Tips, guides and reports for people repairing televisions and electronic equipment

TELEVISION

AND HOME ELECTRONICS REPAIR

NOVEMBER 2001 £3.00

Mobile TV update

Berlin Radio Show report

Motor home installation work

Simple NiCad pulse-charger

9 770032 647115 11

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

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

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

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

classic

Technical helpline 01635 278678

CONTENTS

November 2001 Vol. 52, No. 1

Picture courtesy Ford Motor Company

Editor
Martin Eccles

Consultant Editor
John A. Reddihough

Group Advertisement Sales Executive
Pat Bunce
0208 722 6028
Fax 0208 770 2016

Editorial Office
01782 870684
Fax 01782 878233

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

Next issue, dated December, on sale November 14th.

BBC in the digital age

From its start the BBC has been a broadcaster in the fullest sense of the term: it devised transmission and reception equipment, built up one of the first transmitting networks in the world. and provided programming to feed the transmitters and make it worthwhile to construct (in the very early days) or buy reception equipment. Throughout its long and illustrious history, starting as the British Broadcasting Company in 1922 (with a staff of four!), becoming a public corporation in 1927, and up to the present time it has been at the forefront of broadcasting technology. When the idea of digitising signals first came to be considered, the BBC was at work investigating the possibilities. There were two achievements in particular prior to the age of digital signal transmission.

By 1969 the BBC had devised and brought into operation for networking throughout the UK a sound-in-sync system (compress the sound, digitise it and insert the result in the line sync pulse period). This reduced the number of transmission lines required (many rented from the GPO, as it then was) and, at the same time, improved the sound quality (the bandwidth was increased from 10kHz to 14kHz). It involved practical implementation of the processes of signal sampling, digitalisation and pulse code modulation – with the added advantage of noise reduction. Not long after that BBC engineers went on to develop Ceefax. ITA engineers were working along the same lines and came up with a similar idea, Oracle. Two such technologies would obviously make life unnecessarily difficult for the setmakers and everyone else, so work on a common standard was initiated. Agreement was reached in January 1974: teletext, as we now know it, came into full-scale operation in the autumn of 1976.

Subsequently BBC engineers came up with the Nicam digital sound transmission system. Digital signal and transmission technology is not new to the BBC, which in fact helped to create it.

It was probably more important in the early days of broadcasting to integrate technological research, transmission capability and programme making. In more recent times there has been a belief, in all industries, that different activities are best run by separate companies/organisations, and this is the way things have tended to go. The results have not been all that encouraging. Take the railways for example. To separate the running of trains from the provision of tracks and signalling looks like a recipe for disaster. Enough said. Industrial and service companies have long been urged to rid themselves of property ownership, and have largely done so. This helps the property companies of course, but I'd say that it was astute for a retail company, for example, to own its shops if it can afford to do so. Several companies have come unstuck when they have sold off the freeholds and subsequently found that, when trading conditions became difficult, they couldn't pay the rent. Companies have also been urged to outsource all sorts of other activities, with varying consequences. Such ideas tend to go in cycles. No doubt the latest generation of business consultants are urging their clients to take on the ownership of premises and so on. In the broadcasting field the ITC followed the trend by divesting itself of its engineering and transmission side to NTL. Now that NTL is in difficulties, the aerials and transmission business has been put up for sale. The US investment bank Goldman Sachs has been appointed to seek a trade buyer. No one knows who will end up owning the ITV transmitters. This couldn't, surely, be the outcome that was envisaged?

The BBC at any rate remains a largely integrated organisation, though management fads have created more than enough problems for the Corporation in recent years. It is at present developing digital services and, some time back, presented proposals for new channels to the Department of Culture, Media and Sport. For four digital TV and five digital radio channels to be precise. The government has now responded. Three of the TV channels (two children's channels and one, BBC4, devoted mainly to the arts, science and current affairs, a replacement for BBC Knowledge) have been given the OK, as have the five digital radio channels. But the proposed BBC3, an entertainment channel aimed at those aged 16-34, as a replacement for BBC Choice, has not been approved. The BBC was told that it has not made a good enough case. It has however been given the opportunity to put forward new proposals. According to Culture Secretary Tessa Jowell, the BBC's proposals for BBC3 "were not truly distinctive in an already overcrowded market".

There has of course been a lot of pressure from the commercial channel operators to limit the BBC's efforts to make itself a major force in digital broadcasting. This seems to be the main reason for the failure to give BBC3 the go ahead. The commercial broadcasters are certainly going through a very difficult period, and there are probably enough general entertainment channels. But the BBC wants to be able to appeal to audiences across the board, as it has in the past. If it fails to gain a significant audience in this important sector, one knows all too well what the argument will be next time round: public service broadcasting doesn't appeal to the majority of viewers and should be sold off.

It's a great pity that we have to put up with all this horse trading in the broadcasting field. In the interests of diversity I suppose we have to live with it, but let's hope that the present and future governments will continue to appreciate the importance of public service broadcasting, which the BBC is now giving a digital dimension.

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

INDEXES AND BINDERS
Indexes for Vols. 38 to 50 are available at £3.50 each from SoftCopy Ltd., who can also supply an thirteen-year consolidated index on computer disc. For further details see page 54.
Binders that hold twelve issues of *Television* are available for £6.50 each from Television Binders, 78 Whalley Road, Wilpshire, Blackburn BB1 9LF. Make cheques payable to "Television Binders".

BACK NUMBERS
Some back issues are available at £3.00 each.

SUBSCRIPTION ENQUIRIES
Telephone: 01444 475631
Fax: 01444 445 447
Credit card orders: 01622 778 000
Address: Television, Subscriptions, Rockwood House, 9-17 Perrymount Road, Haywards Heath, RH16 3DH.
Make cheques payable to: Television
Subscription rates:
UK £32.00 per year
Airmail Eire £36.00 per year
Airmail Europe £46.00 per year
Airmail Rest of World £59.00 per year

NEWSTRADE ENQUIRIES
Distributed by COMAG
Telephone: 01895 444055

ISSN **1475-7052**

Cumulus BUSINESS MEDIA

TELETOPICS

ITV via satellite

ITV has been making preparations for the start of satellite transmission. Three transponders aboard Astra 2D have been leased for ten years, and a contract has been signed with NTL Broadcast to uplink all fifteen ITV services. Connections from regional studios will be via the NTL fibre network. This deal puts in place the technical infrastructure for ITV satellite transmissions.

Reception would be via Sky dishes and digiboxes, but there has been a problem over conditional access – ITV and BSkyB cannot agree on terms. ITV could, presumably, make its own arrangements. A relatively minor problem is the location of ITV in the electronic programme guide. Each of the regional franchises will require a separate channel. Another problem is that the ITV signals will reach other countries in northern Europe. ITV has had to negotiate with its programme providers to cater for this, with mixed results. The owners of the Champions League rights for example have refused to agree: when matches are screened by ITV satellite viewers will be directed to switch to the terrestrial service.

Success with ITV via satellite could raise questions about the long-term viability of ITV Digital transmissions.

BSkyB has switched off its analogue transmissions. It has been estimated that some 100,000 subscribers hadn't transferred to the digital services at the switch-off. BSkyB now has over 5·5m digital subscribers.

DVD recorders launched

DVD recorders have now been lunched in the UK. Philips was first off the mark with the DVR1000, which conforms to the DVD+RW standard. It was initially sold at Harrods but has since been rolled out nationally. The price is about £1,300, with blank discs £15 each. The DVR1000 can record up to four hours of video on a 4·7Gbyte disc and has an integrated TV tuner.

Panasonic's DMR-E20 is also now available, at under £1,000. It conforms to the DVD-RAM and DVD-R standards, has extra-long recording times of up to twelve hours, and features a Time Slip function. This enables it to record one programme and play another simultaneously. The Chasing Playback function enables the user to watch from the beginning a recording that has already started while the machine continues to record.

For further information on these and other DVD recorders, see the Berlin Radio Show report, page 18.

LG.Philips Displays demonstrated its new Cybertube CRT range at the Berlin Radio Show. The picture above shows a prototype 32in. high-definition tube in 16:9 format. Full production is expected to start early in 2002, with sets using these tubes being launched in the first half of the year. There will also be 28 and 36in. HD tubes, and 29 and 34in. versions in the 4:3 format. Spot size and uniformity problems have been solved by the use of an advanced electron gun design, while improved deflection yokes ensure optimum picture geometry. The dot pitch is finer than previously, and high-efficiency pigmented phosphors are used. The result is a display which rivals that provided by addressable-pixel array technology, with exceptional colour purity, contrast ratio and picture sharpness.

HDTV broadcasting is not the only reason to use such tubes. Some sets will be fitted with picture improvement processors that sharpen standard-definition pictures. DVD playback and the need to display text-rich web pages from the internet clearly are other reasons.

LG.Philips Displays also demonstrated new slim-line, real-flat standard-definition Cybertubes. These use 120° deflection to reduce the tube depth. As a result, the depth footprint of a 32in. set is no greater than that of a set with a conventional 28in. tube. The new tubes use sophisticated electron optics and advanced glass technology.

STBs

Pace has announced a new low-cost home gateway (STB), Model DTR500, that enables viewers to receive digital terrestrial TV without a pay-TV service subscription. To save space it can be used horizontally or vertically. Its style is radically different from the traditional STB, and it's much smaller.

Microsoft and Philips have released details of an advanced interactive cable STB. It's based on the Philips Nexperia Digital Video Platform (DVP) and Microsoft TV Advanced software, and incorporates the Philips CryptoWorks conditional-access system. The new cable STB enables network operators to offer a wide range of interactive TV services and applications, including enhanced TV, high-speed internet access, a customisable user interface, digital video recording, multiplayer games, an EPG, Windows Media audio and video streaming and complete home networking services.

Bristol-based Cabot Communications, which is owned by Turkish setmaker Vestel, is developing a low-cost STB that gives access to the free-to-view channels. Called PING (Plug in and Go), the unit is expected to be available early in 2002. Vestel was founded in 1984 and has one of the largest TV manufacturing plants in Europe, with an output last year of 5·3m sets, some 90 per cent of which were exported. The company is mainly an OEM source for other brands. It also manufactures white goods.

CD copy-protection systems

The music industry is testing four new copy-protection systems that are designed to prevent consumers copying CDs on CD-ROM drives and make it impossible for PCM audio files to be converted to compressed-file formats like MP3 for storage on a computer hard disk. The systems all exploit the subtle differences between the basic Red Book CD standard, the Yellow Book standard for CD-ROM and the Orange Book standard for CD recorders. CD audio players read the header information on a disc and then play a continuous data stream. In contrast a CD-ROM drive reads data from various sectors on a disc. By adding extra data on an audio CD during production, the copy-protection system can confuse a CD-ROM drive. As a result the disc either doesn't play at all or any copied music files become corrupted.

The copy-protection system developed by Israeli company Midbar Technology, known as Cactus Data Shield (CDS), works by modifying data on an audio CD – the music data itself is untouched. Midbar can provide several different options for music companies, enabling them to control the degree to which music is playable by domestic equipment. With CDS100, an audio CD can be played only by an audio CD deck – a CD-ROM drive cannot read the discs. CDS200 allows a disc to be played by either an audio CD deck or a CD-ROM drive, but the audio files cannot be copied or used with 'ripper' software to produce compressed music files such as MP3. A third option, designed for users who play music from a PC hard drive or an MP3 player, adds compressed and copy-protected music files to a CD disc.

The Sunncomms MediaCloq system prevents users 'ripping' CD files and offers an optional downloading system that allows a user to play music tracks via a PC hard drive.

Sony's DADC key2audio system allows protected discs to be used with audio CD players, DVD-Video players, portable CD players, in-car systems and games consoles like PlayStation 2, but prevents consumers playing a disc with a CD-ROM, DVD-ROM, CD-R or CD-RW drive, whether in a home PC or a hi-fi system. It uses a special data signature that prevents CD playback and copying with a PC. A download option is available.

Macrovision and the Israeli company TTR plan to produce SafeAudio, which works by adding a data signature to the main audio channel. This signature corrupts files that are copied or 'ripped'.

The developers all claim that their systems don't affect sound quality and say that there is high compatibility with standard CD players. Over 2·2 million CDs have been sold in Europe with the new copy-protection systems secretly encoded on them.

Sony's DCR-IP7 camcorder is one of the first two models to use the company's newly developed MicroMV format. The cassettes are 70 per cent smaller than MiniDV standard cassettes. For further details see the Berlin Radio Show report, page 20.

Hitachi withdraws from CE

Hitachi is to "spin off" its consumer-electronics and some of its industrial-equipment operations. It is not exactly clear what the spin-off will entail, but from next April the consumer-electronics operation will become a separate as yet unnamed company. Hitachi's consumer-electronics business is expected to make a substantial operating loss for the year to next March. It accounts for only some 12·5 per cent of Hitachi sales, but is Japan's second-largest CE business. The new company will oversee 21 factories, two in Japan and 19 overseas, and will work in conjunction with Matsushita Electric, with which an alliance was agreed in May to develop digital applications.

Pace sells service division

Following its decision to outsource virtually all STB production, Pace Micro Technology has sold its UK service and repair division to the French company A Novo Group, which has set up a UK subsidiary General Electronique UK Ltd. This will operate at Pace's Saltaire, West Yorkshire headquarters. Pace will continue to employ about 700 at Saltaire on R&D, sales and marketing.

A Novo Group, a global provider of repair and maintenance services, has been providing Pace's overseas servicing requirements.

U-View's move

U-View Ltd., publisher of the popular TV and video circuit diagram books, has moved. The address is now PO Box 595, Doncaster, Yorkshire DN5 7XR. There are new telephone and fax numbers, 01302 337 208 and 01302 724 852 respectively. Or you can e-mail to

u_view_tech@btopenworld.com

Television servicing book 6 has recently been published as a spiral-bound two-volume set at £99 or as a CD-ROM at £79.

TiVo

The price of the TiVo hard-disk digital video recorder in the UK has been reduced to £299 from £399. The additional £10 monthly or £199 product lifetime subscriptions remain the same.

BSkyB has acquired part of a convertible equity stake in TiVo. If further warrants are exercised, BSkyB could end up with more than 8·5 per cent of TiVo. US broadcasters NBC and Discovery also have stakes in TiVo. BSkyB has extended its UK marketing agreement with TiVo for another year, until September 2003 – the original agreement was for two years. BSkyB promotes the sale of TiVo boxes in exchange for a portion of the revenue they generate in sales and monthly rental fees.

Satellite radio

Satellite digital radio broadcaster WorldSpace (see *Television* June page 466 and Teletopics August) has appointed Nevada Distribution as official UK distributor of receivers for its service. Dealers requiring information should contact the Nevada sales desk on 02392 313 095. For further information visit the Nevada website at

www.nevada.co.uk

Test card website

Just about every test card from Baird's original up to the latest 16:9 aspect ratio type can be seen at the following website:

www.meldrum.co.uk/mhp/testcard/...

Grandata Ltd

distributor of electronic components

CD Pick Ups and Assemblies

PART NO	PRICE
2001600001	£28.00
6142205006	£47.00
6450067983	£18.00
6450253089	£25.00
482269110487	£45.00
A4672541A (Mini Disc)	£54.00
CDM12.1 Mech	£16.00
CDM12.3BLC	£45.00
CDM12.4	£16.00
CDM9/44	£21.00
CDM9/44 Mech	£24.00
DAX11A	£26.00
H8112AF	£16.00
HOPM3	£21.50
HPC1MX	£20.00
KCP1H	£17.50
KSL2101ABM Mech	£18.00
KSM213CCM Mech	£15.00
KSM620AAA Mechanism (Suitable for Pioneer)	£26.75
KSS210A Original	£14.00
KSS210A Replace	£11.00
KSS210B	£15.00
KSS212A	£16.00
KSS212B	£11.50
KSS213B	£11.50
KSS213C	£11.50
KSS213D	£16.00

PART NO	PRICE
KSS213E	£13.75
KSS213F	£12.00
KSS320B	£22.75
KSS330A	£28.00
KSS331A	£21.00
KSS331C(RP)2	£38.00
KSS360A	£24.00
KSS363A	£22.00
KSS480A	£20.00
KSS540A	£17.00
KSS542A	£23.50
KSS543A	£22.00
KSS580A	£23.00
KSS880	£24.00
KSS240A Original	£ 30.00
NKS240A (Replacement for KSS240A)	£20.00
OPTIMA5S	£11.50
OPTIMA6S	£11.50
OPTIMA7 (Mini Disc)	£12.00
OPTIMA710A	£19.00
OPTIMA720A	£14.75
PEA1030	£44.00
PEA1179	£45.00
PEA1291	£45.00
PWY1009	£48.00
PWY1010	£45.00
RAE0113Z	£30.00
RAE0140Z	£45.00

PART NO	PRICE
RAE0150Z	£28.00
RAE1052Z	£20.00
RAE150Z Mechanism	£35.00
RCTRH8112	£14.00
RCTRH8136	£45.00
RCTRH8147 Mechanism (Suitable for Denon & Sharp)	£10.00
RCTRH8151	£16.00
RCTRH8153	£36.00
RCTRH8173 (Mini Disc)	£20.00
RCTRH8175 (Mini Disc)	£60.00
SF90	£20.00
SF91	£16.00
SF91 Carriage	£20.00
SFC93	£17.00
SFP1	£12.00
SFP100	£16.00
SFP101 (5 & 8 PIN PLUG)	£15.00
SFP101 with amp IC	£15.00
SFP101 without amp IC	£21.00
SFP101N15	£14.00
SFP101N16	£14.00
SOAD70A	£52.00
SOH90T4N	£17.00
SOHA1	£19.50
SOHAP	£18.00
X49460541 (Mini Disc)	£90.00
X49482601 (Mini Disc)	£65.00

CD Spindle Motors

22.5 mm Shaft — Order Code : CDMOT1 — Price : £ 2.00 + vat

8mm Shaft — Order Code : CDMOT2 — Price : £ 2.00 + vat

Fault Finding & Reference Books

New VCR Fault Finding Guide (Issue 6 - 2001)

Over 400 A5 pages of information Approximately 25% additional information

Over 8000 different faults listed Seperate section for VCR/TV combinations

This book has been revised and uodated with approximately 25% addditional information and conatins over 8000 fault entries for a range of VCRs and TV/VCR combination units. As in previous issues the new information has been merged with existing data to give a comprehensive listing which has been arranged in order by brand and model and fault symptons to provide a quick reference to numerous fault conditions on a range of models.

Order Code : BOOK01

Price : £ 17.50 (No VAT - Postage £ 2.00 + vat)

Jaeger SMD Decoder Book

Over 10,000 SMD Codes listed
Over 200 pages listing each device by : Markings , Manufacturer , Device Type , Correction Type Designation , Base Number , Case Size

Order Code : BOOK08

Price : £ 7.50 (No VAT)

Jaeger 2001 Semiconductor Comparison Book

This A5 book contains vital reference information on 36,800 type on semiconductors , together with alternatives , descriptions and base connections

Order Code : BOOK04

Price : £ 20.00 + vat

(plus £ 2.00 +vat Postage)

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

Tel : (020) 8900 2329 Email : grandata.ltd@btinternet.com

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

Grandata Ltd

distributor of electronic components

105°c Radial Electrolytic Capacitors

VALUE	CODE	PRICE	PER PACK
10 Volts			
100uF	CAP118	£0.45	10
470uF	CAP29	£1.20	10
1000uF	CAP119	£1.50	10
2200uF	CAP120	£2.10	10
16 Volts			
22uF	CAP121	£0.35	10
33uF	CAP122	£0.35	10
47uF	CAP123	£0.35	10
100uF	CAP124	£0.60	10
220uF	CAP125	£0.80	10
330uF	CAP30	£1.75	10
470uF	CAP31	£1.75	10
680uF	CAP32	£2.10	5
1000uF	CAP33	£2.10	10
2200uF	CAP34	£5.25	10
3300uF	CAP35	£5.00	5
4700uF	CAP36	£6.10	10
25 Volts			
10uF	CAP37	£0.45	10
22uF	CAP38	£0.45	10
33uF	CAP126	£0.40	10
47uF	CAP39	£0.48	5
68uF	CAP127	£0.55	10
100uF	CAP40	£0.70	10
120uF	CAP128	£0.85	10
150uF	CAP41	£0.95	5
220uF	CAP42	£1.20	10
330uF	CAP43	£1.40	5
470uF	CAP44	£1.90	10
680uF	CAP45	£3.15	5
1000uF	CAP46	£3.65	10

VALUE	CODE	PRICE	PER PACK
10 Volts continued			
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	CAP52	£0.50	10
22uF	CAP53	£0.45	10
33uF	CAP54	£0.50	5
47uF	CAP55	£0.85	10
68uF	CAP133	£0.55	10
100uF	CAP56	£0.85	10
150uF	CAP57	£0.95	5
220uF	CAP58	£1.45	5
330uF	CAP134	£1.60	10
470uF	CAP135	£1.75	10
680uF	CAP59	£6.50	10
1000uF	CAP60	£4.35	10
2200uF	CAP61	£2.45	2
3300uF	CAP62	£10.00	5
4700uF	CAP136	£3.50	2
50 Volts			
1uF	CAP137	£0.35	10
2.2uF	CAP138	£0.35	10
3.3uF	CAP139	£0.35	10
4.7uF	CAP140	£0.35	10
10uF	CAP63	£0.50	10
22uF	CAP64	£0.70	10

VALUE	CODE	PRICE	PER PACK
50 Volts continued			
33uF	CAP141	£0.85	10
47uF	CAP65	£0.85	10
68uF	CAP142	£0.90	10
100uF	CAP66	£0.85	10
220uF	CAP67	£1.75	10
330uF	CAP68	£2.45	10
470uF	CAP69	£4.35	10
680uF	CAP70	£4.90	5
1000uF	CAP71	£5.25	10
1500uF	CAP143	£4.50	5
2200uF	CAP72	£3.25	2
3300uF	CAP144	£3.25	2
63 Volts			
0.22uF	CAP145	£0.45	10
0.47uF	CAP73	£0.35	10
1uF	CAP74	£0.35	10
2.2uF	CAP75	£0.35	10
3.3uF	CAP76	£0.50	10
4.7uF	CAP77	£0.35	10
10uF	CAP78	£0.50	10
15uF	CAP79	£0.95	5
22uF	CAP80	£0.75	10
33uF	CAP81	£0.85	10
47uF	CAP82	£0.95	10
68uF	CAP83	£1.30	5
100uF	CAP84	£1.20	10
150uF	CAP85	£2.80	5
220uF	CAP86	£2.80	10
330uF	CAP87	£4.00	10
470uF	CAP88	£5.25	10
680uF	CAP89	£5.00	10
1000uF	CAP90	£5.40	5

VALUE	CODE	PRICE	PER PACK
100 Volts			
0.47uF	CAP91	£0.50	5
1uF	CAP92	£0.85	10
1.5uF	CAP93	£0.70	5
2.2uF	CAP94	£0.50	5
3.3uF	CAP95	£0.50	5
4.7uF	CAP96	£0.50	5
10uF	CAP97	£0.95	10
22uF	CAP98	£1.05	10
33uF	CAP99	£1.55	5
47uF	CAP100	£1.75	10
100uF	CAP101	£2.10	10
220uF	CAP102	£6.00	5
470uF	CAP103	£6.00	5
160 Volts			
2.2uF	CAP146	£0.45	10
10uF	CAP147	£1.40	10
22uF	CAP148	£1.80	10
33uF	CAP149	£2.30	10
100uF	CAP150	£3.25	5
200 Volts			
100uF	CAP151	£3.25	5
250 Volts			
1uF	CAP152	£0.60	10
3.3uF	CAP104	£1.75	10
10uF	CAP105	£2.60	10
22uF	CAP153	£2.30	10
47uF	CAP106	£4.35	10
100uF	CAP154	£4.50	5
220uF	CAP155	£2.00	2

VALUE	CODE	PRICE	PER PACK
350 Volts			
1uF	CAP156	£0.70	10
3.3uF	CAP157	£1.50	10
10uF	CAP158	£2.25	10
22uF	CAP159	£3.40	10
400 Volts			
1uF	CAP107	£2.15	5
2.2uF	CAP108	£2.25	5
4.7uF	CAP109	£3.15	5
10uF	CAP110	£4.00	5
22uF	CAP111	£2.50	2
47uF	CAP112	£3.50	2
100uF	CAP160	£4.00	2
220uF	CAP161	£7.00	2
450 Volts			
1uF	CAP113	£2.80	5
2.2uF	CAP114	£3.20	5
4.7uF	CAP115	£4.95	5
10uF	CAP116	£5.50	5
22uF	CAP117	£4.15	2

Fuses

20mm Glass

TIME LAG

CURRENT RATING	ORDER CODE	PRICE
100mA	FUSE36	75p
160mA	FUSE01	75p
250mA	FUSE02	75p
315mA	FUSE03	75p
400mA	FUSE04	75p
500mA	FUSE05	75p
630mA	FUSE06	75p
800mA	FUSE07	60p
1A	FUSE08	60p
1.25A	FUSE09	60p
1.6A	FUSE10	60p
2A	FUSE11	50p
2.5A	FUSE12	50p
3.15A	FUSE13	55p
4A	FUSE14	55p
5A	FUSE15	60p
6.3A	FUSE16	60p

QUICK BLOW

CURRENT RATING	ORDER CODE	PRICE
100mA	FUSE37	60p
160mA	FUSE17	60p
250mA	FUSE18	60p
315mA	FUSE19	60p
400mA	FUSE20	60p
500mA	FUSE21	60p
630mA	FUSE22	60p
800mA	FUSE23	60p
1A	FUSE24	60p
1.25A	FUSE25	60p
1.6A	FUSE26	60p
2A	FUSE27	60p
2.5A	FUSE28	60p
3.15A	FUSE29	50p
4A	FUSE30	50p
5A	FUSE31	50p
6.3A	FUSE32	50p

All above Fuse prices are for a pack of 10

Wickman Fuses

FAST BLOW

CURRENT RATING	ORDER CODE	PRICE
0.04A	FUSE53	60p
0.05A	FUSE54	35p
0.063A	FUSE55	35p
0.08A	FUSE56	35p
0.1A	FUSE57	30p
0.125A	FUSE58	30p
0.16A	FUSE59	30p
0.2A	FUSE60	30p
0.25A	FUSE61	30p
0.315A	FUSE62	30p
0.4A	FUSE63	30p
0.5A	FUSE64	30p
0.63A	FUSE65	30p
0.8A	FUSE66	30p
1A	FUSE67	30p
1.25A	FUSE68	30p
1.6A	FUSE69	30p
2A	FUSE70	30p
2.5A	FUSE71	30p
3.15A	FUSE72	30p
4A	FUSE73	30p

SLOW BLOW

CURRENT RATING	ORDER CODE	PRICE
0.05A	FUSE74	65p
0.063A	FUSE75	65p
0.08A	FUSE76	65p
0.1A	FUSE77	35p
0.125A	FUSE78	35p
0.16A	FUSE79	35p
0.2A	FUSE80	30p
0.25A	FUSE81	30p
0.315A	FUSE82	30p
0.4A	FUSE83	30p
0.5A	FUSE84	30p
0.63A	FUSE85	30p
0.8A	FUSE86	30p
1A	FUSE87	30p
1.25A	FUSE88	30p
1.6A	FUSE89	30p
2A	FUSE90	30p
2.5A	FUSE91	30p
3.15A	FUSE92	30p
4A	FUSE93	30p
5A	FUSE94	30p

All above Wickman Fuse prices are for single units

CERAMIC PLUG TOP (MAINS) FUSES

RATING	CODE	PRICE	RATING	CODE	PRICE	RATING	CODE	PRICE
3A	FUSE33	£1.00	5A	FUSE34	£1.00	13A	FUSE35	£1.00

Soldering Irons and Solder

Antex Soldering Irons

Description	Order Code	Price
25 watt 240 VAC Iron	SI01	£12.50 + vat
25 watt Spare Element	SI03	£6.00 + vat
15 watt 240 VAC Iron	SI02	£12.50 + vat
15 watt Spare Element	SI04	£6.00 + vat

Solder

Solder Gauge & Weight	Code	Price
18 SWG 500 grammes	SI10	£ 5.00
20 SWG 500 grammes	SI11	£ 6.50
22 SWG 500 grammes	SI12	£ 7.00

Grandata Ltd

distributor of electronic components

Transistors / Linear IC's

TRANSISTORS	
2N 2218A	24p
2N 2222	23p
2N 2369	15p
2N 2484	15p
2N 2646	40p
2N 2904	20p
2N 2905	20p
2N 2906	18p
2N 2907	18p
2N 3019	28p
2N 3053	18p
2N 3054	40p
2N 3055	38p
2N 3055H	50p
2N 3440	45p
2N 3441	175p
2N 3442	85p
2N 3771	85p
2N 3772	90p
2N 3773	100p
2N 3819	29p
ACY 18	48p
ACY 19	48p
AD 149	60p
AF 127	100p
AF 139	30p
BCY 33	200p
BCY 70	16p
BCY 71	16p
BCY 72	16p
BD 131	25p
BD 132	25p
BD 133	50p
BD 135	20p
BD 136	20p
BD 137	20p
BD 138	20p
BD 139	20p
BD 140	20p
BD 244	50p
BD 245	50p
BFQ 162	100p
BFQ 232	75p
BFQ 235A	75p
BFQ 252A	60p
BFQ 255A	75p
BFQ 262A	75p
BFX 84	15p
BFX 85	20p
BFX 87	15p
BFX 88	15p
BFX 89	40p
BFY 50	14p
BFY 51	14p
BFY 52	14p
BU 1506DX	130p
BU 1508AX	130p
BU 1508DX	105p
BU 180	100p
BU 204	65p
BU 205	70p
BU 206	100p
BU 207	150p
BU 208A	75p
BU 208AT	200p
BU 208D	130p
BU 2506DF	90p
BU 2506DX	100p
BU 2508A	100p
BU 2508AF	110p
BU 2508AX	130p
BU 2508D	130p
BU 2508DF	120p
BU 2508DX	150p
BU 2520AF	170p
BU 2520AX	140p
BU 2520DF	225p
BU 2520DX	200p
BU 2522AX	150p
BU 2525A	325p
BU 2525AF	220p
BU 2525AX	190p
BU 2525D	240p
BU 2525DX	175p
BU 2527AF	400p
BU 2527AX	250p
BU 2532AL	325p
BU 2722AF	330p
BUF 405A	200p
BUF 405AF	300p
BUH 1215	450p
BUH 315	200p
BUH 315D	175p
BUH 515	200p
BUH 515D	250p
BUH 517	275p
BUH 517D	175p
BUH 715	425p
BUL 310	125p
BUT 11A	30p
BUT 11AF	35p
BUT 11AX	50p
BUT 12A	80p
BUT 12AF	90p
BUT 18A	80p
BUT 18AF	65p
BUT 56A	65p
BUZ 77B	250p
BUZ 80	135p
BUZ 80AF	200p
BUZ 90A	180p
BUZ 90AF	280p
BUZ 91A	260p
IRF 510	70p
IRF 520	75p
IRF 530	75p
IRF 540	100p
IRF 610	80p
IRF 620	100p
IRF 630	75p
IRF 640	150p
IRF 710	150p
IRF 720	85p
IRF 730	125p
IRF 740	90p
IRF 820	90p
IRF 830	85p
IRF 9610	95p
IRF 9620	85p
IRF 9630	130p
IRFBC 30	120p
IRFBC 40	210p
IRFP 150	240p
IRFP 240	300p
IRFPC 40	300p
IRFPC 50	450p
IRFZ 44	160p
MJ 11015	250p
MJ 11016	300p
MJ 15003	250p
MJ 15004	300p
MJ 15015	250p
MJ 15016	350p
MJ 15022	400p
MJ 15023	400p
MJ 15024	400p
MJ 15025	300p
MJE 16206	450p
MJE 18004	175p
MJE 18006	200p
MJE 18008	175p
MJE 18201	350p
OC 28	350p
S 2000A3	175p
S 2000AF	90p
S 2000N	150p
S 2055A	175p
S 2055AF	175p
S 2055N	150p
TIP 121	35p
TIP 122	30p
TIP 125	30p
TIP 126	40p
TIP 127	35p
TIP 145	50p
TIP 147	80p
TIP 2955	50p
TIP 29A	22p
TIP 29C	25p
TIP 3055	50p
TIP 30C	25p
TIP 31A	22p
TIP 31C	27p
TIP 32A	21p
TIP 32C	28p
TIP 33	50p
TIP 33C	60p
TIP 34	65p
TIP 34C	60p
TIP 35C	65p
TIP 36C	65p
TIP 41A	20p
TIP 41C	22p
TIP 42A	20p
TIP 42C	22p

VOLTAGE REGULATORS	
7805	18p
7806	18p
7808	25p
7809	18p
7812	18p
7815	25p
7818	25p
7824	25p
7905	25p
7912	30p
7915	30p
7918	30p
7924	30p
LM 309K	100p
LM 317T	100p

LINEAR IC's	
AN 5151	200p
AN 5265	80p
AN 5512	100p
AN 5515	160p
BA 5402	180p
BA 5406	180p
BA 6209	85p
HA 13150A	1150p
HA 13151	875p
HA 13152	800p
HA 13153A	900p
HA 13157	950p
HA 13158	800p
KIA 6210AH	400p
L 200	200p
L 272	200p
LA 4440	200p
LA 4445	200p
LA 4446	170p
LA 4450	330p
LA 4451	500p
LA 4460	120p
LA 4461	120p
LA 4705	400p
LA 7830	90p
LA 7831	85p
LA 7837	150p
LA 7838	200p
LA 7840	175p
LA 7850	225p
LA 7851	200p
LM 2405T	625p
LM 2406T	400p
LM 2416T	650p
LM 2419T	800p
LM 301	26p
LM 324	30p
LM 339	35p
LM 380	80p
LM 381	150p
LM 382	130p
LM 386	60p
LM 387	100p
LM 389N	105p
LM 3900	40p
LM 3909	100p
LM 3914	160p
LM 3915	160p
LM 3916	270p
LM 393	45p
LM 723	40p
LM 741DIL	18p
LM 747	55p
MB 3730	900p
MC 44602P2	250p
NE 5532P	140p
NE 555	20p
NE 556	40p
SAA 1293	850p
SAA 3004	400p
SAA 5000	200p
SAA 5010	220p
SAA 5012	400p
SAA 5020	350p
SAA 5030	440p
SAA 5050	650p
SAA 5231	170p
SAA 7000	550p
STK 0049	510p
STK 0050	1200p
STK 0059	1000p
STK0080	1000p
STK015	900P
STK025	650p
STK084	600p
STK1039	460p
STK1040	640p
STK1049	700p
STK1060	700p
STK2025	620p
STK2030	1000p
STK2101	1050p
STK2110	550p
STK2230	1300p
STK2240	1800p
STK2250	1600p
STK3044	500p
STK3082	550p
STK3152 II	900p
STK3156	500p
STK4017	400p
STK4019	480p
STK4021	380p
STK4024 II	550p
STK4025	530p
STK4026	480p
STK4026II	480p
STK4028	550p
STK4036	800p
STK4038	680p
STK4042 II	800p
STK4044	950p
STK4046	950p
STK4050 II	1600p
STK405-050A	1200p
STK4060	510p
STK4065	650p
STK4101	500p
STK4111	400p
STK4112	500p
STK4121	480p
STK4122	560p
STK4130 II	700p
STK4131	480p
STK4132 II	600p
STK4133 II	750p
STK4140 II	800p
STK4141 II	420p
STK4141 V	480p
STK4142	530p
STK4150 II	1200p
STK4151	680p
STK4152	650p
STK4161	650p
STK4162	550p
STK4171	900p
STK4172 II	680p
STK4181	680p
STK4182 II	750p
STK4191	900p
STK4192	700p
STK4197 II	950p
STK4199 II	1050p
STK4204 II	1050p
STK4211 V	800p
STK4221 II	1200p
STK4231 II	1050p
STK4231 V	1400p
STK4272	500p
STK4273	700p
STK4274	500p
STK4301	500p
STK4311	650p
STK433	400p
STK4332	365p
STK435	375p
STK4352	500p
STK436	430p
STK4362	450p
STK437	600p
STK4372	490p
STK439	500p
STK4392	500p
STK441	680p
STK4412	450p
STK4432	600p
STK457	470p
STK459	560p
STK460	660p
STK461	600p
STK463	950p
STK465	900p
STK4773	820p
STK4803	1300p
STK4813	800p
STK4833	850p
STK4873	1100p
STK501	550p
STK5314	475p
STK5315	500p
STK5323	600p
STK5324	300p
STK5325	370p
STK5326	750p
STK5330	850p
STK5331	300p
STK5332	180p
STK5333	650p
STK5335	350p
STK5336	350p
STK5337	500p
STK5338	295p
STK5339	400p
STK5340	350p
STK5342	245p
STK5343	380p
STK5352	500p
STK5353	400p
STK5361	375p
STK5362	400p
STK5364	250p
STK5371	350p
STK5372	260p
STK5373	375p
STK5383	300p
STK5391	375p
STK5392	500p
STK5431	550p
STK5434	570p
STK5436	500p
STK5441	350p
STK5443	575p
STK5446	350p
STK5451	390p
STK5461	500p
STK5462	350p
STK5464	300p
STK5466	500p
STK5467	400p
STK5468	300p
STK5471	900p
STK5472	375p
STK5473	480p
STK5474	500p
STK5476	350p
STK5477	700p
STK5478	250p
STK5479	300p
STK5481	470p
STK5482	285p
STK5483	440p
STK5486	450p
STK5488	480p
STK5490	450p
STK561	400p
STK563	415p
STK5632	300p
STK5720	400p
STK5725	350p
STK5730	300p
STK583	400p
STK6316	300p
STK6324B	500p
STK6327	1200p
STK6328A	400p
STK6431	600p
STK6607	400p
STK6722	650p
STK6732	1000p
STK6822	750p
STK6875	650p
STK6922	1500p
STK6932	450p
STK6962	275p
STK6972	300p
STK6981B	500p
STK6982	600p
STK6982H	600p
STK7216	420p
STK7217	250p
STK7225	500p
STK7226	1700p
STK730-060	650p
STK730-080	600p
STK7308	700p
STK7309	400p
STK7310	320p
STK73405 II	550p
STK73410	350p
STK73410 II	500p
STK7348	400p
STK7356	425p
STK7358	440p
STK73908	550p
STK7402	560p
STK7404	600p
STK7406	650p
STK7408	675p
STK7410	1500p
STK7562	1000p
STK7563	800p
STK7573	300p
STK760	500p
STK770	400p
STK7707	900p
STK780	480p
STK78603	750p
STK795	325p
STK79917	800p
STK8260	1200p
STK8280	1850p
STR 10006	450p
STR 11006	325p
STR 12006	350p
STR 17006	500p
STR 20015	400p
STR 2005	400p
STR 2012	350p
STR 30110	330p
STR 30115	275p
STR 3135	250p
STR 370	300p
STR 371	400p
STR 380	350p
STR 381	390p
STR 383	410p
STR 384	350p
STR 40090	350p
STR 40115	600p
STR 4090A	650p
STR 4211	315p
STR 440	800p
STR 44115	475p
STR 450A	700p
STR 451	800p
STR 45111	550p
STR 452	475p
STR 453	500p
STR 454	1300p
STR 455	550p
STR 456	470p
STR 457	600p
STR 470	300p
STR 50020	350p
STR 50103A	260p
STR 50112A	650p
STR 50113	500p
STR 50115	500p
STR 50213	400p
STR 50330	475p
STR 51424	700p
STR 53041	400p
STR 54041	320p
STR 5412	280p
STR 55041	450p
STR 56041	550p
STR 58041	250p
STR 59041	300p
STR 60001	525p
STR 6020	270p
STR 61001	475p
STR 80145	475p
STR 81145	375p
STR 83145	500p
STR 83159	700p
STR 9005	400p
STR 9012	300p
STRD 1706	360p
STRD 1806	360p
STRD 1816	350p
STRD 6008	575p
STRD 6108	450p
STRD 6202	400p
STRD 6601	650p
STRD 6801	500p
STRM 6511	750p
STRM 6559	850p
STRS 6707	1000p
STRS 6708	575p
STRS 6709	600p
STV 2102B	800p
STV 2110B	800p
STV 2116A	750p
STV 2118B	1000p
STV 9379	400p
TA 7205A	400p
TA 8200AH	325p
TA 8207K	175p
TA 8210	260p
TA 8211AH	200p
TA 8215	300p
TA 8215H	300p
TA 8216H	300p
TA 8217P	120p
TA 8218AH	425p
TA 8220H	500p
TA 8221AH	600p
TA 8227	250p
TA 8251AH	700p
TA 8255AH	1050p
TA 8256H	450p
TA 8427K	200p
TA 8659AN	900p
TA 8659CN	800p
TA 8690AN	700p
TA 8701AN	275p
TBA 120S	40p
TBA 520	120p
TBA 530	100p
TBA 540	90p
TBA 560	90p
TBA 810AS	40p
TBA 820M	35p
TDA 1170N	85p
TDA 1170S	85p
TDA 1175	175p
TDA 1524A	200p
TDA 1541A	400p
TDA 1557Q	300p
TDA 1670A	200p
TDA 1675A	200p
TDA 16846	200p
TDA 2002	50p
TDA 2003	65p
TDA 2004	150p
TDA 2005	150p
TDA 2006	70p
TDA 2007	120p
TDA 2008	100p
TDA 2009	160p
TDA 2010	150p
TDA 2020	120p
TDA 2030	80p
TDA 2030H	100p
TDA 2050V	200p
TDA 2051V	450p
TDA 2052V	525p
TDA 2530	300p
TDA 2532	100p
TDA 2578A	700p
TDA 2579A	210p
TDA 2581	100p
TDA 2593	80p
TDA 2595	200p
TDA 2653A	450p
TDA 3190	200p
TDA 3560	600p
TDA 3561	300p
TDA 3562A	260p
TDA 3651	200p
TDA 3652	500p
TDA 3652TX10	800p
TDA 3653B	80p
TDA 3654	80p
TDA 3654Q	85p
TDA 4500	300p
TDA 4565	150p
TDA 4600	200p
TDA 4600II	160p
TDA 4601	120p
TDA 4601D	65p
TDA 4605	190p
TDA 4610	370p
TDA 4950	100p
TDA 6101Q	120p
TDA 6103Q	225p
TDA 6106Q	125p
TDA 6107Q	300p
TDA 8138A	130p
TDA 8139	200p
TDA 8170	170p
TDA 8171	230p
TDA 8172	200p
TDA 8179S	750p
TDA 8350Q	275p
TDA 8351	200p
TDA 8362AN3	750p
TDA 8702	275p
TDA 8703	500p
TDA 9102C	250p
TDA 9302H	225p
TEA 1039	150p
TEA 2017	1000p
TEA 2018A	80p
TEA 2019	600p
TEA 2025B	75p
TEA 2037A	175p
TEA 2164	160p
TEA 2260	225p
TEA 2261	185p
TEA 2262	275p
TEA 5101A	300p
TEA 5101B	175p
TEA 5170	200p
UC 3842AN	80p
UC 3842N	60p
UC 3843	80p
UC 3843AN	80p
UC 3844	70p
UC 3844AN	80p
UC 3845AN	80p
UPC 1488H	115p

Please note that this a very small selection of the transistors and IC's that we stock.
We stock a full range of Japanese Transistors 2SA,2SB, 2SC,2SD,2SJ,2SK series ,
Diodes , CMOS , TTL Logic ICs , Computer ICs , Zenor Diodes...etc
Please call us for any items that are not listed on 020 8900 2329

Grandata Ltd

distributor of electronic components

Digital Satelitte Spares

Sky Digital Remote Control

Order Code : RCSKY
Price : £ 10.75 + vat

Sky Digital Remote & TV Link Eye Combination

Price : £ 18.50 + vat

Magician 4 Remote & TV Link Eye Combination

Price : £ 18.00 + vat

Sky Digital TV Link Eye

Order Code : TVLINKEYE
£ 9.99 + vat each
5 plus ....£ 7.99 + vat each

Digital Compatible Universal LNB's

Strong 0.6 dB

Order Code : LNB12
Price : £ 12.50 + vat

Alps 0.7dB

Order Code : LNB13
Price : £ 15.00 + vat

Magician Sky Digital Remote Control

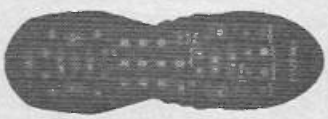
Operates all SKY digital TV box functions

Operates any combination of TV , VCR & Cable/Satellite systems

Full teletext and fatstext functions

Backlit device indicator keys

Ergonomic & tactile design



Order Code : MAGICIAN4
Price : £10.00 + vat

Global Communication Distribution Amplifier

Fully compatible with Sky Digital TV Link Eye
10dB gain to each Port
No Mains wiring required when using Sky Digibox

2 way	4 Way
Order Code	Order Code
GLOB2WAY	GLOB4WAY
Price : £ 13.75 + vat	Price : £17.25 + vat

THIS KIT IS DESIGNED TO REPAIR THE FOLLOWING POWER SUPPLY FAULTS ON THE PACE DIGIBOX 2200:
DEAD PSU TRIPPING PSU

IT COMES WITH CLEAR AND CONCISE INSTRUCTION ON HOW TO CARRY OUT THE WORK
Order Code :SATPSU32
Price : £15.00 + vat

THIS KIT IS DESIGNED TO REPAIR THE NO LNB VOLTAGE FAULT ON PACE DIGIBOX 2200

IIT COMES WITH CLEAR AND CONCISE INSTRUCTION ON HOW TO CARRY OUT THE WORK

Order Code : SATKIT33
Price : £4.00 + vat

PACE DIGIBOX 2200
SPARES SERVICE MANUAL
Contains :Circuit Diagrams
50 plus page Service Manual

Order Code : BOOK07
Price : £ 20.00 (No VAT)

Universal Brand Replacement Remote Controls

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

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

Price : £7.50 + vat each
Buy any 5 of the above and get a Special Price of £ 7.00 + vat each

This advertisement is just a selection of our stock.

We also stock the following :

Video Heads , Pinch Rollers ,Belt KIts ,Idlers ,Service Kits , Video Motors , Cassette Housings , Audio Control Heads , Mode Switches , Video Lamps , Satellite Spares , LNB's , Back Up Batteries , Servicing Tools and Aids , Digital Multimeters TV Switches , Line Output Transformers , Japanese Transistors , Linear IC's , Computer IC's , CMOS and 74 Series and much much more !!!.....All at competitive prices

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

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

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

Tel : (020) 8900 2329 Email : grandata.ltd@btinternet.com

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

WHAT A LIFE

Some TV and VCR faults, a moan about the state of TV programs and presentation, and a spoilt radio-cassette recorder design. Donald Bullock's servicing commentary

When I arrived at the workshop one morning Steven had a massive 32in. Fidelity set on the bench. The complaints were field collapse and EW-correction trouble. He' had a look at the EW circuit and found the TDA8145 chip faulty, with its 3·3Ω (safety type) feed resistor R711 open-circuit. Some checks in the field output section revealed that C620 (0·47µF, 250V) was short-circuit. Replacements restored correct scanning, but he needed help returning the heavy set and asked me to give him a hand.

"It belongs to a nice old couple. I know their son Glen" Steven said, "he's been abroad these last six months."

We took the set back and installed it. Then the old, rather frail, couple settled back to watch it. Steven noticed a photograph of Glen on the sideboard. "Oh look" he said to me, "there's Glen."

"What?" cried the old couple as they stumbled up out of their chairs and looked out of the windows, first one then the other. "Can't see him. Where is he?"

Steven had to explain and calm them down.

A Goodmans 1410

When we got back Mrs Daymoore was waiting with her son Billy. "Hello Mr Bullet" she said, "tell Mr Bullet about it, Billy."

"'E's all wonky" the boy said without paying much attention.

I decided to try to get him to be a bit more explicit and interested. "How wonky?" I asked, "slightly wonky, very wonky, wonky in what way?"

"Wonky as hell" he replied.

"Billy!" Mrs Daymoore cried, "be quiet now and put the set on Mr Bullet's counter."

Billy lifted a Goodmans 1410 from the floor and placed it on the counter.

"Now explain what the trouble is to Mr Bullet" she continued.

Billy looked at me defiantly. "Blank screen an' lots o' sound" he hissed.

"That's better" Mrs Daymoore said, "Mr Bullet will wonder wherever you was brung up."

I said goodbye to them as Paul took the back off the set. Fortunately it uses the Ferguson TX805 chassis, so we didn't expect much trouble. When Paul advanced the setting of the first anode control a raster appeared, with no vision.

Steven looked over. "Had one like that last week" he said, "it was the M52038SP jungle chip IL01. But we don't have one left."

"Might as well make a few checks before we order one" Paul said. He decided to carry out some meter checks on the CRT base panel and soon found that the 12V base bias for the RGB output transistors was missing. The cause was easy enough to find. RT40 (68kΩ, 0·5W) was open-circuit. A replacement restored the picture.

Capacitor trouble

"Ugh, oh dear, phew!" Mr Milton struggled in with a 25in. GoldStar set. He was carrying it the wrong way of course – screen forwards.

"It's my neighbour's set" he explained when he'd got his breath back, "just helping out." It was a CF25C22F (PC33J chassis) and was another blank screen case.

Steven took the back off and upped the setting of the first anode control. "Notice I didn't mark it before altering the setting" he said.

"Why not?" I asked.

"Cleverness" he replied, brushing his nails on his lapel.

I nodded understandingly. I also noticed that there was field collapse, and that C405 (0·22µF, 400V) in the line scan circuit had exploded.

"It'll be C405" I said.

Steven spun round. "How did you know that?" he asked.

"Genius" I replied.

A replacement capacitor restored normal operation.

Bouncing and rolling

Meanwhile Paul was battling with an Hitachi C2119T (G7PS chassis). It seemed to have a good picture, and the sound was all right. But occasionally the picture would begin to bounce and roll.

"I've replaced the field timebase chip and a few other field timebase components" he said. "once or twice I thought I'd cured the fault, but it's still the same."

After a while Steven joined in, but the nasty intermittent fault persisted. I wondered whether it was a sync fault, but the line synchronisation seemed to be stable enough. Then I noticed a sideways twitch and, at the same time, slight video degradation. So the brief fault involved the field and line sync and video quality.

"There's intermittent IF instability" I said.

Steven tapped the IF cans until he found the one that produced the fault condition. It wasn't earthed securely. Once that had been put right the fault had gone.

More picture trouble

At the time I had a Toshiba VCR on the bench, Model V219B. This was another case of an intermittently poor picture. I discovered that the symptom could be controlled to some extent by pressing the deck down here and there. In fact the deck sits on a copper earthing plate, which is at the back of the machine behind the drum: it wasn't making reliable contact.

Cleaning and flexing the plate cleared the trouble, but it's something to bear in mind. Next time I get a problem of this sort I'll install a thick, flexible bonding strip.

A moan

Just why are we inflicted with such terrible television? I've been a bit restricted recently by damage to an ankle, and have found myself spending more time than I usually do stuck in front of the TV set. Since the last figures were announced, programme makers have been expressing concern about the decline in the number of viewers. But I find it hard to believe that they are seriously worried. If they were, surely they would do something about it? And I don't mean just about the poor programmes, but the awful presentation as well.

The programmes mostly seem to assume that viewers have no or very little intelligence. The characters have a limited vocabulary, and engage in a lot of swearing. Now I don't mind the odd well-chosen expletive where the context calls for it, or maybe to emphasise a point. In fact I was brought up in the

literary company of Deadwood Dick and Eskimo Nell. Even today, when the fish are slow-biting or I'm endlessly waiting for Greeneyes to emerge from a clothes shop, recalled passages from their saga together set me off laughing – often to the alarm of those passing by. But surely contemporary conversations don't consist, mainly of swearing? Then there's the endless, mind-numbing triviality of it all.

There seems to be a view amongst the broadcasters that shoddy material can be made interesting by the use of 'lively' presentation. In fact it makes matters worse. Even the BBC News headlines are made hard to understand by the accompanying noise. urgently and discordantly pumping away.

There are good programmes. BBC Knowledge for example is very good indeed, but even these aren't safe from the audio whiz-kids. And excellent period plays can be marred and made hard to tolerate by the jangling and pumping noises that often accompany, and sometimes drown, the dialogue.

Why this conviction that the only way to hold interest is to inflict a constant attack on the senses? I know a better way. Here's how.

Get rid of the synthetic-sound and coloured-lights equipment, all the zooming and hovering and wandering cameras, all the cascading split-second takes and all the yobbos. Substitute good, properly-presented programmes with conventional people using meaningful language. It can be done. The Forsyth Saga went on for months: while it was running there were empty streets and near-empty pubs.

An unfortunate purchase

While I'm in a complaining mood, let me tell you about an unfortunate purchase I made recently. I had been working on a factual book called *The Legend of Clapham* and, while out taking notes, I came across an old boy who had lived through it all. He asked me into his home and I soon found that though he was a font of knowledge his enthusiasm kept running away with him. My pen simply couldn't keep up. So I stopped him and popped out to buy a small recorder.

I couldn't find one locally and had to settle for a radio-cassette recorder. It wasn't that small but was an attractive piece of equipment and the LW/MW/VHF radio side worked well. It had a built-in microphone. I also bought a couple of branded tapes. Then I went back to the old boy

He seemed a bit peeved. "It's getting on and I have to get down to my local afore long" he said.

I nodded understandingly, set everything up, made a test recording then played it back. The results were disastrous. He sounded as if he was talking from inside a waterfall. So I called a halt, went back to the shop and changed the machine.

On my return I had to start all over again. But the replacement was no different. I took out my pad and prepared to take notes.

At this the old boy became testy. Told me that he was worth being recorded, that it had all made him extra thirsty, that he wanted a pint and was fed up with me and my tricks. He then threw me out.

I took the radio-cassette recorder to the workshop and gave it another try. Its recordings had a louder noise level than the audio content. When a prerecorded tape or a piece of unrecorded tape was played however the noise level was acceptable.

On investigation I found that the machine has a little block of permanent magnet that serves as the erase head. When I used a small rubber band to hold the magnet clear of the tape the recordings were excellent.

I then gave the rest of the radio-cassette recorder a once-over. It was really well made, and would have been excellent value had the makers spent a few extra pence and fitted a conventional erase head. Paring down costs is essential to produce competitive products, but in this case the result was that an otherwise successful model had been made useless. I took it back. ■

Picture courtesy Ford Motor Company

Where's mobile TV going?

Douglas Clarkson outlines progress on the emerging European standard for mobile television.

The rapid worldwide telecommunications expansion is presently highly focused on the European scene. In particular, the adoption of the DVB-T standard for terrestrial digital television (DVB-T; ETS 300744) has paved the way to using this standard for development of broadcast services for mobile receivers.

In order to co-ordinate the introduction of such services, the 'Motivate' mobile digital terrestrial television consortium was launched in May 1998. It consists of 17 broadcasters, network operators and manufacturers of professional and domestic equipment .

Within this array, the lead agency is T-NOVA – formerly Deutsche Telekom Berkom. In the UK, the lead organisation is the BBC.

Future markets

Investment in future systems of public transportation – busses, trains, trams, etc. – is on the increase. Also, manufacturers are looking for new ways to enhance passenger comfort and convenience in private vehicles. As a result, mobile receivers have been identified as a future potential growth market.

Car manufacturers are already contemplating how best to introduce such media technology into vehicles in the not too distant future.

Generally, such receivers will be travelling somewhere between 50km/h and 500km/h. Standard analogue broadcast signals however cannot be successfully

What is DVB?

Europe and several other areas of the world have chosen to adopt the Digital Video Broadcasting standard DVB. This is available in a number of compatible versions. These include DVB-S – for satellite transmission, the *de facto* global standard; DVB-C – its cable equivalent; and DVB-T – Europe's chosen digital terrestrial broadcasting system with services which started in the later part of 1998.

The digital SMATV, or Satellite Master Antenna TV, version DVB-CS has been adapted from DVB-C and DVB-S to serve community antenna installations such as for blocks of flats. Singapore has been conducting experiments with DVB-T and Australia has plans to adopt this standard.

received while the receiver is moving – hence the need for a special standard.

In the rapidly evolving world of global communications, the data stream of digital television could carry data, speech, Internet pages, as well as TV in MPEG-2 transmit stream. This implies a broadening range of uses for TV signal systems.

Understanding of how a DVB-T broadcast signal is transmitted from a moving location is improving. In theory, such transmissions would allow systems in motion to act as sources of DVB-T signals. In an increasingly interactive world, this area of technology may yield some interesting results in the future. As yet though, it is almost totally unexploited.

Receiving signals on the move

As a standard, however, with many configurable components, a great deal of work is required to optimise receiver characteristics to ensure picture quality of appropriate standard is achieved.

The problem with decoding of signals relates to the doppler effect. It causes a frequency shift between the transmitter and configured receiver. Also, different environments can result in a complex mix of direct and reflected signals that would naturally pose problems for stationary reception.

Tests and measurements

A key part of the Motivate project has been the development of an experimental system. In this system, transmitter signals are 'doctored' with additive white gaussian noise and receiver the characteristics are determined. This has allowed extensive tests to be undertaken as 'static' testing.

One of the problems with determining the 'quality' of receiver systems is to agree a practical equivalent of image quality. One initial marker was that of SFP, or subjective failure point. This corresponds to one visible error in the receiver video during an observation period of 20 seconds.

This still, however, remains a subjective measurement and a more quantifiable parameter has been used instead. Known as ESR, this parameter is defined as the probability that a certain second contains one or more errors in MPEG-TS packets.

In order to standardise on test processes, various receiver topologies are defined for laboratory tests. These include typical rural area, typical urban reception and DVB-T mobile profile. The DVB-T profile has about 20 designated variations of bit rate, FFT guard interval and constellation.

In future, it is likely that broadcasters will identify the nature of the mobile service area, determining the optimum transmitter characteristics accordingly.

A key as aspect of how a receiver operates is indicated in Fig. 1. Here, the expression C/N indicates the minimum signal required for adequate reception. For slow speeds, the required C/N value is relatively independent of doppler frequency. With increasing frequency though, a practical limit of signal is identified. This constitutes the absolute maximum speed of a receiver.

For the purpose of test systems, omnidirectional antennae at 1.5 m above ground level have been used. Date rates up to 15MHz can be used in such transmissions.

In trials of a range of receivers in November 1998 and November 1999, so-called second-generation signal receivers fared best in general. Also dual-input receivers generally fared better than single-end receivers.

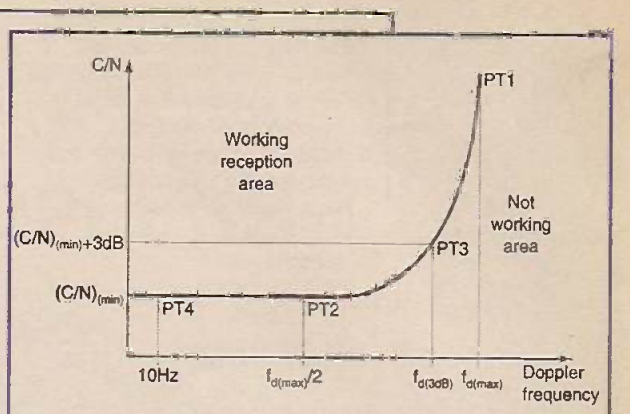
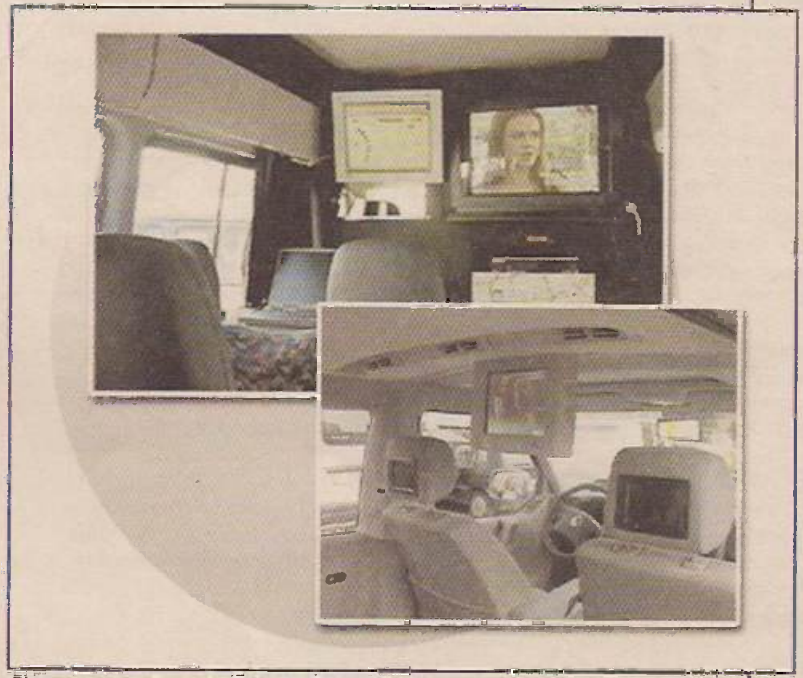


Fig. 1. Key response of carrier versus noise with doppler frequency, which can be used to define the limits of mobile reception.

Fig. 2. Extreme levels of carrier-to-noise response for specific receiver systems at specific signal configuration - indicating in general the differences between the first and second generation chip sets.

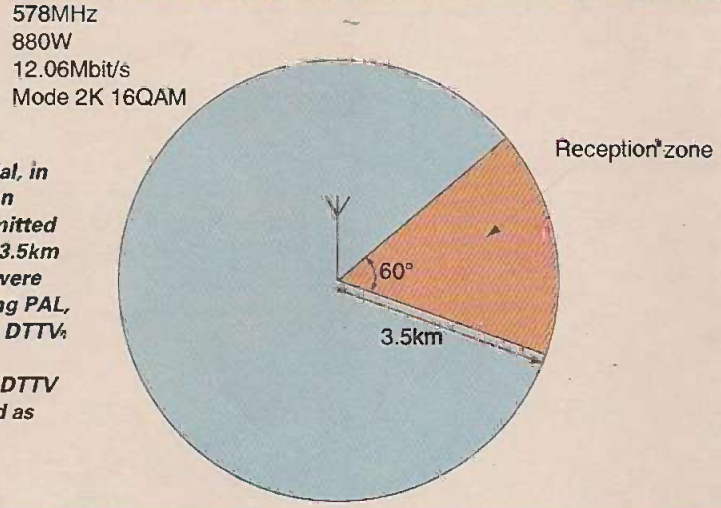


Picture courtesy Deutsche Telekom Berkom GmbH

The range of performances observed for the various systems, however, indicated that further enhancement of receiver technology is needed to enhance synchronisation algorithms.

For a range of receivers tested, baseline values of C/N differed by around 6dB for a specific generic classification of signal. **Figure 2** indicates the typical extreme limits of C/N responses. It shows, generally, the differences between first and second-generation chip sets. A response with a high level of C/N baseline will tend also to have a low value of maximum speed of mobile reception.

Field trials demonstrating such technology to the public have been undertaken – with the more recent being at Helsinki in November 1999 during the Information Society Technology conference. City trams were fitted with innovative TV sets with a 30 minute 'show'. This test clearly showed the technical viability of mobile DVB-T reception.



In a 1998 Motivate trial, in Amsterdam, television channels were transmitted over a 60° arc within 3.5km radius. Two TV sets were involved, one receiving PAL, the other widescreen DTTV. The PAL picture was unwatchable but the DTTV picture was described as "rock steady".

What is Motivate?

Motivate, or Mobile Television and Innovative Receivers in full, has been set up to investigate mobile reception of digital terrestrial TV signals in single-frequency (SFN) and multi-frequency (MFN) networks. It involves the new open standard for data and multimedia broadcasting DVB-T.

These networks will offer customers new features, such as broadband interactive multimedia networks with data rates of 15Mbit/s. Receivers using this standard could be integrated into TV sets, lap tops and cars to provide a user interface for 'information-society' applications. The rapid development of DVB-T infrastructure in Europe will also provide components and services for wireless and hybrid networks.

Motivate will verify the flexibility and suitability of the DVB-T standard for mobile reception. Support will also be provided for implementing DVB-T in countries outside Europe.

The main objectives of Motivate are to:

- analyse the theoretical performance limits of DVB-T for mobile reception and implement optimised receivers,
- study, implement and test efficient algorithms for mobile and portable SFN reception,
- test state-of-the-art DVB-T receivers for mobile reception,
- set-up a pilot network to measure mobile channel characteristics and mobile coverage in urban and suburban networks,
- set-up and carry out major demonstrations to present DVB-T in major national and international events (e.g. IBC'98, IFA'99, NAB'99.),
- support integration, promotion and dissemination of results of other ACTS projects working on DVB-T,
- verify the open API for DVB-T receivers,
- provide guidelines for the implementation of a mobile DVB-T service.

The impact of DVB-T

The DVB-T standard was developed in Europe and has advantages over competing proposals – especially for mobile reception and higher data rates. It is clear that the world-wide competition between the European DVB-T standard and other proposals will have a major impact on European industry and broadcasters.

Peter Christ, Deutsche Telekom Berkom GmbH

Watch this spot

The Motivate project has produced documentation on a 'Reference receiver model' in order to help receivers manufacturers to further improve their equipment for mobile reception. It has also produced implementation guidelines to help broadcasters apply networks for mobile video receivers.

The development of DVB-T for the mobile environment is likely to result in the creation of a new market for TV technology, both in the development and supply of suitable receiver systems but also in the expansion of tailored TV broadcast channels. At the manufacturer level, this opens the way to new products. Already Nokia has developed a product called 'Media Screen' for portable reception.

While there may be other standards of digital TV capable of being used with mobile receivers, considerable progress has been made within Europe in developing systems for mobile reception. Within the not too distant future, this should see the introduction onto the market of a range of relevant products – and the service needs associated with this. ■

For more information...

http://b5www.berkom.de/MOTIVATE/

http://www.infowin.org/ACTS/IENM/NEWSCLIPS/arch1998/981001de.htm

http://www.bbc.co.uk/rd/projects/motivate/

ACTS (Advanced Communications Technologies Services) MOTIVATE (MObile Television & InnoVATive REceivers)

CC Trade Ltd

Lady Smith House, Easy Road, Leeds, West Yorkshire LS9 8QS

SPECIAL OFFERS

5,000 customer returned Morphy Richards and Goblin Vacuums **£6.00**

10,000 Toasters, 4 slice cool wall, customer returns **£1.75**

Also a full range of other Morphy Richards products, too many to mention.

We also do a full range of A grade Morphy Richards Products at guaranteed unbeatable prices.

Steam irons from **£5**. Vacuums from **£12**, just a few examples of our fantastic deals.

We also carry a full range of TV, Video and Hi-fi, etc.

For all enquiries please

telephone 0113 2480512 or fax 01132 496990

A guaranteed deal you will not beat!

Video Surveillance

- C-Mos B/W Camera 15mm x 15mm.....£29

- C-Mos Colour Camera 15mm x 15mm.....£65
- PCB B/W Camera 32mm x 32mm....£24

- PCB Colour Camera w/Audio 32mm x 32mm.....£65
- 23cm (1.3Ghz) Video/Audio Transmitter.....£35

- 13cm (2.4Ghz) Video/Audio Transmitter.....£35
- 1.2 Watt 2.4Ghz Video/Audio Transmitter.....£120

- 4" TFT Boxed Colour Monitor w/Audio.....£110

- Video to VGA Converter.....£65
- VGA to Video Converter.....£90
- External USB Video Capture Box.....£55

All prices exclude VAT

Many more products on our website:

WWW.BITZTECHNOLOGY.COM

Tel: 01753 522 902

Economic Devices

32 Temple Street, Wolverhampton, WV2 4AN, UK. Tel: ++ 44 (0)1902 773122 Fax: ++ 44 (0)1902 428082

Remote Controls from £5.95 each

Stock held for over 5000 different models

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 @ 95P each BUT11AF @ 41P each

BU508A @ 75P each Fully wired scart lead 89P

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 CP90 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

The web page where you can look up the price and order all things TV, VCR and Satellite. Web search by model/service part, remote control, LOPTs etc. overseas enquiries particularly welcome

New CCTV catalogue out NOW cameras, monitors, switches quads, multiplexers, the lot.

The Internationale Funkausstellung 2001

The IFA, held biennially in Berlin, is the world's largest consumer electronics exhibition, where many new developments are given their first public showing. George Cole reports on this year's event

The 2001 Internationale Funkausstellung (IFA) attracted 915 exhibitors from forty countries. There were 160,000 square meters of display space. This year's big themes included the Multimedia Home Platform, plasma displays, recordable DVDs and hard-disk video systems.

The Multimedia Home Platform

Sony claimed that its new KD-32NS100DB Integrated Digital Television (IDTV) receiver is the first commercially available model in the world to use the open-industry, Multimedia Home Platform (MHP), which is a DVB standard. MHP is an open interactive broadcasting standard that's supported by over 300 DVB members, including manufacturers, broadcasters, telecommunications companies and service providers. Its aim is to provide a common standard for interactive TV and the internet via digital TV services.

A digital receiver requires an interface, or API (Application Programming Interface), on which its applications can be based. Interactive applications include an Electronic Programme Guide (EPG), home shopping and home banking. Until the advent of the MHP, most pay-TV and set-top box manufacturers used different operating systems and types of middleware (interactive TV software that sits between the user interface and the interactive application). Examples of such middleware include OpenTV, MHEG, Liberate, Mediahighway and Microsoft TV. As a result, multimedia applications could run on only certain set-top boxes and had to be customised for specific software requirements. MHP's open software architecture enables interactive services to be provided for digital TV viewers regardless of the service source or the digital receiver manufacturer. This should mean that viewers will not have to change their set-top boxes to access an interactive service from another provider, though I suspect that it may not be so simple in practice.

Sony had on show a number of MHP applications, including an advanced EPG, new text services and an interactive sports system. Following their introduction in

Philips' new 32in. plasma display TV, Model 32PF9964.

Germany this autumn, Sony plans to launch MHP-compatible IDTV sets in other European countries during 2002.

Other features of the KD-32NS100B include a flat-screen FD Trinitron Wega CRT; Digital Reality Creation-Multi Function (DRC-MF) which increases the picture resolution by up to four times; 100Hz processing; and Virtual Dolby Surround Sound.

Panasonic is of course also an MHP supporter. The company had on show an MHP-compatible set-top box developed for the Free Universe Network (FUN), an alliance of German broadcasters and electronics companies that provide free-to-air digital TV.

Philips had on show an MHP set-top box that's to be launched in Germany later this year. The company also showed an interactive TV advertisement that used MHP technology.

In order to ensure interoperability between different MHP products, the DVB Project has established a self-compliance test scheme for manufacturers. But the problem facing MHP is that it requires a lot of memory in a set-top box, and there's a legacy of millions of set-top boxes that have only small amounts of RAM. Whether digital broadcasters will rush to upgrade them remains to be seen.

Flat-screen TVs

You couldn't move for large, flat-screen TVs at the IFA. It's now clear that sets using several different types of flat-screen technology will be made available to consumers, with plasma used for the largest screen sizes.

Many setmakers showed plasma or liquid-crystal display (LCD) TV sets and monitors. The Panasonic TH-50PHW3E was noteworthy, with its 50in. plasma screen that provides a 1,366 x 768 pixel resolution and a contrast ratio of 3,000:1. A TV tuner, Model TU-PTA100E-S, is available as an optional extra – the tuner also serves as a video processor and line doubler. The depth of the TH-50PHW3E is 9·8cm and its weight 45kg. Sony unveiled its first plasma screen for the consumer entertainment market, Model PFM-42B1: it's a 42in. panel with 3·15m pixels and a depth of just 8·3cm. The Philips 32PF9964 is a 32in. plasma screen. This is smaller than many of the plasma TVs on the market, but Philips believes that there is a market for plasma TV in this size – not least because the price will be much lower than in the 40in. and over screen sizes. Thomson's plasma offerings included three models in the Wysius series, with 42, 50 and 61in. screens. Earlier this year Thomson formed an alliance with NEC to develop plasma technology.

Sharp, which is better known for its LCD technology, had two plasma TV sets on show, Models PZ-50HV2E and PZ-43HV2E (the first two numbers denote the screen size in inches). Both have a viewing angle of 160°, a contrast ratio of 800:1 and can achieve a brightness level of 350cd/m². Each set is PAL/SECAM/NTSC compatible, and there are four video and three scart sockets. Pioneer showed two new plasma TVs, Models PDP-503HDE (50in.) and PDP-403HDE (43in.). These are analogue sets with Nicam decoders. Pioneer has worked with Sharp in developing flat-screen technology.

Samsung also had 50 and 42in. plasma sets, Models PS-50P2H and PS-42P2H respectively. Hitachi's 32in. widescreen CL32-PD2100 Platara-series plasma TV includes Alternative Lighting of Surface (ALIS) drive technology, which effectively doubles the screen resolution while using the same number of electrodes as conventional PDP technology. It's also claimed to increase longevity. The tuner is housed in a separate off-board unit and is equipped to act as a switching controller for AV sources like DVD and digital satellite. It has three scart sockets. The CL-32PD2100 is now available in the UK.

Not surprisingly, Sharp also had a number of LCD TVs at IFA, with 13, 16 and 20in. screen sizes. There was also a prototype 30in. model. Philips showed two LCD TV sets, with 15 and 20in. screens: they will be launched in the UK next year. There were three LCD sets on the Samsung stand, Models LW-24E15W, LW-17E24C and LW-15E23C, the first two numbers denoting screen size in inches. The largest set has a 16:9 display.

Pioneer showed its Organic Electro-luminescence (OLE) display technology, which was invented by Kodak then developed by Pioneer. The claim is that OLE is superior to LCD technology, but the cost is very high and Pioneer's prototypes to date have a screen size of only 7in.

Projection TV technology

There were many projection TV sets on display, including the Samsung Models SP-55W3HF (50in.) and SP-47W3HF (47in.). Their features include 100Hz scanning, a RealFlect system and automatic convergence setting for optimum picture quality. With two tuners, the sets can display pictures from two separate transmissions on the same screen.

The Sharp XV-Z9000E video projector is the first to use the new 16:9 version of Texas Instruments' Digital Light Processing (DLP) technology. This is based on a large IC that's covered with thousands of micromirrors to reflect incident light: each micromirror functions as a separate light switch, representing a display pixel. The resolution is 1,280 x 720 pixels.

There was a lot of interest in Liquid Crystal on Silicon (LCOS) projection technology, which uses a silicon chip rather than thin-film transistors (TFTs), the advantage being a faster switching speed. JVC uses the technology in the latest version of its D-ILA (Direct-drive Image Light Amplification) system. This ultra-high resolution projection technology, called QXGA D-ILA, has 3·2m pixel resolution, the aim being to provide full-quality HDTV displays. JVC says it plans to launch the technology commercially by the end of the year. Philips and Hitachi are

Sony's DCR-PC120 camcorder features Bluetooth technology.

also developing LCOS displays, and had prototype projectors on show.

The Sony KP-48PS2 and KP-61PS2 are 4:3 projection TV models with 48 and 61in. screens respectively. They use Sony's DRC-MF technology (see earlier mention of this) and a Pro-Optic system that's designed to improve brightness and definition.

CRT developments

Don't let these developments lead you to conclude that the days of the CRT are numbered. Far from it. Setmakers were showing many Real Flat CRT models, several of them combined TV-DVD systems. Thomson's display included TV/DVD models with 14, 25 and 36in. screens, while Samsung's Model DW-21G6DV has a 21in. screen. Philips showed three large-screen TV/DVD sets, Models 28PW6816, 28PW6826 and 32PW6826 (28 and 32in. screens): all have a Real Flat CRT, a 100-page teletext memory with twin-page display, and are CD-R/RW compatible.

But some of the most interesting developments take place backstage at the IFA. At this year's show Philips revealed two new CRT developments. The first, Pixel Plus, uses digital technology to double the number of horizontal lines and increase the vertical resolution. Philips says its system works better than similar formats, such as Sony's DRC-MF, because it is better at handling fast-moving images. The proof will be in the viewing, when the first sets to include Pixel Plus are launched early next year. The other development, shown by Philips Components, is a short-neck CRT which reduces the depth of a 32in. CRT by about 10cm. Philips does not claim that this is a major development but, with a newly-designed casing, it does mean that a large-screen CRT set can look more compact.

DVD recorders

As many readers will know, there are several competing recordable (or, to be more accurate, rewritable) DVD formats, namely DVD-RAM, DVD-RW and DVD+RW. The latter is an as-yet unofficial format which has been developed by Sony, Philips and a handful of PC and CD-R/RW manufacturers. It nevertheless claims higher compatibility with existing DVD-Video players than the official formats.

The group of companies promoting DVD+RW, known as the DVD+RW Alliance, was very active at the IFA. Philips has coined the phrase Twin Way to describe DVD+RW's compatibility. It says that DVD+RW recorders will play DVD-Video discs, and that most DVD-ROM drives and DVD-Video players (at least 90 per cent) will read DVD+RW discs. The company also points out that the DVD+RW specifications are similar to DVD-Video: both use a 650nm wavelength laser with the same numerical aperture (0·6), and the discs have the same track pitch (0·74µm) and reflectivity (18-30 per cent, the same as a dual-layer DVD-Video disc).

Philips' first DVD+RW recorder, Model DVDR1000, will record up to four hours of MPEG-2 video on a 4·7Gbyte disc, either off-air using an internal multi-standard tuner or direct from a camcorder via an IEEE 1394 (FireWire) interface. Analogue sources can be copied via S-video or scart sockets. A recording format called Constrained Variable bit Recording (CVR) is used. This is claimed to combine two MPEG-2 video recording formats, Constant Bit Rate (CBR) and Variable Bit Rate (VBR). The former provides the best picture quality at the price of reduced disc capacity. VBR uses the available disc capacity more efficiently but, as there is little relationship between the playing time and capacity, disc-space management is made more difficult. CVR uses as few bits per second as possible, to improve efficiency, and makes wide bit-rate variations over short time spans possible. Philips says that it also offers the reliability of CBR, by making it possible to record at an average bit rate over longer time spans.

Philips also took the opportunity provided by the IFA to announce double-sided DVD+RW discs with a capacity of 9·4Gbytes. They have a recording time of up to eight hours per disc, depending on choice of recording quality. Philips says that the new discs will be ideal for off-loading PC data when the hard disk(s) are full, for example with large files such as videos or high-resolution digital still images.

The official recordable DVD formats were also well represented at the IFA. The Recordable DVD Council, a group of 66 companies that support the official DVD recording formats, announced plans to launch a worldwide programme to promote their products.

Panasonic had on show its first DVD-RAM recorder, Model DMR-E20, which uses both DVD-RAM and DVD-R technology. DVD-RAM discs can be rewritten up to 100,000 times: DVD-R discs are for single recordings, which can be played by an ordinary DVD-Video player. The latter is an important point, because DVD-RAM discs cannot be played by a standard DVD-Video player as, with one exception, they use a protective caddy. Panasonic and Toshiba say that they will launch DVD-Video players that are compatible with DVD-RAM discs, but these will be expensive.

DVD-R provides a relatively inexpensive way of making recordings that can be played by any DVD-Video machine. In the EP mode a 9·4Gbyte DVD-RAM disc can record up to twelve hours of material, while a 4·7Gbyte DVD-R disc can store up to six hours of material.

The DMR-E20 automatically selects from its four recording modes to obtain the highest picture quality for the remaining record time. It also has a smart time-slip function. One time-slip feature, called

Chasing Playback, enables the user to watch from the start a recording that has already commenced, while the machine continues to record the rest of the programme. A time-slip wheel control enables earlier scenes to be watched at one-minute intervals while a programme is being recorded. Other features of the DMR-E20 include a PAL tuner, a Q-Link function and an IEEE 1394 input socket for connection to a digital camcorder. Table 1 provides a summary of the main features of the DMR-E20.

There was a further recordable DVD system at the IFA in the shape of Pioneer's DVR-7000, which uses the DVD-RW format and also reads and writes DVD-R discs. The DVD-RW format is claimed to have high compatibility with DVD-Video players, DVD-RAM drives and other devices such as games consoles, for example PlayStation 2. But the picture is not clear.

In order to achieve compatibility with DVD-Video players, the DVR-7000 has two recording modes. The first, which Pioneer calls Video Mode, was approved by the DVD Forum last year for recording on DVD-R and DVD-RW discs. Recordings in this mode should be compatible with DVD-Video players, but only if the manufacturers have incorporated the relevant technology in their machines. Not everyone has. The second mode, called VR (Video Recording), offers MiniDisc-type editing and is compatible with only DVD equipment that bears the RW logo. DVD-RW discs can be used and reused about 1,000 times. They provide up to two hours' recording time in the standard mode and one to six hours in the manual mode.

Other features of the DVR-7000 include a one-month, eight-event timer, VideoPlus, PDC, a Dolby Consumer Encoder for recording two-channel Dolby Digital audio, an IEEE 1394 input socket, and a timebase corrector. Another feature, Disc Timer Recording, operates in the VR mode. It enables a user to store timer settings on a disc. Whenever the disc is inserted into the DVD-R7000, the settings program the timer automatically without any user intervention. Pioneer says that this feature is useful for those who want to record a programme that's shown on the same day and at the same time every week, such as a soap opera, on a disc set aside for this purpose.

Other DVD formats

Many of the DVD players on show at the IFA did more than simply play DVD-Video discs. Pioneer's DV-747A can read DVD-Video, DVD-Audio and multi-channel SACD discs. It is also compatible with MP3-encoded discs and CD-R/RW discs. Sony's DVP-NS900V and DVP-NS700P are combined DVD/SADC players: both incorporate a Digital Video Enhancer (DVE) which, Sony says, provides a sharper edge to video images by minimising imperfections such as overshooting. If you looked hard enough you could find DVD-Audio players, such as JVC's XV-FA92, XV-FA90 and XV-SA72.

Sharp's DV-NC55H is a combined DVD player and Nicam VHS recorder which is also compatible with S-VHS recordings and MP3 files. The company points out that its machine enables users to make VHS copies of DVD discs – provided they are not copy-protected. Other features include Dolby Virtual Surround, three-step digital zoom and EP playback (in the PAL mode). Samsung was another company with a combined DVD/VHS machine, Model SV-DVD1E.

Philips had on show a range of DVD-Video players that are compatible with CD-R/RW discs and MP3 files. The number of companies offering these features with DVD-Video players shows the extent to which consumers are using PCs to record, on CDs, MP3 files that have been converted from audio CD PCM files or downloaded from the internet.

Panasonic's DVD-LA95 is claimed to be the world's first DVD player that can read DVD-RAM discs, though the company stresses that compatibility cannot be guaranteed with recordings made on other DVD-RAM recorders.

Sony's DVP-F21 DVD-Video player can be stacked either horizontally or vertically.

Hard-disk video

The VHS format is being challenged by recordable DVD and now hard-disk video systems as well. Hard-disk video recorders like TiVo, Sky+ and JVC's HM-HSS1, which combines an S-VHS deck with a 40Gbyte hard disk, are already on sale, but the IFA showed that these are just the start of a new generation of hard-disk video products.

JVC also had on show Models AV-32DD and AV-28DD2, 32 and 28in. TV sets respectively that have a built-in 20Gbyte hard disk for recording TV programmes. Up to twenty hours of programming can be

Table 1: Main features of the Panasonic DMR-E20 DVD-RAM recorder

Recording media	DVD-RAM, DVD-R
Recording format	Video MPEG-2, audio Dolby Digital 2.0
Playback compatibility	DVD-RAM, DVD-R, DVD-Video, Audio-CD, Video-CD, CD-R/RW.
Horizontal resolution	>500 lines
Video DA converter	27MHz/10 bits
Audio DA converter	96kHz/24 bits
Front connectors	DV input, S video, A/V
Back connectors	Scart (RGB, S and composite video); S video; video and audio outputs
Digital output (optical)	PCM audio, Dolby Digital/DTS; MPEG-2 sound

Timer recording; VideoPlus; FR mode; one-touch recording; time-slip function; digital noise reduction; subtitles; angle of vision information; sound channel selection; Virtual Surround Sound; dialogue language mode; direct navigator; playlist playback; Q-link; menu controls (GUI); joystick remote control; PAL hyperband tuner; automatic channel programming with 99-channel storage.

The Panasonic NV-HDB1EC hard-disk recorder with integrated digital satellite receiver.

Sony's DVP-F21 DVD-Video player can be stacked horizontally or vertically.

recorded on the disk. These two sets went on sale in Japan last summer, but no UK launch date has so far been suggested. A number of TV marketing managers have hinted that similar products will go on sale in the UK within twelve months however.

Panasonic's NV-HDB1EC is a hard-disk video recorder with an integrated digital satellite receiver and an 80Gbyte disk. Its features are summarised in Table 2. It goes on sale in Europe this autumn. Thomson's UDR (Unlimited Digital Recorder) is a set-top box with an integrated hard disk that can store up to 40 hours of TV programming or 8,000 images.

Camcorders

Hitachi recently launched a camcorder that uses the DVD-RAM format. But if you thought this was the beginning of the end for new tape-based camcorder formats you are wrong. Sony unveiled the MicroMV format at the IFA. It uses video cassettes that are 70 per cent smaller than standard MiniDV cassettes. While the MiniDV format uses a version of the JPEG video compression format, MicroMV uses MPEG-2 compression. Each MicroMV cassette has 64kbits of resident memory for storing information on what has been recorded on the tape, such as the length of the clips and the remaining record time. There is also a multi-picture function that shows still images from up to eleven clips. Sony says that a 60min. cassette can be searched in just four minutes, using the camcorder's LCD screen as a monitor. An MPEGMovie AD feature enables users to make short video clips (up to 260 seconds in length) and store them on a Memory Stick card for transfer to a PC. MicroMV's bit rate is just 12Mbits/sec, less than half that of MiniDV, thus saving storage space on a PC hard drive. Sony's first two MicroMV camcorders are Models DCR-IP7 and DCR-IP5.

Sony has also launched camcorders that use Bluetooth wireless technology. This is a standard short-range (between 10-100m) wireless connection system designed to remove the need for many of the connecting leads and cables used today. Models DCR-PC120 and DCR-PC115 are MiniDV camcorders that can also be used for internet access when combined with a Bluetooth-enabled GSM or GPRS mobile phone. Another option is to use a modem adaptor with Bluetooth capability for connection to a fixed-line socket. The DCR-PC120 can even be used for reading e-mails and exploring the internet. Panasonic also had two Bluetooth camcorders, Models NV-MX8 and NV-MX2, on show.

The Sharp VL-NZ10H is the company's smallest Viewcam model to date – it's about 50 per cent smaller than the previous model. Features include an 800,000-pixel CCD imager, a 3in. colour LCD monitor, and 10x optical zoom. It has a memory card slot for SD or MultiMedia cards, which can be used to store digital still images.

Memory cards

Panasonic announced a 256Mbyte SD memory card – previous SD memory cards had a maximum storage capacity of 64Mbytes. In addition to its greater storage capacity the 256Mbyte SD card has a read/write transfer rate of 10Mbits/sec, five times faster than with the 64Mbyte card. The new card should be available later this year. Panasonic intends to introduce a 512Mbyte card in early 2002, a 1Gbyte card in early 2003, a 2Gbyte card in 2004 and a 4Gbyte card in 2005. The latter will be able store DVD-quality feature movies. A summary of SD card capacities and features is given in Table 3.

SD cards are designed for use with a wide range of products, including digital camcorders, digital cameras, portable audio equipment, mobile phones. PDAs (Personal Digital Assistants) and PCs. The current cards can store music, voice, still pictures, text and other data: the new 256Mbyte card can also be used to store MPEG video. Panasonic plans to launch or announce 37 SD-enabled models in 19 product categories.

Sony announced that 174 companies now support its Memory Stick format: the company is developing larger-capacity Memory Stick cards.

Prototype digital camcorders that store moving images on memory cards rather than tape or disc may well be on show at the next IFA. ■

Table 2: Main features of the Panasonic NV-HDB1EC hard-disk video recorder.

Storage medium	80Gbyte hard disk
Max. recording time	45 hours
Recording format	Video MPEG-2TS, audio MPEG-1 Layer 2
Tuner	DVB-S
Cue and review	x3, x6, x12, x24, x300
Timer system	Premium EPG and manual programming
User menus	GUI (Graphical User Interface) in seven languages

Functions include Direct Navigator video archive system; time-shifted viewing; live TV pause; dubbing; one-touch recording; bookmark skip; cue and review; favourites list. The remote control unit is a multi-brand type.

Terminals: Two scart sockets; S-Video output socket; three RCA AV output sockets; optical Dolby Digital output terminal; two RCA audio output sockets; RF in/out terminals.

Table 3: SD memory card capacities and features.

Card capacity	64MB	256MB	512MB	1GB	2GB	4GB
Approx. no. of JPEG photos*						
normal	160	640	1,280	2,500	5,000	10,000
fine	100	400	800	1,560	3,125	6,250
Approx. video time†						
MPEG-4, 384kbits/sec	22	90	180	360	720	1,440
MPEG-2, 4Mbits/sec	2	9	18	36	72	144
Approx. audio time†‡						
normal, 96kbits/sec	86	344	688	1,343	2,686	5,372
fine, 128kbits/sec	64	256	512	1,000	2,000	4,000

* 1,200 x 900 pixels. † Minutes. ‡ AAC, MP3.

Servicing the NEI CE25/CE28 series chassis

Alan Dent continues with his coverage of fault possibilities with these chassis, this time dealing with the tuner, the signal processing circuitry and the audio circuitry

Last month's article on these chassis covered the chopper power supply and timebase sections of the receiver, also the tube drive circuitry on the CRT's base panel. This time we will concentrate on the small-signal stages and the audio circuitry.

Tuner and band-switching

A UHF-only tuner was fitted in sets intended for the UK market, with no band-switching. Sets sold in some European countries, including Ireland, have a multiband tuner with band-switching (TR108-110, TR112-114 and the associated components). Here are the faults I've encountered in this area.

Noisy picture: If the AGC action is OK, the tuner is low gain and should be replaced. If there is no AGC action, check whether C226 (47µF) is leaky or R247 (1kΩ) is open-circuit. The tuner AGC comes from pin 6 of the TDA4504B IC on the jungle module.

Tuning drift: The PCA84C640B microcontroller chip IC117 produces a PWM tuning output at pin 1. This is integrated by TR126 and the associated components. TR126 (2N3904) could be leaky or low-gain. C272 (100pF) in its base circuit could be noisy. The integrating capacitors C199 and C271 (both 100nF) could be leaky.

Vertical noise bars (approximately five) across the screen: Replace the tuner. Other symptoms are a very unstable picture and noise bars with no aerial connection.

One band not being selected: Check the relevant band-switching components. TR108/113 select UHF, TR110/112 select Band I and TR109/114 Band III.

Luminance and no picture faults

Composite video leaves the jungle module at pin 6 and passes to pin 16 of the TDA8453A luminance delay and chroma filtering chip IC109. There are two luminance outputs from this IC. The output at pin 6 goes to pin 25 of the TDA8391 colour decoder chip IC111 for matrixing with the chroma signals. The delay output at pin 4 passes to TR120/121 which provide inverted and non-inverted sync feeds. The non-inverted output goes to pin 27 of the SAA5231 text generator chip IC110 for text sync. It leaves IC110 at pin 1 and returns to the jungle module at pin 13. The inverted output from TR120/121 goes via TR122 to pin 19 of scart socket AV1. If the set is non-text, the inverted feed from TR120/121 goes direct to pin 13 of the jungle module.

No luminance and no OSD: Check that the 8V supply to the 5V regulator IC103 (7805) is present. If not, R139 (0·22Ω fusible) could be open-circuit or D122 (BY297) leaky. Check the sandcastle pulses at pin 15 of the jungle module, pin 8 of IC111 or pin 15 of IC113. If distorted or of incorrect amplitude, check that the pulses at the junction of R151/C157/R152/C155 are of 20V peak-to-peak amplitude. If not, C155 (1nF) could be leaky. If necessary disconnect the sandcastle inputs at IC111 and IC113 and check the pulse amplitude at the junction of R173/R151/C157: this should be 300V peak-to-peak. R173 (270kΩ) high in value causes a droop on the trailing edge of the top pulse, R121 or R151 (both 270kΩ) high in value causes the bottom level to be distorted. If the sandcastle pulse modifies when pin 8 of IC111 is lifted but is not clean and square, check R121/R151.

No luminance, OSD OK: Pin 2 of the jungle module should be low for TV, high for AV. The switching source is pin 16 of the audio switch module. Pin 36 of the microcontroller chip IC117 should be low for TV, high for AV. This output is inverted by TR116 then fed to pin 2 of the audio switch module where it's inverted again by TR903 before appearing at pin 16.

Pin 15 of the audio switch module should be at 0V. If not, the video from pin 6 of IC109 will be inhibited.

Check whether R286 (150Ω) is open-circuit. If so, pin 9 of IC111 will float to 0·9V.

If there is no 2FC output at pin 28 of IC111 there will be no luma output at pins 4 and 6 of IC109. There should be a 400mV 2FC signal at pin 12 of IC109. Causes of loss of the 2FC signal are XL102 (4·43MHz) faulty or C203 (15pF) open-circuit.

Very weak luminance, poor sync, OSD OK: Check whether R010 (2·2kΩ) on the jungle module is open-circuit, then check whether C295 or C210 (both 10µF) is leaky, TR120 (JC501P) is leaky collector-to-emitter, or R230 (56kΩ) is open-circuit or high in value.

No raster until the first anode voltage is increased: The TDA8391 colour decoder and luminance/chrominance matrixing chip IC111 could be faulty. The first anode voltage will be difficult to set, because the brightness oscillates. IC111 usually fails as a result of flashover from the line output transformer to chassis.

There could be a fault in the dark-current feedback conditions between pins 6/11/14 of IC601 on the CRT base and pin 10 of IC111 via pin 4 of CON600. For an average still picture there should be 1V DC at the cathode of zener diode D604. Check whether pin 10 of IC111 or pin 4 of

CON600 is open-circuit.

C256 (1µF) which decouples pin 11 of IC111 could be leaky.

Pin 24 (beam limiting) of IC111 should be at 4·5V nominal. If the voltage is lower, check R160 (8·2kΩ), D134 (1N4148), R333 (1kΩ) and C299 (33µF).

On early chassis (Clarivox), check the earth connections to the jungle module. These can break rather easily if the module is handled roughly.

Uncontrollable brightness: Check whether pin 5 of IC111 is open-circuit and filter components R317 (33kΩ), R206 (18kΩ) and C269 (470nF).

No picture when the SVHS switch SW100 is operated: D138 (1N4148) is open-circuit.

No luminance from/to a scart socket pin: Check relevant signal path.

Negative picture: See jungle module section.

Interference on picture as volume is increased: Lead PL107, PL108 trapped in CRT P band.

Colour decoder

The colour decoder section is quite complex, involving three ICs: IC111 (TDA8391) is the decoder, IC113 (TDA8451A) is a digital chroma delay line and IC109 (TDA8453A) provides chroma filtering and luminance delay. Some fault conditions have been listed in the luminance/no picture section. Auto grey-scale correction is used to minimise colour drift as the set ages. Here are some specific colour decoding faults.

No colour: IC113 could be faulty. If its 12V supply at pin 3 is missing check whether R337 (10Ω fusible) is open-circuit. If there's a monochrome picture with a ragged display check C202 (100nF) for leakage.

One primary colour missing: No output from the relevant pin of IC111 (13 red, 15 blue, 17 green). Check the relevant clamp capacitors C257 red, C253 blue and C252 green (all 470nF) for leakage. Also see CRT base panel section.

Chroma unstable at transitions: Check whether R253 (3·3kΩ) or C243 (1µF), which are connected in series with pin 5 (PLL) of IC113, is open-circuit.

Magenta and cyan only: If the chroma from IC111 to IC113 and back is OK there's an internal fault in IC111.

Noisy chroma: Can occur when the focus lead connection at the line output transformer isn't seated correctly.

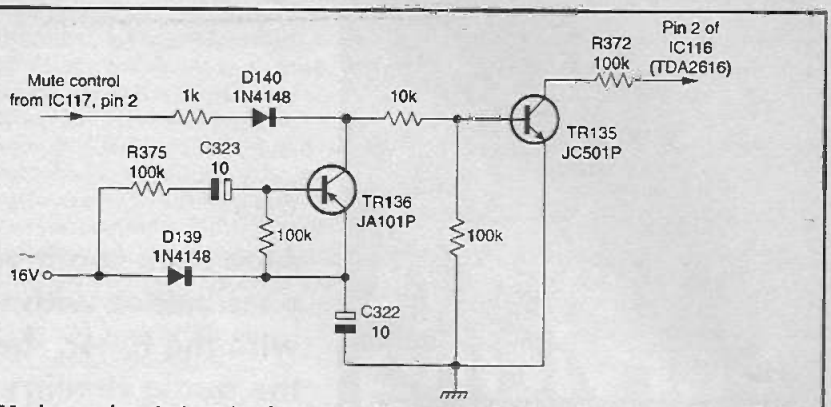


Fig. 4: Muting and anti-plop circuits used with the TDA2616 audio output chip. TR135 is switched on by the microcontroller chip IC117 to provide muting. TR136 is normally off, with 16V at its base and emitter. At switch off D139 is reverse biased and TR136's base is driven negatively. It switches on, applying the charge held by C322 to the base of TR135 which switches on to mute the audio chip.

Audio circuitry

The sound IF circuitry is centred on IC002 (TDA2545A), which is part of the jungle module. Its input comes from the quasi-parallel SAW filter SF001. The output at pin 12 of IC002 is passed to pin 8 of the Nicam module. There is also a mono path via CF100 to IC114 (U829B), then to pin 10 of the Nicam module. IC505 (4066) on the Nicam module carries out mono/stereo switching. The outputs at pins 11 and 12 of the Nicam module go the audio switch module, which routes audio signals to and from the scart sockets, and to IC115 (TDA8425). This switching chip is connected to the I^2C bus: it also controls the volume, tone and other variables.

In versions 1 and 2 of the chassis the audio output chip IC116 (TDA2009A) is fed via a mute module. In version 3 the mute circuit is on the main panel and works in conjunction with IC116, which is type TDA2616 (see Fig. 4).

The TDA2009A chip's audio output pins are 8 and 10: the outputs are fed to the speakers via 2,000µF coupling capacitors (C236 and C288). With the TDA2616 chip the output pins are 4 and 6 and the coupling capacitors are 1,000µF (same circuit reference numbers).

The following is a guide to audio fault-finding, based on workshop experience.

No sound: Check the 26V supply from the chopper circuit to IC116. If missing, R133, D108 or the PCB track from the power supply around the edge of the main board could be open-circuit.

Use an oscilloscope to trace the audio from pins 11 and 12 of the Nicam module to pins 18 and 20 of IC115, then from pins 9 and 13 of IC115 to pins 1 and 9 of the TDA2616 audio chip or, in earlier versions, pins 1 and 5 of the TDA2009A chip via the audio mute module (audio in at pins 4 and 6, out at pins 1 and 2, with the mute input at pin 5 – pin 3 provides the chassis connection for the mute circuit). If muting is active, check the ident pulse at pin 29 of the microcontroller chip IC117. This comes from pin 5 of the jungle module (pin 14 of IC001). Pin 2 of IC117 goes high for muting. In version 3 muting is applied to pin 2 of the TDA2616 IC via TR135 (JC501P), which could be short-circuit – see Fig. 4.

Intermittent muting could occur with early chassis because pin 12 of the microcontroller chip IC117 was left floating: it should be connected to chassis.

If there's no audio from IC115, check C237 (100µF) which could be leaky. It's connected to pin 2.

No sound when AV is selected: IC115 is probably faulty.

No mono sound, stereo OK: R517 (10kΩ) on the Nicam module open-circuit.

IC116 getting hot: Can be caused by RF oscillation at the output pins. Check whether any of the following are open-circuit: C286 or C287 (both 0·1µF), R257 or R258 (both 1Ω, fusible). With the TDA2616 chip, check C282 (100µF) which is connected to pins 3 and 8. Shorted speaker leads etc. will probably destroy IC116.

Distorted mono sound: L107 could be off tune or CF100 or C297 (1nF) faulty.

Mono audio missing: TR111 (JC501P) could be faulty or R248 (2·2kΩ) open-circuit. TR111 is an emitter-follower between the output from IC114 and pin 10 of the Nicam module. It also provides a feed to the AV2 scart socket.

Low-level mono audio/distorted Nicam: Check whether pins 2 and 3 of the audio switch module are shorted.

Sound plop at power off: This applies to the version 3 chassis only – there is no anti-plop circuit with the TDA2009A chip. Fig. 4 shows the muting and anti-plop circuit

used with the TDA2616 audio output chip. If the anti-plop circuit doesn't work, TR136 (JC101P) could be faulty or R375 (100kΩ) open-circuit. The 16V supply could be missing from the top-side track. Check D139 and other components as necessary.

Nicam module

The Nicam decoder used in UK sets is in one module that's connected to the microcontroller chip IC117 via the I^2C bus. There are few faults here.

No Nicam sound: If the LED or on-screen display shows no Nicam signal, the carrier or data PLL isn't locked. If the LED or on-screen display show nothing wrong, check the audio outputs at pins 6 and 8 of the TDA1543 DA converter IC502. If audio is present here, check through IC503 (TL084) and TL505 (4066) and the associated components. If there's no audio output from IC502, check IC501 (SAA7280), IC504 (TDA8732) and the associated components.

Nicam slowly oscillating (plopping): Check the setting of C544 (data PLL).

Nicam drop-out: L503/4 may be the wrong value – should be 1mH (applies to versions 1 and 2 only). ■

Next month
The teletext section and the microcontroller system

HELP WANTED

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

Wanted: An XC411874P processor (circuit diagram shows ZC411867P) for the Matsui Model 21V1N (Grundig CUC7350 chassis). Also a TP720 remote-control unit. Phone Leslie E. Swain on 01480 811 058 or e-mail les@bctalk.net

Wanted: Working chassis (PCB TNP197010) for the Panasonic Model TX2172 (Alpha 1 chassis). Also PCB 3104 303 31338 for the Philips Model 21CE4550/05S (2B chassis). Ron Bruce, 11 New Zealand Way, Rainham, Essex RM13 8JP. Phone 01708 558 792.

For disposal: 'Er indoors has decreed that, having reached retirement, I must dispose of my "that'll come in useful one day" treasures stored in our secondary warehouse (the loft). There are therefore, free to a collector or similar 'squirrel', several analogue satellite receivers (Amstrad, Pace, Philips, etc.), some working, and a quantity of front-loading VCRs in various states, useful for spares. Please help me save my marriage! Phone Tony Savage on 07947 530 059 (Plymouth area, Devon/Cornwall border) or e-mail tonyx@supanet.com

Wanted: A service manual for the Philips Laservision video disc player, Model VB700 or VB600 (the 700 has remote control). A photocopy would do but must be in good condition. A. Hodson, 283 Blackburn Road, Haslington, Rossendale, Lancs BB4 5JG. Phone 0161 959 5443.

Wanted: Philips Nicam VCR Model VR712/05 for spares. C. Walkington, 2 Bramley Drive, Backwell, Bristol BS48 2HN. Phone 01275 462 885.

Wanted/for disposal: Require a service manual for the Aiwa NSX-S555 digital audio system. Have for disposal the following: Heathkit 1M distortion analyser with manual; EKO Music Box 15 Rhythm; Hacker Sovereign radio, complete; working Pye transistor radio, circa 1963; Record Minor insulation tester in leather case; two Farnell sine/square audio oscillators; 17 Sony RM694 teletext handsets, new boxed; 18 Sony RMT-V373 TV/VCR handsets, new boxed; also a small quantity of TV valves, new/used tested. C.J. Randle, 1 Corn Hill, Orchard Hills, Walsall WS5 3DJ. Phone 01922 620 456.

Wanted/for disposal: Require MN15522VMS IC for the Panasonic VCR Model NVJ35. Have for disposal a Tektronix oscilloscope type 545B, not working but complete. Offers please, buyer collects (North Wales). Phone David on 01492 531 584.

Wanted: Digital processing board for the Panasonic Model TX29A3 (Euro-1 chassis). Phone Doug Carson on 01229 774 749 or e-mail dougcarson@FSBDial.co.uk

For disposal: 359 copies of *Television* from January 1970 to December 2000. E-mail offers to david@coggeshall20.freeserve.co.uk

For disposal: One Grundig V1700 VCR with tapes. Copies of *Television* from January 1994 through to December 2000. *Wireless World* February 1982 to December 1982; April and September 1980: February, March, May, July, September 1981; February, April, May, November and December 1983; January 1984; *Electronics and Wireless World* January and April 1985. One 405/625-line monochrome TV set. One Telequipment D52 double-beam oscilloscope. Denis E. Peace, 24 Emmott Drive, Rawdon, Leeds, W. Yorkshire LS19 6RF. Phone 01132 502 796.

Wanted: A TDA2655B IC or deflection panel type 29504-007-21 for the Grundig CUC220 TV chassis. Reg Stroud, 2A Linden Road, Gloucester GL1 5HD. Phone 01452 503 581.

For disposal: Ten volumes of Newnes circuit books, pre 1970; *Television* magazines published during the 1980s; a Philips D801 desoldering station; a quantity of valves and other items. Offers to John, TV Hire, 10 Clapham Park Road, London SW4 7BB. Phone 020 7622 7762.

Wanted: Original remote-control unit (secondhand OK) and/or operator's handbook for the NordMende TV Model Futura 72 (28in. screen). Phone Michael Buckley on 01322 336 524 or e-mail j.cahillane@virgin.net

For sale: *Television* magazines published during the years 1979-2000. Only five missing (May 1981, January 1982, July and August 1986 and March 1999). Reasonable offers please. Buyer to arrange collection from Bognor Regis. Phone P. Everett on 07939 265 776 or e-mail tvmags@bramblehedge.co.uk

For disposal: Free, for spares, a Cossor 1033 dual-beam oscilloscope with manual. All valves and CRT working. Mains transformer insulation has failed (2kV mains-derived EHT). Phone Ronald Camp on 01245 707 622 (Brentwood, Essex) or e-mail ronald.camp@marconi.com

Wanted/for disposal: Require service manuals (not copies) for the Sharp CD-302E CD midi system and Sharp VC780HM VCR, also a line output transformer (part no. AL21003) for the Pye 11U 405/625-line monochrome chassis and a waveband knob and manual for the Goodmans Stereomax AM/FM tuner. Have for disposal a Sanyo G3003 music centre; a Ferguson TX9 series 20in. TV set with 'stereo' sound, teletext and stand; and an Invicta 20in. single-standard hybrid monochrome chassis. David Hazell, 3 Wrde Hill, Highworth, Swindon, Wilts SN6 7BX. Phone 01793 765 390.

Simple Ni-Cad pulse charger

Ian Field describes a simple Ni-Cad battery pulse-charger circuit based on the use of a conventional iron-cored mains transformer

The principle of Ni-Cad battery pulse charging and its advantages were described in an article of mine in the March 2001 issue of *Television*. That article also outlined a way of modifying a typical AC adaptor/small PC switch-mode power supply to provide pulse charging.

Many people will probably not be keen to mutilate a direct off-line switch-mode power supply for the purpose. So I've drawn up a basic pulse-charger circuit that's based on the use of a conventional iron-cored mains transformer. It can be built from scratch at very little cost. Alternatively a conventional-type mains adaptor or 'cheap-and-nasty' commercial Ni-Cad charger could easily be modified: a commercial Ni-Cad charger has the advantages of a built-in transformer and battery bays, and a current-limiting resistor of value correct to suit the size of cells that fit the bays.

Circuit description

The new circuit is shown in Fig. 1. Some of the resistor values depend on the number of cells, so these have been left to the constructor to determine in accordance with the particular application. The transformer shown feeds a bridge rectifier. Alternatively a transformer with a centre-tapped secondary winding to feed a single-phase, full-wave rectifier circuit could be used.

Resistors R1, R2 and R3 with transistor Q1 form a zero-voltage detector. The ratio of R1 and R2 is chosen to provide sufficient base bias to saturate Q1 for any sinewave amplitude value that exceeds ten per cent of the peak value. Thus Q1 switches off only briefly at the zero crossing point. The MOSFET switching transistor Q2 can then conduct. Its gate is driven by the differentiating network C1/R4: R3 must provide sufficient charging current for C1 so that the voltage developed across R4 is at least the gate-threshold voltage for Q2, enabling it to switch on.

Differentiator-coupling is required because otherwise, if the mains supply was interrupted, the zero-voltage detector circuit would interpret this as being a permanent zero-crossing condition and Q2 would be permanently switched on, which would be catastrophic for the battery! To maximise its useful effect, the brief discharge pulse produced by Q2 must be as high-current as can be accommodated. The zener diode D6 is included to protect the MOSFET's gate from being driven negatively when Q1 switches off, and to discharge C1 so that it is ready to produce the next charging spike to switch Q2 on.

D5 is included to isolate the battery voltage from the half-wave output from the bridge rectifier, otherwise the zero-crossing detector wouldn't work.

The current-limiting resistor R5 will already be present if a commercial Ni-Cad charger is being modified. Otherwise, its value must be calculated to limit the charging current to a value appropriate for the cells being charged.

The value of the shunt resistor R6 will be very low. The idea is to make the very brief current pulses when Q2 switches on as high as practicable. R6 is included mainly to protect the MOSFET, which should be the highest-current type ready to hand.

Performance

The performance of this design is unlikely to come anywhere close to that of the HF type previously described, but it is very simple to build. I doubt whether there is any danger that it would harm a lead-acid battery, so it might be worth trying the unit with a lead-acid battery which has become so sulphated that a normal battery charger can't get any charging current started. ■

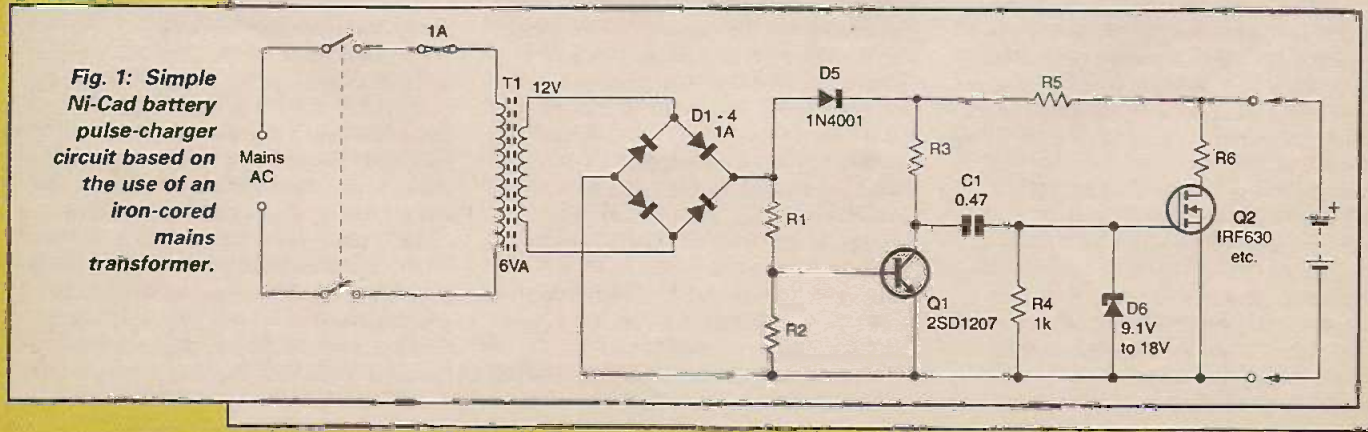


Fig. 1: Simple Ni-Cad battery pulse-charger circuit based on the use of an iron-cored mains transformer.

SPECIAL OFFERS

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

TEKTRONIX 2232 Digital Storage Scope, Dual Trace, 100 MHz, 100m/s with probes.....£525
H.P. 54501A Digitizing Oscilloscope, 100MHz, 4CH,£425
H.P. 3312A Function Gen. 0.1Hz-13MHz, AM/FM Sweep/Trl/Gate/Burst etc.....£300
FARNELL Dual PSU, XA35-2T, 0-35V, 0-2A Twice, OMD, LCD Display.....£180
CIRRUS CRL254 Sound Level Meter with Calibrator, 80-120dB, LEQ.....£150
EDDYSTONE 1002 Receiver 150kHz-30MHz + Broadcast FM. Unused.....£125
FARNELL AMM255 Automatic Mod Meter 1.5MHz-2GHz. Unused.....£300

H.P. 3310A Function Gen 0.005Hz-5MHz, Sine/Sq/Tri/Ramp/Pulse.....£125
FARNELL FLM4 Sine/Sq Oscillator. 10Hz-1MHz, low distortion, TTL output, Amplitude Meter.....£125
H.P. 545A Logic Probe with 546A Logic Pulser and 547A Current Tracer.....£90
FLUKE 77 Multimeter 3½ digit Handheld.....£60
FLUKE 77 Series 11.....£70
HEME 1000 LCD Clamp Meter 0-1000A. In Carrying Case.....£60

RACAL 9008 AUTOMATIC MODULATION METER AM/FM 1.5MHz-2GHz  **ONLY £95**

H.P. 8494A Attenuator DC-4GHz 0-11dB N/SMA£250
H.P. 8492A Attenuator DC-18GHz 0-6dB APC7 £95
MANY OTHER ATTENUATORS, LOADS, COUPLERS etc AVAILABLE

DATRON 1061 HIGH QUALITY 5½ DIGIT BENCH MULTIMETER True RMS/4 wire Res/Current Convertor/IEEE £150

MARCONI 2019A

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

MARCONI 893C AF Power Meter, Sinad Measurement Unused.....£100
Used.....£60
MARCONI 893B – No Sinad.....£30
MARCONI 2610 True RMS Voltmeter Autoranging 5Hz-25MHz.....£195
GOULD J38 Sine/Sq Osc. 10Hz-100KHz. Low distortion.....£75-£125
AVO 8Mk6 in Ever Ready Case, with leads etc.....£80
Others Avos from £50
GOODWILL GFC8010G Freq. Counter 1Hz-120MHz Unused.....£75
GOODWILL GVT427 Dual Ch AC Millivoltmeter 10Mv-in 12 Ranges Freq 10Hz-1MHz.....£100-£125
SOLARTRON 7150 OMM 6½ digit True RMS – IEEE.....£95-£150
SOLARTRON 7150 Plus.....£200
RACAL TRUE RMS VOLTMETERS
9300 5Hz-20MHz usable to 60MHz. 10V-316V.....£95
9300B Version.....£150
9301/9302 RF Version to 1.5GHz from.....£200-£300
HIGH DUALITY RACAL COUNTERS
9904 Universal Timer Counter, 50MHz.....£50
9916 Counter, 10Hz-520MHz.....£75
9918 Counter, 10Hz-560MHz, 9-digit.....£50

SOLARTRON 7045 BENCH MULTIMETER

4½ digit BRIGHT LED WITH LEADS **ONLY £30** 

HUNTRON TRACKER Model 1000.....£125
H.P. 5315A Universal Counter, 1GHz, 2-ch.....£80
FLUKE 8050A DMM 4½ digit 2A True RMS.....£75
FLUKE 8010A DMM 3½ digit 10A.....£50
MARCONI TF2015 AM/FM sig gen, 10-520MHz.....£175
FARNELL LF1 Sine Sq. Oscillator, 10Hz-1MHz.....£75
RACAL/AIM 9343M LCR Databridge, Digital Auto.....£200

GOULD OS 300 OSCILLOSCOPE

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

MARCONI 2022E Synthesised AM/FM Sig Gen 10KHz-1.01GHz LCD Display etc.....£525-£750
H.P. 8657A Synthesised 100kHz-1040MHz Sig Gen.....£2000
H.P. 8656B Synthesised 100kHz-990MHz Sig Gen.....£1350
H.P. 8656A Synthesised 100kHz-990MHz Sig Gen.....£995
H.P. 8640A AM/FM 500kHz-1024MHz Sig Gen.....£400
H.P. 8640A AM/FM 500kHz-512MHz Sig Gen.....£250
PHILIPS PM5328 100kHz-180MHz with 200MHz Sig Gen Freq Counter IEEE.....£550
RACAL 9081 Synth AM/FM Sig Gen 5-520MHz.....£250
H.P. 3325A Synth Function Gen 21MHz.....£800
MARCONI 6500 Amplitude Analyser.....£1500
H.P. 4275A LCR Meter 10kHz-10MHz.....£2750
H.P. 8903A Distortion Analyser.....£1000
WAYNE KERR 3245 Inductance Analyser.....£2000
H.P. 8112A Pulse Generator 50MHz.....£1250
DATRON AutoCal Multimeter 5½-7½ digit. 1065/1061A/ 1071 from £300-£600
MARCONI 2440 Frequency Counter 20GHz.....£1000
H.P. 5350B Frequency Counter 20GHz.....£2000
H.P. 5342A 10Hz-18GHz Frequency Counter.....£800
B&K Accelerometer type 4366.....£300
H.P. 11692D Dual Directional Coupler 2MHz-18GHz.....£1600
H.P. 11691D Dual Directional Coupler 2MHz-18GHz.....£1250
TEKTRONIX P6109B Probe 100MHz Readout. Unused.....£60
TEKTRONIX P6106A Probe 250MHz Readout. Unused.....£85
H.P. 1650B Logic Analyser 80 Channel.....£1000
MARCONI 2305 Mod meter, 500kHz-2GHz.....£750

ROHDE & SCHWARZ APN 62 SYNTHESISED 1Hz-260kHz SIGNAL GENERATOR. BALANCED/ UN-BALANCED OUTPUT. LCD DISPLAY £425

H.P. 6012B DC PSU 0-60V; 0-50A 1000W.....£1000
FARNELL AP60/50 1kW Autoranging.....£1000
FARNELL H60/50 0-60V; 0-50A.....£750
FARNELL H60/25 0-60V; 0-25A.....£400
Power Supply HPS3010 0-30V; 0-10A.....£120
FARNELL L30-2 0-30V; 0-2A.....£80
FARNELL L30-1 0-30V; 0-1A.....£60
Many other Power Supplies available
Isolating Transformer 240V In/Out 500VA.....£40

PORTABLE APPLIANCE TESTER MEGGER PAT2 Only £180

TIME 1051 Low Ohm Res Box 0.01ohm to 1M Ohm in 0.01ohm steps. Unused £100

RADIO COMMUNICATIONS TEST SETS

MARCONI 2955/2955A.....from £1500
SCHLUMBERGER 4040.....£900

SPECTRUM ANALYSERS

ADVANTEST R4131B 10kHz-3.5GHz.....£3500
H.P. 8591E 1MHz-1.8GHz, 75 Ohm.....£4500
EATON/AILTECH 757 0.001-22GHz.....£1500
H.P. 8558B with Main frame 100kHz-1500MHz.....£1250
H.P. 853A (Dig Frame) with 8559A 100kHz-21GHz.....£2250
H.P. 3580A Audio Analyser 5Hz-50kHz. As new.....£1000
B & K 2033R Signal Analyser.....£750
H.P. 182 with 8557 10kHz-350MHz.....£500
MARCONI 2370 30Hz-110MHz.....from £500
HP141 Systems 8553 1kHz-110MHz from.....£500
8554 500kHz-1250MHz from £750; 8555 10MHz-18GHz.....from £1000
H.P. 5372A Frequency and Time Interval Analyser.....£2250

OSCILLOSCOPES

TEKTRONIX TDS380 Dual Trace, 400MHz, 2G/S.....£2000
TEKTRONIX TDS350 Dual Trace, 200MHz, 1G/S, unused £1500
TEKTRONIX TDS320 Dual Trace, 100MHz, 500M/S.....£1200
TEKTRONIX TDS310 Dual Trace, 50MHz, 200M/S.....£950
LECROY 9400A Dual Trace, 175MHz, 5G/S.....£1500
TEKTRONIX TAS485 4 Ch 200MHz etc, unused.....£900
TEKTRONIX THS720A Dual Trace LCD 100MHz 500M/S, unused.....£900
HITACHI VC6523 Dual Trace 20MHz 20M/S Delay Cursors etc, unused.....£600
PHILIPS PM3092 2+2 Ch 200MHz. Delay etc £800. As new.....£950
PHILIPS PM3082 2+2 Ch 100MHz. Delay etc £700. As new.....£800
TEK TAS465 Dual Trace 100MHz. Delay.....£750
TEK 2465B 4 Ch 400MHz. Delay Curs.....£1500
TEK 2465 4 Ch 300MHz. Delay Curs.....£900
TEK 468 Dig Storage. Dual 100MHz Delay.....£450
TEK 466 Analogue Storage. Dual 100MHz.....£250
TEK 485 Dual Trace 350MHz. Delay.....£550
TEK 475 Dual Trace 200 MHz. Delay.....£400
TEK 465B Dual Trace 100MHz. Delay.....£325
PHILIPS PM3217 Dual Trace 50MHz Delay.....£200-£250
GOULD OS1100 Dual Trace 30MHz. Delay.....£200
HAMEG HM303 4 Dual Trace 30MHz.....£325
HAMEG HM303 Dual Trace 30MHz.....£300
HAMEG HM203.7 Dual Trace 20MHz.....£250
FARNELL DTV20 Dual Trace 20MHz.....£180

MANY OTHER OSCILLOSCOPES AVAILABLE

RACAL RECEIVER RA1772 50KHz –30MHz LED DISPLAY BASICALLY WORKING £250

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

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

TELETEST

Video & Computer Test Equipment

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

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

£159.95 ex VAT

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

Free Info Pack
www.teletest.co.uk

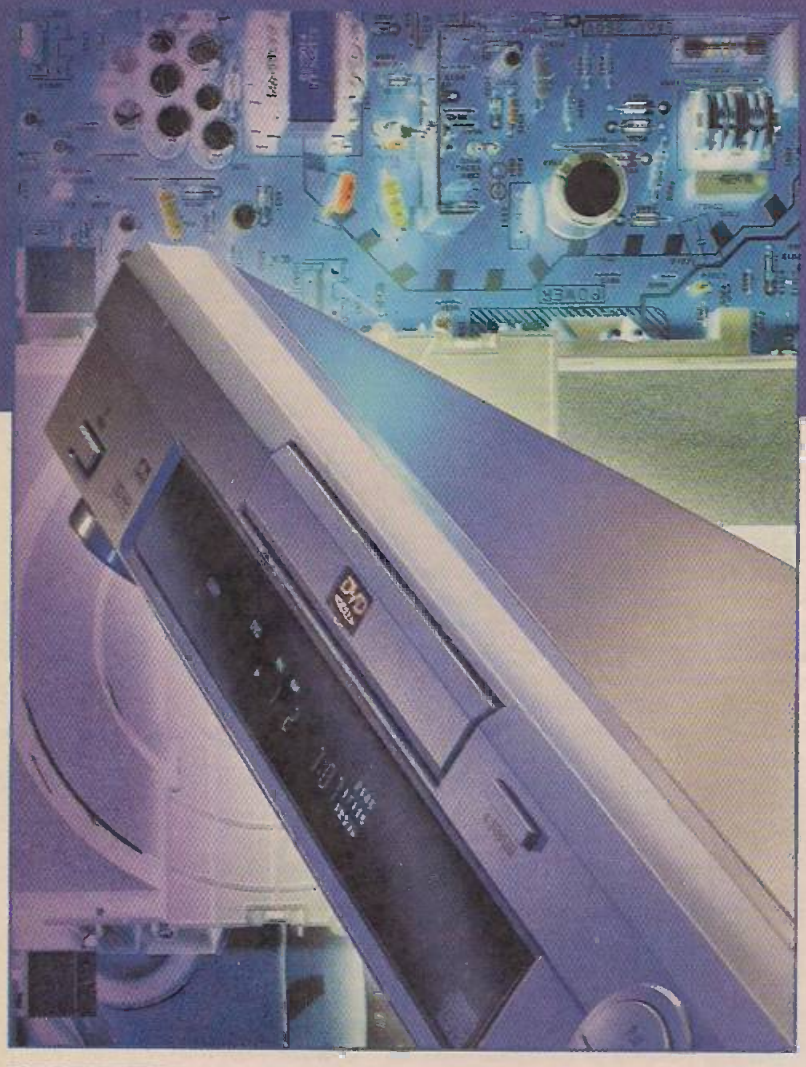
Available Now...

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

The most powerful combination of parts information ever produced for the service industry.
If you would like our Trade Catalogue including the latest SALI * CD please contact sales and add **CAT2002** to your next order.
* Free carriage on all SALI orders of £12 or more.

Seme

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



DVD player servicing

This month K.F. Ibrahim describes the system control, A/V decoder, audio processing and user interface sections of a DVD player

Last month's instalment started an account of the various sections of a DVD player, concentrating mainly on the optical unit and the servo system. This month we will complete the player description with a look at signal processing and system control.

System control

A microprocessor chip forms the heart of the DVD player's system control (syscon) arrangement. It is responsible for hardware and software programming and controls both the signal processing and servo sections of the player. Control is via address and data buses; control lines such as R/W (read/write), the IRQs (interrupt requests) and CS (chip select); and a serial bus which might be a two-line I²C, a three-line IM or a proprietary type. Fig. 16 shows in block diagram form the basic elements in this area.

One or more gate-array chips may be used to provide links to the servo-control devices and the multi-channel audio decoder. An EEPROM non-volatile memory stores personal selections and settings, such as video aspect ratio and language.

Advances in chip integration and the use of what is knows as system-on-chip (SoC) technology have resulted in the functions of two or more chips being combined within a single device. Fig. 17 shows the main connections to a chip that integrates the syscon microprocessor and gate-array functions.

The A/V decoder

Fig. 18 shows in simplified block diagram form a chip that combines the demultiplexer and A/V decoder functions. The programme-stream (sometimes referred to as transport-stream) output from the RF processor chip (see Fig. 9 last month) consists of multiplexed video, audio and other 'packetised elementary data streams' (MPEG-coded data). The first step that has to be taken is to demultiplex the transport stream to separate the video, audio and other PESs, which are stored in an SDRAM chip.

The Video PESs are fed to the video MPEG decoder which carries out data decompression and picture reconstruction, using the SDRAM memory to store picture frames as necessary. The output from the video decoder, in the form of multiplexed Y, Cr and Cb data, is fed out via a mixer section that enables on-screen display data to be added. The video data leaves the chip via an 8-bit parallel bus for subsequent digital-to-analogue conversion and encoding in PAL (or NTSC) form.

The demultiplexed audio PESs may consist of MPEG, AC-3 (Dolby Digital) or linear PCM data. There are separate decoders for these. The audio decoder produces left/right stereo and multi-channel outputs. The outputs consist of a data line that carries the audio information plus bit clock and L/R clock lines. The SDRAM also provides audio signal delay to ensure lip sync with the video

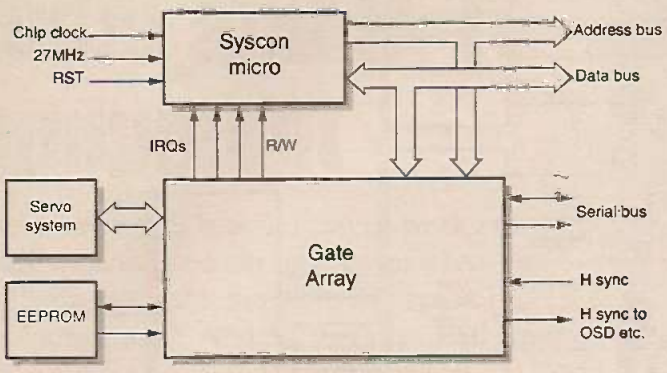


Fig. 16: Block diagram of the syscon section of a DVD player.

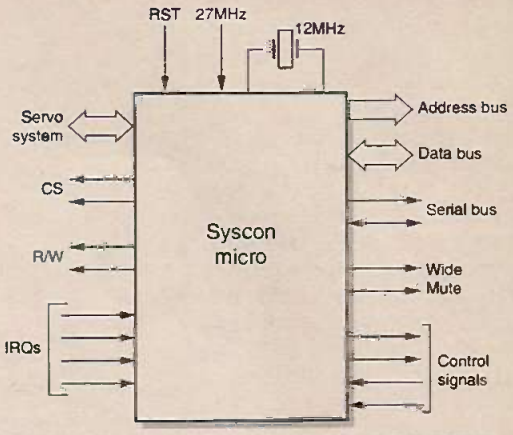


Fig. 17: Connections to a chip that combines the syscon microprocessor and gate-array functions.

information.

Digital video and audio outputs are usually also fed to coaxial or fibre connector ports. To simplify matters this is not shown in Fig. 18.

A crystal oscillator generates the 27MHz system clock. There's also an external chip-clock input.

Audio processing

The DVD system enables three audio encoding techniques to be used: MPEG-2, Dolby Digital (AC-3) and linear PCM. Fig. 19 shows in block diagram form the elements of a DVD player audio processing system.

The audio decoder that provides left/right stereo or multi-channel sound has three main outputs: the L/R data, a bit clock which indicates the bit rate of the data stream, and an L/R clock (the left and right channels are sampled in turn, hence the need for this clock). There are extra outputs when multi-channel audio is present. It feeds a two-channel DAC to obtain left and right stereo outputs, and a multi-channel audio digital signal processor (DSP) which can provide up to seven outputs with MPEG sound and 5.1 channels with Dolby Digital (see pages 652-4 September for more on the audio formats).

The audio decoder also feeds a downmixer which is used where a simple two-channel stereo output is required from Dolby Digital. Downmixing involves matrixing the centre- and surround-channel information on to the main stereo channels. This is satisfactory as a basic process, and can be improved by tweaking for optimum results.

With MPEG sound encoding the centre- and surround-channel information is already matrixed on to the main channels, so downmixing is unnecessary.

The linear PCM sound encoding format is the same as that used with audio CDs. There is no data compression, hence the high bit rate. Up to eight channels can be produced by the audio DSP with linear PCM.

The user interface

A dedicated microcontroller chip is used as an interface between the user controls and the rest of the player (syscon etc.). It has its own individual clock and is

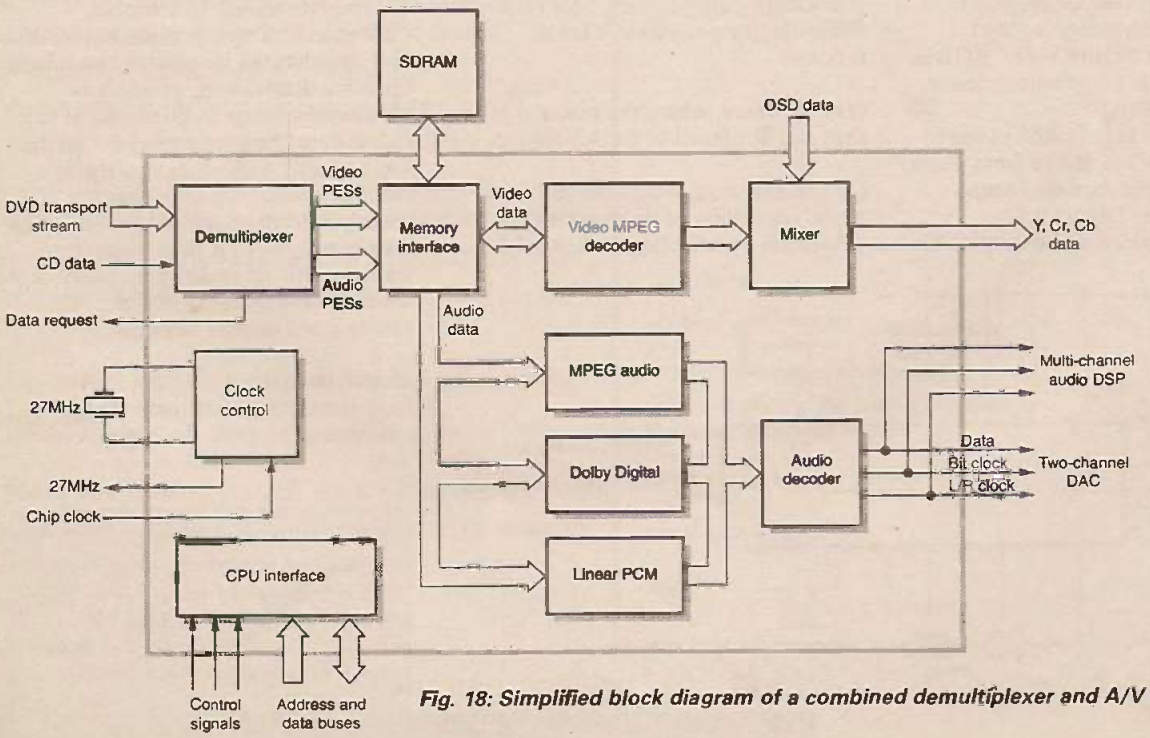


Fig. 18: Simplified block diagram of a combined demultiplexer and A/V decoder chip.

powered by an ever 3·3V supply. Fig. 20 shows in block-diagram form this section of the player.

The functions of the interface microcontroller chip are as follows:

(1) To control the power supply operation. When a player is switched on from cold, only the 'ever' voltages are produced and the power supply is in the standby mode. The user interface chip receives a power-detect signal from the power supply. When the chip detects an on request, it provides a power-control high signal. This brings the power supply out of the standby mode, switching on the other DC supplies.

(2) To receive and decode inputs from the front-panel button switches.

(3) To receive and decode the output from the IR remote-control receiver.

(4) To control the front-panel display.

(5) To initiate switching of the input/output ports as required.

(6) To provide video and audio muting as required.

(7) Communication with the syscon microprocessor chip.

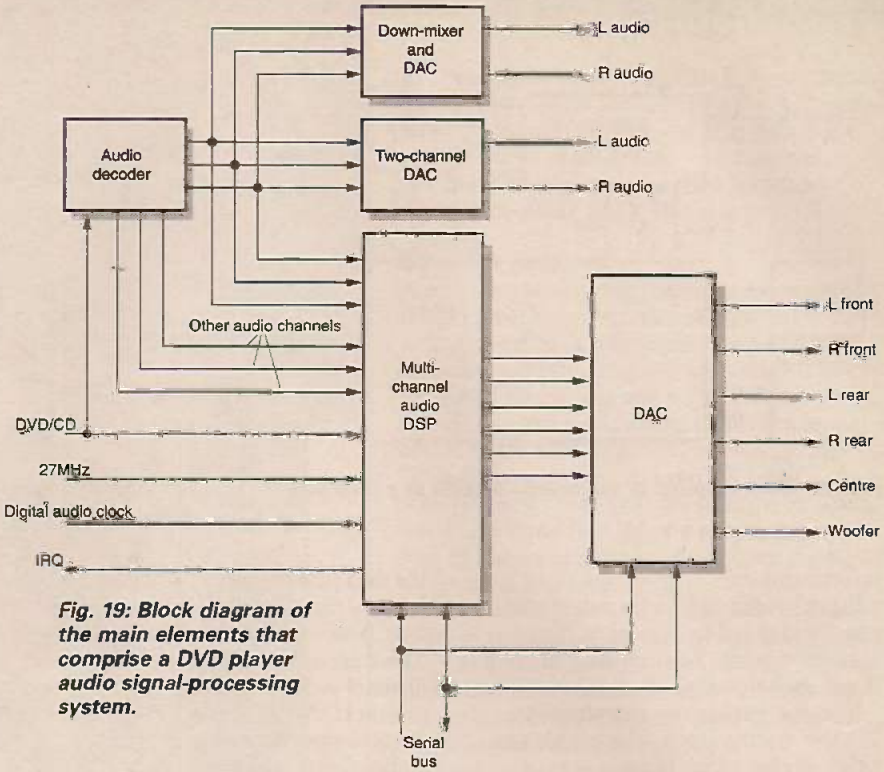


Fig. 19: Block diagram of the main elements that comprise a DVD player audio signal-processing system.

DVD player outputs

There are various analogue video outputs from a DVD player. The scart connector provides RGB and composite video/blanking/sync (CVBS) outputs. There are separate luminance and chrominance (S-Video) outputs. And phono connectors (usually yellow) provide composite video. S-video provides the best quality video. RGB is second best, while composite video is comparatively poor.

Analogue audio is provided as stereo from the scart socket, stereo from phono sockets, up to eight surround sound channels or Dolby Digital 5.1.

Raw digitally-coded audio outputs are available at coaxial and optical-fibre output sockets for feeding to an external decoder/amplifier, e.g. Dolby Digital.

Video formats

Video is available in two formats: 4:3 (1·33:1) and 16:9 (1·78:1) – the latter is known as widescreen. Films are usually 1·88:1 or wider, hence the need for conversion. This may involve black borders (mattes) at the sides or top/bottom, or cropping the sides and top/bottom of the picture. The various video display possibilities are as follows:

(1) Full frame, where the material is shot and displayed in the 4:3 format.

(2) Pan and scan, where the picture is made, regardless of its shape, to fill the 4:3 format by selecting part of the image for display.

(3) Letterbox, which is a method of showing widescreen video on a 4:3 format screen. Widescreen (16:9 or wider) is made to fit the screen by adding mattes at the top and bottom.

(4) Widescreen, where the recording and display is in this format.

Film can be anamorphically squeezed into 4:3 format then 'unsqueezed' by the TV receiver to full 16:9 format.

TV receivers may provide conversion that stretches the image, the result being distorted dimensions, as when an anamorphic image is displayed as 4:3. In this case the image will be squashed horizontally, with elongated figures. Another, more common, example is when a 4:3 image is stretched horizontally to fit a 16:9 widescreen display. This all makes a mockery of the sophisticated circuitry designed to ensure good display linearity.

Next month

In next month's instalment we will concentrate on fault-finding procedures.

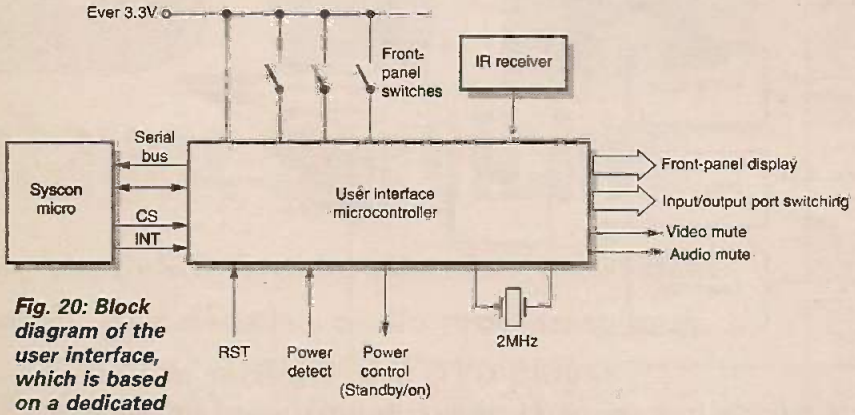
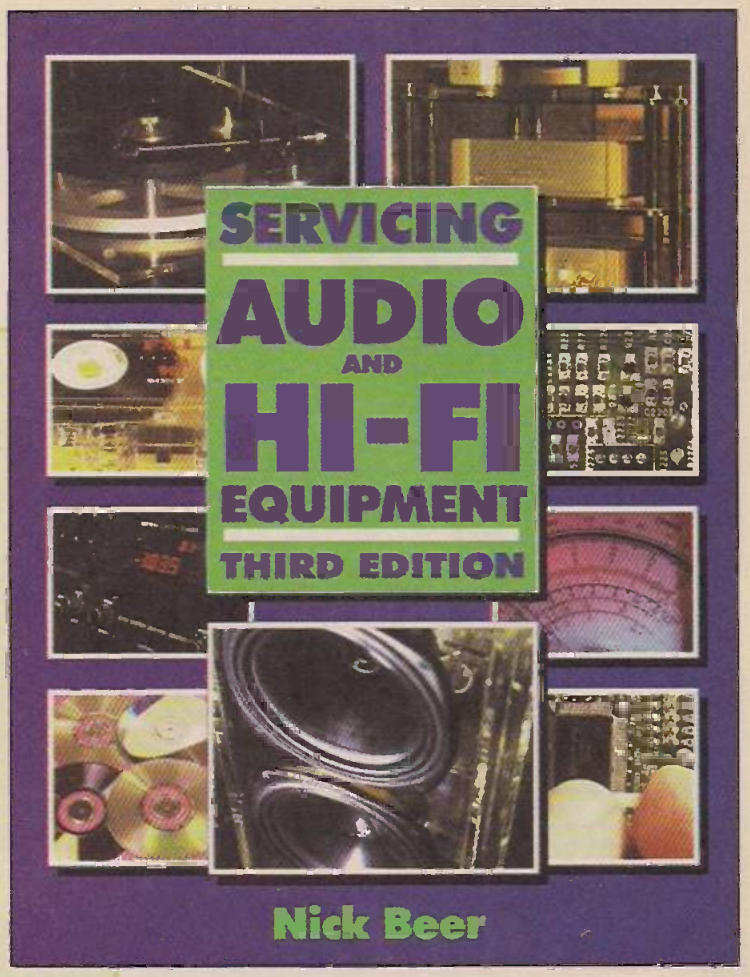


Fig. 20: Block diagram of the user interface, which is based on a dedicated microcontroller chip.

K.F. Ibrahim is Senior Lecturer at the College of North West London and is author of several books, including *Digital Television* and *Television Receivers*.

Servicing Audio and Hi-Fi Equipment



'Its readers will benefit from its wealth of easily assimilated information, and repairs hitherto thought impossible will speedily become routine. And the first may well cover its purchase price. Congratulations on a comprehensive, well-written and lucid work' *Electronics Informer.*

'Interesting, entertaining and useful for both practitioners and teachers. All round a satisfying book which deserves to be considered as a tool rather than an ornament collecting dust on the shelf.'
Skillset Newsletter

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

A symptom index and comprehensive manufacturer and supplier guide allow quick access to specific advice and suggestions.

The third edition is bang up to date with the latest technology - DVD, CD Recordable, PC audio systems. There is also new material on PA equipment.

*** Essential bench companion for all service engineers.**

*** New technology such as DVD and expanded material on MiniDisk will ensure another successful launch to this new edition**

Please supply the following title:

Servicing Audio and Hi-fi Equipment

Total_____

Name

Address

Postcode

Telephone

Method of payment *(please circle)*

Mastercard/Visa/Cheque/PO

Cheques should be made payable to Cumulus Business Media

Credit card no_____

Card expiry date

Signed

Price includes delivery and packing

UK Price: £32.00 Europe £34.00 ROW £36.50

Return to Jackie Lowe, Cumulus Business Media
Anne Boleyn House, 9-13 Ewell Road, Cheam, Surrey, SM3 8BZ

Side view of the motor home to which the electric step was to be fitted.

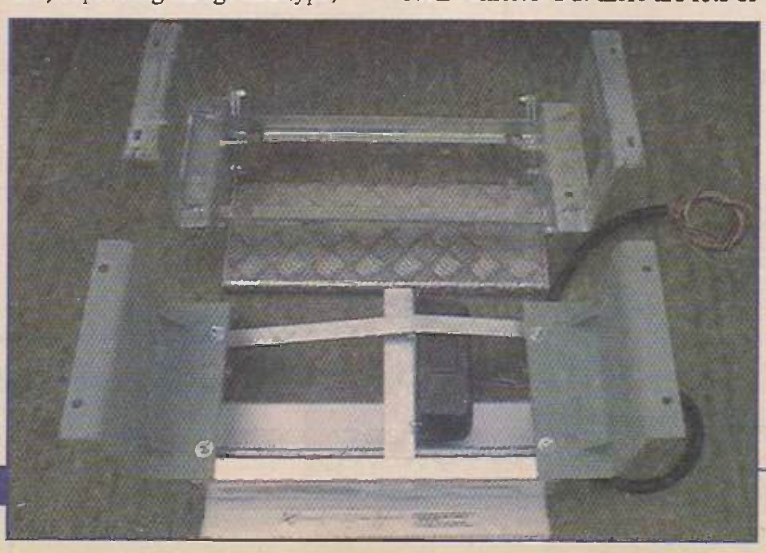
Work on motor homes

Motor homes offer many opportunities for installation work. Tom Baker describes step replacement with an electrically-operated version

In a previous article (July) I discussed fitting radio/CD systems in caravans and motor homes and mentioned how important it is to hide all wires and make the job a neat one, as space is at a premium. Motor homes are similar to caravans in a lot of ways but, depending on age and type, the difference can be as great as chalk and cheese. Motor homes can range in value from a few thousand to over sixty thousand pounds.

Some people can be intimidated by a sort of palace on wheels, and won't consider doing any work on such vehicles. But there are lots of extras that can be fitted, and many owners who are ready to purchase them but don't have the ability or wish to carry out installation. Here are just a few examples, to whet your appetite: satellite navigation systems; Sky satellite dishes; tow bars; reversing cameras; reversing detectors; electric steps; and air-conditioning units. I've fitted them all – except for satellite navigation – and can assure you that once you have made up your mind where to install a unit the rest is relatively easy. If you should feel over-whelmed by a job, just say to yourself "it's only a posshed up delivery van", because basically that's what a motor home is.

By this I mean that they are all built on a commercial van chassis. So there's lots of space underneath to run wires. And because there is, in effect, a caravan stuck on top,



Comparison between the original mechanical step (rear) and the motor-driven step (front) with its extension brackets in place.

there's lots of wooden flooring to clip the wires to.

Safety

Now to the serious bit. Make sure that when you run wires underneath a vehicle you don't leave any cabling which could chafe on the chassis. If you think there's a possibility that it might, either re-route it or put it inside some plastic conduit designed for the purpose. The conduit has a slit up the middle to enable you to get it over the wire.

You cannot be too careful about this because, unlike a caravan, a motor home has a big battery in it. There might in fact be two or three to run accessories, and they don't switch off when the ignition key is taken out.

In addition, always make sure that whatever you fit is connected to its own fuse or fuses. I emphasise this because I have seen at first hand what a burnt out motor home looks like. Believe me, it's not a pretty sight. The one I'm thinking about was set alight by vandals, but it was enough to make me think much more about electrical safety with motor homes.

Electric door steps

Now for this month's main topic, fitting a step that's controlled (extended/retracted) by an electric motor. I don't know whether any of you listen to Terry Wogan in the mornings on Radio 2: I do, and one of the catch phrases he uses is "is it me?" I seem to be saying this more often myself as I get older. It happened to me last week when I was asked by a customer to fit an electric step to his motor home. He said that as it already had a mechanical step that could be pulled out fitting a motorised version should, apart from the wiring, be a doddle.

So I ordered one and, when it arrived, I studied the instructions. These told me how easy it was to fit the step and wire it up, and I convinced myself that it really would be a doddle. Three days later I phoned the customer to tell him that the step had arrived, and arranged to collect his motor home and take it back to my workshop for fitting.

It was only when I started to remove the existing step that the feeling I'd taken on something I shouldn't have came over me. I took a closer look and noticed that the fixing screws were eight and a half inches away from the ones on the new step! The phrase "is it me?" came to the front of my mind. What I'd not thought about was that some motor homes have deep fibreglass skirts along the bottom and sides, so that you don't see the chassis structure on which the motor home is built.

The step I had obtained was designed to be fitted to either a wooden or metal floor and was, therefore, flat at the top for flush fitting. But the floor that confronted me was eight and a half inches away, up in the air, behind the skirt.

Not being the type of person to give up, I took both steps around to my friend John, the blacksmith, and showed him my problem. Then I let him look at the steps. After a pause for a laugh he suggested making two extension pieces to enable the new step to fit. The accompanying photographs show how this turned out.

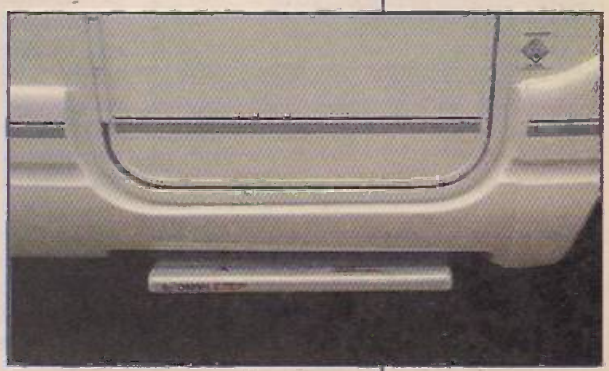
While John made the extension brackets I sorted out the wiring. This wasn't just a case of a live and an earth wire. There was also a live wire from the ignition switch, so that the step retracts automatically when the vehicle is started up – this is a safety feature. I took these connections directly from the main fuse box, but for added protection fitted individual in-line fuses as well.

Then I ran the cables out through the engine compartment and tie-wrapped them to the existing loom, taking them underneath the vehicle and again tie-wrapping to the underside – so that they wouldn't flap about and risk chafing against something. You have to bear in mind that if there's a big diesel engine there will be a lot of vibration, while the vehicle might travel over some very rough terrain. It will spend most of its life on roads.

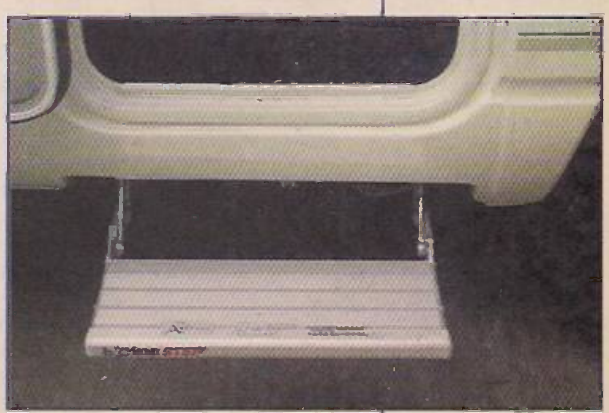
John eventually brought the step back and, after I'd spent another half an hour on my back underneath the vehicle, the step was firmly attached to it. I connected the relay to the switch then, having followed all the manufacturer's instructions, it was time to test the installation. I was impressed when it worked first time.

I had to charge the customer £30 on top of the quoted price for the extra brackets. Fortunately he appreciated that the problem couldn't have been foreseen and was happy to pay. ■

The original and new steps shown beneath the door to the motor home.



The motorised step retracted for driving.



The motorised step extended while the motor home is stationary.

Next time

A job I'm often asked to carry out is to fit a rear-mounted camera system to enable the driver to see what's behind when reversing. I'll cover this in the next instalment in the series.

The omnistep is available from Hayes Leisure Ltd. of Birmingham (0121 5263 433) and Broadview Blinds of Poole, Dorset (01202 679 012).

LETTERS

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

or e-mail tessa2@btinternet.com using the subject heading 'Television Letters'.

Please send plain text messages. Do NOT send attachments. Type your full name, address, postcode, telephone number and e-mail address (if any).
Your address and telephone number will not be published unless requested, but your e-mail address will unless you state otherwise.
Please send ONLY text intended for the letters page. Correspondence relating to subscriptions and other matters must be sent to the office address given above.

Terrestrial digital TV

In his letter in the October issue Geoff Darby suggested that ITV Digital is doomed. The satellite alternative, Sky Television, has yet to make a profit however, and there are stories that its pictures disappear during thunderstorms. As for the stunningly good Sky pictures on the major channels, because of the very nature of digital TV the ITV Digital pictures are also stunningly good on all channels!

Being interested in TV engineering but loath to pay a subscription to watch, I decided that what I needed was a dual-standard analogue/digital TV set, rather like in the 405/625-line days. I eventually discovered that Argos has been selling a 28in. Bush analogue/digital set for £395 – plus a free one-year subscription for some pay channels.

To check that I would be able to receive terrestrial digital TV, I managed to borrow a set-top box. This confirmed that reception was possible. But because of the wide spread of the channels I had to purchase an ITV Digital recommended wideband aerial. Having installed this in place of my previous aerial, I was in a position to obtain the Bush TV set. I did, and have been very impressed with the results: stunningly good widescreen pictures in either analogue or digital form, a good choice of local and national programmes, several FTA channels, the EPG, and only one remote-control handset required.

I had to do some work to get this service, but I do live thirty miles from the transmitter. What baffles me is that the availability of dual-standard sets is so poorly publicised. At the price I paid, I'm sure that many people would take up the terrestrial digital TV option. After all, you get very affordable widescreen TV.
I could go on about digital TV issues, but I believe that terrestrial TV is here to stay and will ultimately be most people's choice of TV.

Incidentally, children's analogue portables will still be very useful for PlayStations. Nintendos and the like.
Mike Bellis,
Bury St Edmunds, Suffolk.

Vintage radio repairs

I enjoyed the articles on vintage radio repairs, having started to work as a service engineer in 1955 when this was the usual job, also because for some years now I've been restoring and collecting valve radio receivers. The following additional points may help those interested in this type of work.

First, most valve radio receivers didn't have a fuse or, if they did, it was often overrated. I always fit a fuse in the live supply, before the switch, then check the maximum current drawn by the set. This is usually about 300mA. I fit an anti-surge type rated at about 100mA higher than the measured maximum current. It provides extra safety and protects the usually irreplaceable mains transformer from the effects of short-circuits – valve rectifiers are infamous for spectacular shorting.

Secondly, open-circuit line cords, barretters and droppers in AC/DC radios can be dealt with by fitting a motor-run capacitor in series with the heater chain instead. In my experience this should have a value of between 2µF and 3µF. Start with 2µF and monitor the heater voltage as you slowly increase the input from a variac. If the heater voltage is low with a 240V input, add 0·1, 0·22 or 0·47µF tubular capacitors, rated at 1kV, until the voltage is correct or just under. If the voltage reaches its correct level with an input of less than 240V, start with a 1µF or 1·5µF capacitor. After each addition to the capacitance, start checking again with the variac at zero. A 470kΩ resistor must be fitted across the capacitor terminals to provide a discharge path, otherwise a small shock may be received if the pins of the plugtop are touched when it is removed with the receiver's on/off switch in the on position. As a test I pulled the plug with the resistor fitted: it took about two seconds to connect the meter probes, by which time any charge had gone. A finger test was quicker but still OK. Always check each set modified in this way.

A bonus is that the capacitor runs cold, reducing the heat generated in the heater circuit to just that produced by the valves.

My last restoration was a Masteradio Model D110, a small set dating from about 1946 with a Bakelite case. It originally had a line cord and required a capacitance value of 2·22µF. Motor-run capacitors can be obtained from CPC – see page 314 of the 2001 catalogue. I use the plastic-case type, either tag or wire-ended depending on which is easier to fit.
John Langley,
Burton Latimer, Northants.

I must disagree with one point made in the articles on restoring vintage radio sets. It was stated that a silicon diode as a replacement for a valve rectifier will cause disaster, because a silicon diode is fully active from the moment of switch-on while a valve rectifier heats up slowly, in fact more slowly than the rest of the valves in the set. As a result the HT does not rise excessively, because by the time it reaches a maximum value it's loaded down by the operation of the other valves. But a directly-heated rectifier comes to life in only a few seconds, and this is the most common type used in vintage radio sets. Certainly the HT has risen long before the other valves have heated up. If you want to check this, connect a voltmeter to the

HT line then switch on.

I think that the cause of capacitor explosions in such sets is that the capacitors have already deteriorated and have survived only because the HT voltage is lower than normal – otherwise, why are you replacing the rectifier? The increased voltage finishes them off.

As a practical point, many millions of valve TV sets used silicon rectifiers. I don't remember seeing any fall in reliability as a result.

J. Ellis,
Birmingham.

Editorial comment: We have never come across a TV set, hybrid or whatever, that uses a silicon HT rectifier without a surge-limiter resistor. This is a basic design recommendation. It would seem a sensible precaution to use a series resistor of appropriate wattage with a silicon rectifier whatever the nature of the equipment.

The child-lock problem

Things have come a long way since you had to tune your telly by adjusting a 100kΩ potentiometer for each channel in turn. It was back-breaking work, but you had to do it only once – unless your four-year old son rearranged the pots while you were out. Fortunately we now have chips that save our poor fingers from those abrasive little thumbwheels. But they often incorporate clever childlocks that would keep MI5 out. So you may have to phone the Helpline and, surprise, surprise, be held in a queue, listening to a birdy song for half an hour.

Television magazine has published unlock sequences from time to time. But I can never remember them when it matters and, judging by the Engineers' Forum web site, I'm not the only one with this problem. So I intend to launch a web site dedicated to revealing the secrets of child-locks, hotel modes and service modes so that they are all available in one place. It may take some time, as I need to compile a list. In this connection any e-mail contributions would be greatly appreciated. My e-mail address is phil@colorfusion.fsworld.co.uk

Multi-million pound sponsorship deals would also be very welcome.

Philip Barry,
Bedale, North Yorkshire.

Recycling brown goods

One of the most important points on this subject seems to have been missed. The government appears to be anxious to allocate responsibility for waste disposal problems to anyone other that itself. The simple facts are as follows. All businesses pay rates, which are a form of taxation. We don't get free rubbish collection. Our rates are payment enough for waste disposal.

If extra has to be paid, why should the electronics industry be singled out? Why not the plastic toy industry, fitted kitchens, plastic food containers or what have you?

The servicing trade should certainly not be expected to contribute towards the cost of dealing with this problem. If extra cost was imposed on manufacturers and importers, at least the products would be more expensive to buy and therefore worth repairing. This would also reduce the trade deficit.

John Hopkins,
Felixstowe, Suffolk.

Replacement transistors

My thanks to David Benson and Ian Johnson (Letters, August) for their suggestions on alternative replacement transistors for use in the Quad 303 power amplifier.

I have recently repaired a Quad 303 that had one channel short-circuit. The U17219/U17229 pre-driver transistors were replaced with a BC546B and BC556B, while 2N3055H transistors were used to replace the 38494 transistors in the output stage. I used types BD139 and BD140, fitted with small bolt-on heatsinks, to replace the 38495/38496 driver transistors in the audio circuit and the power supply regulator, as these have proved reliable as driver transistors in the Armstrong 626 receiver I rebuilt several years ago. The regulator output transistor was replaced with an MJ15003.

The small electrolytic capacitors in the 303 and the associated 33 control unit all had to be replaced. Many of them were leaking electrolyte, while the bootstrap capacitor in one of the output stages was open-circuit. This doesn't take long, as they are all readily accessible. The plastic-encapsulated electrolytic capacitors used by Quad, of Callins or ROE manufacture, seem to be prone to both these failure modes.

The owner assures me that the repair has had no adverse effect on sound quality.

Back to replacements for the 38495/6, the BFX39/87/2N4037/BFY34/2N3053 would probably be unsuitable on voltage grounds, but I will bear in mind the BC441/461 and 2N5320/5322 for next time. I'm sure that standard "cog-wheel" heatsinks would be ideal for these. This would save the bother of having to transfer the flanges from the old devices.

I have also had a Quad FM3 tuner in for repair. The two-lamp tuning indicator was alight on one lamp only, regardless of the tuning point. This was caused by the FM discriminator coil being badly misaligned. The tuning indicator uses an amplified bridge circuit to monitor the DC bias at the discriminator's output.

I hope that these observations will prove helpful to those interested in repairing Quad hi-fi equipment. Long may these fine amplifiers last!

Simon Pearson,
Chipping Norton, Oxon.

Mechanical scanning

I don't know about pictures of the planets being taken using mechanical scanning (see TV before the tube, March, and 30-line TV, September), but the Mars Viking Landers of the 70s did use it. The cameras, built by Itek for over $25m, used vertical line scanning. A mask-scanned section of the scene was reflected by a stepping mirror on to one of several selectable diodes each with a colour filter. These produced RGB and IR data. Line scanning was from top to bottom at 512 pixels per line, the camera stepping to the right for the next line. Each pixel's brightness level was converted to a six-bit word.

The two cameras could rotate through almost 360° to build up panoramic views. They were spaced 1m apart to provide stereoscopic imaging. Nasa didn't, as I understand it, like using the words "taking photographs" as they had connotations of shooting pictures with an Instamatic! "To image" was the preferred phrase.

This very slow-scan method was used because, originally, the data was to be transmitted back to earth directly from the Landers, which were not going to have a recorder on board. The technology of the time was just not capable of providing a reliable high-speed microwave data link via the 30W on-board transmitter. In the event however the Landers carried a metal-tape recorder which allowed a higher uplink speed to the Orbiter's recorder. This stored data was then transmitted to earth by the Orbiter at about 16kbits/sec – pretty high-speed back then.

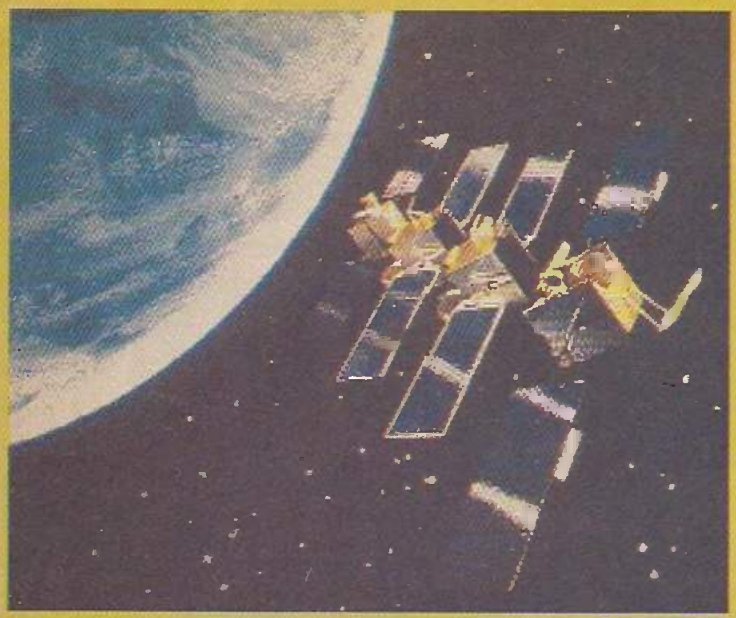
Because of the 178m km Mars-Earth distance, the weak signal produced numerous bit dropouts, but computer enhancement of the data replaced the missing bits. Even today those pictures are pretty impressive.

Bill Leftly,
Portsmouth.

DVD player servicing

In his article in the September issue K.F. Ibrahim says "for digital TV the aspect ratio is taken as 5:4". Not so: the aspect ratio is either 4:3 or 16:9. Mr Ibrahim seems to have arrived at his figure by dividing the number of pixels per line (720) by the number of active lines (576). But this would produce the suggested aspect ratio only if the pixels were square, which they aren't. If the same logic is applied to 525-line TV, a ratio of 3:2 (720/480) would be indicated. This is equally incorrect.

Richard Russell.
Orsett, Essex. ■



DX and Satellite Reception

Terrestrial DX and satellite TV reception reports. Broadcasting and satellite band news. A new prospect for DX reception: satellite VHF transmissions. Roger Bunney reports

A motorised paraglider lands on the Statue of Liberty. The report was from Fox News via NSS K at 21·5°W.

Sporadic E propagation of Band I signals was very active during early August. On the 12th it fell away, but was back a week later. Then it just seemed to switch off. As a bonus there was excellent meteor scatter propagation (signal 'pings') on August 1st, while tropospheric enhancement continued from the end-July opening, with Band III/UHF reception from the Benelux countries and Germany. Here's the SpE log for the period under review:

1/8/01	RAI (Italy) ch. IA; Tele-A (Italy) ch. E2–.
2/8/01	LRT (Lithuania) ch. R2; RAI IA; NRK (Norway) E3; C+ (Canal Plus) L2.
3/8/01	RAI IA, B; RTP (Portugal) E3.
4/8/01	TBK (Belarus); SVT (Sweden) E2; RAI IA, B.
5/8/01	TVE (Spain) E2-4; TVA (Italy) E3–; Tele-A E2–; RAI IA; RTL Klub (Hungary) R2; HRT (Croatia) E4; IRIB (Iran) E2.
6/8/01	SVT E2, 3; RTP E2, 3; TVE E2, 3.
7/8/01	RAI IA; TVA E3–; Tele-A E2–; TVE E3, 4; RTP E2-4.
8/8/01	RAI IA.
9/8/01	RAI IA, B; TVA E3–; Tele-A E2–; TVE E3; RTP E2, 3.
10/8/01	RAI IA, B; RTL Klub R2; TVE E2-4; RTP E2, 3; C+ L2; ARD (Germany) E2.
11/8/01	TVE E4; RAI IA; Tele-A E2–.
12/8/01	TVE E2-4; RTP E2, 3; RAI IA; TVA E3
13/8/01	RAI IA
14/8/01	TVA E3–.
16/8/01	NRK E2; SVT E2-4.
19/8/01	TVE E2; RAI IA, B; TVE E3–; Tele-A E2–; SLO (Slovenia) E3; HRT E4; PTP (Russia) R2.
20/8/01	TVE E3, 4; RTP E3.
22/8/01	TVA E3–.
30/8/01	Unidentified ch. R2 and 3 signals, mainly a.m.

The Iranian reception on the 5th was logged by Cyril Willis (King's Lynn) at 1645 hours.

The amateur radio publication *Six News* reports a daytime (1745-1807 GMT) SpE opening on June 10th, with contacts at 50MHz between operators in USA/Canada (west coast) and France/the Netherlands/the UK.

There is sad news of the death of Major Ken Ellis, G8KW, MBE on June 28th, aged 92. He was a true pioneer with VHF signal propagation and had a remarkable military career during World War II, particularly in the Middle East.

Satellite sightings

Dutch amateur P16ALK has been operating a downlink via Eutelsat W2 (16°E) at 12·729GHz, with SR 2,000 and FEC 3/4. A recent check produced instant lock at 100 per cent signal level. P16ALK was centre screen with an inlay surround of

screens showing other live TV amateurs, test cards and related video content. A scrolling banner advised on a change of frequency to 12·742GHz, with SR 2,000 and FEC 7/8. I'm not sure about the purpose of the P16ALK downlink.

The APTN news feeder via Hot Bird (13°E) at 12·581GHz H, SR 5,632, FEC 3/4 (service identification currently SATLINK) has been providing footage and interviews on the Israeli/ Palestinian problem for European networks throughout the day and evening.

Dramatic live pictures of the shuttle Discovery docking with the International Space Station were downlinked on August 12th and fed from Houston across the Atlantic via NSS K (21·5°W). Reuters carried the report at 11·462GHz V (5,632, 3/4). There were pictures from inside the shuttle and the ISS.

A new service, called Atlantic Satellite, has come into use via NSS K at 11·487GHz H (5,632, 3/4), which is a BT lease. While I was monitoring 11·462GHz (Reuters) recently the Fox News Channel appeared, with an unusual news item about a motorised paraglider landing on the Statue of Liberty. His arrival brought helicopters, firemen and police. He was brought down and arrested.

Golf and horse racing were prominent during the month. The Globecast NSS K feeder at 11·590GHz V (20,145, 3/4) carried the Arlington Million race on the 18th from Arlington Park, Illinois. On the same day there was horse racing via Eutelsat II F3 (21·5°E) from Deauville, France. This was at 11·663GHz H from about 1300 hours. Some races were encrypted.

I manage to receive United Media's early evening downlinks for Meridian and Anglia via my 2m dish, though the signal (NSS K at 10·988GHz) is marginal when it's raining. During mid-August the Meridian truck TES-43 suddenly produced encrypted signals, i.e. no pictures, whereas Anglia's truck TES-42 remained in the clear. An auto search on the 28th revealed that the symbol rate had changed from 5,632 to 5,750.

Nick B (Sutton) confirms my feeling that NSS K has reduced the downlink signal levels at certain frequencies. The Reuters downlink at 11·462GHz has been troublesome recently, as has Globecast at 11·590GHz, with picture freezing and squaring. The signal levels were previously excellent. This could be to discourage news-feed monitoring by small-dish enthusiasts, to reduce news content lifting by non-subscribing broadcasters, or alternatively because of satellite ageing or drift within its orbital slot.

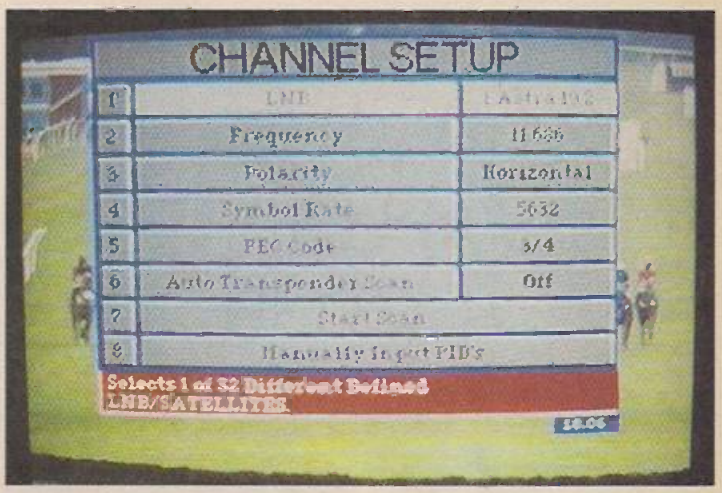
The Pakistani channel ARY Digital is being transmitted, along with Zee Cinema, via Hot Bird (13°E) at 12·746GHz H (27,500, 3/4) in the clear, whereas from 28°E it's encrypted as premium channel package content. Edmund Spicer (Littlehampton) mentions that the Spanish news channel Canal 24 Horas, which was transmitted by Hot Bird as a PAL signal, has been replaced by a Retevision digital package (clear MPEG) that consists of TVE-Internacional, TVE-Internacional Asia, Hispavision, Canal Clasico and Nostalgia. This is at 11·785GHz (27,500, 3/4).

Roy Carmen (Dorking) reports that two FTA downlinks have appeared via Eutelsat W3 (7°E) with coverage of the situation in Macedonia. They are EBU Skopje Path 1 and EBU .... Path 2, at 10·974 and 10·982GHz V. SR is 6,666, FEC 7/8 and there are common PIDs, V 308, A 256 and PCR 8190. The downlinks are fired up only when needed.

Broadcast news

N. America: Over thirty per cent (413) of US commercial TV stations are unlikely to meet the deadline of May 1st, 2002 for the start of DTT transmissions in parallel with their analogue services, though 200 at least of these stations expect to make a start within twelve months. NAB has sought DTT extensions from the FCC. Test DTT transmissions at Montreal, Canada started on August 1st.

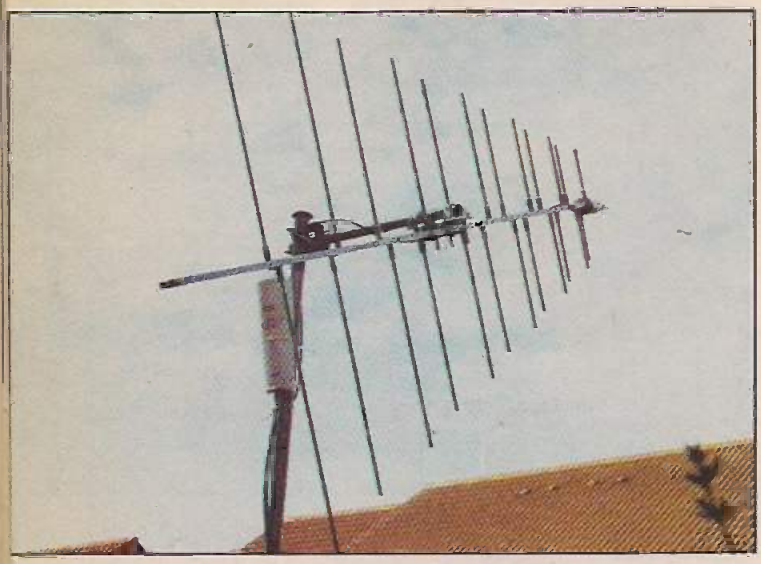
Russia: The Moscow regional station TV Tsentr is extending its coverage to adjoining states – the Ukraine, Belarus and Moldova.



Channel set-up information from the RSD ODM-300 digital receiver, with horse racing via Eutelsat II F3 in the background.

The potential audience is some 74m people.

The main Russian network radio and TV organisations are to join to form the Russian Television and Radio Broadcasting Network (RTRS). Up to a hundred transmission centres plus satellite teleports and the distribution infrastructure will be included. The aim is to improve operation across the system and avoid possible collapse of parts. Some $US400m is understood to be required to replace worn-out equipment.



The Chelcom log-periodic VHF array Roger has been using for Fleetsatcom reception. The washing-up liquid container protects plug connections. A further plastic cover at the front of the array protects an encapsulated cable connection.

Sweden: TV4, the commercial TV channel, is seeking two more national DTT licences. It has held a national and regional licence since early 1999 and plans to start a news channel, possibly in partnership with CNN, and TV4 Sport.

Mauritius: The Mauritian Independent Broadcasting Authority will introduce new guidelines by the end of the year, allowing three radio and one commercial TV station to open. Successful applicants must comply with certain ethnic and cultural requirements, including transmission in the four local languages.

Satellite reception at VHF

Over the past twenty five years this column has covered satellite TV reception as it has evolved, starting with the 860MHz transmissions from the ATS-6 satellite to the Indian sub-continent in 1976 onwards, then C band (4GHz) transmissions, which started in the early Eighties, and subsequently Ku band (11-12·75GHz) transmissions. Now Ka band (17·7-21·2GHz) beckons!

Recently however, following letters from Hugh Cocks (Algarve, Portugal) and comments from Christian Mass (chief editor of *Tele-Satellite*), I've been checking on the 240-270MHz VHF band. It's a very quiet part of the spectrum, which is officially allocated to Tactical Military Communications and US Forces satcoms activity. Between 248·85-269·95MHz there are downlinks from the military satellites US AFSATCOM and US FLTSATCOM FLEET. These satellites provide a simple means of communication between distant bases, ships at sea etc. and those back home, also military and data communications, encrypted of course. Remote signals are uplinked to a satellite at say 300MHz, then downlinked at 250MHz. But the satellites also relay, unintentionally, broadcast radio programming and pirate voice communications. Beam coverage is global.

Studio-to-transmitter radio links (STLs) also use the 290MHz band. The signals pass out into space, where they are picked up by the US military satellites and downlinked to the world. Such downlinks are heard across Europe, but Hugh in the Algarve picks up much stronger signals than we can in the UK.

A simple discone aerial plus preamplifier will provide a usable input for a conventional scanner. I use an elderly Icom R7000 scanner, which has either 15 or 5kHz FM bandwidth. This set-up produces recognisable audio though not hi-fi. A wide bandwidth (150kHz) is hopeless, 40kHz apparently being about optimum – if you can adjust your bandwidth.

The strongest signal I've come across is Radio Buenaventura, Valle del Causa, Columbia, which broadcasts at 1,240kHz. Its FM STL is heard at 269·74MHz. Other radio programmes have been heard at 241·835, 253·620 and 254·102MHz, with Spanish voice communications being heard at 256·952 and 260·533MHz (the latter from Sao Paulo, Brazil). These voice transmissions are pirates that use modified 2m gear for cheap links across the Atlantic, the Americas etc. via the military satellites. It's possible to 'network' illegally between Moscow, Africa, Saudi Arabia, Argentina, Newfoundland – virtually anywhere.

Most of these military satellites have a 53·6MHz gap between the uplink and downlink frequencies. The satellites are dotted across the sky. The ones of interest in the UK are those at 24·69, 22·63 and 15·82°W, and at 71·44 and 72·03°E – this excludes the Nato Skynet satellites. But if the aerial has no or minimal directional capability this is rather academic.

Having established that a discone aerial provides inadequate gain with the circularly-polarised downlink signals, I decided to invest in a Chelcom log-periodic array that covers 140-440MHz. This provides some gain. Alternatively a simple, cheap three-four element Band II Yagi or an old Band III aerial could be cut down to suit.

The Chelcom aerial is made to an impressive telecoms standard. Once it was aligned at approximately 20°W there was a considerable increase in signal strength compared with that produced by the discone aerial. A further improvement was obtained by using a Labgear PWH110 wideband head amplifier. This is a little noisy perhaps, at 2·5dB, but its 22dB gain provides a considerable improvement. Bandwidth limiting would help with noise reduction.

This satellite VHF reception has provided an interesting diversion from conventional satellite reception. The broadcast signals received are consistent and fairly strong. Intermittent Spanish communications can be heard anytime across the band – OK if you understand the language!

There's lots on Fleetsatcom operations at www.fas.org/spp/military/program/com/fleet_ops.htm

For information on Chelcom (Cheltenham) aerials go to www.chelcom.com

For a satellite listing go to www.ute-monitor.org/satcom/satlist.html

Labgear (Cambridge) can be contacted at 01223 366 521.

Satellite news

Eutelsat has acquired a 21·5 per cent interest in Hispasat. The two satellite operators have formed a joint venture to launch a new satellite, Amazonas, which should arrive at 61°W some time during 2003. Meanwhile Eutelsat's Atlantic Bird 2 should have arrived at 8°W by the time that this is read, with Atlantic Bird 1 due to follow in the first quarter of 2002. This programme is aimed at building up Eutelsat's transatlantic capabilities and developing business in the Americas.

NTL's 11·013GHz H lease aboard Eutelsat W2 (16°E) is carrying the transmissions of political broadcaster Zietouna Channel, which claims to be a mouthpiece for oppressed people in Tunisia and other Arabic states. The parameters are SR 5,632, FEC 3/4: PIDs V 256, A 272.

A new technique, SDS (Shared Dish System), is being developed in New Zealand. Satellite signals are demodulated then remodulated using frequencies that are within the first IF bandwidth of a conventional analogue satellite receiver (950-1,450MHz in NZ). This modulation is transmitted at very low power, possibly milliwats, using a wideband aerial for line-of-sight reception at up to 5km. For reception, a simple wideband L-band log-periodic aerial with preamplifier and an analogue receiver are required. The aim is reception by a local community at minimal cost.

The new Indian satellite InSat 3B has an additional 'upper' C band extension, 4·5-4·75GHz. At present there is only a single transmission, a test pattern at 4·624GHz (SR 2,222, FEC 1/2). The usual extended C band is 3·4-4·2GHz. ■

£1 BARGAIN PACKS
Selected Items

PIEZO ELECTRIC SOUNDER, also operates efficiently as a microphone. Approximately 30mm diameter, easily mountable, 2 for £1. Order Ref: 1084.

LIQUID CRYSTAL DISPLAY on p.c.b. with i.c.s. etc. to drive it to give 2 rows of 8 figures or letters with data. Order Ref: 1985,

30A PANEL MOUNTING TOGGLE SWITCH. Double-pole. Order Ref: 166.

SUB MIN TOGGLE SWITCHES. Pack of 3. Order Ref: 214.

HIGH POWER 3in SPEAKER 11W 8ohm). Order Ref: 246.

MEDIUM WAVE PERMEABILITY TUNER. It's almost a complete radio with circuit. Order Ref: 247.

HEATING ELEMENT, mains voltage 100W, brass encased. Order Ref: 8.

MAINS MOTOR with gearbox giving 1 rev per 24 hours. Order Ref: 89.

ROUND POINTER KNOBS for flatted ¼in. spindles. Pack of 19. Order Ref: 295.

CERAMIC WAVE-CHANGE SWITCH. 12-pole, 3-way with ¼in. spindle. Order Ref: 303.

REVERSING SWITCH. 20A double-pole or 40A single pole. Order Ref: 343.

LUMINOUS PUSH-ON PUSH-OFF SWITCHES. Pack of 3. Order Ref: 373.

SLIDE SWITCHES. Single pole changeover. Pack of 10. Order Ref: 1053.

PAXOLIN PANEL. Approximately 12in. x 12in. Order Ref: 1033.

CLOCKWORK MOTOR. Suitable for up to 6 hours. Order Ref: 1038.

TRANSISTOR DRIVER TRANSFORMER. Maker's ref. no LT44, impedance ratio 20k ohm to 1k ohm; centre tapped, 50p. Order Ref: 1/23R4.

HIGH CURRENT RELAY, 12V d.c. or 24V a.c., operates changeover contacts. Order Ref: 1026.

3-CONTACT MICROSWITCHES, operated with slightest touch, pack of 2. Order Ref: 861.

HIVAC NUMICATOR TUBE, Hivac ref XV3. Order Ref: 865 or XN11 Order Ref: 866.

2IN. ROUND LOUDSPEAKERS. 50Ω coil. Pack of 2. Order Ref: 908.

5K POT, standard size with DP switch, good length ¼in. spindle, pack of 2. Order Ref: 11R24.

13A PLUG, fully legal with insulated legs, pack of 3. Order Ref: GR19.

OPTO-SWITCH on p.c.b., size 2in. x 1in., pack of 2. Order Ref: GR21.

COMPONENT MOUNTING PANEL, heavy paxolin 10in. x 2in., 32 pairs of brass pillars for soldering binding components. Order Ref: 7RC26.

HIGH AMP THYRISTOR, normal 2 contacts from top, heavy threaded fixing underneath, think amperage to be at least 25A, pack of 2. Order Ref: 7FC43.

BRIDGE RECTIFIER, ideal for 12V to 24V charger at 5A, pack of 2. Order Ref: 1070.

TEST PRODS FOR MULTIMETER with 4mm sockets. Good length flexible lead. Order Ref: D86.

LUMINOUS ROCKER SWITCH, approximately 30mm square, pack of 2. Order Ref: D64.

MES LAMPHOLDERS slide on to ¼in. tag, pack of 10. Order Ref: 1054.

HALL EFFECT DEVICES, mounted on small heatsink, pack of 2. Order Ref: 1022.

12V POLARISED RELAY, 2 changeover contacts. Order Ref: 1032.

PROJECT CASE, 95mm x 66mm x 23mm with removable lid held by 4 screws, pack of 2. Order Ref: 876.

LARGE MICROSWITCHES, 20mm x 6mm x 10mm, changeover contacts, pack of 2. Order Ref: 826.

MAINS RELAY with 15A changeover contacts. Order Ref: 965.

COPPER CLAD PANELS, size 7in. x 4in., pack of 2. Order Ref: 973.

100M COIL OF CONNECTING WIRE. Order Ref: 685,

WHITE PROJECT BOX, 78mm x 115mm x 35mm. Order Ref: 106.

LEVER-OPERATED MICROSWITCHES, ex-equipment, batch tested, any faulty would be replaced, pack of 10. Order Ref: 755.

MAINS TRANSFORMER, 12V-0V-12V. 6W. Order Ref: B11.

THIS MONTH'S SPECIAL

IT IS A DIGITAL MULTITESTER, complete with backrest to stand it and hands-free test pro holder. This tester measures d.c. volts up to 1,000 and a.c. volts up to 750; d.c. current up to 10A and resistance up to 2 megs. Also tests transistors and diodes and has an internal buzzer for continuity tests. Comes complete with test prods, battery and instructions. Price £6.99. Order Ref: 7P29.

1mA PANEL METER. Approximately 80mm x 55mm, front engraved 0-100. Price £1.50 each. Order Ref: 1/16R2.

VERY THIN DRILLS. 12 assorted sizes vary between 0.6mm and 1.6mm. Price £1. Order Ref: 128.

EVEN THINNER DRILLS. 12 that vary between 0.1mm and 0.5mm. Price £1. Order Ref: 129.

BT PLUG WITH TWIN SOCKET. Enables you to plug 2 telephones into the one socket for all normal BT plugs. Price £1.50. Order Ref: 1.5P50.

D.C. MOTOR WITH GEARBOX. Size 60mm long, 30mm diameter. Very powerful, operates off any voltage between 6V and 24V D.C. Speed at 6V is 200 rpm, speed controller available. Special price £3 each. Order Ref: 3P108.

FLASHING BEACON. Ideal for putting on a van, a tractor or any vehicle that should always be seen. Uses a Xenon tube and has an amber coloured dome. Separate fixing base is included so unit can be put away if desirable. Price £5. Order Ref: 5P267.

MOST USEFUL POWER SUPPLY. Rated at 9V 1A, this plus into a 13A socket, is really nicely boxed. £2. Order Ref: 2P733.

MOTOR SPEED CONTROLLER. These are suitable for D.C. motors for voltages up to 12V and any power up to 1/6h.p. They reduce the speed by intermittent full voltage pulses so there should be no loss of power. In kit form these are £12. Order Ref: 12P34. Or made up and tested, £20. Order Ref: 20P39.

BT TELEPHONE EXTENSION WIRE. This is proper heavy duty cable for running around the skirting board when you want to make a permanent extension. 4 cores properly colour coded, 25m length. Only £1. Order Ref: 1067.

LARGE TYPE MICROSWITCH with 2in. lever, changeover contracts rated at 15A at 250V, 2 for £1. Order Ref: 1/2R7.

BALANCE ASSEMBLY KITS. Japanese made, when assembled ideal for chemical experiments, complete with tweezers and 6 weights 0.5 to 5 grams. Price £2. Order Ref: 2P44.

CYCLE LAMP BARGAIN. You can have 100 6V 0-5A MES bulbs for just £2.50 or 1,000 for £20. They are beautifully made, slightly larger than the standard 6.3V pilot bulb so they would be ideal for making displays for night lights and similar applications.

DOORBELL PSU. This has AC voltage output so is ideal for operating most doorbells. The unit is totally enclosed so perfectly safe and it plugs into a 13A socket. Price only £1. Order Ref: 1/30R1.

INSULATION TESTER WITH MULTIMETER. Internally generates voltages which enable you to read insulation directly in megohms. The multi-meter has four ranges, AC/DC volts, 3 ranges DC milliamps, 3 ranges resistance and 5 amp range. These instruments are ex-British Telecom but in very good condition, tested and guaranteed OK, probably cost at least £50 each, yours for only £7.50 with leads, carrying case £2 extra. Order Ref: 7.5P4.

REPAIRABLE METERS. We have some of the above testers but slightly faulty, not working on all ranges. should be repairable, we supply diagram, £3. Order Ref: 3P176.

TWO MORE POST OFFICE INSTRUMENTS Both instruments contain lots of useful parts, including sub-min toggle switch sold by many at £1 each. They are both in extremely nice cases, with battery compartment and flexible carrying handles, so if you don't need the instruments themselves, the case may be just right for a project you have in mind.

The first is **Oscillator 87F.** This has an output, continuous or interrupted, of 1kHz. It is in a plastic box size 115mm wide, 145mm high and 50mm deep. Price only £1. Order Ref: 7R1.

The other is **Amplifier Ref. No. 109G.** This is in a case size 80mm wide, 130mm high and 35mm deep. Price £1. Order Ref: 7R2.

HEAVY DUTY POT. Rated at 25W, this is 20 ohm resistance so it could be just right for speed controlling a d.c. motor or device or to control the output of a high current amplifier. Price £1. Order Ref: 1/33L1.

STEPPER MOTOR. Made by Philips as specified for the wind-up torch in the Oct '00 Practical Electronics is still available, price £2. Order Ref: 2P457.

SOLDERING IRON, super mains powered with long-life ceramic element, heavy duty 40W for the extra special job, complete with plated wire stand and 245mm lead, £3. Order Ref: 3P221.

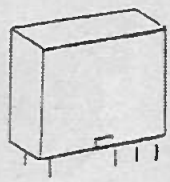
RELAYS

We have thousands of relays of various sorts in stock, so if you need anything special give us a ring. A few new ones that have just arrived are special in that they are plug-in and come complete with a special base which enables you to check voltages of connections of it without have to go underneath. We have 6 different types with varying coil voltages and contact arrangements. All contacts are rated at 10A 250V AC.

Coil Voltage	Contacts	Price	Order Ref:
12V DC	4-pole changeover	£2.00	FR10
24V DC	2-pole changeover	£1.50	FR12
24V DC	4-pole changeover	£2.00	FR13
240V AC	1-pole changeover	£1.50	FR14
240V AC	4-pole changeover	£2.00	FR15

Prices include base

MINI POWER RELAYS. For p.c.b. mounting, size 28mm x 25mm x 12mm, all have 16A changeover contacts for up to 250V. Four versions available, they all look the same but have different coils:



6V Order Ref: FR17
12V Order Ref: FR18
24V Order Ref: FR19
48V Order Ref: FR20
Price £1 each less 10% if ordered in quantities of 10, same or mixed values.

NOT MUCH BIGGER THAN AN OXO CUBE. Another relay just arrived is extra small with a 12V coil and 6A changeover contacts. It is sealed so it can be mounted in any position or on a p.c.b. Price 75p each. 10 for £6 or 100 for £50. Order Ref: FR16.

RECHARGEABLE NICAD BATTERIES. AA size, 25p each, which is a real bargain considering many firms charge as much as £2 each. These are in packs of 10, coupled together with an output lead so are a 12V unit but easily dividable into 2 x 6V or 10 x 1.2V. £2.50 per pack, 10 packs for £25 including carriage. Order Ref: 2.5P34.

FOR QUICK HOOK-UPS. You can't beat leads with a croc clip each end. You can have a set of 10 leads, 2 each of 5 assorted colours with insulated crocodile clips on each end. Lead length 36cm, £2 per set. Order Ref: 2P459.

BIG 12V TRANSFORMER. It is 55VA so that is over 4A which is normal working, intermittently it would be a much higher amperage. Beautiful transformer, well made and very well insulated, terminals are in a plastic frame so can't be accidentally touched. Price £3.50. Order Ref: 3.5P20.

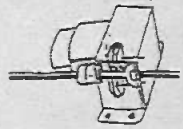
BUY ONE GET ONE FREE

ULTRASONIC MOVEMENT DETECTOR. Nicely cased, free standing has internal alarm which can be silenced. Also has connections for external speaker or light. Price £10. Order Ref: 10P154.

CASED POWER SUPPLIES which, with a few small extra components and a bit of modifying, would give 12V at 10A. Originally £9.50 each, now 2 for £9.50. Order Ref: 9.5P4.

3-**OCTAVE KEYBOARDS** with piano size keys. brand new, previous price £9.50, now 2 for the price of one. Order Ref: 9.5P5.

1.5V-6.V MOTOR WITH GEARBOX. Motor is mounted on the gearbox which has inter-changeable gears giving a range of speeds and motor torques. Comes with full instructions for changing gears and calculating speeds, £7. Order Ref: 7P26.

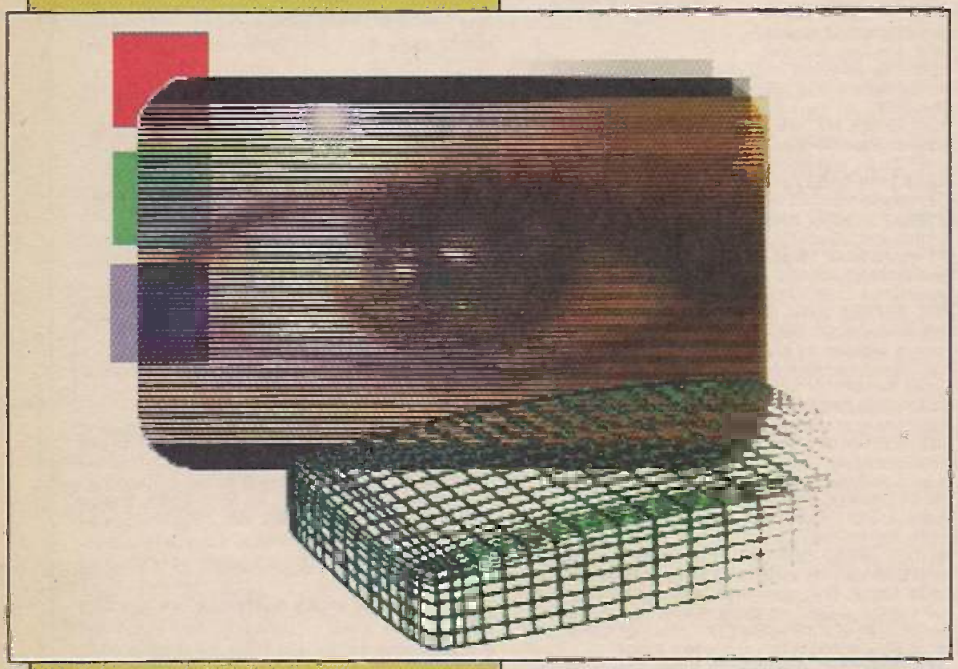


MINI BLOWER HEATER. 1kW, ideal for under desk or airing cupboard, etc., needs only a simple mounting frame, price £5. Order Ref: 5P23.

TERMS

Send cash, PO, cheque or quote credit card number – orders under £25 add £4.50 service charge.

J & N FACTORS
Pilgrim Works (Dept. E.E.)
Stairbridge Lane, Bolney
Sussex RH17 5PA.
Telephone: 01444 881965
Email: jnfactors@aol.com



TV FAULT FINDING

Reports from
Michael Dranfield
John Hepworth
Bob Flynn
Gerald Smith
Philip Salkeld
Geoff Butcher
Robin Beaumont
Glyn Dickinson
Graham Boor
Graham Richards and
Roger Burchett

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

Reports can be sent by post to:
Television, Fault Reports,
Anne Boleyn House,
9-13 Ewell Road,
Cheam,
Surrey SM3 8BZ

or e-mailed to:
tessa2@btinternet.com

Sharp 51AT-15H (5BSA chassis)

I've had a batch of these sets in for repair, all with the same intermittent fault – they would go off, accompanied by a screeching noise and corruption of the EEPROM's AGC and AFT settings so that, when the set came back on, it was off tune. In each set the cause of the fault was Q708 (BC338-40) in the switched 5V supply. I used a BD131 (different pin connections) as a replacement, because it's a power transistor which is designed to get hot – the BC338 isn't.

To reprogram the NVM, tune the set to a station on auto. When the AFT comes into operation it will take the set off tune. So fine tune the set for the best picture and store this setting. Then put the set in the service mode and go to the AFT adjustment. When the remote-control unit's 'key' symbol is pressed, the NVM's AFT data will be programmed automatically. **M.D.**

Hitachi C2846TN

This set came in because it was tripping. In between trips the HT supply would peak at 170V. If a 100W bulb was just touched on the HT rail the set would come on with the HT correct at 150V.

With the set now working, I was able to carry out some checks in the voltage error amplifier circuit. Although it worked all right when the set was in operation, insufficient optocoupler current caused poor regulation at switch on. Hence the tripping. The cause of the trouble was R951 (8·2kΩ), which provides the supply to the anode of the optocoupler's diode section. It had risen in value to 22kΩ. **M.D.**

Akai CT2579N (Nokia Compact DE chassis)

This set had a massively oversized picture. The symptom was rather like an old monochrome set when the DY87 EHT rectifier's emission was low. As the picture size didn't alter when the brightness level changed I ruled out the diode-split line output transformer. The cause of the trouble was traced to a dry-joint at C513, which is one of the two parallel-connected line scan-correction capacitors. **M.D.**

Ferguson D14R (TX807 chassis)

If, at switch on, you get a burst of EHT then the set reverts to standby, check the 0·68Ω safety resistor RP68. In this particular set it was open-circuit. It's near the line output transformer. **M.D.**

Watson FA3629B

This set is fitted with the new Vestel 11AK20SE chassis. The fault was no sound, and on investigation I found that R829 (47Ω) in the feed to the TDA2822M audio output chip IC301 was open-circuit. As there was a low-resistance reading between the IC's supply pin and chassis I decided that it was faulty and replaced both these items.

The method of entering the service mode with this model is the same as with the previous one: go to install in the customer menu then press the remote-control unit's 4.7.2.5 buttons. **M.D.**

Toshiba 2855DB

There was a blank raster and no sound – no on-screen displays either. On investigation I found that the 5V supply was absent because an SOC1000 circuit protector (equivalent to a 1A fuse) was open-circuit. Once this had been replaced the set worked perfectly with an input via the scart socket, but not with an aerial input.

These sets have a digitally-controlled tuner which has constant 5V and 32V supplies – there is no variable 0-33V tuning supply. It was the third of these tuners, type UF812BL, that I've had with this fault symptom. The tuner, part no. 23321196, is made by Sony and is repairable by MCES. **J.H.**

Cathay CTV3000

The problem with this set was line drift as it warmed up. After a lot of heating and freezing around the TA7698A colour decoder/timebase generator chip I eventually found that C232, which is connected to pin 33, was suspect. A replacement cured the fault. **J.H.**

Philips GR2.4 chassis

There was sound but no raster. The tube's heaters were alight, and EHT was present. The first anode voltage was quite low, and nothing much happened when it was increased. When I looked at the screen after a few minutes with the lights off however I could see a faint display of line collapse. There were no signs of any dry-joints or burn-ups on the board, so I carefully popped the scan-coil connector out of its plastic moulding and took a peek. There were two whacking great dry-joints. Once I'd resoldered all the joints here there was a good picture. **J.H.**

Bush 2051T

This is the first of these Turkish-made sets I've seen. It led me right up the garden path. The customer had snapped off the aerial socket, and this was the only problem he had mentioned. I repaired the socket and switched on, to be greeted by a high-pitched squealing noise from the power supply.

I looked all over for short-circuits, but couldn't find any. There was no 12V supply, and while checking this out (I'd no circuit diagram) I realised that the set was in standby. The 12V supply comes from pin 8 of the 9-pin chip IC101. Pin 4 is the switching pin. When I pressed the PR+ button at the front of the set it started up and ran quietly. Put it in standby and it squealed like a stuck pig.

There are four small electrolytic capacitors in the power supply, C114 (100µF), C113 (22µF), C115 (220µF) and C116 (10µF). They all tested OK when checked with a capacitance meter, but replacements cured the fault.

The customer said it wasn't doing that before, of course. **J.H.**

Sharp DV5103H (Euro DS1 chassis)

If the set is slow to come on, with Q700 (BF487) in the start-up circuit overheating, replace C707 (22µF, 50V) and C713 (1µF, 50V). **B.F.**

Panasonic Alpha 4 Chassis

There was field cramping and a buzz on the sound. The TDA3654 field output chip was faulty. **B.F.**

JVC JX Chassis

The sound was OK but there was no picture. When the setting of the A1/G2 control was advanced there was a blank white raster, and teletext could be displayed. The TDA4580 RGB video controller chip was faulty. **B.F.**

Aiwa VXT1450K

The fault with this TV/VCR combi unit was field collapse. The cause was traced to FR812 (3·9Ω, 1W fusible) which was open-circuit. No reason for its failure could be found. A long soak test after fitting a replacement proved that all was now OK. **B.F.**

Sanyo ED1 Chassis

When this set was first switched on the picture was blacked out except for about two inches across the bottom of the screen. The cause of the trouble was traced to poor connections at Q453. Although they looked OK, resoldering them was the answer. Q453 is in the standby switching circuit that controls the supply to the line driver stage. **B.F.**

Sharp CS Chassis

The reported fault was distorted sound from one channel – the sound would mute normally without noise. When you get this problem, replace the surface-mounted zener diodes (27V or 24V dependent on model) across the inputs to the sound output transistors. It's advisable, in the interest of reliability, to replace the transistors as well. If the fault persists, replace the two 1N4933 diodes across the output transistors. **G.S.**

Sharp 59CS-D8H

Various symptoms were reported with this set: the picture was slow to appear, text would keep coming on, and there was a bad buzz on sound. Much to my surprise all three faults showed up almost immediately. The cause of all these problems was C714 (1,000µF, 16V), which is the reservoir capacitor for the 5V supplies. It had blown up. **G.S.**

Toshiba 2939DB

The speaker symbols would appear erratically on the screen and the set suffered from Nicam dropout. The cure for this problem is to change the values of three components on the Nicam board. Replace RD12 (100kΩ) with a 33kΩ, 0·5W resistor; replace RD11 (2·2kΩ) with a 1·8kΩ, 0·5W resistor; and replace CD18 (22nF) with a 47nF capacitor. If the Nicam board has to be replaced, it's part no. is 2336-9729. **P.S.**

JVC AV25GS1EK (MX chassis)

Stuck in standby faults can be tricky to diagnose. I normally disconnect pins 5 and 6 of the EEPROM chip and see what happens. If the set bursts into life, as this one did, the EEPROM chip is probably faulty. It's IC704 (part no. CAT35C104HP) in this model. **P.S.**

Hitachi C2544TN (G100 chassis)

There was hum on sound and a pattern effect on the screen. The cause was faulty electrolytics in the power supply: C924 (470µF, 16V), C925 (10µF, 50V) and C927 (470µF, 25V). They are associated with the 5V and 12V supplies. **P.S.**

Philips 25PT632A/05 (GR2.4AA chassis)

This set was dead with the fuse in the mains plug blown. It's becoming a common fault: the on/off switch starts to arc or burn. The sets are easily recognisable because of their mahogany cabinets. **P.S.**

Bush 2568NTX

The symptoms were lack of width with EW bowing. A nice easy one for a change. R629 (2·7Ω, 0·5W) was open-circuit. **P.S.**

Mitsubishi CT25M3TX (Euro 14 chassis)

This set was going berserk. It was reluctant to come out of standby, wouldn't stop at stations and the graphics were going crazy. C955 (2,200µF, 25V) on the secondary side of the power supply was leaking and had damaged the EEPROM IC702. A new capacitor and X24C04P memory chip put matters right. **P.S.**

Philips 25PT4103

The power supply and EHT were pulsating at a low rate. I found that R3425 (12Ω) in the line drive circuit had gone high in value. **G.Bu.**

Philips 32PW9763/05 (MD2.25E chassis)

This set was stuck in standby with the red LED flashing. The behaviour of the LEDs provides vital information. If the red LED flashes at 5Hz it's a protection fault indication from the main microcontroller chip, which lives on the control and teletext subpanel. If the LED flashes at 1·25Hz the fault is more likely to be in the control circuit itself.

I attempted to read out any error codes, using the Philips dealer service tool, but no information was available. Back to basics! The standby 5V supply was present, and the 5V and 8V supplies, which feed the control board, appeared briefly during the start-up phase. The 'main-is-alive' line, which runs between the main and standby processors, provides further valuable information. When I checked the waveform on it at pin 36 of the standby processor, using the waveform in the service manual as a guide, I saw that the bottom part of the pulse was missing. This suggested a main processor fault. I had a spare control board available, so I swapped over the pluggable NVROM and software ROM ICs and soldered it in. The set then came to life, proving that the fault was on the control panel.

A replacement main processor (it's a 64-pin flatpack device) didn't help, so I

removed the feature box for better access to the control board. It should be written large on every workshop wall that a microcontroller chip requires three things: power, clock pulses and a reset. In this case the reset line, at pin 53, was stuck high because the 3·3V zener diode D6227 was open-circuit. A new surface-mounted zener diode restored correct operation.

Why did all this take so long? The control board is hidden away behind the screened feature box and is very difficult to check while in place. If the set is dead (or nearly so), removing the feature box will not make matters any worse, as the error will not be detected. With hindsight, making the control PCB a plug-in type would have made our lives easier. **R.Be.**

Panasonic TX21S1T

This set worked normally at start up but, over several minutes, the brightness then increased until excessive beam current made it trip. After checking various possibilities I replaced the line output transformer, which turned out to have a fault in its A1 supply section.

Shortly afterwards a **TX21S3T** came in with identical symptoms. The cure was the same, though the two models use different LOPTs. **R.Be.**

Sony KVX2532U (AE1B chassis)

The customer complained that the picture broke up when the aerial lead was disturbed. As an afterthought he mentioned that teletext didn't work. It appeared that the luminance signal was being lost when the aerial socket was moved. When text was selected, the display attempted a few words then gave up, not even managing to advance the clock.

I decided to look for the cause of the text problem first, as this was not intermittent. The text board plugs into the motherboard, and is surrounded by clip-on screening cans. As the metalwork was very short of solder where it met the earth print, I resoldered all the lugs then refitted the board. This appeared to cure the problem. I went on to look for the cause of the luminance fault, resoldering connections on board A (signals) and its connectors – these have caused problems in the past. When I refitted board A however the text fault was back and was worse than ever!

I examined the text board with a microscope and found that there were dry-joints at most of the ICs. The SAA5231 chip, whose task is to extract the text information from the video waveform, was the worst affected. Resoldering all the ICs on the text board cured both faults.

A similar problem with screening cans occurs with the **Sony AE1C** chassis, at board B1 which carries the colour decoder and digital comb filter chips. Resoldering here can cure a variety of colour faults. **R.Be.**

JVC AV25S1EK (MX II chassis)

The picture was unstable with line jitter. For some reason it was worse with BBC1. An oscilloscope check showed that the video output from the IF module had ragged sync pulses. Further investigation led me to the 1µF electrolytic reservoir capacitor for the AGC feed. A replacement cured the fault. **R.Be.**

Sanyo CBP2180A (A5 chassis)

Before you condemn the output IC because of a field fault, check L451 (33mH). It can go open-circuit, often intermittently, causing all sorts of odd displays. **G.D.**

Hitachi C2546TN

This set came in because it was tripping. I replaced R950 (68kΩ), R951 (12kΩ) and R952 (82kΩ), which are all in the power supply voltage error detection circuitry and are rated at 0·5W, then attended to the usual dry-joints. This cured the tripping but there was no colour, though the screen took on a red cast as the setting of the colour control was advanced. I first suspected the 4·43MHz crystal, but the cause turned out to be the TDA4665 digital delay line chip IC501. **G.D.**

Sanyo 25MT2

This set would come on for a few seconds then trip off, with the standby light flashing. By repeatedly switching out of standby a good picture and sound could be obtained during those few seconds. The microcontroller chip's protection circuit (pin 45) monitors the 9V and 24V outputs from the power supply, the 200V supply derived from the line output transformer, and the beam current. I noticed that C662 (470µF, 16V) was leaking, but a replacement made no difference. It's the reservoir capacitor for the 9V supply. Then, by isolating the protection sensing lines in turn, I discovered that the problem was with the 200V supply monitoring. R495 (180kΩ) in the potential-divider network was open-circuit. **G.D.**

Fidelity CTV3128NF

As an agent for a national repair company we see quite a few of these sets, all of which have been bought at a local out-of-town superstore. If the mains fuse is open-circuit for no apparent reason, check that the degaussing posistor has been upgraded from the black type to a Philips 96209 type.

Several of these sets have come in recently because they were dead. Replacing R609, C620, Q580 and Q602 usually provides a cure. We have been advised to change R609 to 2kΩ, 5W for greater reliability. **G.Bo.**

Panasonic TX24W1 (Alpha 2W chassis)

This set appeared in the workshop with a job sheet that said "bright red picture". According to another dealer the tube was faulty. Once the red output stage peaking coil on the CRT base board had been replaced there was a normal picture. Change all three at the same time – L351, L352 and L353. **G.Bo.**

Amstrad CTV3121N

The job sheet said that only the standby light could be seen. On investigation I found that R22, an 0·22Ω safety resistor, was open-circuit. A replacement restored normal operation.

The customer had also said that for a time the set had not always done what it was asked to do, or carried out an incorrect operation. As a precaution I replaced I301 and I302 (the microcontroller and EEPROM chips). The set was given a long soak test before it was returned. **G.Bo.**

Bush 2850NTX/A (TV8 chassis)

The only sign of life was a momentary flicker from the LED at switch on. When I checked the outputs from the chopper power supply I found that there was only 30V at the cathode of D202 (BYT56K), which is the HT rectifier. This suggested that its reservoir capacitor C203 (47µF, 250V) was faulty. The capacitor seemed to be more or less OK when checked with a capacitance tester, but a replacement restored normal operation, with the HT at 145V. **G.R.**

Grundig CUC3400 chassis

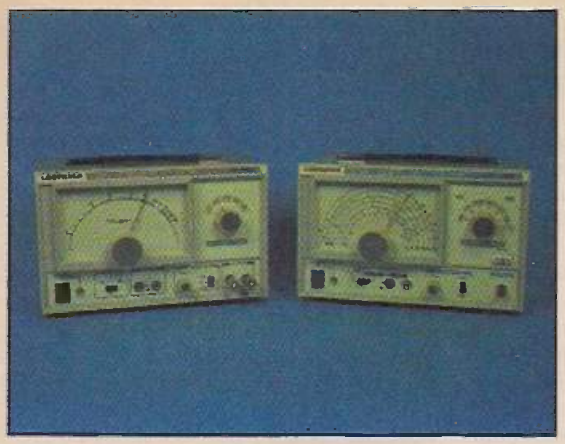
This chassis uses a combined chopper/line output stage. Repeated blowing of the transistor (T661) was cured by replacing IC655 (TDA3640), D666 (fit type RGP30M), R637 (1kΩ preset), C661 (47µF, 63V), D662 (ZPD3·9V), R661 (1Ω carbon) and C667. The latter is either 0·15µF or 2·2µF depending on the transistor/transformer combination. The transistor can be type BUT56A or type BUT12A. **G.R.**

Mitsubishi CT2146TX (Euro 6 chassis)

There was no line drive, though no reason for its absence could immediately be established. My eye was drawn to some carbonised glue around the field output chip IC401 however. When this was scraped away the cause of the fault could be seen: the earth track from the line generator circuitry had been almost completely eaten away. **R.Bu.**

Bush 3114A

If the standby light is on but the set is otherwise dead, check whether R502 (330kΩ) is open-circuit. When R502 fails the STR50103 chip doesn't start up. **R.Bu.** ■



20% discount for *TV* readers

on audio and rf signal generators

Vann Draper Electronics Ltd
The test & measurement specialists
www.vanndraper.co.uk
Equipment from Grundig, Kenwood, Hameg, Tektronix, Hitachi, Fluke, Avo and many more.

Vann Draper is offering over 20% discount to readers of *Television Magazine* on both their audio and rf signal generators

Both units normally sell for the low price of £151.58 but for readers of *TV* the price is just £119 fully inclusive of VAT and delivery.

The generators are supplied ready to use complete with mains lead, operating manual and a 12 month guarantee.

To order, simply post the coupon to:

Vann Draper Electronics Ltd, Stenson House, Stenson, Derby DE73 1HL.

Or Tel 01283 704706 Fax 01283 704707 Email sales@vanndraper.co.uk

AG2601 audio generator specification

Frequency range	: 10Hz-1MHz, 5 ranges + variable
Frequency accy	: +/-5% of full scale
Output waves	: Sine and square
Output impedance	: 600ohm
0bB amplitude	: >20Vpp no load
-20dB amplitude	: >2Vpp no load
-40dB amplitude	: > 200mVpp no load
Sinewave distortion	: <0.05% (500Hz-50kHz)
Size and weight	: 150 x 250 x 130mm, 2.5kg
Power requirement	: 115/230Vac 50/60Hz

SG4160 rf generator specification

Frequency range	: 100Hz-150MHz, 450MHz 3rd hartm'c
Frequency accy	: +/-5% of full scale
Rf output	: 100mV rms no load
Output control	: High/low switch and fine adjust
Int modulation	: 1kHz (AM) 30% approx
Ext modulation	: 50Hz-20kHz at <1Vrms input
Audio output	: 1kHz min 2Vrms
Crystal oscillator	: For 1-15MHz crystal
Size and weight	: 150 x 250 x 130mm, 2.5kg
Power requirement	: 115/230Vac 50/60Hz

Use this coupon for your order

Please supply me:

AG2601 audio generator(s) at £119 inc vat and delivery

SG4160 rf generator(s) at £119 inc vat and delivery

Name:

Address:

Tel No:

Total £

Cheques payable to Vann Draper Electronics Ltd

or debit my visa, mastercard or switch card:

Card type:

Card No:

Expiry date: Switch iss No:

Signature:

Overseas readers can still obtain this discount but carriage charges vary according to country. Please telephone, fax, email or write to Vann Draper

M.C.E.S.

Specialists in the service and repair of all types of:

Digital Tuner Units

Pace, Amstrad, etc.

Analogue Tuner Units
IF amplifier modules
RF Modulators and Booster amps
Video Heads
L.N.B.s

FOR LATEST INFORMATION
and CURRENT PRICES
SEE OUR WEBSITE
HTTP://WWW.MCES.CO.UK

Tel: 0161 746 8037
Fax: 0161 746 8136
E-mail: sales@mces.co.uk

15 Lostock Road, Davyhulme, Manchester M41 0ES

The best in CRT Screen Polishing

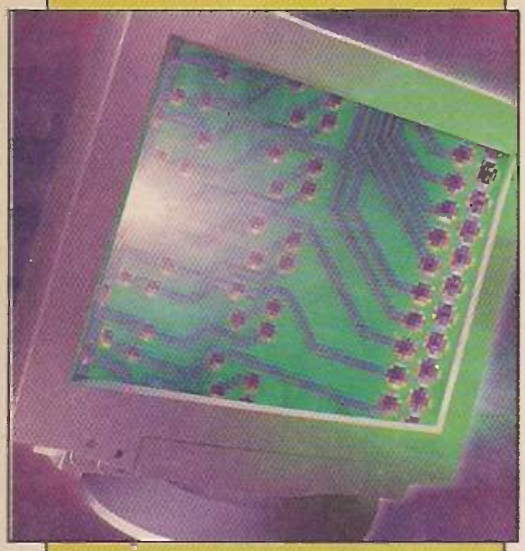
Registered Office:

'Fairlands', Beckney Avenue,
Hockley, Essex SS5 5NR

Tel: Southend on Sea
(01702) 201108

CRT REGUNNING EQUIPMENT FOR SALE

TELEPHONE FOR DETAILS



MONITORS

Fault reports from
Tony Mathews
Roger Burchett
Alun Rawson-Williams
Ian Field
Geoff Butcher
Gerry Mumford
and
Duncan Robinson

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

Reports can be sent by post to:

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

or e-mailed to:
tessa2@btinternet.com

Mitsubishi Diamond + 91

This monitor seemed to be completely dead. The cause of the trouble was on the primary side of the power supply, where zener diode D904 was short-circuit. It's adjacent to the mains switch. **T.M.**

Mitsubishi Diamond Pro 67TXV

There was a colour fault with this monitor: the display's blue content was missing. A cold check on the RGB output transistors revealed the cause. Q6B4, type 2SC3593, was short-circuit base-to-emitter. A replacement transistor and resoldering the CRT base pins completed the repair. **T.M.**

Mitsibishi Diamond Pro 720

This monitor powered up then produced a display that had a predominant blue cast. Checks on the RGB panel led me to suspect the M52742ASP chip. A replacement cleared the fault. **T.M.**

Intergraph TXT5F68

This Matsushita-manufactured monitor's display had disappeared while its owner was otherwise occupied. Inspection revealed that the tube's heaters were out. The supply comes via an 0·47Ω resistor, R864, which was open-circuit. I also replaced the reservoir capacitor C864 (2,200µF, 16V). A prolonged soak test confirmed that everything was then OK. **R.B.**

CTX 1785GM

The LED lit and the relay operated. Then there were arcing noises from the separate power supply board. On removal of the board, which is mounted vertically, I found that the chopper transformer had almost fallen off. Transformer removal, retinning and resoldering restored normal operation. **R.B.**

Compaq CDS522

The monitor was dead, though the computer seemed to boot up. On investigation I found that the 2SD1878 line output transistor was short-circuit all round. A 2SC742 or an S2055 can be used as the replacement. When this transistor fails, check for dry-joints at the line output transformer's terminals, the scan coil connector and the line output stage's tuning capacitor. Also check the 220µF, 50V capacitor in the output transistor's base circuit. Its capacitance value can decrease. **A.R-W.**

IBM 8512

There are three versions of this monitor, V, 002 and 003. They can be quickly identified by the connector at the monitor end of the signals cable and the type of line output transformer fitted. The three different cable types are as follows: one with ten-way socket and moulded strain relief; one with male connector and moulded strain relief; and one six-way socket plus one four-way socket and double-spade earth connector.

The early type is of fully-screened construction with a separate chopper power supply at the side. This provides two outputs, 180V to the main PCB and 130V to the CRT base panel. If the monitor seems to run all right for a couple of minutes or so then an acrid smell and smoke from the vicinity of the LOPT are noticed, check C525 (22µF, 250V, high-temperature type) which becomes leaky.

We've had several faults with the 002 version, as follows:
(1) Dead with the chopper power supply screaming. In this event check C226 (100nF) which is at the back of the line output transistor. It can be short-circuit, open-circuit or dry-jointed.
(2) Dead with the mains fuse F100 (1·6AT) open-circuit and the 2SD1739 line output transistor Q202 short-circuit. Replace the fuse then, before fitting a new line output transistor, connect a dummy load across the 89·5V line. If the voltage is high, replace the three small electrolytic capacitors in the power supply. These are C112 (47µF, 25V), C114 (100µF,16V) and C117 (0·47µF, 50V).
(3) Dead with F100 open-circuit. Check R101 (2·7Ω), R104 (4·7kΩ, 7W) and/or R105 (470Ω, 3W) for value change (high or low) or open-circuit and Q/HS100 (BUZ80A) short-circuit.
(4) Dead with the 2SD1739 line output transistor Q202 short-circuit. Replace Q202 and check its base drive coupling capacitor C222 (10µF, 50V) which dries up. **A.R-W.**

CTX 1769SE

The mains fuse had blown, but there was no sign of a cause on the primary side of the power supply. I decided to replace the fuse, power up and check the pulses at the pins of the UC3842 chopper control chip. Before doing so I removed the chopper MOSFET to avoid inadvertent power supply operation. Everything seemed normal – except for a smell of burning! Its cause was the BT169D thyristor Q101 (TO92 type), which feeds the start-up supply to the UC3842 chip. This was a red herring however, since Q101 is there to supply the chip only briefly. Once the power supply starts up, the feedback winding on the chopper transformer provides the supply for the chip. It also biases Q103 on to short Q101's gate to chassis.

When I refitted the chopper MOSFET and powered up again the front LED glowed briefly then went out. There was little else. Line output and B+ chopper transistor failure is common with this chassis, but very seldom blows the mains fuse. So I suspected a fault elsewhere.

This hunch was confirmed when I discovered that D110 (BYM26C) on the secondary side of the power supply was short-circuit. **I.F.**

Compaq V70 Model 621

Although this 17in. monitor's power supply was running the front LED was not illuminated. Unfortunately there were no tell-tale noises or smells to provide a clue. I let the power supply run for a short time and tried touch tests to see if anything was excessively hot. As there were no untoward temperatures I switched off, checked the electrolytics on the secondary side of the power supply to ensure that they were not holding dangerous charges, then set about checking the power semiconductor devices in the timebase output stages.

Q502 (2SC5088) in the EHT generator circuit was very leaky. Unfortunately I'd none in stock. The nearest I could find was a 2SC5129. A DMM diode-check showed that this device doesn't have an integral damper diode. Since the original was virtually short-circuit, it was impossible to apply the same test. So I examined the circuitry and found that there was an external damper diode. The 2SC5129 should therefore do.

After fitting it I gave the monitor an extended soak test – these monitors occasionally suffer from mysterious repeat failures soon after repair. I've found that the 2SC5XX9 family of transistors can raise reliability questions, failing in use but testing OK out of circuit. The most common cause of trouble appears to be insulation failure of the casing. These transistors seem to have a low tolerance to misapplication such as being mounted on a heatsink that hasn't been deburred during manufacture or inadequate application of heatsink compound. I had made sure that I wasn't guilty of either of these, and the 2SC5129 proved to be a suitable replacement.

A point to watch with this chassis is that if you are testing it with the bottom metal plate removed the brightness and contrast controls rest on the bench surface like wheels. The bottom edge of the on/off button does as well, usually keeping the tact switch permanently pressed. All this can cause frustration, for example when the monitor is moved sideways and the brightness and contrast settings turn to zero. Slackening the single fixing screw on the on/off tact switch sub-PCB assembly will eliminate inadvertent operation during bench work, but remember to retighten it before final reassembly.

Some owners have added a note to the fault description saying that the degaussing buzz at switch-on is alarmingly loud. This loud noise is caused by the top run of the degaussing coil slamming against the steel frame mounted around the CRT's rimband. The assembly includes a thick plastic sheet to prevent the coil chaffing against the steel shroud, which acts as an acoustic resonator! A couple of rubber wedges salvaged from the yoke of a scrap CRT are perfect for this purpose. Wedge them between the plastic sheet and the metal shroud, holding the plastic sheet firmly against the CRT bowl to stop it flapping about. The degaussing buzz will then be more like that experienced with other monitors. Some wedges are made of organic rubber. This eventually decomposes, becoming a conductive residue, so fit the wedges well clear of the EHT cap.

Another point to watch is C183 (10nF, 1kV) on the CRT panel. Despite its large diameter, it's very thin for a 1kV disc ceramic. Occasionally this item starts to break down intermittently, giving rise to perplexing symptoms. **I.F.**

Tatung C7BTR

The report said: "Went too wide. Tried to adjust it, but it popped and went off." On investigation I found that the chopper transistor was short-circuit and that fusible resistors R808 (0·22Ω) and R867 (0·2Ω) were blown. I replaced these items and also the UC3842 chopper control chip in case it too was faulty. This restored operation, but there was still excessive width with no control. The cause was traced to D434 (DMV32). It's a dual-diode in the line output stage. There was a leak between pins 2 and 3. **G.B.**

Time X70

The width was much reduced, with wavy sides and poor pincushion correction. The geometry and size controls had some effect, and the customer had said that the situation improved slowly as the monitor warmed up. The cause of the trouble was found in the supply regulator for the line output stage: C334 (47µF, 250V) was open-circuit. The monitor was made by CTX. **G.B.**

Acer VP1450OA

This monitor was totally dead with the BU2508DF line output transistor Q410 short-circuit. When it was replaced the unit worked for a second, went pop, then the green disappeared from the display! Video transistors Q908 (2SD756) and Q911 (2SB716) on the tube base panel had gone short-circuit with loading resistors R920 and R928 (both 33Ω, 1/8W) burnt up. Replacement of these items restored the green. **G.M.**

Viglen CA1726

This big old monitor was dead apart from light from a green LED at the front. The power supply system is on a separate PCB. There are two separate supplies on this PCB. The one that generates the low voltages was OK, but the one that generates the higher voltages had blown up.

The chopper FET Q6 (2SK956) was short-circuit, along with its driver transistor Q7 (2SA966) and the UC3842 control chip IC3. As a result the fusible feed resistor R23 (0·56Ω, 1W) was open-circuit.

The power supply functioned once replacements had been fitted, but there was still no screen display. Big dry-joints at the scan plug to the CRT yoke, on the separate deflection PCB, were the cause of this. **G.M.**

Acer 7276e

This monitor came in with a note which said it was dead. In fact there was power briefly: the front LED lit up green for about one second before it went out. On investigation I found that the 2SC5048 line output transistor Q302 was short-circuit – it had blown the 3A wire-ended fuse J013. Replacement of these two items produced a perfect display. **G.M.**

Hyundai HL5854B

There was excessive width with EW bowing. The cause was traced to D308 (UF5408) in the EW diode modulator circuit. It was leaky. **G.M.**

Philips 4CM8270/25T

I've had a number of cases where the BU2525A line output transistor in these 15in. monitors has failed (short-circuit). There seems to be no obvious cause, so I'm wondering whether the heatsink is inadequate or the transistors are coming to the end of their life. The symptoms are usually no display and ticking – or there may be just no display. **D.R.**

Hewlett-Packard D2814A

This 15in. SVGA monitor would work for a couple of hours or so then the frame scanning would cease. The cause was found to be a dry-joint at C3, which is near the frame output chip. Resoldering cured the fault, proved by a soak test that lasted for several hours. I resoldered some other dodgy-looking joints in the frame-output stage area, and also resoldered the legs of the line output transformer. **D.R.**

Jean VP1555 (type J51E)

This monitor was completely dead. On investigation I found that there was a large burn mark in the area surrounding the JFET chopper transistor Q801 (K2645). I replaced this, along with IC801 (8-pin DIL package) which was cracked, resistor R812 (240kΩ) which had blown, diode D808 (BA159) and fuse F801 (2·5AT). The monitor then worked normally. **D.R.**

VCR CLINIC

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

We welcome fault reports from readers – payment for each fault is made after publication. See page 42 for details of where and how to send reports.

Samsung SI1240

There was no capstan motor rotation. On investigation I found that the tiny 10µF, 25V electrolytic capacitor on the motor PCB had leaked electrolyte which had eaten away the 12V supply track. This is a very common fault with Sharp machines, but I've never previously come across it with any other make of video. **M.D.**

Crown CRV97

This Daewoo machine failed to come back on after a thunderstorm and power cut. Simple I thought: just replace the 1µF capacitor in the power supply. When I did this the VCR came back on but wouldn't rewind or fast-forward very well, while the drum ran too slowly and hunted.

After ruling out the power supply I scoped the drum speed control signal at pin 3 of IC501. Its mark-space ratio was all over the place. Perhaps the EEPROM, IC503, had been corrupted. But when I scoped its serial clock line I found that the clock frequency was drifting erratically. Now the EEPROM data is clocked by the microcontroller chip, which has an external 16MHz clock crystal, X501. When I connected a frequency counter, via a x10 probe, across X501 the VCR's fluorescent display went off. This suggested that the crystal was faulty, and indeed a replacement provided a complete cure. I obtained it from Farnell Electronic Components – part no. 485-093. **M.D.**

Sony SLV-SE700

There was a cassette trapped inside this machine and the mechanism was jammed. At switch on the loading motor pulsed once only. Investigation showed that the main loading cam was at an angle with respect to the deck plane. When it was removed the plastic spigot on slider B was seen to be bent and distorted – it had escaped from the cam groove. A new slider, part no. 3-053-878-01, restored normal operation. **E.T.**

Sony SLV-E720UX

This machine's front-panel display operated intermittently. The cause was several dry-joints at connector CN601 on the power supply board. **E.T.**

Sony SLV-F900B

This quite new machine was completely immobilised – in fact there was no sign of life at all. The mains fuse was found to be intact, and a check showed that charging current was drawn from the mains supply at switch on. Normal operation was restored once C153 (47µF, 50V) and C154 (1µF, 50V) in the power supply had been replaced. **E.T.**

Amstrad DD8900

The E-E picture produced by this machine was very poor. It didn't look like a power supply fault, and in fact the cause was in the IF module. I decided to replace all the electrolytic capacitors in this module. This cleared the fault. **M.M.**

Panasonic K mechanism

The cause of failure to accept a tape and no tape eject with F03 shown in the display is often, but not always, a cracked loading motor coupling. Sometimes a faulty mode switch gives the same symptoms. It's advisable to replace both items. **M.M.**

Hitachi VTF360E

The symptoms were poor mono sound and picture flickering, with noise bars going through the picture. Observation revealed that the tape was riding up the audio/control head. I initially suspected the pinch roller, but the cause of the trouble was the back-tension band – the pad had parted company with it. A new back-tension band restored correct operation. **M.M.**

Sony SLC5

The customer's instructions were to repair this machine whatever the cost! There was no play or fast-forward operation, though rewind was possible. The cause of the trouble was the BOT sensor, which was short-circuit. Even after seventeen years it was still available from Sony. So were all the belts and the rewind modification kit. The machine worked extremely well after these items had been fitted. I wonder how many of today's VCRs will be working in seventeen years' time?! **M.M.**

Hitachi VTF150

This machine wouldn't play tapes because the half-load arm failed to pull the tape up to the capstan shaft. The reason for this was that the spring on the half-load arm had broken. It's supplied only with the half-load arm assembly, but once this had been fitted the VCR worked perfectly. **M.M.**

Toshiba V703B

The sound was very poor with a definite wow. I had to replace the capstan motor and the pinch-roller assembly. **M.M.**

JVC HRS5900

The customer said that this machine would sometimes switch itself off. It had received previous attention – the mode switch, pinch roller and control plate had been replaced.

In view of the symptoms I decided to replace both end-of-tape sensors and both reel sensors. A check with the customer a few days later confirmed that all was now well. **M.M.**

Toshiba V854

There was no audio from this machine and the record indicators were flat out. The cause of the trouble was the multi-standard MSP3410 sound processor chip ICD03. It's on the MPX board. **J.C.**

Sony SLVE520U

There are several power supply causes of the no results symptom, but a common one is circuit protector PR512. Note that it has been uprated to 1·25A from 1A. **J.C.**

GoldStar GSEQ210 (D17 series deck)

Tape damage is usually caused by a faulty pinch gear and take-up lever. The damage occurs when a cassette is ejected. If the old-type parts are fitted, the take-up guide will be in a forward position after replacement of the pinch gear and the take-up lever will position the guide so that it faces to the left of the deck. When first installing the unit remember that the guide may look as if it's in the wrong position but is actually set correctly. **J.C.**

Ferguson FV11

There was no mechanical operation and checks soon revealed that there were no 5V and 12V outputs from the STK5481 chip IC1. A replacement restored the voltages but there was still no reel motor operation. The cause was traced to Q605 (2SC2560). **J.C.**

Aiwa HVFX1500

This machine wouldn't eject tapes. The cause was a cassette housing fault. When I dismantled the unit I found that the slide lever was broken. It's item 429 in the parts layout in the service manual. **J.C.**

Sony SLV625

A problem you can get with these machines is cutting out in playback or record. The VCR may work in playback or record for several minutes, then just stop. The cause is faulty sensors, HP001 and HP002. Check them by replacement. **J.C.**

Sanyo VHR776E

This machine was dead and a quick check revealed that the 2·5A mains fuse F5001 had blown. The cause turned out to be the BC10 mains bridge rectifier D5001, which was short-circuit between the positive pin and one mains input pin. **J.C.**

Mitsubishi HSM40V

This machine would leave a loop of tape when a cassette was ejected, especially after rewind. The usual cause is the mode switch, but not this time. Replacement of the idler reel assembly, item C035 in the diagram, cured the problem. Rewind operation was still a bit noisy however. This was cured by cleaning and lubricating the shaft of the take-up gear spool, item C031. **B.F.**

Hitachi VT410

This old-timer showed no signs of life. On investigation I found that there were no switched voltage outputs from the power chip because it wasn't getting a power-on signal. The fault was eventually cured by replacing the LA7935 chip on the VST tuning panel. Hardly an obvious cause! **B.F.**

JACK'S WORKSHOP

Jack Armstrong

No Astra 2D

A local satellite TV installer came to see me about a problem he had encountered with a SkyDigital installation on the outskirts of town. The owner of the house had insisted on having the dish mounted on his chimney, so that it was "as high as possible to get the best picture". The installer advised against this, but the customer had insisted – and even paid extra.

When the dish had been installed as requested it was found that the Disney programmes and others transmitted by Astra 2D couldn't be received. The installer then tried replacing the LNB, the cable, the dish and the receiver. Despite these checks, the fault was still present.

The installer had proved that there was nothing wrong with the equipment. So an external factor had to be the cause of the problem. There are some GPO communications dishes and other equipment at a site about a mile west of the town. As a test, I suggested that the dish should be positioned at ground level.

Next day the installer phoned me to say that he had done as I suggested, and that the 'missing' channels could now be received. "What next?" he asked.

"Fix the dish on a wall that's shielded from the GPO tower to the west" I replied.

He did so, then phoned again to say that the problem had now been solved.

Curiously, no one else on that side of the town has been affected. Perhaps all the dishes there are effectively shielded. Or perhaps the communications signal has a very narrow beam that affects only the one house. I wonder if they can cook food on the roof!

Digibox bugs

A customer returned the Grundig GDS310/2 Sky digibox I'd sold him a week previously. He wanted it for the FTV (free to view) programmes only, and had phoned 08702 438 000 to request a smart card. This had arrived three days later. He then phoned again to get the card 'authorised' with his digibox. He did this three times, but the card still didn't work.

I asked him to leave the card and the receiver with me, then phoned the card centre and provided the customer's post code and details of the card number and the digibox. The receiver was left connected to my workshop test dish while a signal was to be retransmitted via satellite. But after 24 hours the fault was still there. When I used my own Sky card for the 'basic' Sky programmes the digibox worked. I phoned again, and a new card was promised.

The customer had also complained that the digibox crackled and popped when a menu was on the screen. I checked this and found that he was correct. On making some enquiries I learnt that most or all Grundig receivers are doing this right now. There are just random clicks and pops instead of background music. The fault lies with the latest software, which "will be corrected eventually". In the meantime, Grundig digibox owners are advised to select "Background Music OFF" in the services audio menu.

Apparently other digiboxes also have problems. The Sony one has no Personal Planner. Panasonic models have the Personal Planner but don't seem to be very reliable in operation. In addition, changing programmes rapidly can make the digibox freeze, forcing the user to disconnect the power for a few seconds. I've noticed that my 'old' Pace BSkyB 2200 also occasionally freezes, and I've heard of numerous complaints about ITV Digital receivers locking up. It seems that while the technology for compressing and encoding pictures and sound works extremely well, the software that that controls the operation of digiboxes leaves something to be desired.

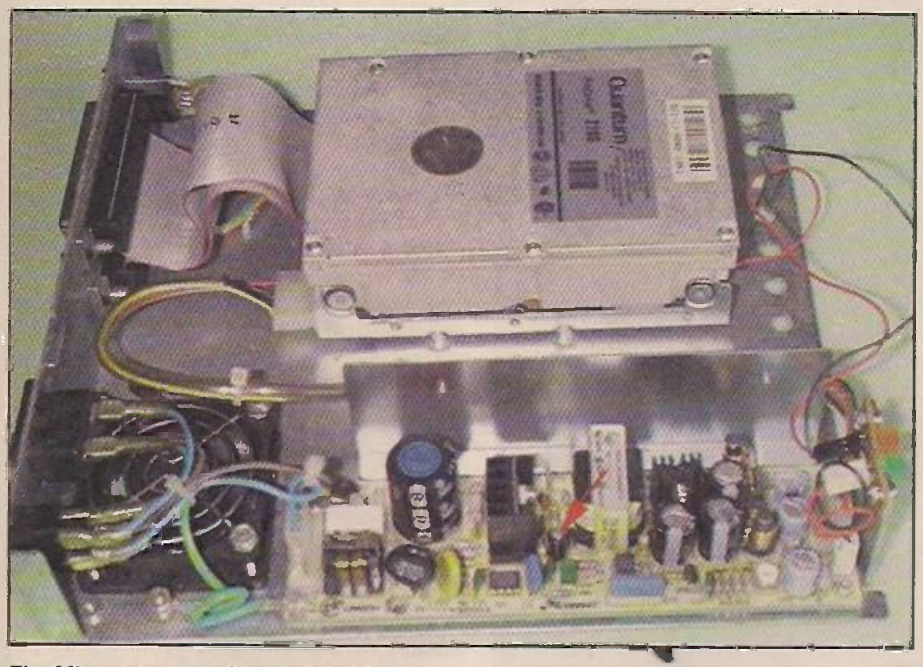
Three days later the Grundig digibox owner brought along the new FTV card, which worked immediately in his receiver. The faulty card was returned in the envelope provided. This is not the first faulty smart card I've come across.

An HDD repair

I was having one of those slack days when customers stay away in droves. It was a good opportunity to take a look at an external SCSI hard-disk drive (HDD) I'd bought for £5 at a computer fair some time back and put into storage. Before applying mains power I had a quick look inside. Everything appeared to be OK, but when I connected 230V AC I could hear the power supply squealing. Checks showed that there were no output voltages from it.

The label indicated that the HDD had been manufactured by Micronet Technology Inc. in Irvine, California. There was a model number, MS-540, but I had little hope of getting any information for it. I've had plenty of experience fixing switch-mode power supplies however, so I was undeterred. On investigation the most likely culprit was the electrolytic capacitor C7 (100µF, 25V) next to the heatsink (see photograph above right). When I checked it with my Genie-Plus ESR meter I obtained a reading of over 35Ω, which proved that my guess was correct. A replacement restored normal power supply operation but, as a precaution, I replaced all the other electrolytic capacitors as well.

An external SCSI HDD power-supply box such as this one is worth about £40 without a hard-disk drive. So it's easy to make a profit when the fault is as simple to locate and remedy as this one was. ■



The Micronet external hard-disk drive.

If you have any questions about Apple Macs you can e-mail Jack from the internet web site at:
http://www.ukstay.com/jack

You can also contact Mac Users and ask questions at the Yorkshire Mac User Group web site (YMUG):
http://www.ymug.york.co.uk

Information about Sky Digital Satellite receivers can be found at:
http://www.satcure.co.uk

You can order Apple Mac cables, connectors, batteries and other accessories from the SatCure web site at:
http://www.satcure.com

Test Case 467

Don't we just love intermittent faults? Take the case of Mr Hurst. We had already paid him two visits, with difficulties over settling the call-out bills, to check his quite-new Samsung TV Model CI683CNX. He had told us that at rare intervals the picture would become "all lines and squiggly" – but it never did so when anyone technical was there to see the effect. He finally brought the set to the workshop, complete with an off-screen photograph that showed the fault symptom. The picture is reproduced alongside: it illustrates the result of some very nasty happening in the line scanning department. If only more customers could help us in this way when the fault is intermittent!

The set was put on the soak-test bench and left to run while Television Ted looked out the service manual. This says that the model is fitted with the S51A chassis. In fact the chassis was type SCT12B, which is covered by a different manual altogether – that for Model CI6844N. The set doggedly refused to show us the fault, but Mr Hurst's photograph suggested that the line oscillator was running at the wrong frequency when the fault occurred. So Ted waded into this department, which is in the TDA8375 (IC201) area. Physical and thermal provocation produced little effect, though the excellent picture moved a little to the left and to the right between the extremes of temperature to which the chip and its peripheral components were subjected by our TV trouble-shooter.

The recalcitrant Samsung set was then left to run, which it did happily for the rest of the day with no problems showing up. It did the same during the next day – and the one after that. Meanwhile, the photo was taped to the top of the screen. On day four the fault appeared soon after the set was switched on. The display it produced was torn and distorted, and a squeal came from within. Fearing for the health of the line output transistor, Ted hastily switched the set off. He then hooked up a dual-trace oscilloscope, with one probe connected to pin 40 (line drive) of IC201 and the other connected to a line output transformer pin to monitor the flyback pulses there. When he switched the set on again all was well on the TV and scope screens. This situation lasted for a couple of hours, then the gremlin struck again.

Three workshop boffins, Ted, Sage and Real Technician, instantly gathered around the oscilloscope, which showed that the IC continued to churn out correctly-timed drive pulses. The line output transformer produced a jagged and torn waveform however. It looked as bad, in its way, as the on-screen display. Could the cause of the problem have been the line output transformer perhaps, or possibly the flyback tuning capacitor? Maybe the scan-yoke coils were faulty? In fact the cause was none of these things, and the repair called for little in the way of materials.

What was the cause of this fault, and why was it so elusive? For the solution, turn to page 56.

The fault symptom, when it appeared, on the screen of Mr Hurst's TV set.

SATELLITE NOTEBOOK

Reports from Michael Dranfield and Christopher Holland

Grundig GDS200

This digibox was stuck in standby following an electrical storm. A replacement modem panel confirmed that the main PCB was undamaged and that the fault was on the original modem panel. No surprise really.

I replaced the DSP1670 modem chip, but the box failed to reboot. Further tests showed that there was no 5V supply at the CSP1034AH chip U1, and that choke L5 was open-circuit. In this event check the resistance across C26. I found that there was a dead short, which was caused by the CSP1034AH chip. A replacement chip and choke restored normal operation.

If you use a choke from a scrap board as a replacement for L5 make sure it's the correct one, marked 100. The other chokes, marked 101, have too high a DC resistance and will drop the 5V supply to 3·5V. **M.D.**

Amstrad DRX100

This digibox's picture would sometimes freeze. When it happened the box would remain in this state until the mains supply was disconnected. If power was then reapplied the box wouldn't come out of standby.

Because of the intermittent nature of the fault it was some weeks before I found the cause, which was poor soldering at the flash memory chips U200 and U202. The soldering looked perfect even when a magnifying glass was used to inspect it, but reflowing the joints cured the fault. **M.D.**

Pace 2200

A number of these digiboxes came in for repair following a major lightning strike hereabouts. Every one of them was stuck in standby, and in each case a frequency counter connected to the modem crystal via a x10 probe indicated that the DSP1675 modem chip had died.

The chip is available from Pace (part no. 903-0016751) at a very reasonable price – about £17. In addition, Pace

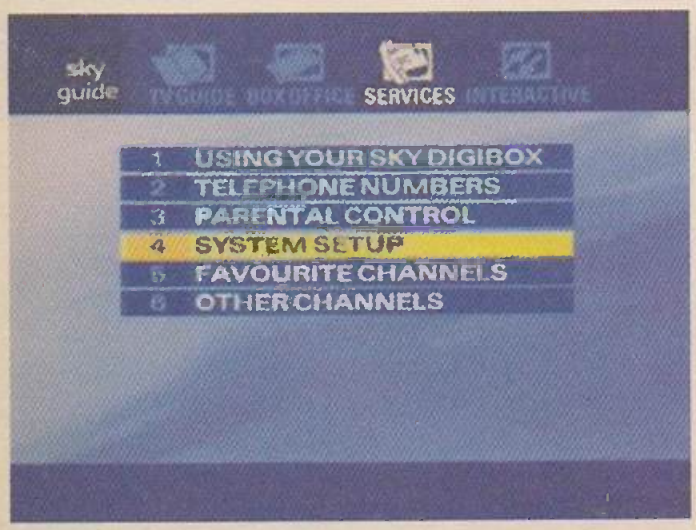


Photo 1: The Services menu.

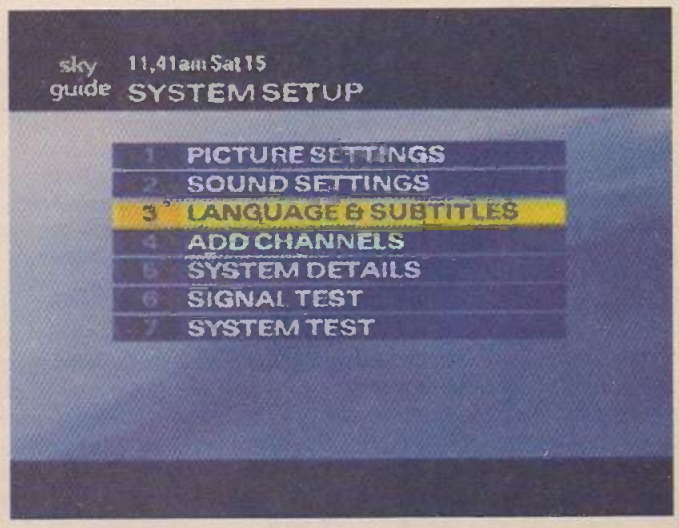


Photo 2: The System Setup menu.

strongly recommends replacing several other components on the telephone line side. They may appear to be perfectly OK, but replacing them could avoid a comeback at a later date. The components (U852, Q850, D852 and D800) are available as a kit, part no. 265-230A2B1. At less than £2 trade it would be silly not to replace them. You will sometimes find the top blown off the optocoupler U852.

A new DSP1675 chip and kit cured every one of these damaged digiboxes. **M.D.**

Digital TV update

A number of digital channels have been moved between transponder multiplexes since the full listing last month (page 753). There are also some new channels. The changes are listed in Table 1 – the EPG number is shown in brackets after the channel name. The Money Channel (EPG 516) and the Computer Channel/ Dot TV (567) are no longer being transmitted.

Eurobird's D4S transponder (11·527GHz) has been activated and test transmissions are being run. Channel 5 has been conducting widescreen tests using its normal transponder (3 – 11·758GHz H).

Radio stations Big Blue and The Saint are encrypted. From observations, they appear to be within the EPG only with viewing cards for addresses in London and the South East (Big Blue) and the South (The Saint). With other cards for English post code addresses the channels can be added via the Extra Channels menu. The stations are blocked with cards for Scottish, Welsh and Irish addresses. They are not available with a free-to-air viewing card: a minimum Sky subscription contract is required. **C.H.**

Table 1: Latest digital channel changes.

Channel and EPG	*Sat*	*TP now*	*Frequency (GHz)/pol*
Big Blue* (898)	2B	32	12·324 V
Channel Health (193)	EB	D7S	11·585 H
Club Asia* (895)	2B	32	12·324 V
Eurosport (420)	2A	8	11·856 V
Eurosport News* (420)	2D	55	10·921 H
EWTN* (897)	2B	32	12·324 V
Fox Kids (610)	2B	29	12·266 H
Granada Plus (118)	2A	27	12·226 H
History Channel (561)	2B	25	12·188 H
History Channel + 1 (562)	2B	25	12·188 H
Kiss (450)	2B	35	12·382 H
Magic* (452)	2B	35	12·382 H
Muslim TV* (675)	EB	D11S	11·662 H
Nat Geographic + 1 (559)	2A	8	11·856 V
Nickelodeon (604)	2B	34	12·363 H
PCNE Chinese (673)	EB	D3S	11·508 H
Rapture (458)	2A	27	12·226 H
Sky MovieMax 2 (309)	2A	11	11·914 H
Sky MovieMax 4 (311)	2B	20	12·090 V
Sky MovieMax 5 (312)	2A	7	11·836 H
Sky One (106)†	2B	19	12·070 V
Sky Premier 2 (302)	2A	11	11·914 H
Sky Premier 4 (304)	2B	20	12·090 V
Sri Lanka TV*‡ (681)	2B	37	12·422 H
Star Plus (672)	2B	34	12·363 V
Tara (178)	2B	29	12·266 H
The Saint* (899)	2B	32	12·324 V

* New channel. † Sky One UK, Ireland and cable share transponder 19. ‡ See Photo 4.

TP = transponder, 2A = Astra 2A, 2B = Astra 2B, 2D = Astra 2D, EB = Eurobird.

Euronews language

Euronews (EPG 528, 11·680GHz V) is normally received in the UK in English. It can also be received by a digibox in other languages however. To alter the language, press the Services button and select option 4, System Setup (see Photo 1). Then select option 3, Languages & Subtitles (see Photo 2). Scroll through the various languages in the Favourite Language/Audio part at the top of the screen (see Photo 3), then save the changed settings in the usual digibox manner. All other channels in the EPG should remain in English or the original language.

Though other languages are listed in menu, the digibox will switch to only French, German or Spanish. Euronews can be received in other languages, such as Italian and Portuguese, but digiboxes do not appear to be able to cater for this requirement at the moment. If you want reception in these languages it's best to use a free-to-air digital receiver. Enter the Euronews frequency (11·680GHz V, SR 27,500, FEC 2/3). Normally all receivable languages can be scrolled through via the Audio or Alternative Audio menu. C.H. ■

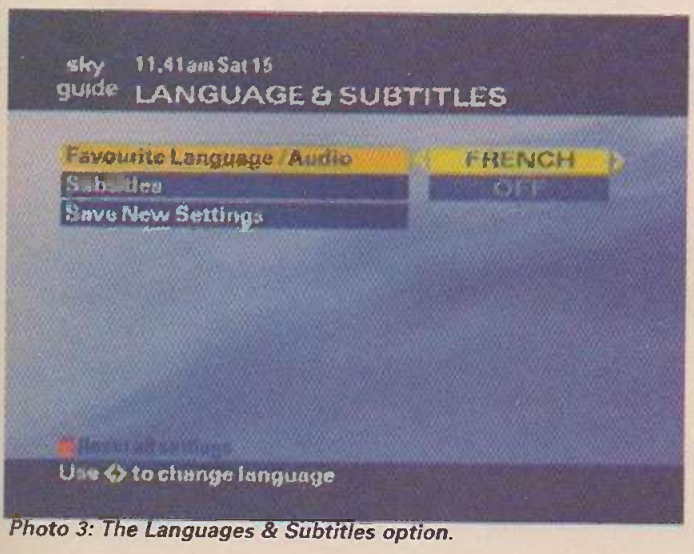


Photo 3: The Languages & Subtitles option.

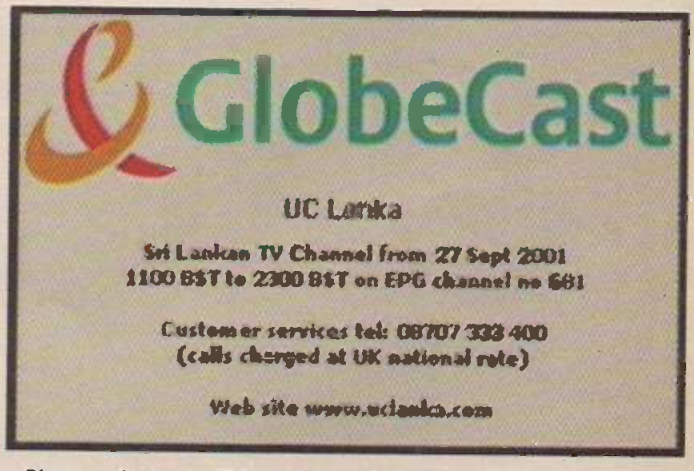


Photo 4: Sri Lanka TV test transmission.

WEB SERVICE

To reserve your web site space contact Pat Bunce

Tel: 020 8722 6028 Fax: 020 8770 2016

E-MAILS p.bunce@cumulusmedia.co.uk

AcquiVision

http://www.acquivision.com

Acquivision solutions, including XY-Plotting, Oscilloscope (with FFT), Data Logging and Custom Software, have been getting the most from computers since 1994, Download software. Telephone (01903) 830502

Alltrade

http://www.alltrade.co.uk

ALLTRADE

Phone 01273 413798 Fax 01273 425700

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

A.R.D. Electronics Plc

http:/www.ardelectronics.com

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

Baird 30 Line Recordings

http://www.dfm.dircon.co.uk

For history buffs and the curious here's a fascinating site containing early TV recordings and their background.

BBC

http://www.bbc.co.uk/enginfo

If you need any help with your reception go to this site – both of the addresses point here. There's special advice for people with loft installations, and caravaners and boating enthusiasts.

Dönberg Electronics

http://www.donberg.ie

As the leading distributor for the TV, Video and Audio trade in Ireland, we supply over 2000 shops & service dept with Audio-Video and TV spares, Semiconductors, Test Equipment, Service Manuals, Remote Controls etc. At present we stock over 30,000 different lines

EURAS International Ltd

http://www.euras.com/english

"The definitive fault index... based on feedback from manufacturers, technicians and workshops throughout Europe" IER Magazine. Available on CD-ROM including ECA vrt-disk 2000. Subscription includes free Internet access for update downloading, access to pin board, discussion forums and classified ad section. Monitor database also available.

Goot Products

http://www.kieagoot.co.uk

Kiea Trading Company is the sole agent of Goot products, We specialise in supplying the soldering and desoldering product range manufactured by Goot Japan for the UK market. Goot uses advanced production technology to manufacture

high quality soldering iron products for industrial, professional and general purpose use.

Matrix Multimedia Ltd

http://www.matrixmultimedia.co.uk

Matrix Multimedia publishes a number of highly interactive CD ROMs for learning electronics including: Complete electronics course, Analogue filter design, and PICmicro(R) microcontroller programming (C and assembly).

M.C.E.S.

http://www.mces.co.uk

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

MMWafercards

http://www.mmwafercards.com

Smartcards and programmers for all access-controlled applications. Incorporating www.satstore.co.uk

The Enthusiasts Satellite Store.
Tel 01386 48731
Fax 01386 765875

Mauritron Technical Services

http://www.mauritron.co.uk

The UK's leading independent supplier of Service Manuals and Operating Guides from valve to video. Also available on CD Rom or download direct from the internet.

PC Universe

http://www.pc-universe.net

PC Universe supplies core computer components at "WORLD-beating" prices. Our range of reliable brand name products is available to order online 24-7.
Nationwide delivery. Free Tech support at all levels. Call LO Call 0845 4585817

Sky digital repairs

http://www.horizonsatellites.co.uk

The Horizon site gives details of our range of products and services including Sky Digital Receiver Repairs.

Servicing Advice

http://www.repairfaq.org/REPAIR/F_Repair.html

Here are some frequently asked questions about servicing consumer electronic equipment, with a US bias. But there's some good material on monitors and CD players and CD-ROM drives. (thanks to David Edwards for this information)

Switch-it-on

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

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

Service Engineers Forum

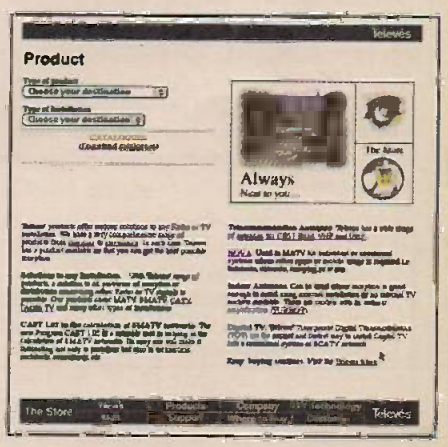
http://www.E-repair.co.uk

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

Televes

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

Televes website was launched as an easier way to keep in contact with our World-wide Network of Subsidiaries and Clients. This site is constantly updated with useful information/news plus you can download info on our range: TV Aerials & accessories, Domestic and Distribution amplifiers, Systems Equipment for DTT and Analogue TV, Meters and much more.



The Service Engineers Forum

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

A brand new site dedicated to the needs of service engineers containing detailed servicing articles, circuits & repair tips. The site also includes for sale, wanted & special offer sections, industry news & much more. An impressive site well worth visiting.

For customers without net access, servicing product details are also available by ringing Mike on 0151 522 0053

Transworld Satellite

http://www.transworldsatellites.co.uk

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

UK Mailing List Group

http://www.egroups.com/list/uktvrepair

Following on from the newsgroup discussion last month there is a UK Email group for TV technicians where you can send an Email to everyone in the group. There's just over 30 people in the group at present. For more details and how to register look at the egroup home page. Just a general comment though - you do have to be careful who you give your Email address to so that you can avoid "spamming" - that is getting lots of unwanted Email about dubious Russian site (amongst others).

PSA

http://www.psaparts.com

This web site gives details of various specialist parts for repairers, from rare semiconductors to compute batteries and printer parts. The vast majority of items are in stock, and can be purchased on-line via this sites shopping facility.

Repairworld

http://www.repairworld.com

Repairworld is a US based fault report database which is updated bi-weekly. It operates on a subscription basis and describes itself as an "affordable solution for all technicians". There is apparently no minimum number of months for which you have to subscribe. You can see some samples of the material for free, monitors, VCR, DVD and Camcorders being of particular relevance to UK users. The site provides a "chat room" where you can talk via your keyboard to others "in the room".

Vintage Wireless Co London

http://www.vintagewirelesslondon.co.uk

Phone 0207 2583448 Fax 0207 2583449

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

Put your web address in front of 21 000 electronics enthusiasts and experts.
Television **acknowledges your company's need to promote its web site, which is why we are now dedicating pages in every issue to announce your WEB ADDRESS.**
This gives other readers the opportunity to look up your company's name, to find your web address and to browse the magazine page to find new sites.

We understand that cost is an important factor, as web sites are an added drain on budgets. But we are sure you will agree that the following rates make all the difference:

FOR 12 ISSUES:
Lineage only will cost £150 for a full year, just £12.50 per month.
This includes your company's name, web address and a 25-word description.
Lineage with colour screen shot costs £350 for a full year, which equates to just £29.17 per month.
This price includes the above mentioned information, plus a 3cm screen shot of your site, which we can produce if required.

To take up this offer or for more information ring:

Company name	Web address			

AUDIO FAULTS

Reports from
Roger Burchett
Geoff Darby
Robin Beaumont
and
Russell J. Fletcher

We welcome fault reports from readers – payment for each fault is made shortly after publiation. See page 42 for details of where and how to send reports.

Hyundai C320

This car radio/cassette unit suddenly failed, with no display or operation. It's a well-made piece of equipment that's reasonably easy to work on. The problem was caused by flux residues that bridged the tracks from the microcontroller chip to the display. This was easy to spot, as the board was otherwise very clean. Use of isopropyl alcohol to clean up cleared the fault.

I suspect that the owner or his garage mechanic disconnected the battery, after which the microcontroller chip failed to reset. **R.Bu.**

JVC UX-V10/V30R

I've had two of these in recently, both with the same basic problem. With the first, which was the -V10 version, the cassette deck clattered back and forth and sometimes jammed, but never did as it was asked. The cause of this bizarre behaviour was the 'trigger arm', which is the link between the deck solenoid and the cam gear. It's item 35 in the exploded view, and was displaced from its clip.

To get at it you have to remove the deck and the PCB that's attached to it. Remove the forward flywheel, after removing the drive belt and the plastic flywheel retainer washer at the base of the capstan shaft. The trigger arm is then clearly visible, and can be clicked back into place. Reassembly is the reverse of the dismantling procedure.

The second one was a -V30R version. Its tape deck was dead because the 5·6Ω safety resistor R9101, which is located close to CN304 on the main PCB, had failed. Once it had been replaced I had the clattering deck symptom, the cause again being displacement of the trigger arm. **G.D.**

Sony HCD-H1500

This unit appeared to be dead, but checks in the power supply showed that the basic outputs were present and correct. The cause of the trouble was that the 5V supply to the microcontroller chip was missing, because regulator Q791 was faulty. It's mounted on the main, not the power supply, PCB. Basic operation was restored once this item had been replaced but, curiously, there were no displays. The cause of this final problem was the 24V zener diode D910, which was short-circuit. It provides the reference for the –24V display supply regulator Q903, which is on the power supply PCB. **G.D.**

Sony DEJ715

This personal CD player would play a disc when one was inserted, but none of the operate buttons at the top had any effect. In addition the LC display, which shares a PCB with the switches, had some missing segments. The control and display panel is connected to the main PCB by a flexible cable, which had two open-circuit leads. A complete new switch unit was required – fortunately the player was still under warranty. **R.B.**

JVC RD MD5

This very impressive portable system comes equipped with a built-in sub-woofer arrangement that will fill a room with sound. Wisely, the manufacturer has designed it so that it cannot be run from internal batteries!

The MiniDisc section played discs without problems, except that new recordings suffered from intermittent skipping. After removing about a hundred screws to take out the MiniDisc unit, I was expecting to find a problem with the magnetic overwrite head. But nothing seemed to be wrong. Time for measurements. The unit was reassembled and the service manual consulted. I used the remote-control unit to get into the service mode, then used our Sony power meter to check the laser power. The meter is a modified MiniDisc caddy that you insert like a disc.

The laser power for recording on a MiniDisc is about ten times the read power, as the surface of the disc has to be heated to above the Curie point to enable the magnetic head to imprint a new recording. In this case the write power was 20 per cent low. Resetting to the correct value gave good results with both playback and recording.

Next time I'll check the laser power before dismantling the set! **R.B.**

Sony HCDRX90

There were problems with the CD section of this audio system. Discs would focus and spin, but refused to play. The tracking servo was working overtime, and the pickup was very noisy. After replacing the pickup and a number of components in the servo circuit I decided to consult Sony Technical, who said that the cause could be the flexible printed circuit which connects the pickup to board BD. Apparently it fails quite often. A replacement was immediately effective. **R.B.**

Studiomaster Mixdown Gold deck

We have these studio recording decks in for investigation on several occasions, the complaint being no or intermittent output. Go straight to the insert jack sockets, without checking for anything else. Resistive switching contact here causes the fault. It's probably as well to replace the sockets whenever a unit comes in for service. **R.J.F.** ■

Answer to Test Case 467

– page 47 –

The line output stage has to generate a linear ramp current waveform. It's produced by the transformer when the line output transistor or the efficiency diode is conductive, returning the earthy end of the primary winding to chassis. The flyback pulse, which drives the beam to the left-hand side of the screen to start the next line scan, is produced by the transformer and its associated tuning capacitor. For correct operation the line output transistor must be switched on and off quickly, providing a low-resistance path to chassis when it's on.

It was in this area that the fault in the Samsung TV set lay. The 2SD1887 line output transistor Q401 was sometimes unable to switch on fully and cleanly because of a dry-joint at the earthy end of the line driver transformer's secondary winding. The defect was barely visible and very difficult to prove, even by physical disturbance at the lead-out pin and the PCB. A tiny tell-tale ring was just visible at the joint however.

Ted could have simply resoldered the joint, but he would have been unsure that the problem had been effectively cured. Instead, he open-circuited the connection completely and inserted a resistor with a value of just a few ohms. When the set was repowered the fault symptom was present on the screen, thus proving the diagnosis. Ted switched off, removed the test resistor then thoroughly cleaned, tinned and resoldered all four pins of the line driver transformer (T401). The fault hasn't recurred despite Mr Hurst's conviction that it would. Perhaps we should issue complimentary Polaroid cameras to other customers whose sets produce horrid intermittent problems!

NEXT MONTH IN TELEVISION

Guide to the Panasonic E-5 chassis

This digital TV chassis was designed for use in large-screen, high-performance receivers. Brian Storm describes its various technical features.

Broadband technology

Broadband communications technology is required for transmission of large quantities of data at a reasonable speed. The data can of course include video information. Mark Paul provides a guide to the technology and its relevance to today's consumer electronics equipment.

The PC and the TV

Peter Marlow discusses the convergence between TV and PC systems.

DVD player servicing

The concluding instalment in K.F. Ibrahim's series on DVD player technology concentrates on fault-finding procedures.

PLUS ALL THE REGULAR FEATURES

Published on the third Wednesday of each month by **Cumulus Business Media**, Anne Boleyn House, 9-13 Ewell Road, Cheam, Surrey SM3 8BZ. **Cumulus Business Media** is a division of **Highbury Communications PLC. Filmsetting** by JJ Typographics Limited, Unit 4, Baron Court, Chandlers Way, Temple Farm Industrial Estate, Southend-on-Sea, Essex SS2 5SE. **Printed** in England by Polestar (Colchester) Ltd., Newcomen Way, Severalls Industrial Park, Colchester, Essex CO4 4TG. **Distributed by** Comag, Tavistock Road, West Drayton, Middlesex UB7 7GE (tel. 01895 444 055). **Sole Agents** for Australia and New Zealand, Gordon and Gotch (Asia) Ltd.; South Africa, Central News Agency Ltd. ***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 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.

Special Offer Sale – 20 Remote Controls £20.00 (mixed all well known brands)

FERGUSON ICC 7 HAND SET £3.00

FERGUSON VIDEO

FV90 LV HAND SET £3.00
FV80 LV HAND SET £3.00
FERGUSON
BATTERY CONVERTER TA606 £15.00
24V DC/240V AC £15.00
BENCH POWER SUPPLY VARIABLE
0-30V 3A-TWIN METERS
P/P £5.00 ea £50.00
BRIDGE RECTIFIERS 10 FOR £1.00
BURGLAR ALARM KIT full description £7.00
CAMCORDER-UNIVERSAL BATTERY 9.6V –
1400MA FOR JVC-PANASONIC-PHILIPS
£5.00
CAMCORDER-RIPOD SHOULDER POD £3.00
CAPACITORS:-
1IN/2KV, 2NZ/2KV, 4NZ/4KV EACH 15p
5N6/2KV, 6N2/2KV, 9N1/2KV EACH 15p
35V-22UF, 50V-4.7UF, 50V-100UF
EACH 25p
AA BATTERIES 1.5 VOLT
STC ALKALINE 10p
DESOLDER PUMP £2.00
DIGITAL CAPACITANCE METER CMC200
200PF-20MF £28.00
FILTERS – 455 & 480 EACH 10p
GAS SOLDER IRON-PORTASOL HOBBY
£10.00
INFRA RED DETECTOR
WIDE/SHORT ANGLE WITH RELAY £5.00
INFRA RED RECEIVER-MATSUMI
MINIATURE £1.00
MILLI VOLTMETER-ELECTRONIC-LEADER
LMV-181A 40V A/C IN-IMV F/S
£5 P&P £5.00
IMV-300V CALIBRATED
COST £225.00 £5 P&P
COLOUR TV BATTERY
CONVERTER IN 24VDC TO 240V OUT
£15.00
MODULATOR-TUNABLE SATELLITE-TV
£1.00
PANEL-IK2-FM2211 STEREO £5.00
PANEL-CVC80-POWER £5.00
POSITOR 18 2 PIN 20p
POSITOR-2322 662 98012 50p
POWER SUPPLY –
12V DC & 24V DC-REGULATED £2.00
POWER SUPPLY-REGULATED 3-12V 500MA
£5.00
PSU AC 12V 500MA £1.50
PSU AC 9V 1A £1.50
QUARTZ HALOGEN –
500W 200V FOR OUTDOOR LAMPS £1.00
R.S. SAFE BLOC £5.00
RELAYS-SUB MINIATURE 25p
SATELLITE TUNER UNIT – 2427611
. . . . BASE BAND/VIDEO OUT £3.00
SCART TO 4 PHONO LEADS 1.5M £3.00
SCART TO 6 PHONO LEADS £3.00
SCART TO "D" PLUG £1.00
SCART TO SCART LEADS –
ALL PINS CONNECTED – 1.5 METRES
£2.00
SOUND 5.5MHZ MPM 1000T £1.00
SOUND 6.0MHZ MPM 1040 £1.00
TRANSFORMER-RS ENCAPSULATED
MAINS
0-120V-0-120V PRI 0-9V-0-9V SEC £1.00
TRIPLER KT3/K30 £4.00
TRIPLER – UNIVERSAL £5.00

FERGUSON

ADAPTOR – VPT – TEXT – VA354 £2.00
AC MAINS & BATTERY-VA365
P/P £3.00 ea

CAMCORDER BATTERY, HIGH CAPACITY
9.6V 1800MA-VA310 £3.00
CAMCORDER BATTERY CHARGER
9.6 VOLTS VAZ65 EACH £6.00
CAMCORDER CAR ADAPTOR CHARGER –
AND BATTERY-VA308 £5.00
CAMCORDER LENS 2 OFF –
TELE-CONVERSION LENS x1.4 & x0.7
£1.00
CARDIOID CAMERA MICROPHONE-VA
SUPER 218 TELESCOPIC BOOM & STAND
£5.00
CHASSIS-TX80-NEW-NO TUNER P/P £5.00
EACH £15.00
CHROME BOARD-ICCS
I/Cs U4647TKF OR HA11498 £6.00
DECK AND CAPSTAN MOTOR:-
FV61LV, FV62LV, FV67LV, FV68LV
EACH £30.00
FV70B, FV71LV, FV72LV, FV74LVX
EACH £30.00
FV77HV £30.00
FV31R £12.00
HEAD AND DRUM
MODULATOR-SATELLITE-T1040-SRD3/4
£2.00
PANEL-REMOTE TX100s £5.00
PANEL-TI228B TEXT
FOR TX89, TX98, TX99, TX100 £6.00
PANEL-TX90 THORN FRONT –
– 8 BUTTONS 01M4-515-002 £5.00
PANEL-TUBE BASE-ICC5 £5.00
PANEL-TUBE-BASE-TX89, TX98, TX99 £5.00
PANEL-TUNING 1509G-TX9, TX10 £5.00
POWER SUPPLY 12V-3A
FOR VIDEOSTAR CAMERA PP3 £4.00
PUSH BUTTON UNIT-TX85, TX86 –
8 BUTTONS £5.00
TRANSFORMERS-SWITCH MODE:-
TX85, TX86, TX89 EACH £4.00
TX100 £5.00
473190-00, 40153000 EACH £5.00
ICC5 3112-338 326842 £4.00

HITACHI

DECODER-TELETEXT PC232A5 – ISSUE 4
£15.00
HEAD AND DRUM – 620E £12.00
MAINS SWITCH WITH STAND-BY £50p
MODULATOR No 5587881 £5.00
OSCILLOSCOPE 20MHZ DOUBLE BEAM –
V212 £188.00
PANEL-TELETEXT G8P – ISSUE 6 £10.00
PANEL-TELETEXT PC315-11 – ISSUE 7
£15.00
PANEL-TEXT-VT753E £20.00
POWER SUPPLY TV SWITCH MODE
STR 4211 ISSUE 10 £8.00
POWER SUPPLY VIDEO SWITCH MODE
VTM312ELM £10.00
THICK, FILM-HM9204A £3.50

HOSIDEN

TUBE BASE – MIXED 10 for £1.00
AA Batteries made by STC Group of Companies
10p each

ITT

IF MODULES:-
5827-01-51, 5827-51 EACH £3.00
5828-04-10, 5829-02-58 EACH £3.00
5929-03-41 EACH £3.00
TELETEXT CONVERSION KIT £3.00
CORE 2 90° ITT-TEXT PANEL £3.00

1996/7 MATSUI

VIDEO CHASSIS WITH TUNER-IR £5.00
POST £4.00

MATSUI – ORION

DECKS WITH HEADS –
D1096 VXA110 VP 9401 £16.00
HEAD-VSR1500 = ORION D2096 £5.00
PANEL-MAIN-VSR 1500 P/P £5.00ea £3.00
POWER SUPPLY-VSR 1500 £5.00
POWER SUPPLY & REG –
TYPE STK 5343-VP9501 £8.00
POWER SUPPLY-SWITCH MODE-1500 £3.50

SAMSUNG TECU5983 VA24A
VHF-Tuner with Aerial Socket
Fit most new TV's £5

FERGUSON NICAM MODULE III
Art No 989 591-E00 £5

VIDEO DECKS

AIWA 1500
MATSUI VXA 1100
MATSUI 1500
ORION D1094
ORION D1096
ORION D2096 ETC
} £5 £9 POST

CAPSTAIN MOTOR FOR ABOVE DECKS
£8.00
20 HIGH VOLTAGE CAPS 1500V – 2000V
MIXED £1.00
PAL TV ADAPTOR – RGB IN UFH OUT £5.00

HANDSETS

AMSTRAD
4600 £3.00
4700 £5.00
6000 £15.00
6800 £4.00
UNIVERSAL £3.00
DECCA
NICAM LCD £4.00
FERGUSON
BSB £1.50
FV41R/3V59
FV41R/FV42 – FV51-52 } £10.00
ICC5 £7.00
IK2000, IK7000 EACH £4.00
SRD2, SRD3, SRD4 EACH £1.00
T780 £2.00
TV/SATELLITE WITH FST £3.00
HITACHI
CPT2158 (NO REPLACEMENT) £5.00
VIDEO RM933E VIDEO PLUS £30.00
MATSUI
1500 £5.00
VSR 1500 £4.00
VX3000 £3.00
3000/ORION – TV AND VIDEO £2.00
RC = PACE 900, FERGUSON, SONY,
GRUNDIG £5.00
MITSUBISHI
RM35 – VIDEO £5.00
NOKIA
RC202 £4.00
VP9401
D1096
VXA1100
AND VIDEO PLUS
ORION
TV AND VIDEO £2.00
VIDEO WITH LCD – 1992/93 MODELS £5.00
SAMSUNG
HANDSETS, TV & VIDEO – 12 TYPES EACH
£3.00
SANYO
UNIVERSAL VIDEO £3.00

COMPLETE REPAIR KIT, CLUTCH AND
PINCH ROLLER, IDLER D2906 £7.00

TUNERS

IF TERC8-022A TBJZA-00ZA-ALPS £3.00
SATELLITE SXT2302180968 £3.00
SATELLITE
WITH BASE BAND MIN SXT2302234 £4.00
SMALL UNF/VHF £3.50
VHF/UHF – TEKE4-112A £4.00
4944
U321, U341, U342, U343
U344, U411, U412, U944 } EACH £2
U743, 7744
AMSTRAD
UE33-BO1 £3.00
MRF7-7E33
MATSUI ORION VIDEO TUNER IF £5.00
FERGUSON
IF2105-RE £5.00
MTP2011-AP00 £5.00
UHF – ICC5 £5.00
VHF – ICC5 £5.00
TX85, TX86, TX89, TX90 EACH £4.00
TX98, T99, TX100 EACH £4.00
ORION
1500 – UE33 BO9 £4.00
PANASONIC
SMALL UHF/VHF £3.00
FERGUSON
DOUBLE SIDE NICAM £10
ICC5 NICAM SINGLE BOARD ICC5 £10
SHARP
TUNER AND IF 1810587 PA1 UK £3.00
TATUNG
UNIVERSAL 205 OR EQUIVALENT
WITH AERIAL SOCKET £3.00

MOTORS

HITACHI
CAPSTAN 150E £3.00
MATSUI
CAPSTAN I/C NO. M56730 ASP £15.00
2 TYPES 1995 TO 1997 MODELS MATSUI
VIDEO
DECKS WITH CAPSTAN MOTOR
AND HEAD P/P £5.00 £20.00
MITSUMI
MOD MRF7-UF32 £5.00
MOD TMUG3-103A £5.00
MITSUBISHI
CAPSTAN-HSE41-I/C M51782ASP £2.00

Treble A Batteries 12 for £1

12v to 15 D.C.

TV MODULATOR WITH LEADS
VIDEO IV 75R
AUDIO IV 10K
HV100 £5 EACH

TV AERIAL AMPS VHF/UHF

1 WAY 20dB EACH £5
2 WAY 18dB EACH £5
4 WAY 10dB EACH £5
8 WAY 4dB EACH £5
240v MAINS

COMPUTER 3 PIN MAINS LEADS

2½ METRES LONG – GREY EACH £1.50
2 METRES LONG – BLACK EACH £1

SCART TO SCART – ALL PINS – 1 METRE
EACH 60p

7805	20p	2SD1432	£1.00	BU204	60p	BUT11AF	50p	BYW29/50	15p	HD6404251	50p
7806	20p	2SD1453	£1.00	BU205	75p	BUT12A	20p	BYW95	10p	HD6410S15	£1.00
7809	20p	2SD1576	£1.00	BU206	£1.00	BUT13	£1.00	BYW95C	10p	HEA52BBP	15p
7812	20p	2SD1577	£2.00	BU207	£1.00	BUT18AF	£1.00	BYW562A 100V	8p	HEF4029BP	20p
7812F	20p	2SD180T03	15p	BU208	50p	BUT11/800	15p	BYX10	10p	HEM3093	20p
2SC940	£1.00	2SD1878	£1.00	BU208A	£1.50	BUW13	40p	BYX38/300	25p	HGA1124A	50p
2SC3795	£1.00	2SK1460	£1.00	BU208D	90p	BUW84	60p	BYX55/350	10p	HM6264	
2SC3973B	£1.00	2SK1464	£1.00	BU222	£1.00	BUX39	£1.00	BYX55/600	10p	ALP-15	£3.50
2SC4313	£5.00	2SC4891		BU326	£1.00	BUX84	50p	BYX71/60	20p	IK75T 6931 B1	£3.00
2SC4589		1500V/15A	£2.00	BU407	40p	BUX84AF	50p	BYZ106	10p	IN5401	3p
10A/1500V	£2.00	AN5521	£1.00	BU508A	90p	BUY49	20p	BZW-C110	5p	IR106A	10p
2SC5350	15p	AN5551	£1.00	BU508AF	£1.00	BY187	5p	BZW83-C20	3p	L298N	£4.00
2SD200	£1.00	AN5331	£2.00	BU508D	80p	BY208-800	5p	CA3123Q	50p	LA7830	£1.00
2SD401	40p	BC550C	20p	BU508DF	£1.00	BY228	15p	CD4555BE	20p	LA7831	£1.00
2SD716	£1.00	BDV648	50p	BU705	£1.00	BY229	6p	CLE871A	£5.00	M708 AB1	£1.50
2SD787	30p	BDV658	50p	BU801	50p	BY255	5p	FE3B	4p	M708 LB1	£1.50
2SD789	30p	BF8695	20p	BU906A	£1.00	BY299-200	15p	HA1140	£1.00	M37204ECSP	£1.00
2SD320	£1.00	BF870	20p	BUN07	50p	BY299-800	30p	HA1185	£1.00	M58658P	£1.00
2SD068	75p	BFW41	15p	BU806DF1	£1.00	BYT71-800	15p	HA1196	50p	MN650	£1.00
2SD480	30p	BT Phone Batterys	£1	BU824	50p	BYV19-30	15p	HA11485ANT	£1.50	S13522V	£1.00
2SD1264	50p	BU105/04	80p	BU826	£1.00	BYV28-200	15p	HA1180-INT	£1.50	SAA1061	£3.00
2SD1266	£1.00	BU108	£1.00	BUK444/800	£2.00	BYV95B	10p	HAS13385PI	£2.00	SAA3018	£1.00
2SD1398	£1.00	BU124	50p	BUK445/600	£2.00	BYV95C	12p	HAS13385P3	£2.00	SAA5010	£2.00
2SD1415	£1.00	BU126	80p	BUK454/600	£1.00	BYV96D	10p	HCF4520	50p	SAA5231	
2SD1427	£1.00	BU180A	65p	BUT11	50p	BYW20-08-9	£1.00	HCF4520BE	50p	(TEXT)	£2.00

No accounts — No Credit Cards

SENDZ COMPONENTS

63 BISHOPSTEIGNTON, SHOEBURYNESS, ESSEX SS3 8AF.

Tel: 01702 338894 Fax: 01702 338805

Specific P/P charges are PER ITEM • For UK addresses add P/P to order then 17.5% VAT to total. This applies to EC unless VAT No. is given • Exports – P/P at cost • Postal Order/Cheque with order. Unless otherwise specified add £1.70 P/P to SMALL ORDERS + Additional P/P for HEAVIER GOODS. Technical information by telephone only • Government/School Orders on official headings.

Callers to shop – 212 London Road, Southend-on-Sea
Open Saturday Only 10-12noon – 2-5pm.

PLEASE ADD 17.5% VAT TO BOTH THE GOODS TOTAL AND P/P CHARGE

CAMPION WHOLESALE LTD.

UK's Largest Electrical Wholesaler

For Both the UK and Export

NEW

Ex-Rental and Graded
TV's, Videos, Satellite,
Hi-Fi Equipment and White Goods

FREE Delivery Service to most areas of the UK

World-Wide Export Service

Experts in UHF / VHF Conversion

TEL: 01299 879642 FAX: 01299 827984

CALL TODAY FOR A BROCHURE OR COME AND SEE OUR LARGE WAREHOUSE

Unit 75 Barracks Rd, Sandy Lane Ind. Est. Stourport, Worcestershire DY13 9QB

Just 10 minutes from M5 Junction 6 - Worcester North

TV's From £5.00

Video's From £5.00

Satellite's From £5.00

TV / Video Stands From £1.50

Major Credit Cards Accepted

MARKET TRADERS WHOLESALERS WELCOME

VISION TECH

EXPORT CATERED FOR: AFRICA, EAST EUROPE, MIDDLE EAST ETC.

Wholesalers, Distributors and Export Agents of Electronic Domestic Appliances

Tel: (+44) 121 554 8282
Fax: (+44) 121 554 2121
49 Harford Street, Hockley, Birmingham B19 3EB

ONE STOP CASH 'N' CARRY

Discounts Always Available on Quantity

All we ask is for one visit. We promise you will not be disappointed with our quality and prices.

***PLEASE RING FOR LATEST OFFERS.* 0121 554 8282**

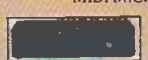
TELEVISIONS


ALL TOP BRANDS/SIZES - SONY - HITACHI - TOSHIBA - BEKO - WHARFEDALE - AMSTRAD - PANASONIC - SANYO - ETC

HI-FI


MIDI MICRO SEPARATES - ALL BRANDS

DVD/VIDEO




REGION 1 - MULTI-REGION

SMALL AUDIO


PERSONAL CD - MINI DISC - RADIO/CASS - SINGLE/TWIN/MONO. CD. RADIOS. WALKMAN - CLOCKS ETC

LARGE/SMALL DOMESTIC


MICROWAVES - HOOVERS - KETTLES - IRONS - TOASTERS

VAST RANGE OF OTHER PRODUCTS TOO MUCH TO LIST

DARTEL ELECTRONICS

8 Heather Park Drive, Alperton
Wembley, Middlesex HA0 1SL

Tel: 020-8795-1735

High quality graded stock from manufacturers

VCR's,
Televisions, Hi-Fi's,
Car Stereos, etc

All popular brands boxed with warranty

Tel for details

Visit by appointment

WILTSGROVE LTD

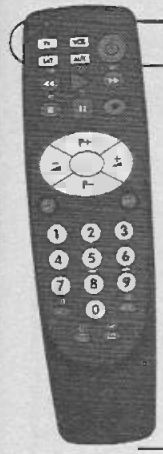
ELECTRONIC COMPONENTS & SPARES DISTRIBUTORS

35-38 River Street, Digbeth, Birmingham B5 5SB

Tel: 0121 772 2733
Fax: 0121 766 6100

email: sales@wiltsgrove.co.uk
http://www.wiltsgrove.co.uk

UNIVERSAL REMOTE CONTROLS



8-WAY UNIVERSAL

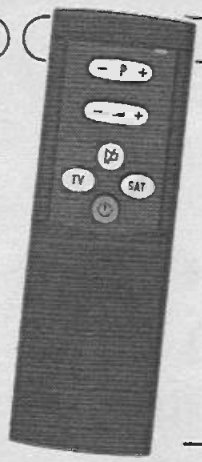
- 8 Way Pre-Programmed Remote control
- Will operate normal and Fastext
- Can operate TV, VCR's, Sat, Aux.

Order Code: URM-380

Our Price:

1+ £6.75

10+ £5.75



2-WAY UNIVERSAL

- 2 Way Pre-Programmed BASIC Remote control
- Can operate TV & Sat.

Order Code: URM-850

Our Price:

1+ £5.75

10+ £4.95

Following Range of Products in Stock

Audio/ Vjdeo accessories	Computer accessories	Service Aids
Aerials & accessories	Fuses	Service Manuals
Batteries	IC's	Soldering equipment & accessories
Books	Lighting accessories	Switches
Cable	LOPT's	Tools
Capacitors	Microwave Spares	Transistors
CCTV/Security equipment	Remote Controls	TV/VCR Spares
CD/DVD Laser's	Resistors	Vacuum Bags & Spares
	Satellite spares	

Following Brand Spares Available

AIWA	NEI
AKAI	NOKIA
ALBA/BUSH	ORION
ALTAI	PANASONIC
AMSTRAD	PHILEX
ANTEX	PHILIPS
ANTIFERENCE	PYE
CLASSIC	SALORA
CROWN	SAMSUNG
DAEWOO	SANYO
GOODMANS	SHARP
GRUNDIG	SONY
HITACHI	TATUNG
HR	TECHNICS
KONIG	THOMSON
JVC	THORN
LG	TOSHIBA
MATSUI	UNIROSS
MITSUBISHI	WHARFEDALE

Call Us Now!!! on 0121 772 2733

Trade ElectroniX
0121 773 3300
WWW.Trade Electronix.Co.Uk

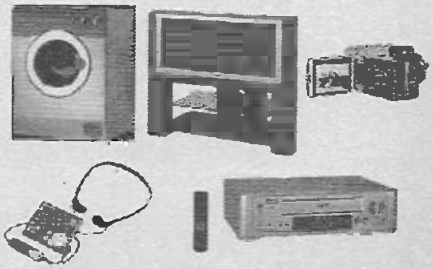
NOW OPEN!!!!! In Birmingham

Trade ElectroniX
Fax 0121 773 2300
WWW.Trade Electronix.Co.Uk

MARKET TRADERS - CARBOOTS SALES - RETAILERS

NEW CONTRACTs
EX- CATOLOGUE
STOCK AVAILABLE IN PALLETS
HARDWARE & ELECTRICAL GOODS
MORPHY RICHARDS
STOCK IN LARGE QUANTITY.

30/34 River Street
Digbeth,B'ham
B5-5SB UK



All Goods are subject to Vat,carriage & availability Prices subject to change without prior notice

HITACHI - SONY - PHILIPS - TOSHIBA - WHARFEDALE - MINATO - SHARP
TV's VCR's ,HiFii , DVD, SMALL APPLICIANCES IN STOCK

Electronicworld TV AND VIDEO LTD

Top Quality Flat Screen Branded Stock

TRUE FLAT SCREEN TV's
Massive Savings!


14" R/C Portable £35

14" Fastext Portable £45
20" R/C TV £40

21" Fastext TV £50

28" Fastext Nicam (boxed) £95
28" Widescreen Nicam £125

32" Widescreen Nicam £225
DVD Players from £60

VCR's from £30
Hi-Fi's from £25

THIS IS JUST A SMALL SELECTION OF OUR MANY MODELS AVAILABLE

All Prices are Exclusive of VAT

BUY FROM US AND SAVE A FORTUNE

CONTINUING CLEARANCE OFFERS

BRAND NEW STOCK AVAILABLE

NEW STOCK ARRIVING DAILY (500 TV's)

BIRMINGHAM 208 Bromford Lane, Erdington, Birmingham B24 8DL **0121 327 3273** Fax: **0121 322 2011**
LONDON 221 Kenton Road, Harrow, Middlesex HA3 0HD 020 8907 9387
PRESTON Unit 434 Ranglet Road, Walton Summit, Preston PR5 8AR **01772 316066**
ERDINGTON 0121 328 0623 – **SMALL HEATH** 0121 772 5507 – **ACOCKS GREEN** 0121 706 3075

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

TUBES

WIDESCREEN

at a price worth fitting

28" Panasonic W66EHK....
28" LG W66QBD....
28" Videocolour W66EHU....
28" Videocolour W66EJU....
28" Videocolour W66EGV....
32" Videocolour W76EDX....

Ring Irene for prices

EXPRESS TV
The Mill, Mill Lane,
Rugeley, Staffs WS15 2JW
Tel: 01889 577600 Fax: 01889 575600

Pandora's drums

Unique and atmospheric music recorded in the early 1900s – the days *before* 78s.

21 tracks – 72 minutes of recordings made between 1900 and 1929. These electronically derived reproductions are no worse than – and in many cases better than – reproductions of early 78rev/min recordings – some are stunning...

ONLY £11.99

All tracks on this CD were recorded on DAT from cylinders produced in the early 1900s. Considering the age of the cylinders, and the recording techniques available at the time, these tracks are of remarkable quality, having been carefully replayed using modern electronic technology by historian Joe Pengelly.

Use this coupon to order your copy of Pandora's drums

Please send me ..... CD(s) at £11.99 each for which I enclose:

Cheque ❑

Credit card details ❑ tick as appropriate

Name

Address

Phone number

Total amount £.....

Make cheques payable to Cumulus Business Media
Or, please debit my credit card.

Card type (Master/Visa)
Card No
Expiry date

Please mail this coupon to *Television*, together with payment. Address orders and all correspondence relating to this order to Television, Cumulus Business Media, Anne Boleyn House, 9-13 Ewell Road, Cheam, Surrey, SM3 8BZ

Track

1 Washington Post March, Band, 1909
2 Good Old Summertime, The American Quartet 1904
3 Marriage Bells, Bells & xylophone duet, Burckhardt & Daab with orchestra, 1913
4. The Volunteer Organist, Peter Dawson, 1913
5. Dialogue For Three, Flute, Oboe and Clarinet, 1913
6. The Toymaker's Dream, Foxtrot, vocal, B.A. Rolfe and his orchestra, 1929
7 As I Sat Upon My Dear Old Mother's Knee, Will Oakland, 1913
8 Light As A Feather, Bells solo, Charles Daab with orchestra, 1912
9 On Her Pic-Pic-Piccolo, Billy Williams, 1913
10 Polka Des English's, Artist unknown, 1900
11 Somebody's Coming To My House, Walter Van Brunt, 1913
12 Bonny Scotland Medley, Xylophone solo, Charles Daab with orchestra, 1914
13 Doin' the Raccoon, Billy Murray, 1929
14 Luce Mia, Francesco Daddi, 1913
15 The Olio Minstrel, 2nd part, 1913
16 Peg O' My Heart, Walter Van Brunt, 1913
17 Auf Dem Mississippi, Johann Strauss orchestra, 1913
18 I'm Looking For A Sweetheart And I Think You'll Do, Ada Jones & Billy Murray, 1913
19 Intermezzo, Violin solo, Stroud Haxton, 1910
20 A Juanita, Abrego and Picazo, 1913
21 All Alone, Ada Jones, 1911

Total playing time 72.09

21 tracks – 72 minutes of music.
Published by *Electronics World*. All recordings reproduced by Joe Pengelly.

SERVICE DATA

SERVICES

MISCELLANEOUS

RECRUITMENT

BENCH ENGINEER WITH DESIRE TO BROADEN HORIZONS

Required by **Inflight Productions**, a leading supplier of entertainment to airlines.

This is a new position, driven by a need to expand our in-house capability. You will be experienced in the repair of domestic video and TV to component level, and able to apply this to our VHS and Video 8 duplicators and broadcast monitors. You will be self-motivated, and capable of running your own workshop, although bench repair will only occupy part of your time.

We run a professional audio and video production facility operating in a wide range of formats. You will assist our chief engineer in the maintenance of this equipment, and aid in preparation of cabling for new installations. This is an opportunity to expand your experience into the broadcast environment, and will provide a variety of challenges. A flexible attitude to work is essential.

Inflight is an expanding, lively and friendly company with a comfortable working environment. Salary negotiable according to experience.

Applications should be made in writing enclosing a CV to: Tony Taverner, Inflight Studios, 15 Stukeley Street, London WC2B 5LT.

Very experienced

BENCH ENGINEER

for busy repair centre based in Illford, Essex.

Good salary
friendly work place
Monday-Friday

020 8924 0303
0771 858 3385

LINEAGE

EX RENTAL T/V Slot Meter's £100 action £65 inc Vat P/P. For 10. Tel: 01200 429056.

PRIVATE RETAILER has excellent part exchange colour televisions and videos to clear. Tel: 01494 814317.

MANUALS

SERVICE MANUALS

Have you ever turned away work for want of a Service Manual?
Have you ever bought a Service Manual and never used it more than once?
Then why not join ...

THE MANUALS LIBRARY

For details and membership application form write, phone or fax:

HARVEY ELECTRONICS
43 Loop Road, Beachley, Chepstow, Mons, NP16 7HE
Tel: 01291 623086 Fax: 01291 628786

Visa: Mastercard accepted

FOR SALE

A - B GRADED STOCK
Chromavision - S-O-T
Tel/Fax:
01782 848153/744105

28" Nicam Whardale.....£95
28" Widescreen Nicam....£140
21" F/text, silver twin, speakers.....£59.89
VCR Nicam, 6 heads, silver £55
VCR's from.....£40
DVD Multiregion.....£79.99
Ex-rentals from.....£25.00

ALL WORKING STOCK

FOR SALE
ELECTRICAL BUSINESS

with substantial freehold premises. Prime location in North London. Enormous potential for enlarging an already lucrative business. Genuine sale brought about by ill health.

£128,000 (negotiable)

Contact J. Pryce on 077698 00209

in Store ELECTRICS LIMITED
1043 Leeds Road
BRADFORD BD3 7DB
Tel: 01274 665570/660196
Fax: 01274 665246
E-Mail: tradesales@instorelec.fsnet.co.uk

MANUFACTURERS NEW GRADED STOCK
MINT IN ORIGINAL PACKING
EVERYTHING FULLY GUARANTEED

COMBI TVCR from	£99
14" PORTABLES SCART	£59
WIDESCREEN TV from	£185
ON DIGITAL WIDESCREEN	£375
SVHS VCR	£195
MICROWAVE OVENS	£34
DVD MULTI REGION	£120

Audio • DVD • CDR • Cameras • Fax • MWO
CREDIT CARDS WELCOME = 48 HR DELIVERY

MISCELLANEOUS

NEED HELP NOW?

Then ring the
★ ELECTRON TECHNICAL HELPLINE ★
Genuine help available to all repairers of
T.V. - V.C.R. - SAT - AUDIO (Inc Valves) - MICROWAVE - MONITOR AND MOST ELECTRONIC EQUIP
Over 30 years experience and vast data base

0906 470 1706
Calls cost 60p per minute

Hours of Business Mon to Fri
9.00 am-12.30 pm : 2.15 pm-5.30 pm
Sat Morn 9 am-12 noon
ELECTRON G.T.
9 CHAPEL ST, DONISTHORPE, SWADLINCOTE, DERBYSHIRE DE12 7PS

REPAIRS

accént

TECHNIC

CAMCORDER REPAIRS

Collection and delivery anywhere in the UK.
All makes, fast service.
Phone free for details.

Fax: 01905 796385
(0800) 281009

WANTED

WANTED

by established dealer.

A supply of Ex-Rental or previously-owned Televisions and Videos, working or not.

We will pay cash and collect any amount from any location.

Please contact Albert on:
Derby 01332 367215 or 07949 853399

FOR SALE

DIRECT TV'S AND VIDEOS

All stock untouched.
We have no shop and no TV engineers.

- Videos £8, £9 and £10 each
- Colour portables £9, £10 and £11 each
- 21" TV's £10.00
- 25" TV's £12 and £14 each
- 27" TV's £16.00
- 29" TV's £18, £20 and £22 each

Larger screens subject to availability

Tel: 01269 831880

BEST CASH PRICES PAID

For ALL valves especially KT88, PX4 and other audio types

Tel: 01403 784961

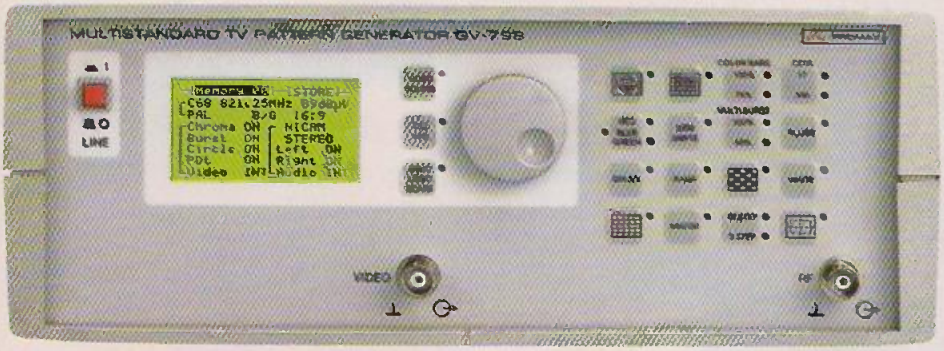
Minimum UK order £50+VAT+ Freight

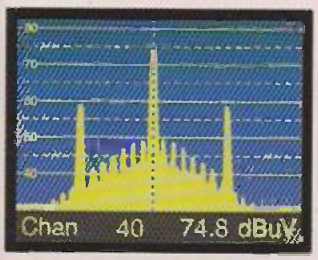
Billington Export Ltd
Sussex RH14 9EZ
Fax 01403 783519
Email: sales@bel-tubes.co.uk
Visitors by appointment

For further details on advertising please contact Pat Bunce 020 8722 6028

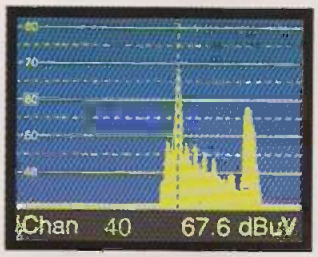
PROMAX

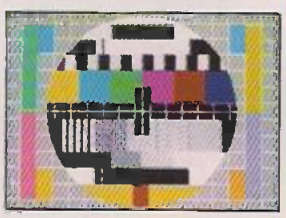
TELEVISION TEST PATTERN GENERATORS





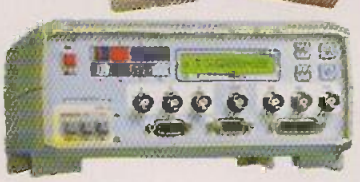
The new pattern generators GV 798 and GV 898 offer advanced features at realistic prices. They produce 16:9 and 4:3 formats, output level set in 1 dB steps, multistandard, VITS, WSS, VPS, PDC, Teletext and much more. GV 898 uses vestigal side band modulation.





PROMAX GV SERIES

- Choice of 12 instruments
- NICAM and Teletext
- 4:3 and 16:9 Formats
- Full field and VITS
- Computer Controlled
- Front panel memories
- Multi Standard, PAL, NTSC, SECAM
- Own Company Logo
- Computer Monitor testers
- Hand Held Models
- High Quality Construction
- Attractive Price Levels
- Full After Sales Service
- Available from Stock



FOR TELEVISION PATTERN GENERATORS, THERE'S NO WIDER CHOICE THAN WITH PROMAX

PROMAX

SELECTED ITEMS FROM THE PROMAX RANGE OF TEST EQUIPMENT

MS 250

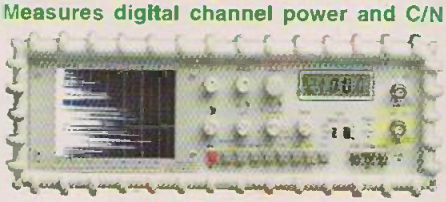
Analogue and Digital Satellite Detector.

PRODIG 1

Satellite Dish Installer's Meter
Does more than just BSkyB

PRODIG 2

Analogue & Digital Aerial Meter
Measures digital channel power and C/N



MC 377+

Analogue & Digital, Satellite & Terrestrial
Measures channel power and C/N

PROLINK 3 SERIES

Satellite & Terrestrial, Analogue & Digital,
Spectrum Analyser with Optional BER

Alban

ALBAN ELECTRONICS LIMITED

THE PROMAX SERVICE CENTRE

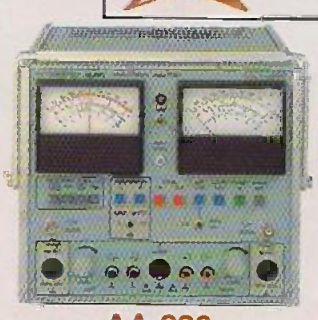
6 Caxton Centre, Porters Wood,
St. Albans, Hertfordshire, AL3 6XT.

TEL : 01727 832266
FAX : 01727 810546

EMAIL : albanelectronics@cs.com

SALES + SERVICE + CALIBRATION

PROMAX



AA-930
Audio Analyser

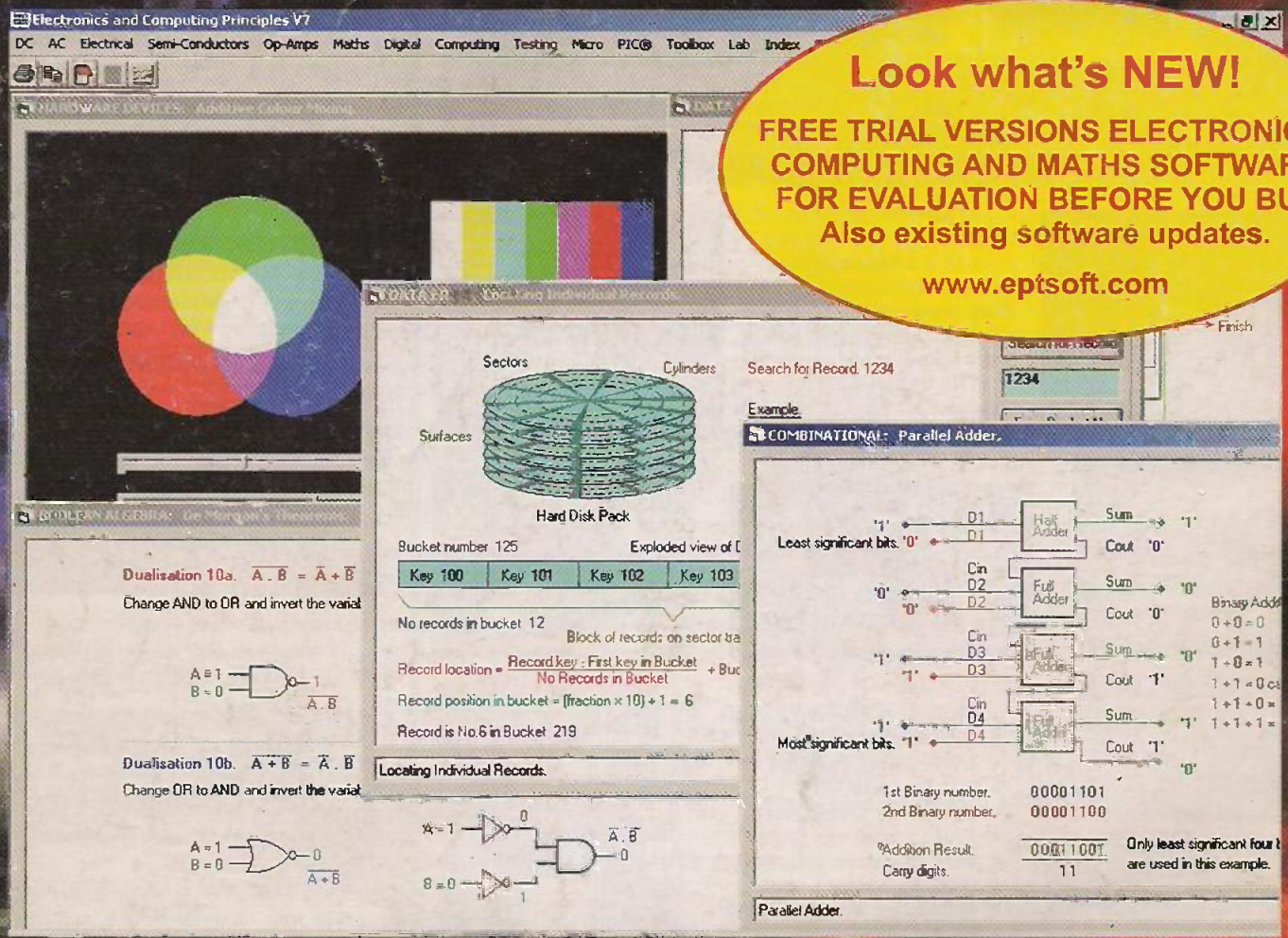
TA-901
CRT Rejuvenator

TA-903B CRT Rejuvenator

'Electronics and Computing Principles V7'

'95, '98, NT or 2000

Looking for a change of direction and need a quick refresher or skills update, then this is the software for you!



Visit www.eptsoft.com or telephone for full details, including a description by Robert Penfold.

Electronics:-
Atomic Structures, DC Current flow, Basic Electronics, Simple DC Circuits, Types of Switching, Variable Voltages, Ohm's Law, DC Voltage, DC Current, Series/Parallel Resistors, AC Measurements, AC Voltage and Current, AC Theory, RCL Series/Parallel Circuits, Capacitance, Capacitors, Inductance, Inductors, Impedance, Communication System, Signals, Attenuators, Passive/Active Filters, Tuned Circuits, Coupling and Selectivity, Oscillators, Circuit Theorems, Diode Theory, Diode Applications, Transistor Theory, Bipolar Transistor, Transistor Configurations, Transistor Circuits, Field Effect Transistors, Operational Amplifier Theory and Applications, Sum and Difference Amplifiers.

Electrical:-
DC and AC Power, SCR, Power Supplies, Voltage Regulators, Magnetism, Motors/Generators, Transformers, Three Phase Systems.

Digital Techniques:-
Logic Gates, Flip Flops, Combinational Logic, Counters, Counting, Shift Registers, Logic Interfacing, Timers, Boolean Algebra and DeMorgan's Theorems.

Microprocessors and PIC Microcontrollers:-
Basic Micro-Computer, Busses, A.L.U, Clock and Reset, Instructions and Control, Memory Cells, ROM and RAM, Memory Addressing, Instructions, PIC Introduction, PIC16F84 Architecture, PIC16C71 A/D, Byte, Bit, Literal and Control Instructions.

Personal user £99.95 +VAT
Education* £299.95 +VAT
(*Includes unlimited multi-user site licence.)

Measurement and Component Testing:-
Analogue multi-meter, Measurement, Component Testing.

Mathematics:-
Simple Numbers, Number Types, Roots, Triangle Ratio's, Triangle Angles, Area, Surface Area and Symmetry, Volume, Percentages, Ratio's, Fractions, Vectors, Circle Angles, Laws, Algebra Rules, Powers, Simplifying, Equations, Graphing, Slope and Transposing, Angles, Complex Numbers, Statistics, Lottery Number Prediction, Physical Science.

Computing:-
Hardware Devices, Data Structures, Data Files, Binary Numbers, Binary Arithmetic.

Toolbox:-
DC Calculations, AC Calculations, Numbers, Applications.

V7 can now be found in many of the COMPUTER MAINTENANCE training schools.

eptsoft limited. Pump House, Lockram Lane, Witham, Essex. UK. CM8 2BJ.
Tel: +44 (0)1376 514008. Fax: +44 (0)870 0509660. Email: info@eptsoft.com.

Switch, Delta, Visa and MasterCard accepted.
No additional postage or airmail charges.