk>

WILTSGROVE LTD founded in 1984, is renowned as a leading supplier of Audio, Video, TV, Spare parts and Accessories.

We are now pleased to announce the launch of our ONLINE CATALOGUE:

<http://www.wiltsgrove.co.uk>

Our easy to use search engine will allow you to find the products you require via:

- Make / Model.
- Product Category.
- Key Word search.
- Manufacturers part number.
- Our Order Code.

All orders before 5pm will be dispatched the same day.

Tel: (0121) 772 2733

Fax: (0121) 766 6100

Email: sales@wiltsgrove.co.uk

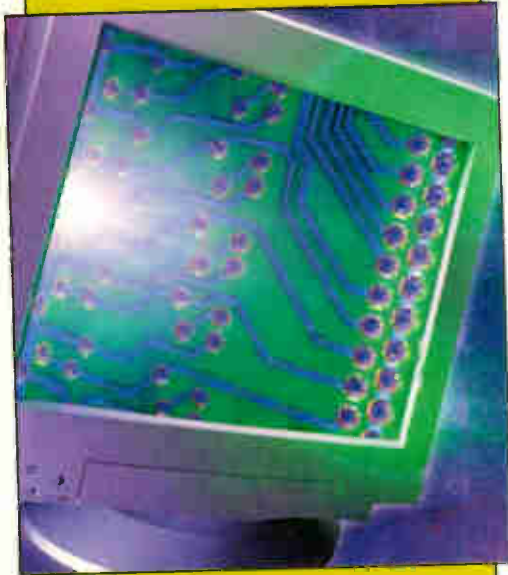
Make sure of your copy of *Television*

It can be difficult finding a copy of *Television* at local newsagents. The number of magazines being published keeps increasing, which means that newsagents have less shelf space for the display of individual titles. Specialist magazines in particular get crowded out.

There's a solution to the problem. Most newsagents provide "shop-save" and/or home-delivery services. There's no charge for a shop save. You simply ask your newsagent to order a copy for you: it will be kept on one side each month ready for you to collect. Home-delivered copies are ordered in the same way, but generally incur a delivery charge.

A newsagent can order any magazine for you, whether or not the shop normally stocks it.

If you buy your copies of *Television* from a newsagent and want to make sure you get every issue, just ask at the counter.



MONITORS

Fault reports from
Bob Bradley
Ian Field
and
Gerry Mumford

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

Reports can be sent by post to:

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

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

Dell D1025HE

This monitor is fitted with a Sony CRT and a chassis manufactured by Nokia. The customer said it was dead, with no light from the power LED at switch on. It can be a difficult monitor to open. At each side of the back cover there are two slots that hide latches which have to be unclipped to gain access. I've known engineers give up after damaging the back cover. To help I've made a flat-bladed tool out of a small piece of 1mm-gauge steel, about 6mm across the blade end, filed to fit the slots and disengage the latches – note that a screwdriver blade will leave a hole in the cabinet because of the blade's taper.

Start by laying the monitor face down on a foam-rubber pad to prevent scratching, then remove the swivel stand by unclipping it. Remove the two back cover retaining screws then, starting at one side, insert the flat-bladed tool into the lower slot until you hear it click, then do the same at the upper slot. Once one side is free, repeat the process at the other side. When the back cover is clear, use a 5.5mm nut-spinner to remove the metal shielding from the upper part of the chassis.

On inspection I saw that the mains fuse was blackened. This usually means that there has been a major failure of some kind, but checks with a DVM switched to ohms didn't reveal anything out of the ordinary. So I removed the degaussing posistor, replaced the fuse and cautiously switched on. To my surprise the monitor powered up and worked. There didn't seem to be anything wrong with the posistor, so I refitted it and retested the monitor.

With the blackened fuse still playing on my mind, I decided to check a few other components on the primary side of the chopper power supply. To my amazement, the mains bridge rectifier's reservoir capacitor had a hole punched through the side of its case, something I'd never come across before in all my years of servicing. Was the cause a faulty capacitor or an external problem like a heavy spike on the mains supply? I may never know. The only clue is that the customer is a building contractor and the monitor was being used at his site office when it died. With all the heavy plant around, the damage could well have been caused by an unstable mains supply. Whatever the cause, a replacement fuse and capacitor restored normal operation. **B.B.**

Compaq 610T (V50)

The unit that came in was in an appalling state. There was a large split in the cabinet, a crack in the PCB and the CRT was broken. A hopeless situation? Well, in the stock room there was a V50 that had suffered from water damage. The corrosion was so bad that several surface-mounted

components were missing – their print lands had been eaten away. But the CRT and cabinet were OK. It also had an intact signal cable (someone had cut the plug off the latest unit).

So I had two monitors with one good cabinet, one good CRT and one cracked PCB. There are those who have strong views about repairing cracked PCBs. My view is that it depends on the damage the PCB has sustained. In this case the crack spanned from inductor 5608 to transistor 7159. The line output transistor has a guard-slot that had provided stress relief. The crack had separated its collector pin's solder pad from the track in two directions, and ran through a row of wire links next to transistor 7159.

Any track of substantial width was braced with 20 SWG tinned-copper wire, and the group of thin tracks running under the row of wire links were cleaned and repaired with strands stripped from a length of flex. All the high-voltage print had plenty of clearance to enable a strong repair to be carried out without compromising insulation distances. The thin tracks were more difficult but, with care and patience, it was possible to lay a single strand over each cracked track. Once all known damaged tracks had been repaired the PCB was thoroughly cleaned with cellulose thinners to remove all traces of flux, then examined with a strong light and magnifier to check for shorts – and missed tracks!

The repaired PCB was fitted in the monitor with the good cabinet and CRT. When I tested the unit it produced an over-bright raster which, when the brightness was turned down, had very low contrast with flyback lines. Further investigation revealed a break between the collector of transistor 7158 and link 9821. I had lifted the pad at 9821 while moving the link out of the way so that I could manoeuvre a fibre-pen between the solder joints to clean off the green varnish, and had forgotten to repair the damage. Once this had been made good the unit produced a much improved display. All that was needed was to set up the grey-scale to correct for the fact that the PCB was being used with a different CRT. **I.F.**

CTX VL1300

This huge 21in. monitor seemed to be totally dead. Checks in the power supply showed that it was starting up then cutting out very quickly. So attention was turned to the line output stage, where the BU2532AL scan transistor Q313 and the 2SJ512 B+ regulator Q306 were found to be short-circuit. Once these two devices had been replaced this quite old unit produced a very good display. **G.M.**

Solution to Test Case 500

- see page 615 -

How much easier our jobs would be if there were no intermittent faults! Those in most other service industries would not pursue problems like this one in detail and down to individual component level – they would replace chunks of hardware and modules until the cure was found, by trial-and-error. The cost of the replacement lumps of mechanics and/or electronics is of course borne by the customer or user, be it an automatic door-opener in a public building, an ABS control module in a top-end car, a radiotelephone set in an aircraft, or whatever.

Modern TV chassis designs are based on energy-conscious principles. The power consumption of a degaussing posistor, when kept warm to reduce the current in the shield-mounted degaussing coils, is nowadays considered to be a significant 'green' factor (waste of electricity!). Hence the increasing use of a relay in degaussing circuits to switch the supply off. There's another advantage: degaussing can be activated at switch-on from standby as well as with a cold start using the mains on-off switch.

The chassis in George Cooper's set incorporates a relay for this purpose. It's designated RLY600 and was the cause of the trouble, proved by replacement. The faulty relay had sometimes made contact, complete or partial, when it should have been open-circuit. The effect, with a cold posistor, was a significant 50Hz mains current in the degaussing coils – it was not synchronous with the field-rate scanning of the picture.

NEXT MONTH IN TELEVISION

The Beta format today

The cost of VHS recorders is nowadays so low that it is difficult to make a profit from repairing them. Strangely however this is not the case with Beta (Betamax) machines, which can be surprisingly valuable. Colin McCormick reviews the various models that were released and the servicing possibilities, including some stock faults you may encounter and the spares situation.

Plasma panel problems

Manufacturers have been discouraging the repair of most high-tech products, such as plasma TVs, in recent years. Repairers have nevertheless had problems with plasma panels. Stephen Williams lists some faults and provides advice on handling them.

Vintage radio: tuning indicators

Tuning indicators were never really necessary with the AM receivers that graced the nation's homes from the Twenties to the Seventies. They were nevertheless often a feature of the better class of receiver, and there were several different types. J. LeJeune describes their mode of operation and circuitry.

DAB receiver review

Roger Bunney tries out the Roberts RD6 (Gemini 6) DAB/FM radio receiver.

PLUS ALL THE REGULAR FEATURES

TELEVISION INDEX & DIRECTORY 2004

Plus hard-copy index and reprints service

Here's the essential repair information you need! The Television Index & Directory 2004, in CD-ROM form, contains the text of over 15,000 high quality fault reports on TVs, VCRs, Camcorders, DVD players, Monitors, Satellite TV units, Audio equipment and CD players, searchable by make and model, plus the text of 200 Test Cases and over 250 major servicing articles, from sixteen years of Television magazine. It also contains a full sixteen-year index of Television, a Spares Guide, a directory of Trade and Professional Organisations, an International TV Standards guide, a satellite TV Channel Finder, a TV transmitter list and a compendium of internet resources for service engineers. The software is quick and easy to use, and runs on any PC with Windows 95, 98, ME, NT, XP or 2000.

Television Index & Directory 2004 CD-ROM, £199

Television Index & Directory 2004 CD-ROM upgrade, £46 (to qualify for this upgrade you need to have purchased a previous version of the Television Index on floppy disk or on CD-ROM)

A six-month update of the index and fault reports will be available in May 2004. If you wish to take advantage of this, £10 should be added to your order.

Television Index only, 1988–2003, £36

Television Index only upgrade from previous versions, £18

Hard-copy indexes of Television magazine are available for Volumes 38 (1988) to 53 (2003) at £3.50 per volume.

Reprints of articles from Television back to 1988 are also available, at the flat rate of £4.00 per article – you can order through our web site, or write to the address below.

The above prices include UK postage and VAT where applicable. Add an extra £1 postage for non-UK EC orders, or £5 for non-EC overseas orders, although Channel Island residents do not need to add any extra postage. Cheques should be made payable to SoftCopy Ltd. All major credit and debit cards are accepted. Please use our new secure website for your orders, details below. Allow up to 28 days for delivery (UK).

SoftCopy Limited, 1 Vineries Close, Cheltenham, GL53 ONU, UK

Telephone 01242 241 455 Fax 01242 241 468

e-mail: sales@softcopy.co.uk

web site: <http://www.televisionmag.co.uk>

Published on the third Wednesday of each month by Highbury Business, Media House, Azalea Drive, Swanley, Kent, BR8 8HU. Highbury Business is a division of Highbury House Communications PLC. Filmsetting by Impress Repro by Design, Unit 2, 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 Seymour Distribution Ltd, 86 Newman St, London, W1T 3EX. Sole Agents for Australia and New Zealand, Gordon and Gotch (Asia) Ltd.; South Africa, Central News Agency Ltd. Television is sold subject to the following conditions, namely that it shall not, without the written consent of the Publishers first having been given, be lent, resold, hired out or otherwise disposed of by way of Trade at more than the recommended selling price shown on the cover, excluding Eire where the selling price is subject to currency exchange fluctuations and VAT, and that it shall not be lent, resold, hired or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever.



COLOUR TRADE

**POSSIBLY
LARGEST & OLDEST
EST. IN
THE UK EST FOR
30 YEARS**

Wholesaler Distributors & Expert Agents of
Domestic Electronics & Appliances

**FULL RANGE OF FACTORY
GRADED TV'S DVD / VIDEOS
HI-FI SMALL & LARGE
DOMESTIC GOODS**

www.colourtrade.com

**WHOLESALE MADE EASY ON LINE, SIGN UP
NOW FOR OUR WHOLESALE PRICES.
ALL ORDERS DISPATCHED ON THE SAME DAY.**

**Now Available
TV'S, DVD'S, VCR & AUDIO**

Over 40 years of genuine experience

Experts on:-

Thomson • Sanyo • Beko • LG • Tatung • Ferguson
Bush • Funai • Pacific • Dansai • Samsung & more

**TECHNICAL SUPPORT
0907 076 70 80**

Call cost 60p min

MAIN DEALER

- Thompson
- Sanyo
- Beko



Tel: 0121 359 7020 Fax: 0121 359 6344
Phoenix House, 190 Bridge St. West, Newtown, Birmingham B19 2YT
Email: inquiries@colourtrade.com



NIKKO ELECTRONICS ELECTRONIC COMPONENTS DISTRIBUTORS

LOPT'S

- LOPT'S FOR MONITORS
OVER 500 DIFFERENT
TYPES IN STOCK
- LOPT'S FOR TV'S
FROM £6.00
- ORIGINAL ELDOR
LOPT'S
- HR DIEMEN AND
- LOW COST NIKKO
LOPT'S
and more, Pls enq!
- REMOTE CONTROL
FOR TV/VIDEO
FROM £5.00

DVD/CD LASER PICKUPS + MECHANISM

REPLACEMENT

KSS-210A	£7.95	KSS-213D	£8.50
KSS-213B	£7.95	KSS-213E	£8.75
KSS-213C	£7.50	KSS-220F	£13.00
KSS-240A	£17.50	KSS-710A	£15.50
KSS-210B	£8.50		

ORIGINAL ALSO AVAILABLE FOR KENWOOD, PIONEER, SONY

KHM 220 AAA orig	£57.00
CDM 12.1	£13.00
12.3	£14.75
12.4	£23.00

AND A LOT MORE, PLEASE ENQUIRE!

AN-5277	£2.35	TA-8273	£11.50
AN-7125	£2.49	TA-8276	
BA-4900	£5.50	TA-8277	£11.95
BA-4901A	£8.50	TA-8427K	£0.89
BA-4905	£5.99	TDA 7384	£4.90
BA-4908	£6.50	TDA-7385	£5.75
BA-4911	£8.50	TDA-7386	£6.99
HA-13158	£5.50	TDA-7490	
HA-13159	£13.50	TDA-7560	£13.00
TA-8260	£8.50	TDA-8568Q	£5.75
TA-8262	£10.75	TDA-8588BJ	
TA-8263	£9.25	TDA-16833	£1.35
TA-8268	£15.00	TDA-16846	£1.48
TA-8272		STK-5332	£1.30

STK-401-020	STK-407-070	STK-490-310
STK-401-030	STK-407-090	STK-495-020
STK-401-040	STK-407-100	STK-496-030
STK-402-030	STK-407-120	STR-F6523
STK-402-040	STK-407-710	STR-F6524
STK-402-070	STK-411-220	STR-F6535
STK-402-071	STK-411-240	STR-F6552
STK-402-090	STK-411-290	STR-F6653
STK-402-100	STK-412-010	STR-F6654
STK-402-120	STK-412-020	STR-F6655
STK-402-240	STK-419-120	STR-F6656
STK-405-030	STK-419-130	STR-F6668
STK-405-050	STK-419-150	STR-F6676
STK-405-070	STK-442-130	STR-F6707
STK-405-090	STK-443-050	PAL-006A
STK-405-120	STK-489-010	PAL-007A
STK-407-040	STK-490-040	
STK-407-050	STK-490-110	

- Sony tactile switch 4 pin MOQ 10pcs £0.28
- Sony tactile switch 2pin MOQ 10pcs £0.25
- Wire ended lamps for car stereo 6,9,12V
MOQ 50pcs £0.15 each

• SPECIAL MOQ 10PCS

S-2000N/CH	£0.65	BUT-11A	£0.35
S-2055N	£0.65	SAP15P	£3.25
BU-2508AF/CH	£0.65	SAP15N	£3.25
BU-508AF/CH	£0.49	UC-3842A	£0.45
STR-50103A	£1.75	TDA-8361/N3	£2.75
STR-54041	£1.49		

- PRICES QUOTED EXCLUDING VAT AND
SUBJECT TO CHANGE W/O PRIOR NOTICE.

NIKKO ELECTRONICS
358 Kingston Road, Ewell, Epsom Surrey KT19 0DT
Tel: 020 8393 7774
Email: dalbani@nikko-electronics.co.uk
Website: www.dalbani.co.uk

**IT'S EASY
TO ORDER**

PHONE
020 8393 7774
OR FAX
020 8393 7395

**CLICK/ORDER
ONLINE**
VIEW OUR CAT ON
www.dalbani.co.uk



TUBES

STOCK CLEARANCE OF 4 X 3 CRTS

NO REASONABLE OFFER REFUSED -
MUST CLEAR

Small Screen

14KLL, 160DB 5" Matsushita, 23KQT, 2701B,
27GDC 10" Samsung, All types of 14", 34LRG 14"
Sony, 46JNL19" Sony

20" and 21"

48EAK Philips, 48LPE, 48EKB, 48ECR, 48JLL,
Bush/Alba types 51 EER, 51 LPE, 51 AEZ, 51EKD,
51KQQ, 51-570 (KT3) 51LPT Sony, 51QDX

25" and 26"

53JBW Sony, 59KPR Samsung, 59JMZ Toshiba,
59ECF Panasonic, 59EEH, 66EAS, 66EHJ Thomson,
66EAK Philips, 66EMZ Telsa

29" and over

68QCP Samsung, 68LNH Sony, 80JYV Sony,
81KVA Sony, 90AFX Thomson

EXPRESS TV SUPPLIES LTD

The Mill, Mill Lane, Rugeley, Staffs WS15 2JW
Tel: 01889 577600 Fax: 01889 575600

TUBES FOR SANYO SETS

414 010 7100

W66ESF

NEW £125.00

Are you paying more?

LOADS MORE TYPES IN STOCK

CONTACT

D'Lec Components Ltd
3 Manor Court, Sole Street,
Cobham, Kent DA13 9BU

Tel 01474 361276

Fax 01474 335228

E-mail: sales@dlec.co.uk

Visit www.dlec.co.uk



Almost everything you
need for your business
under one mouse

CPC have over 100,000 top quality products online,
ranging from spares and components to computing,
audio, video, cables, connectors, electrical,
security components, tools, in the work place and
test equipment all available in just two clicks.

www.cpc.co.uk



Economic Devices

PO Box 73, Oakengates TF2 8WR Tel ++44 (0)1952 273130 Fax ++44 (0)1952 405478

Remote Controls from £5.95 each

SEMICONDUCTORS
Over 34,000 types of
transistors, IC's, diodes etc. or equivalents stocked

We take your hassle Some suppliers just won't help. We will
work really hard to find those difficult
parts - just ask and let our 'no holds barred' enquiry hound work for you!!!

...and look at the special offers.....

BUT11A @ 99p each BUT11AF @ 119p each
BU508A @ 159p each Fully wired scart lead 99p

a slight inconvenience....

....you must buy more than one....

BU208A	X 5	75p ea	TEA2018A	X 5	99p ea
BU508A	X 5	79p ea	UC3842	X 5	59p ea
BU508AF	X 5	85p ea	CNX62A	X 5	29p ea
BU508D	X 5	89p ea	S2000AF	X 5	84p ea
BUT11A	X 5	29p ea	TDA3653B	X 5	55p ea
BUT11AF	X 5	47p ea	TDA3654	X 5	82p ea
Philips type 1.2 volt Back up battery				X 5	59p ea
Philips type 2.4 volt Back up battery				X 5	120p ea
Scart - Scart lead 1.5m Fully wired				X 2	89p ea
Positor PT37, TH98009 (White)				X 5	59p ea
Thorn TX100 Chassis 110 DGR LOPTX				each	£11.24
Philips GP90 Chassis LOPTX				each	£11.63

...and now ask about our
value for money full price list.
Remember £1.50 post & handling
All major credit cards accepted

www.telepart.co.uk

New CCTV catalogue out NOW
cameras, monitors, switches
quads, multiplexers, the lot.

WEB SITE WWW.JOHNSRADIO-UK.COM WWW.JOHNSRADIO.COM
JOHN SRADIO ELECTRONICS TEST AND COMMUNICATION EQPT

MASSIVE 10,000 SQ FT WAREHOUSE CLEARANCE SALE

DC-MICROWAVE TO 300 GHZ - OPTICAL - LIGHT - EQPT - PARTS
TEKTRONIX - HP - AGILENT - MARCONI
PHILIPS - RACAL - B&K - R&S - W&G - ETC

Sales Warehouse, Johnsradio, Smithies Mill, Birstal Smithies Lights, 883-885 Bradford Rd,
Batley, West Yorkshire, WF17 8NN.

Tel: 01924 442905 Fax: 01924 448170 E-mail: johnsradio@btconnect.com

Directions M62 Junction 27, A62 to Huddersfield, 1 mile to Birstal Smithies Lights, (6 roads)
left under factory chimney aerial, Smithies Moor Lane 50 YDS second left red gate.

HOURS M-F 9AM - 1PM AND 2PM - 5PM, SAT 9AM - 1PM

Phone for appointment or to request item lists, photos, site map.

All welcome, Private or trade, for sales, workshop repairs or calibration.

PLEASE CONTACT PATRICIA AT WHITEHALL WORKS, 84 WHITEHALL ROAD,
EAST BIRKENSHAW, BRADFORD, WEST YORKSHIRE, BD11 2ER

Tel: 01274 684007 Fax: 01274 651160

WEB SITE WWW.JOHNSRADIO-UK.COM WWW.JOHNSRADIO.COM

This Magazine reaches over

10,000

potential customers

To advertise in this space
call Steve on

01322 611254

ONLINE SHOPPING CHEAPER AND EASIER

www.elclondon.co.uk

TV, VIDEO SPARES AND ELECTRICAL ITEMS



ELC EAST LONDON COMPONENTS

63 PLASHET GROVE, LONDON E6 1AD.

TWO MINUTES WALK FROM UPTON PARK TUBE STATION

TEL: 020 8472 4871 FAX: 020 8503 5926

E-mail: sales@elclondon.co.uk

Grandata Ltd
distributor of electronic components

Mobile Phone Wireless Handsfree Solution



Works In any car

Works with any mobile phone

NO cigarette lighter needed

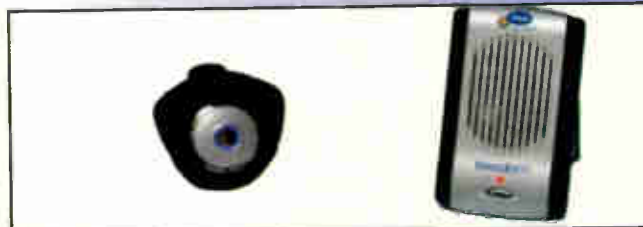
NO Wires

NO Installation

Clip the wireless speakerphone to your sunvisor

Clip the wireless transmitter to your phone

Then your ready to drive with both hands on the
steering wheel



Order Code : FONEFREE

Price : £ 16.00 + vat

See our 6 page advert for more Special Offers

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

Tel: (020) 8900 2329 Fax : (020) 8903 6126

Email : sales@grandata.co.uk

inStore
ELECTRICS LIMITED

171 HAREHILLS LANE, LEEDS LS8 3QE
Tel: 0113 240 1114. Tel/Fax: 0113 240 7275.

Mobile: 07976 403134

Email: sales@instoreleeds.freeserve.co.uk

PHILIPS

14" PORTABLE FROM £39.00

*

14" COMBI TV/VCR £69.00

*

24" W/S TV FROM £149.00

*

28" W/S TV FROM £169.00

*

32" W/S TV FROM £269.00

*

DVD PLAYERS FROM £34.00

*

VCRS FROM £34.00

*

AUDIO FROM £34.00

**PLEASE CALL FOR A STOCK LIST
MANUFACTURERS GRADED PRODUCTS**

FRUSTRATED!

Looking for ICs TRANSISTORS?

A phone call to us could get a result. We offer an extensive range and with a World-wide database at our fingertips, we are able to source even more. We specialise in devices with the following prefix (to name but a few).



2N 2SA 2SB 2SC 2SD 2P 2SJ 2SK 3N 3SK 4N 6N 17 40 AD
ADC AN AM AY BA BC BD BDT BDV BDW BDX BF
BFR BFS BFT BFW BFX BLY BLX BS BR BRX BRY BS
BSS BSV BSW BSX BT BTA BTB BRW BU BUK BUT BUV
BUW BUX BUY BUZ CA CD DX CXA DAC DG DM DS
DTA DTC GL GM HA HCF HD HEF ICL ICM IRF J KA
KIA L LA LB LC LD LF LM M M5M MA MAB MAX MB
MC MDA J MJE MJF MM MN MPS MPSA MPSH MPSU
MRF NJM NE OM OP PA PAL PIC PN RC S SAA SAB
SAD SAJ SAS SDA SG SI SL SN SO STA STK STR STRD
STRM STRS SV1 T TA TAA TAG TBA TC TCA TDA TDB
TEA TIC TIP TIPL TEA TL TLC TMP TMS TPU U UA
UAA UC UDN ULN UM UPA UPC UPD VN X XR Z ZN
ZTX + many others

Please visit our website at
www.cricklewoodelectronics.com
17 thousand components in stock

Mail, phone, Fax, Credit Card orders & callers welcome.



Cricklewood Electronics Ltd

40-42 Cricklewood Broadway, London NW2 3ET
Tel: 020 8452 0161 Fax: 020 8208 1441

Visit our new www.cricklewoodelectronics.com
Email: sales@cricklewoodelectronics.com

leaders

reliability practicability professionalism



Multimeter FSM Indispensable Installer's TOOL

THE ULTIMATE RANGE FIELD STRENGTH METERS (FSM)

- 3 or 5" TFT screen
- High resolution 0.1dB
- High accuracy +1dB MATV & +2SAT
- C/N measurement (analogue and digital measurements)
- Up to 4hours battery
- Shock protection (rubber)
- Quick menu keys
- RS232 & Scart sockets
- Easy and friendly to use

Televés U.K.LTD
T. 01633-875821
F. 01633-866311
televés.uk@televés.com



Televés
www.televés.com

Digi Repairs UK & Ireland

sky+ TRADE REPAIR SERVICE FOR THE UK & EIRE

Are you looking for a reliable company to repair your sky digiboxes?
We offer **FREE SAMEDAY** Collection when you send more than one box for repair!

- **FIXED PRICES**
Pace, Grundig, Amstrad Fixed price £38 + VAT includes return delivery
Panasonic, Sony Fixed price £55 + VAT includes return delivery
Sky + (Standard repair) Fixed price £45 + VAT includes return delivery
(Hard Drive replacement) Fixed price £75 + VAT includes return delivery
- Prices include all faults Micro processor, Modem, Software corruption and BGA replacement. Send more than one box at a time we collect for FREE.
- Specialists in the repair of Amstrad & Sony digiboxes.
- Refurbished digiboxes for sale.
- Fast Turnaround Time.
- All repairs fully guaranteed.
- Collection arranged from anywhere in the United Kingdom and Eire.
- Authorised Sky Digital Repair Centre.

Receive our latest Satellite and technical newsletter **FREE** through email. Just send us an email with Newsletter in the Subject title to:
info@digirepairs.co.uk

Contact:
DIGI REPAIRS (UK & Ireland)
UNIT 25, ENNISKILLEN BUSINESS CENTRE
TEMPO ROAD, ENNISKILLEN BT74 4RL
TEL: 02866327293 (NATIONAL RATE)
0845 6441628 (LOCAL RATE)
Email: info@digirepairs.co.uk

www.sdstrade.co.uk

sky Freeview OR sky FREEVIEW

SPECIALISTS IN ALL MAKES AND MODELS OF SATELLITE EQUIPMENT

ALL ORDERS WELCOME - LARGE OR SMALL

REPAIRS FROM ONLY £35 + VAT

SKY & SKY+ SPARES - MOST MAKES AND MODELS

sky+ **NEW MODEL SKY+ INCLUDING DELIVERY AND INSTALLATION KIT - £199**

HUNDREDS OF REFURBS AND NEW BOXES CALL FOR PRICES OR VISIT OUR WEB SITE

EXCLUSIVE TO SDS!



SILVER PACE 2200 DIGIBOXES CALL FOR TRADE PRICES

SDS
Satellite & Digital Services Ltd

1 HOWARD AVENUE
BARNSTAPLE
DEVON
EX32 8QA
TEL: 01271 325888
FAX: 01271 329163

Service Link

TELEPHONE 01322 611254
FAX 01322 616376

FOR SALE

inStore
ELECTRICS LIMITED
171 HAREHILLS LANE,
LEEDS LS8 3QE
Tel: 0113 240 1114

Tatung LCD 15"£239
Philips LCD 15"£299
Philips LCD 17"£299

Other models available.
CALL FOR FULL PRICE LIST

Ex Rental TVs Sony, Philips, Hitachi

32 and 28 Widescreens
Portables, Combis
For stock and price
Telephone
Barry McDonald
07836 789528

PROJECTOR SPARES

Spare parts and service
information for
VIDIKRON
video projectors from
PROJECTSPARES
Tel: 01444 831769
Fax: 01444 831580
E-mail:
projectspares@btinternet.com

**Service
Link**

RECRUITMENT

Are you...

- Based in the South-East?
- Familiar with electro-mechanics?
- Used to field work and dealing with people?
- Looking for a competitive salary?
- And a secure career change?
- Wanting variety and a challenge?

Talk to Peter on 01323 842843

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)
Over 30 years experience and vast
data base
0906 470 1706
Calls cost 60p per minute

SERVICE MANUALS

and Service Sheets for
TV - VIDEO - AUDIO

Prices start at

CTV	s/sheet	5.00
VCR	s/sheet	7.00
CTV	s/man	10.00
VCR	s/man	13.00

No p/p or VAT
- Other items POA -

AMTEL

Huna,
Caithness KW1 4YL
01955 611313
www.amtel.co.uk

SERVICE MANUALS

Have you ever turned away
work for want of a Service
Manual? Have you ever brought
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/Fax No: 01291 623086
Visa: Mastercard accepted

**OPEN
6 DAYS**
TV/VCR CIRCUITS
(WE DO NOT STOCK
AUDIO OR MONITOR
INFORMATION)

**TEL A.T.V. on
0114 285 4254**

CTV Circuits from £5.00
VCR Circuits from £7.00
CTV Manuals from £10.50
VCR Manuals from £14.50
User instructions also available
(P/P add £2.50 to each order)

**419 LANGSETT ROAD
SHEFFIELD S6 2LL**

MANUAL COLLECTIONS PURCHASED,
(POST 1995)

SERVICE DATA

Service Information **FES** Circuit Diagrams

TV's, VCR's, SATELLITE
CAMCORDERS, AUDIO &
HI-FI's

Prices are from £5.50 + £2.75 P&P
add a further £5.50 per item
in the same order

note: some items priced individually
**we now supply universal
tv/video remotes at competitive
prices**

Payment by credit card, PO or cheque
Tel: Fax 01206 211570
e-mail: colin@fryerns.fsbusiness.co.uk

2 The Lodge
Easthorpe Green
Marks Tey, Colchester
CO6 1HA

WANTED

BEST CASH PRICES PAID

FOR VALVES KT88,
PX4 AND MOST
AUDIO/OTHER
TYPES.

Tel: 01403 784961

Billington Export Ltd
Sussex RH14 9EZ
Fax 01403 783519
Email: sales@bel-tubes.co.uk
Visitors by appointment

For a
FREE

consultation on
how best to market
your products/
services
to a professional
audience contact

**STEVE on
01322 611254**

CLASSIFIED TEL: 01322 611254

WILTSGROVE LTD

35/38 River Street, Digbeth, Birmingham B5 5SB

TEL: 0121 772 2733 - FAX: 0121 766 6100



e-mail: sales@wiltsgrove.co.uk
<http://www.wiltsgrove.co.uk>

Opening Times: 9:00am - 6:00pm (Monday - Saturday)

OFFERS VALID UNTIL THE END OF AUGUST 2004

CD LASER PICKUPS

ORDER CODE	OEM No.	PRICE
AP-1002G	KSS150A, KSS210A	£9.45
AP-1005R	KSS240A	£16.75
AP-1017G	KSS213B	£6.40
AP-1018	VAM1201, VAM1202, CDM12.1, CDM12.2	£11.85 £11.85
AP-1019HD	CDM12.4	£14.75
LASER HEAD ONLY		
AP-1022	HB151AF, H8151AF	£13.60
AP-1023	HB147AF, H8147AF	£26.45
AP-1024	HB136AF, H8136AF	£32.95
AP-1027	OPTIMA150S, OPTIMA6S	£21.50
AP-1039	KSS213D	£9.45
AP-1041G	KSS213F	£9.95
AP-1052P	RAE0152	£14.96
HEAD ONLY		
AP-1058	KCP1H	£9.95
AP-1061	KSM880, KSM880CAB	£19.98

ORDER CODE	OEM No.	PRICE
AP-1073	KSM900AAH	£13.87
AP-1078	KSS213E	£9.95
AP-1086	HPC1MX	£10.95
AP-1087	HPC1LX	£12.95
AP-1092	SOHDP1	£17.75
AP-1094	SOHDV1, SOHDV1U	£19.95
AP-1096G	KSS213C	£6.45
AP-1110	SOHA1, CMSA30NM6	£12.25
AP-1121	KSM440AEM	£24.95
AP-1225	VAM2103	£12.45
AP-1232	SOHAD3	£12.50
AP-1260	VAM1202J	£12.85



MAINS SWITCHES

SW-1047R BUSH	SW-1054R DAI WOO
order code SW-1047R	REMOTE CONTACT £1.95
SW-1054R	NO REMOTE CONTACT £1.95

	Make/Model No BUSH - WS6674 JMB N028WSS JVC AV25TS4EK, AV25SX4EK AV25TS4EK AV32WFP1EK SANYO - CE14M4B SCHNIEDER - STV2803T
order code SW-1043	JVC/SANYO £1.95

SW-1007R	SW-1042R
order code SW-1007R	PHILIPS £1.20
SW-1042R	PHILIPS £1.95

SW-1014R	SW-144R
order code SW-1014R	PHILIPS £1.20
SW-144R	SANYO £1.25

BULLET CAMERAS

BLACK & WHITE BULLET CAMERA

FEATURES:

- Built-in 6 LEDs to observe the security area under dark of 0 Lux
- Extremely low power Consumption

SPECIFICATION:

Image Pick Up Device	1/3 B/W Interline Transfer CCD
Scanning System	2.1 Interlace (NTSC Standard) / 2.1 Interlace (PAL Standard) 525 Lines/60 Fields/30 Frames / 625 Lines/50 Fields/25 Frames
Scanning Frequency	15.734KHz(H), 59.94Hz(V) / NTSC 15.625KHz(H), 50Hz(V)/PAL
Effective Pixels	768(H) x 494(V) / NTSC 752(H) x 582(V) PAL
Image Size	6.00mm(H) x 4.96mm(V)
Video Output	1.0Vp-p NTSC Comp / 1.0Vp-p PAL Comp
Electronic Iris	1/60~1/100,000sec / 1/50 ~ 1/100,000sec
Sync. System	INT Only
Resolution	More than 380 TV Lines
Gamma	r=0.45
S/N Ratio	50dB (AGC Off)
Power Source	DC 12V 200mA 4.5W
LEDs	6 LEDs Built-in
Minimum Illumination	0 Lux
Dimensions (WxHxD)mm	35 x 35 x 50
Lens Type	Regular Lens



order code
AV-1540
£39.95

WATERPROOF COLOUR CAMERA with INFRARED

SPECIFICATION:

Image Sensor	1/4 Colour CCD Camera
Effective Pixels	NTSC: 250,000 - PAL: 290,000
Scanning System	2:1 Interlace
Output Signal	1.0Vp-p (Sync negative) Termination 75 ohms
Light Sensitivity	3 LUX (without LED)
Resolution	Horizontal: 330TV Line
Lens	Fixed Focus Lens
Sensitivity	0 Lux (IR LED on) 0.5 Lux (IR LED off)
Iris	Auto - Iris controlled by Electronic System
Weight	Approx. 280g
S/N Ratio	45dB or more (AGC off)
Gamma	0.45
Gain Control	Automatic Gain Control
Consumed Current	150 mA Max. 180 mA Max. (with 6 white LEDs) 250 mA Max. (with 12 white LEDs)
Power Supply	Regulated DC 12V
Shutter Speed	NTSC: 1/60 ~ 1/100,000 sec. PAL: 1/505 ~ 100,000 sec.
Video Out	RCA or BNC
Operation Temp	-10°C ~ +50°C
LED (Option)	6EA / 12EA



order code
AV-1542
£64.95

Authorised Distributors for Ruwido's Amadeus range of replacement remote controls.

Ruwido remote controls are great value for money with high on quality and easy to use.

The advantages are obvious:

- Performs all original functions.
- Performs all Special functions.
- No need for programming.
- Much more lower in cost!

ruwido



* All items are subject to Availability, Carriage & VAT E & OE.
Prices & Offers subject to change without prior notice

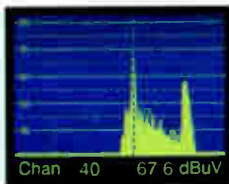
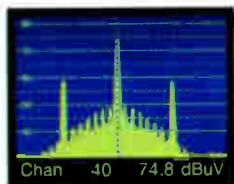
*****TRADE ONLY*****

Freefax Orderline: 0500 55 05 05

TELEVISION TEST PATTERN GENERATORS

The new **GV 998** is a digital pattern generator offering more advanced features at again a realistic price. Those features include :

- ◆ MPEG-2 format Transport Stream generation
- ◆ Video and audio included in the TS
- ◆ Video and audio inputs
- ◆ Generation of a variable frequency sound carrier for decoding verification
- ◆ Multistandard and multisystem analogue TV signal generation
- ◆ Possibility to edit different fields of the TS database to present the name of the service provider
- ◆ Remote control via a personal computer
- ◆ Moving video patterns to check MPEG-2 decoders



**IDEAL FOR
PLASMA
DISPLAYS**

**IDEAL FOR
WIDE SCREEN**

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
- ◆ Own Company Logo
- ◆ Computer Monitor testers
- ◆ Hand Held Models
- ◆ Multi Standard, PAL, NTSC, SECAM
- ◆ 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**



**AA 930
AUDIO ANALYSER**

**TA 903B
CRT
REJUVENATOR**



**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 577

Analogue & Digital, Satellite & Terrestrial
Measures channel power and C/N



PROLINK 3 + 4 PREMIUM

Satellite & Terrestrial, Analogue & Digital,
Spectrum Analyser with BER (optional on P3)

Alban

ALBAN ELECTRONICS LIMITED

THE PROMAX SERVICE CENTRE

6 Caxton Centre, Porters Wood,
St. Albans, Hertfordshire, AL3 6XT.

TEL: 01727 832266 FAX: 01727 810546

WEB: www.albanelectronics.co.uk

EMAIL: info@albanelectronics.co.uk

SALES + SERVICE + CALIBRATION