

THE LEADING UK CONSUMER ELECTRONICS TECHNOLOGY MAGAZINE

TELEVISION

SERVICING·VIDEO·SATELLITE·DEVELOPMENTS

NOVEMBER 1997 £2.50

A REED BUSINESS PUBLICATION

**Consumer Electronics
at the Berlin Show**

**Digital TV
Receivers**

DiSEqC Explained

**Hot Bird 3
Launch**

**Toshiba
Service
Briefs**

**Adding a CCTV
Sound Channel**



Fault Reports *TVs, VCRs, Camcorders and Satellite*

Win with Philex

Win £1,000 worth of Holiday Vouchers by entering this simple competition.

Fancy a European break or somewhere further afield? For your chance to go somewhere special with Philex, please read on.

All you have to do is enter below the 5 most popular original remotes you provide to your customers every day.

Then complete the tie-break sentence in no more than 12 words. If your 5 most popular remotes and tie-break answer match our panel's decision, you could be a winner. Final date for entries is 31 December 1997. Post, fax, or e-mail your answer to: Philex Remote Competition, at the address shown below. Good luck!

Make Model No. No.sold weekly

- 1.
- 2.
- 3.
- 4.
- 5.

Please complete the following sentence in no more than 12 words.

I use Philex replacement remote controls because.....

.....

.....

.....

Are you? 1. A Service Engineer
 2. A Distributor 3. An End User

Name.....

Position.....

Company.....

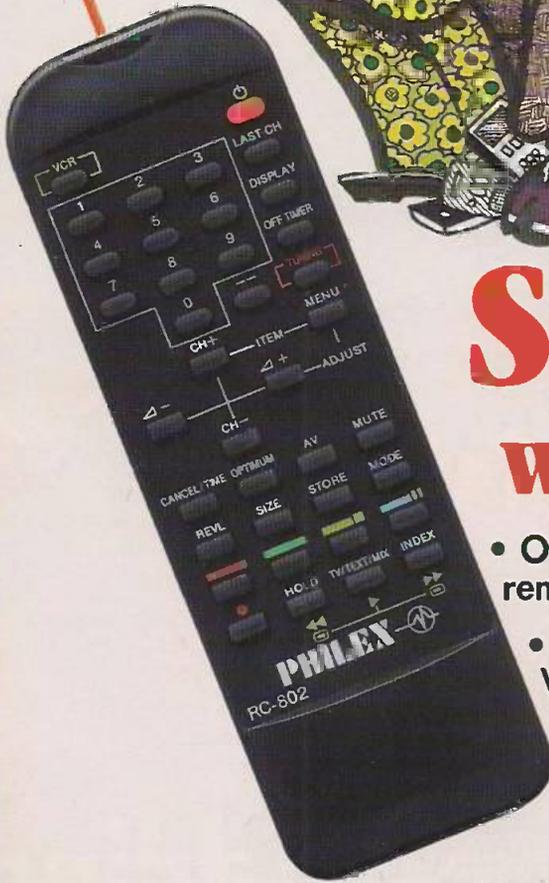
Address.....

Post Code.....

Daytime Tel:.....

Rules: 1. Only one prize will be awarded to value in Vouchers of £1,000. 2. The judges decision will be final. 3. No correspondence will be entered into. 4. A full list of the rules is available on request to Philex. 5. Winners name will be published upon request. 6. Winner may be required to help with future promotional material. 7. The winner will be notified by post by 30 April 1998. 8. Only one entry per person. 9. The 5 remotes must not be part of the present replacement Philex range.

Problem



Solving with Philex

- Over 200 superb replacement remotes available
- Over 7000 original TV & VCR models covered
- Stylish ergonomic design
- Robust and user friendly
- Made to our strict levels of quality control

For over 14 years Philex has been at the forefront of providing high quality replacement remote controls for TV, VCR, and satellites. Our complete range offers solutions for nearly all your remote problems. Our latest catalogue has a comprehensive model cross reference and clear, detailed line drawings of all the remotes in our range. For further information, why not call the number below?



Philex. Committed to your success.

0181 202 1919

PHILEX PLC, 110-124 THE BROADWAY,
 WEST HENDON, LONDON NW9 7PP
 FAX: +44 (0) 181 202 0015
 web site <http://www.philex.com>
 email: sales@philex.com

CONTENTS

November 1997

Vol. 48, No. 1

Viewing Figures 3

Teletopics 6

Microsoft's internet TV system, some interesting new TV chips from Philips and other news.

Introduction to Digital TV 8

This time the interesting bit: what will be inside a digital TV receiver. Also dish and aerial requirements. By J. LeJeune.



Launch of Hot Bird 3 12

Eutelsat's Hot Bird 3 satellite will make a significant addition to the transmission facilities available at 13°E. Peter Brough was present at the launch.

Camcorner 14

Camcorder servicing hints and fault reports.

Consumer Electronics at IFA '97 16

Some important developments were presented at this year's Berlin Show. In particular there was the announcement of the official European launch of the DVD system. George Cole reports.



Satellite Workshop 22

Jack Armstrong's column on satellite receiver servicing.

Test Case 419 23

Toshiba Service Briefs 24

The latest servicing know-how from Toshiba Technical.

Digital Head-end Cable Receivers 26

Here's a start for digital TV experimentation: satellite cable TV head-end receivers are now becoming available on the second-hand market. They can be difficult to tame however, as Hugh Allison reports.

DiSEqC Explained 28

K. Rutherford on the origin on Eutelsat's digital satellite equipment control system and its technical details.

TV Fault Finding 30

Monitor Faults 34

Tips on computer monitor servicing.

Help Wanted 47

What a Life! 48

Donald Bullock does a stint on the home patch in rustic Gloucestershire. As usual, this entails problems with equipment – and people.

Satellite Notebook 50

Problems with satellite equipment and installations.

Letters 52

Adding a CCTV Sound Channel 54

The Bull Electrical CCTV colour camera provides excellent pictures for a very modest outlay but lacks a sound channel. Eugene Trundle decided to see what could be done about this. His solution is based on a kit available from Maplin.



Photograph Mark Swallow

Long-distance Television 58

Terrestrial DX and satellite TV reception, news from abroad and a bit of history – the German TV service in Paris during World War II and how it was received at Beachy Head. Roger Bunney reports.

VCR Clinic 62

Next Month in Television 65

Editor

John A. Reddihough

Production Editor

Tessa Winford

Consultant Editor

Martin Eccles

Publishing Director

Susan Downey

Advertisement Manager

Carol Nobbs
0181-652 8330

Advertisement Sales Executive

Pat Bunce
0181-652 8339
Fax 0181-652 8931

Editorial Office

0181-652 8120
Fax 0181-652 8956

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.

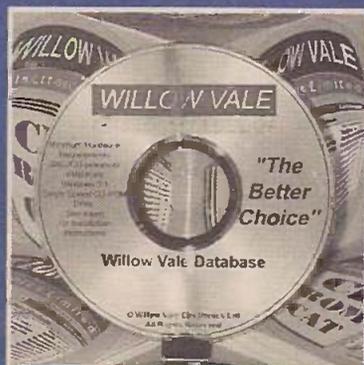
A WORLD OF SPARES

CD-Rom Revolution

The updated CD-Rom catalogue now contains even more information

587,000 Descriptions
351,000 Part Numbers
300,000 Products
3,000 Pictures

Now with interactive COPLINK giving up to the minute information and availability.



TECHLINE is always available. Should you require any technical help or advice on 0891 615915. (*all calls charged at premium rate).

DE-ZINE-LINE, Willow Vale's FREE planning service designing your professional sound and communication system. Phone or Fax Gerry Bevan on 01635 254218.

C.O.P.S. computer ordering parts system via our 'viewdata' based order/enquiry system.

Call Willow Vale
0118 987 6444

Fax Willow Vale
0118 986 7188

Authorised Spares and Accessories Distributors for:

- Sharp
- Philips
- JVC
- Grundig
- Tatung
- Pace
- Nokia
- Matsui
- Ferguson
- Saisho

Genuine manufacturers' parts available for many other premium brands.

Sound and Security Division Distributors for:

- Adastra
- Altai
- Aiphone
- Audio Technica
- Audix
- Baldwin-Boxall
- Bose
- Computar
- Domineye
- Eagle
- ERL
- Goodmans
- Inkel
- Jamo
- Millbank
- Next Two
- Philips
- Secure Care
- Shure
- TOA
- Trantec
- Univox

WILLOW VALE
ELECTRONICS LIMITED

'The Better Choice'

READING HEAD OFFICE
Tel: 0118 986 0158
Fax: 0118 986 7188

MANCHESTER BRANCH
Tel: 0161 682 1415
Fax: 0161 682 9031

Viewing Figures

The ITV companies seem to be getting worried. Over the past four years, their share of the TV audience has fallen from 38 to 33 per cent. With increasing competition from satellite and cable channels, and the advent of Channel 5, what else would you expect? The BBC has also been doing well. But the all important thing, so far as ITV company heads are concerned, is advertisement revenue. Obviously this decreases with a falling share of the audience, but it remains the main source of funds for the ITV companies. From a totally independent viewpoint, one might suggest that the ITV network is not doing too badly to account for a third of viewing time. Nevertheless warning bells are ringing, and the pay of the network's senior directors is to be linked to the ratings achieved by Channel 3. A new schedule strategy is promised for next year.

Figures released by the broadcasting research organisation BARB show that during its first twenty five weeks of broadcasting Channel 5 achieved a 3.3 per cent share of the TV audience. This is more or less as expected. Channel 5 says that eighty per cent of UK households can now receive its service, though new aerials may be needed by some viewers. Channel 5 also claims to have a younger audience – it claims a 33 per cent 'profile' compared with 24 per cent for ITV and 28 per cent for Channel 4.

Astra has recently released mid-year figures on its market penetration in the UK and Ireland. The company says that of the total number of some 24.8 million TV households, 73.3 per cent rely on terrestrial transmissions, just over 17 per cent receive satellite transmissions and

just under 10 per cent get their TV via a cable network. The vast majority of Astra viewers receive their signals via a dish. In the UK alone, almost 75 per cent of viewers rely on terrestrial transmissions, 17.4 per cent (4.12m) can receive satellite transmissions via a dish or SMATV system and almost eight per cent are connected to a cable system. In the UK and Ireland as a whole, 1.32 million households have replaced all or part of their satellite reception equipment since the original date of purchase. 74.4 per cent of those who use a dish or SMATV system can receive the Astra 1D transmissions.

The latest figures on UK cable-served households, released by the ITC, show that of nearly ten million premises that are passed by a cable over 2,158,000 are linked to it, a connection rate of 21.9 per cent. It's interesting that despite a continuous increase in the number of homes passed by cable the connection rate has remained in the 21.5-22 per cent range in recent months. Cable is making some progress, but seems to have reached a connection saturation level in the UK.

What is of overwhelming interest is what happens next, when all those digital multiplexes start to churn out TV channels and the number of satellite TV channels is vastly increased. It's doubtful whether this will result in any fortunes being made. The fact is that there are only so many hours in the day, and only so much time can be spent watching the box, whatever the programming or the video source. Research has shown that the number of hours that people spend watching TV/video have not increased in recent years. There has in fact been a slight decrease. There is no reason to

believe that a plethora of channels will make much difference. So more channels will simply mean smaller audiences. There is no solution to the concern of those at ITV: schedule strategies can help broadcasters compete, but in the end it's the finances available to buy in film rights and sports coverage and pay for popular programming that counts. More is going to have to be spent simply to maintain audience share.

Meanwhile the steering committee of the European Digital Video Broadcasting consortium, which has over two hundred members including broadcasters, manufacturers and regulatory organisations, has agreed to co-operate on the development of a set of standards for the next generation of TV set-top boxes. These will bring digital TV to the home and also interactive services including the internet. The idea is to enable a single box to be used for the many types of service that are shortly to become available. The computer industry is represented by IBM, Intel, Microsoft and Motorola. Access to interactive services, including software downloading and the internet, will be via an 'application programming interface': this is the common operating system to be developed.

Back Issues

Because of a production problem we have been unable to include our usual Back Numbers box this month. Back issues for all of 1996-7 and most of 1994-5 continue to be available at £3 each inclusive of post/packing from the address shown below in the correspondence section. For further details see page 863 last month.

COPYRIGHT

© Reed Business Information Ltd., 1997. All rights reserved. No part of this publication may be reproduced, stored or transmitted in any form or by any means without the written permission of the publishers.

All reasonable precautions are taken by *Television* to ensure that the advice and data published are reliable. We cannot however guarantee it and we cannot accept legal responsibility for it.

CORRESPONDENCE

All correspondence regarding advertisements should be addressed to the Advertisement Manager, "Television", Reed Business Information, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Editorial correspondence should be addressed to "Television", Editorial Department, Reed Business Information, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

INDEXES AND BINDERS

Indexes for Vols. 38 to 46 are available at £3.50 each from SoftCopy Ltd., who can also supply an eight-year consolidated index on computer disc. For further details see page 65

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. See last month's issue for ordering details.

SUBSCRIPTION ENQUIRIES

Telephone: 01444 445 566
Fax: 01444 445 447
Credit card orders: 01622 778 000
Address: Television, Subscriptions Dept, PO Box 302, Haywards Heath, West Sussex RH16 3YY, UK.
Make cheques payable to: Television
Subscription rates:
UK £30.00 per year
Airmail Eire £34.00 per year
Airmail Europe £43.00 per year
Airmail Rest of World £56.00 per year

NEWSTRADE ENQUIRIES

Distributed by MarketForce
Telephone: 0171 261 7704

WEB SITE

For a full list of RBI magazine's:
<http://www.reedbusiness.com>

ISSN 0032-647X



REED
BUSINESS
INFORMATION

YOU!!



NEED ECONOMIC

10000

Thousands of semiconductors I.C's etc. of video parts, heads, belt kits etc. of remote controls. etc. etc. over 100,000 database records to help find the difficult video parts quickly. Stock availability & price in seconds

We compete on **QUALITY** - We compete on **SERVICE**
We will not compromise and yet our prices are often less.

.....and look at the special offers..... (strictly while stocks last)

REGBABY10 each £13.00	TEA2018A X 5 £5.75	STK5481 X 2 £10.00
BU208A X 5 £3.75	BUT11AF X 5 £2.75	STR50103 X 2 £5.90
BU508A X 5 \$4.15	BUT11A X 5 £1.75	S2000AF X 5 £5.25
BU508AF X 5 £3.50	CNX62A X 5 £3.00	TDA3653B X 2 £1.80
BU508D X 5 \$4.45	UC3842 X 5 £2.95	TDA3654 X 2 £1.80

Philips type 1.2 volt Back up battery X 5 \$4.50	
Philips type 2.4 volt Back up battery X 5 \$8.75	
Scart - Scart lead 1.5m Fully wired X 2 £2.90	
Standard video sensor lamp X10 £2.50	
Std video sensor lamp + plug X10 \$4.00	
3V29 etc. Belt kit X 5 \$4.50	
3V35/36 etc. Belt kit X 5 \$4.25	
VT11E etc. Belt kit X 5 \$5.50	
Positor PT37, TH98009 (White) X 5 \$4.75	
Thorn TX100 Green spot LOPTX each £12.95	

(please add £1.00 handling all + VAT)

.....and now ask
for a full price list.

Satellite division Satellite division Satellite

PSU repair - refurb kits

Over 120,000 kits sold

KIT1 \$6.95 Pace - PRD600, PRD900, PSR600, PSR900, Ferguson SRD5, SRD16, Grundig STR1, Maspro SRE250S/1, 350S/1, Philips STU802/05M, Manhattan 850, 950 Goodmans ST700, Toshiba TU-SD200, SAT98	
KIT2 \$8.95 Pace - SS900, 9200, 9210, MRD920, Ferguson SRV1, Grundig GIRD2000, 3000, Philips STU801, Network 900, 9200, Bush IRD150, Nokia SAT1500, Maspro SRE250S, 350S, 450S, Alba SAT6600, Pritel SR5700, Thompson SR54	
KIT3 \$6.95 Amstrad - SR510, 520, 540, SRDR45, SRD550	KIT4 \$6.95 Amstrad SRD 500
KIT5 \$6.95 Amstrad SRX320, 340 etc (export models)	KIT6 \$6.95 Pace D100, 120
KIT7 \$6.95 Churchill D2MAC decoder	KIT8 \$5.95 Pace MSS100
KIT9 \$9.45 Pace MSS200, 300, Apollo	KIT10 \$19.11 Pace MSS500, 1000
KIT11 \$5.95 Ferguson SRD4	KIT12 \$16.45 EchoStar SR5500 (early PSU with adjuster)
KIT13 \$29.71 EchoStar SR6500, 7700, 8700	KIT14 \$23.95 Amstrad SRD600
KIT15 \$7.96 Minster (Sorenson PSU type only)	
KIT16 \$5.95 Amstrad SRD700, SR950, SRX100, 301, 501, 1002, 2001, SRD2000, SAT250	

Please add £1 handling all + VAT

Satellite division Satellite division
"The Satellite Repair Manual"

You could say that what Martin Pickering doesn't know about satellite receivers isn't worth knowing. What he does know has become legendary. Having been at it since the start of consumer satellite TV, he has built up a massive data base on satellite receivers. Not only on their faults, common and less common but also on modifications and upgrades. Martin brings in-depth expertise to the subject, having previously been involved with equipment reliability testing and component specification. This book has become established as a bible for satellite TV repair. But the subject doesn't stand still. New models, new faults - there is always something to add. So here we have the fourth edition, which has been completely updated and now has 240 pages - the previous edition had 135. In addition to receiver fault notes and general information you'll find many useful button sequences for resetting parental lock codes, resetting installation choices to factory defaults and other less well known operations, practical information on LNBs with typical current drains, a list of manufacturers and suppliers addresses and other useful material, all presented in a nice Wire-O binding so that the book lies flat on the bench.



Recoup the cost with your first repair! £16.95

Economic Devices

32 Temple Street, Wolverhampton, WV2 4AN, UK Tele ++ 44 (0)1902 773122 Fax ++ 44 (0)1902 29052

Possibly a **FIRST.AGAIN**, you can search our www site for video spares, semiconductors, remote controls, satellite gear, line output transformers and CCTV components. Its simple and will only cost the price of a local call. You can order parts, enquire about parts, or simply send a message. All at the cost of a local call. If you don't have the gear to access the internet get straight in touch with your local computer supplier or ask us for 2 fact sheet.

have you got **HASSLE!!** USE your ACCESS of VISA

Economic supply TV & Video parts *send send* **Fast**

Our experienced staff **WANT WANT WANT** to help you
 We can give you an **instant answer** from our database which contains over **100,000** references and we can give that answer **IN SECONDS**
 If we can't find it immediately, we will **HASSLE & HASSLE** our supplier, **HASSLE** the manufacturer. We will make phone call after phone call, and Fax after Fax on your behalf. **WE WILL DO ALL THIS FOR YOU.**
 We do it willingly and for **FREE**. **YOU NEED ECONOMIC !!**

IN4001	0.03	2SC2274	0.35	AA119	0.36	BC557	0.09	BT151500R	1.12	BZ6122	0.19	MAX232CPE	4.70	TA7281P	3.20	TD43654Q	2.82
IN4002	0.04	2SC2335	1.12	AC127	0.71	BC557B	0.18	BT151800R	1.15	BZ612V4	0.07	MC13002P	7.69	TA7698AP	5.97	TD44500	4.66
IN4003	0.03	2SC2458	0.84	AD162	0.96	BC558B	0.18	BU208A	1.46	BZ6133	0.19	MC7812CT	0.77	TA7778P	5.11	TD44501H	9.57
IN4004	0.11	2SC2482	0.35	AF127	2.48	BC558C	0.09	BU208D	1.61	BZ6136	0.19	MJ15003	2.23	TAB205AH	4.00	TD44503	4.00
IN4005	0.06	2SC2570A	0.38	ANS265	1.76	BC559E	0.14	BU2508AF	1.58	BZ6139V	0.14	MJ2955	0.77	TAB210AH	4.50	TD44505E	7.35
IN4006	0.06	2SC2655	0.31	ANS512	1.76	BC560C	0.11	BU2508DF	1.58	BZ6156V	0.11	MJ802	2.91	TAB210H	4.79	TD44505M	11.97
IN4007	0.04	2SC2705	0.35	ANS515	2.79	BC635	0.23	BU326A	1.36	BZ6168	0.11	MJE13005	0.86	TAB215H	4.96	TD44510	2.74
IN4148	0.06	2SC2785	0.36	ANS521	1.66	BC636	0.14	BU406	0.69	BZ616V2	0.11	MJE18004	2.05	TAB216H	8.01	TD44580	10.05
IN5062	0.14	2SC3225	0.60	ANS601K	9.74	BC637	0.11	BU426A	0.86	BZ616V8	0.19	MJE3055T	0.45	TAB221H	0.00	TD44600	2.14
IN5401	0.14	2SC3330	0.52	AN7171K	5.56	BC639	0.21	BU500	1.41	BZ617V5	0.09	MJE340	0.45	TAB403K	2.31	TD44600/2/3	2.82
IN5402	0.14	2SC3400	0.17	AN7190K	11.11	BC640	0.11	BU500S	2.05	BZ618V2	0.19	MJF18004	2.05	TAB427K	3.76	TD44601	1.46
IN5404	0.13	2SC3423	0.60	BA157	0.09	BC846B	0.52	BU508A	1.29	BZ619V1	0.09	MJF18204	6.07	TAB718N	7.69	TD44601D	1.46
IN5408	0.09	2SC369	0.06	BA158	0.07	BC848B	0.35	BU508AF	1.32	BZ61C22V	0.11	MN650	1.71	TAB739P	6.01	TD44605	4.10
IN6263	0.20	2SC3807	0.91	BA159	0.11	BC848C	0.41	BU508APH	1.99	BZ61910	0.30	MPSA06	0.35	TAA550B	0.31	TD446052	1.97
IN914	0.02	2SC3993	0.72	BA3910B	6.99	BC856B	0.21	BU508D	1.56	BZ61912	0.11	MPSA13	0.18	TBA120S	0.89	TD44650	1.76
1S44	0.11	2SC4517A	3.14	BA5406	2.14	BC858C	0.19	BU508DF	1.88	BZ61936	0.10	MPSA63	0.18	TBA120U	0.47	TD47240A	2.57
2N2222A	0.23	2SC458	0.18	BA5412	2.48	BC875	0.33	BU508V	2.40	BZ793V9	0.09	MPSA93	0.11	TB4820M	0.35	TD47240A	3.59
2N3055	0.50	2SC4742	5.11	BA6209N	1.18	BC131	0.26	BU536	1.65	BZ795V6	0.09	MR856	0.11	TD41013A	1.56	TD48140	4.62
2N3055H	1.29	2SC4769	4.02	BA6209N	1.27	BC132	0.26	BU606	1.03	BZ796V2	0.08	NE855	1.03	TD41015	1.37	TD48145	1.97
2N3773	1.52	2SC536	0.30	BA6219B	1.76	BC137	0.46	BU808	1.88	BZ79C33	0.11	NE555N	0.43	TD41035T	4.27	TD48170	4.70
2N3904	0.32	2SC945	0.11	BA6222	1.70	BD139	0.31	BU8150	2.14	BZ79C5V1	0.11	P600A	0.33	TD41044	1.43	TD48172	2.65
2N4401	0.11	2SD1207	0.57	BA6247	1.95	BD140	0.24	BUK444500B	2.40	BZ853V9	0.11	P6KE130A	2.55	TD41060	1.08	TD48175	6.41
2N555	0.12	2SD1246	0.30	BAT43	0.52	BD233	0.23	BUT54AR	1.27	BZ8812	0.29	P6KE180A	4.65	TD41085C	2.74	TD48178S	5.95
2SA1013	0.35	2SD1275	1.41	BAT85	0.96	BD234	0.36	BUT11	0.65	BZ882V7	0.03	PIC16C8404S04	5.00	TD41170	1.82	TD48180	4.87
2SA1015	0.11	2SD1276	1.39	BAV21	0.21	BD237	0.31	BUT11A	0.95	BZ883V0	0.11	R2KL	0.77	TD41170N	2.57	TD48190	3.59
2SA1020	0.44	2SD1292	0.64	BAX14	0.17	BD238	0.24	BUT11AF	1.18	BZ884V7	0.09	R2M	0.84	TD41170S	2.05	TD48350Q	5.56
2SA1029	0.26	2SD1330	0.31	BC107B	0.20	BD243	0.45	BUT12A	1.17	BZ885V1	0.13	R4050	3.04	TD41180P	2.48	TD48380	2.53
2SA1048	0.19	2SD1397	2.31	BC108	0.24	BD243A	0.60	BUT12AF	1.87	BZ88C12V	0.09	REGBABY10	13.00	TD41187S	3.59	TD49503	2.13
2SA1145	0.36	2SD1398	2.14	BC109A	0.00	BD243C	0.44	BUT18AF	1.37	CD4001	0.24	RG2	0.64	TD41516Q	4.27	TEA1039	2.11
2SA1286	0.60	2SD1426	3.51	BC141	0.36	BD244A	0.34	BUT56A	1.19	CD4017	0.47	RGP10G	0.26	TD41519A	2.74	TEA2018A	2.29
2SA1370	0.43	2SD1427	2.91	BC147A	0.24	BD244C	0.43	BUV48A	1.97	CD4049	0.35	RGP15G	0.33	TD41520B	4.50	TEA2029C	7.04
2SA1706	0.50	2SD1432	5.04	BC148A	0.35	BD245C	0.94	BUM11A	1.32	CD4052	0.29	RGP15J	0.17	TD41524A	7.52	TEA2031A	4.26
2SA733	0.18	2SD1439	5.86	BC149B	0.11	BD433	0.21	BUM41B	1.39	CD4053	0.61	RGP15M	0.44	TD41563Q	4.79	TEA2164	3.40
2SA872A	6.10	2SD1441	5.98	BC158B	0.12	BD434	0.39	BUM48A	1.03	CN62A	1.29	RGP30M	0.30	TD41554Q	8.12	TEA2260	2.48
2SA933	0.36	2SD1453	3.85	BC168	0.04	BD436	0.52	BUX8A	1.03	CN82A	2.10	S2000A	2.57	TD41557Q	7.23	TEA2261	3.68
2SA940	0.82	2SD1497	4.74	BC182	0.14	BD437	0.52	BUT71A	1.03	CN83A	2.55	S2000A3	3.59	TD415580	4.69	TEA5101A	6.48
2SA950	0.18	2SD1541	4.96	BC182L	0.14	BD438	0.38	BUZ80	3.52	CN75B	0.52	S2000AF	1.46	TD41670A	2.98	TC106D	0.82
2SA966	0.41	2SD1548	5.95	BC184A	0.12	BD581	0.47	BUZ80A	4.15	DTA114ES	0.31	S2055AF	3.74	TD41675A	3.85	TC246D	1.54
2SA992	0.31	2SD1554	3.25	BC184L	0.06	BD826	0.43	BUZ90A	3.40	DTC124ES	0.77	SAA129302	10.37	TD41904	1.63	TIP106D	0.60
2SB1010	0.35	2SD1555	2.65	BC187	0.47	BD839	0.57	BUZ90AF	3.30	DTC144ES	0.19	SAB3035	1.71	TD41908A	5.61	TIP110	0.35
2SB1066	0.82	2SD1556	5.11	BC212	0.09	BD901	0.52	BY127	0.18	FR605	0.43	SG264A	12.88	TD42002	1.12	TIP120	0.77
2SB1143	0.77	2SD1651	2.38	BC212B	0.19	BD902	0.60	BY133	0.08	FXT749	0.90	SGSIF344	10.70	TD42005	1.83	TIP12H	0.40
2SB1243	0.60	2SD1858	0.43	BC212L	0.18	BD911	0.52	BY206	0.20	HA13001	3.85	SL1430	1.92	TD42006	1.06	TIP122	0.40
2SB560	0.43	2SD1877	2.14	BC237	0.12	BDT64C	1.18	BY227	0.13	HA13119	2.05	SL1431	2.82	TD42030H	0.91	TIP295	0.89
2SB643	0.29	2SD1878	2.63	BC237B	0.19	BDT65C	1.68	BY228	0.26	HA13151	13.20	SN74141N	0.17	TD42030V	1.46	TIP29E	0.77
2SB647	0.57	2SD1879	3.16	BC238	0.11	BF194	0.22	BY2291000	1.31	HA51338SP3	7.69	STK4132I	10.00	TD42050	4.56	TIP3055	1.08
2SB649A	0.77	2SD1884	3.35	BC238B	0.16	BF195	0.07	BY255	0.14	HA6251	14.32	STK4141I	10.23	TD42270	1.208	TIP31A	0.36
2SB688	1.61	2SD1887	3.56	BC307	0.06	BF197	0.18	BY299	0.18	KCH28I	0.26	STK4142I	9.40	TD42540	1.29	TIP32C	0.40
2SB698	0.35	2SD288	0.85	BC307B	0.15	BF199	0.18	BY397	0.20	IR959A	15.79	STK4152I	10.95	TD42541	1.12	TIP35C	1.82
2SB716	0.43	2SD350A	1.97	BC308	0.09	BF258	0.04	BY398	0.16	IRFBC40	5.98	STK4192I	14.64	TD42577A	3.45	TIP41C	0.65
2SB772	0.50	2SD381	1.66	BC308A	0.09	BF420	0.21	BY399	0.12	KA6210AH	6.15	STK5332	2.82	TD42578A	3.20	TIP42C	0.52
2SB774	1.61	2SD400	0.34	BC308C	0.26	BF421	0.24	BY448	0.30	LA4270	2.73	STK5342	4.07	TD42579A	4.91	TIP47A	1.85
2SB891	0.60	2SD401A	0.77	BC309E	0.10	BF422	0.19	BYD14J	0.35	LA4280	3.12	STK5372H	6.84	TD42581Q	2.85	TIP4791A	1.25
2SB892	0.35	2SD466	0.28	BC327	0.10	BF423	0.14	BYD33D	0.12	LA4282	5.11	STK5421	9.52	TD42582	3.57	TIP72CP	1.03
2SC1008	0.24	2SD667	0.38	BC328	0.14	BF459	0.43	BYD33J	0.16	LA4445	3.45	STK5481	8.12	TD42593	1.12	TMP47C432AP8189	15.19
2SC124	0.48	2SD669A	0.64	BC337	0.14	BF471	0.37	BYD33M	0.26	LA4460	2.50	STK7253	7.69	TD42600	7.69	TMP47C434N3537	19.19
2SC1318	0.19	2SD718	1.90	BC338	0.06	BF487	0.57	BYW1040	2.55	LA4700	4.27	STK7308	6.41	TD42611A	0.64	TMP47C434N3555	16.63
2SC1473	0.21	2SD756	0.47	BC368	0.18	BF491	0.41	BYW95B	0.21	LA6324	2.05	STK7348	5.74	TD42611AQ	1.32	TPU2732	10.05
2SC1573	0.52	2SD837B	1.12	BC369	0.18	BF494	0.12	BYW95C	0.28	LA6320	2.94	STR1006	7.37	TD42615A	4.00	U2829B	3.40
2SC1675	0.14	2SD856	0.79	BC372	0.53	BF759	0.38	BYW96D	0.27	LA7830	1.88	STR4211	9.40	TD426330	14.21	UC3842	1.46
2SC1685	0.21	2SD882	0.43	BC546A	0.11	BF869	0.38	BYW96E	0.53	LA7832	2.40	STR50020	9.38	TD42635A	6.13	UC3844	1.20
2SC1740	0.16	2SD898B	6.41	BC546B	0.12	BF871	0.41	BYW96F	0.31	LA7835	2.99	STR50103A	5.56	TD42650	4.82	UC3844N	1.91
2SC1815V	0.11	2SD965	0.67	BC547	0.11	BF959	0.18	BYW95C	0.21	LA7837	4.19	STR50103A	5.56	TD42651A	3.85	UC3844N	1.91
2SC2001	0.23	2SD965R	1.05	BC547A	0.04	BF960	0.30	BYW95C	0.21	LA7837	4.19	STR50103A	5.56	TD42652A	4.62	UC3844N	1.91
2SC2023	3.18	2SK1117	3.40	BC547B	0.11	BF970	0.43	BYW96E	0.50	LC7132	4.70	STR54041	5.15	TD42656	6.74	UC3844N	1.91
2SC2073	1.																

TELETOPICS

Microsoft's Internet TV System

Microsoft has entered the TV field in the USA with a system, called WebTV Plus, that uses a set-top box to give viewers access to information, including web pages, which is transmitted during the hours when normal broadcasting is off-air, i.e. during the night. The system was originally developed by the computer software company's subsidiary WebTV, which it bought earlier this year. WebTV Plus is a second-generation version, giving higher speed operation.

A hard disc with a capacity of 1-Gbytes is used to store the transmitted information – this is sufficient for up to twelve hours of VHS-quality video or thousands of pages from Web sites. The set-top box converts this information to a form that can be displayed on the normal TV screen. Users will still need a standard computer modem and a phone line if they wish to send e-mail, order services or participate in interactive TV. Downloading is

via the normal TV aerial. The main material consists of selected news, entertainment from web sites and an electronic programme guide that provides supplementary information – statistics on teams and players during a sports programme for example. A media commentator points out that the system is more to do with enhanced TV than the internet.

The WebTV Plus boxes are being made under licence by Mitsubishi, Philips and Sony. They sell for \$299, a subscription to the service costing \$19.95 a month. WebTV says that Microsoft is not subsidising either the boxes, which incorporate some advanced electronics, or the service. Microsoft also intends to market the system in Europe.

From next year the boxes will use Microsoft's Windows CE software. The capacity of the hard disc would make it possible to record programme material for later viewing.

Latest Philips TV Chips

Philips has released details of some interesting new ICs for TV. The TDA9144 is a multistandard decoder which has blanking facilities for PALplus and EDTV-2 (extended definition TV) broadcasts and full PALplus 'helper' line demodulation, enabling a set to display these widescreen formats while maintaining compatibility with standard PAL, NTSC and SECAM transmissions. It accepts a composite video input or separate YC inputs, generates standard analogue YUV outputs and enables RGB inputs to be inserted.

The SAA5284, which has been designed for use in multimedia PCs and set-top boxes, is a video data acquisition chip that greatly simplifies recovery of data transmitted during the field flyback blanking period (VBI). It can also capture the full-field data transmitted on specialist subscriber-TV channels. The chip has an input multiplexer for two analogue composite (CVBS) signals, the selected one being digitised on-chip: this enables signal filtering, clock recovery and data slicing to be performed digitally. Full programmability

means that the SAA5284 can decode all known VBI formats, including 525- and 625-line teletext, Intercast, wide-screen signalling, video programming system, closed captioning and PDC data broadcast signals.

Philips BiMOS technology, which combines bipolar and CMOS, was first used in 1991 in the TDA8362 TV signal processor. It enabled the IF strip, source switching, sound control, colour decoding (PAL and NTSC), RGB control, audio preamplification, sync processing and timebase drive signal generation to be carried out in a single chip. The subsequent TDA837X series added I2C bus control and SECAM decoding. The latest TDA884X series uses BiMOS-2 technology, enabling further features to be incorporated. These include black stretch and coring (to increase the picture's dynamic range), skin-tone adjustment (for NTSC operation), linear zoom, blue stretch (for enhanced white reproduction) and AVL (automatic volume limiting). Philips has developed a whole range of ICs to go with its single-chip TV signal processors.



Texas Instruments has announced a new link-layer MPEG-2 controller IC, type TSB12LV41, for the IEEE 1394 high-speed serial bus which has been generally adopted for use with multimedia peripheral equipment. It's the first IC that enables MPEG data packets to be assembled on chip, off-loading these tasks from the system's microcontroller or microprocessor. The chip is intended for use in set-top boxes, digital TV sets and digital audio/video recording equipment, and comes in a 100-pin thin quad flat pack. It's memory is large enough to provide bi-directional data transmission.

C-Cube has introduced a one-chip MPEG-2 codec, dubbed the DVx. The device provides encoding and decoding of an MPEG-2 digital video data stream and has applications in DVD equipment, PC editing and digital camcorders, enabling users to carry out their own editing.

Video News

Fujitsu has launched the Plasmavision 42, a 42in. plasma display for TV and PC applications. The display is 6in. deep and provides a viewing angle of 160°. It's priced at the equivalent of about £10,000.

Philips and Matsushita were amongst the firms showing 42in., widescreen flat-panel TV sets at the recent IFA '97 (see report on page 16). With the Philips set the display can be wall-mounted for easier viewing. The Matsushita Model TH42PM1 will be available in

Japan only initially: a European launch is planned for later next year.

Although the official European DVD launch is next spring, Samsung plans to introduce Model DVD905 about now at a price of £550. It comes with two free titles.

Hitachi's latest VCR, Model VT645E (suggested price £330) incorporates the Easy Index system. This winds to the start of a recording, goes into the playback mode, displays a short sequence then moves to the next recording.

Closed Captions

The European Captioning Institute has announced that over 1,000 prerecorded videocassettes in the UK are now encoded with Closed Captions, the system designed to help those who are deaf or have impaired hearing. It uses teletext-type subtitles, which are inserted in the field flyback (vertical blanking)

period. The captions are normally hidden, but can be displayed by using a Closed Caption decoder.

Hitachi has launched a PAL/NTSC compatible Closed Caption decoder in Germany, where the system is known as Movie Text, but has no plans at present to launch it in the UK.

News from Nokia

From September 1st Nokia General Communications Ltd. started to operate as Nokia Multimedia Network Terminals Ltd. The change has been made to reflect the move towards multimedia in its business. The company was the only manufacturer to show a working prototype digital terrestrial TV

decoder at the recent Frequency Allocation conference in Chester. It was an adapted Nokia Mediamaster satellite TV decoder with the QPSK front-end removed and a COFDM front-end interfaced. The company continues to be located at Bridgmead Close, Westmead, Swindon SN5 7TS (01793 556 000).



A new UHF/VHF/FM aerial has been added to the range of indoor aerials from Philex. It incorporates an amplifier with adjustable gain for optimum signal-to-noise ratio performance. Suggested retail price is £22. A 12V AC/DC input is required - the aerial is available with a BS power or Euro power lead.

Philex has also introduced easy-to-fit flexible link satellite and TV coaxial connectors. Intended primarily for use with metal-cased windows, the connectors come complete with an adhesive strip for secure connection and are finished in white. The great advantage is no need to drill holes. Suggested retail price is £1.50 each.

For further details apply to Philex plc, Philex House, 110-124 The Broadway, West Hendon, London NW9 7PP (0181 202 1717, fax 0181 202 0014).

Exhibitions

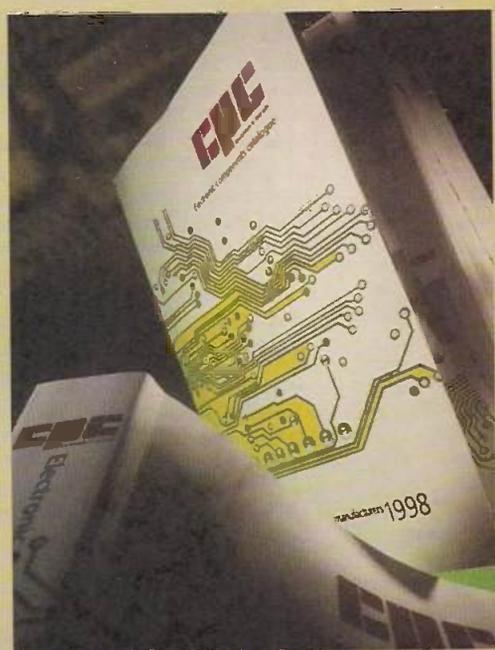
Cable and Satellite '98 will be held at Earl's Court-2 on May 18-20th 1998. The CAI (Confederation of Aerial Industries Ltd.) Trade Fair will be held at the Heathrow Park Hotel on June 16-18th 1998.

Grundig

The Grundig saga continues. Pieter de Jong has resigned as chairman, the second company head to resign this year. He will be succeeded by fellow board member Herbert Bruch. The London investment bank Botts and Company is to sell a holding of at least 43 per cent of the shares in Grundig to a consortium being organised by the Bavarian state government. Philips has settled a dispute over the extent of its commitment to fund Grundig's losses.

Congratulations CPC!

Spares distributor CPC celebrated its thirtieth birthday this summer and recorded record sales for the year at £29m. The company was established in 1967 as a distributor of consumer electronic components, dealing mainly with the TV repair industry. Today CPC serves a wider market, with a vast range of products. In fact the company's 1998 catalogue, just released, features more than 10,000 new products. It has 2,100 full-colour pages divided into 57 product sections. New and concise indexing makes the catalogue particularly easy to use. All existing CPC customers will receive a copy of the catalogue by mail. Others interested should call 01772 654 455.



In this second instalment in his new series **J. LeJeune** takes a look at a typical digital TV receiver arrangement and considers aerial requirements



Introduction to Digital TV

Having examined the MPEG-2 video and audio data compression system which is to be used for digital TV services in the UK, we are in a position to look at a typical receiver arrangement. Because of the rapid development of new and ever more densely packed ICs, it is difficult to be too specific at present about final receiver layout. But whatever new ICs may be introduced for the purpose, the underlying principles of signal demodulation and processing will remain the same.

Since the transmission medium – terrestrial off-air, satellite or cable – dictates the signal modulation system used, this will determine the arrangement of the receiver's front end. We will be looking at this in Part 3 next month. The rest of the receiver circuitry is much the same whatever the signal source. The front end is generally referred to as the 'channel decoder'.

For terrestrial digital TV reception the channel decoder will tune across the the UHF bands and contain demodulation circuitry for coded orthogonal frequency-division multiplex (COFDM) signals. A cable channel decoder will cover the VHF and UHF bands and will demodulate 64-QAM signals. 64-QAM (quadrature amplitude modulation) is a variant of the QPSK (quadrature phase-shift keying) modulation system used for satellite digital TV transmissions. In fact all three modulation techniques are related, since they are all based on the use phase modulation.

Satellite TV Decoder

Fig. 1 shows a typical digital satellite receiver in block diagram form. The channel decoder contains the tuner, which is under phase-lock loop control from the micro-controller. It delivers separated I and Q (in-phase and quadrature) outputs which are converted into 6-bit digital form. The signals are then demodulated and presented to the forward error correction (FEC) chip. Forward error correction for satellite signals involves Reed-Solomon decoding and convolutional decoding using the Viterbi algorithm (sorry about that!).

To summarise this, after selection by the tuner the signal is demodulated and error correction is undertaken.

With terrestrial and satellite systems there is in addition convolutional coding, which is required to prevent loss of data because of the transmission medium. Some of this additional coding may not be necessary with cable TV, which operates in an environment with better protection – its use is at the discretion of the cable company. This implies that a digital cable TV receiver may be specific to a particular company or network. The modem used in a cable receiver may also differ from that used in a satellite or terrestrial receiver.

The signal at the output from the channel decoder consists of an MPEG-2 data stream which may contain several TV services multiplexed together. This 'transport stream', as it's called, consists of packets of data, each with its own identification – see Figs. 2 and 3. The ID bits tell the next IC in the receiver, the transport stream demultiplexer, which packets belong to which service. The TS demultiplexer separates the packets and assembles them in the correct time sequence. It looks for the packets relating to the requested service, removes them from the transport stream and, after assembling them in the correct time sequence, passes them to the MPEG decoder chip for processing. The TS demultiplexer chip operates at a clock frequency of 25MHz.

If the demultiplexer detects a scrambled service it passes the data to the conditional access module, which contains descrambling circuitry appropriate for the system in use. A smart card is required for access to scrambled programmes: it holds information about which services have been paid for by the user.

The conditional access module is in a sealed can the size of a credit card but about 5mm thick. It has a PCM-CIA connector at one end. Incidentally an unscrambled service such as CNN does not require the presence of the conditional access module, so a receiver can be tested without conditional access using such a service. Some cable TV receivers may have the conditional access module integrated on to the main receiver PCB.

Rebuilding the Pictures and Sound

Video data is sent from the TS demultiplexer to the MPEG video decoder via an 8-bit data bus. There is also

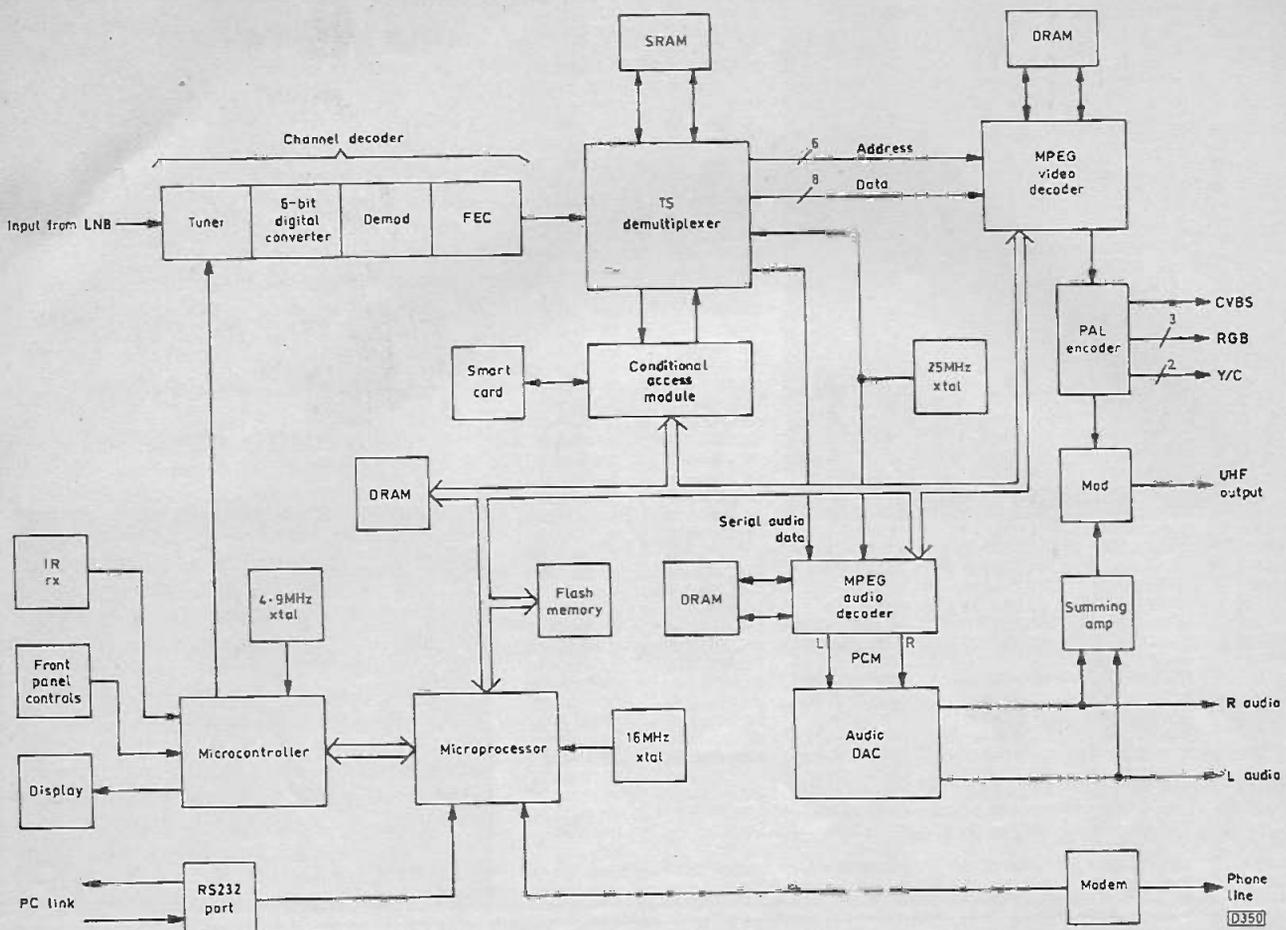


Fig. 1: Simplified block diagram of a typical digital satellite TV receiver.

a 6-bit address bus. Processing is controlled by the microprocessor, which uses the flash memory to store software programmes. These can be upgraded by transmitted data, giving the receiver a degree of future proofing. The flash memory is not unlike an EEPROM in that it is non-volatile, i.e. it retains stored data when not powered. But it cannot be overridden. Instead, data is stored first in a DRAM and then transferred to the flash memory block-by-block, using an erase/write/verify process. Thus off-air upgrading can take as long as ten minutes to complete.

Most receivers will have external access to the microprocessor via an RS232 port. The uses of this will include receiver fault diagnosis and flash memory upgrading by connection to a suitably-programmed PC. It's likely that fault diagnosis using a dedicated PC program will become common.

The MPEG video decoder rebuilds the TV picture from the I (reference) frames and the P and B frames (see last month) that are transmitted. Most receiver video memories are just large enough to be able to handle I, P and B frames. In some receivers the B frames are not used, the frames being built up from I and P ones instead. This local B frame generation requires a greater amount of DRAM however.

Audio data is sent from the TS demultiplexer chip to the MPEG audio decoder chip in serial form. Audio processing is also under the control of the microprocessor. Another DRAM is associated with the audio processor chip to delay the audio output by up to a second. This is controlled by the packet time stamps to assure correct sound and picture synchronisation – the video data processing can take up to a second, particularly when it is scrambled. The outputs from the MPEG audio decoder consist of L and R pulse-code modulation (PCM). This is converted back to analogue form then passed to the UHF modulator and rear panel sockets. Stereo is combined to form a mono input to the modulator by means of a simple summing amplifier.

Control

The microcontroller chip performs all the usual house-keeping functions required in a receiver. It controls the tuning, sets the LNB polarisation, instructs the modem, produces the 22kHz tone and drives the LED display. It

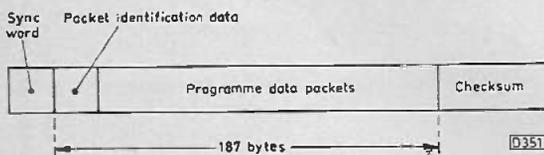


Fig. 2: An MPEG-2 data packet. The packet identification data enables the transport stream demultiplexer in the receiver to sort out the data packets.

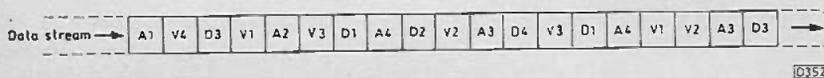


Fig. 3: Representation of the data transport stream, showing multiplexed video (V), audio (A) and data (D) packets.

BA157=0.10	LA7835=2.35	STK5335=3.25	TCA955=4.10	2N6539=0.35	2SD761=0.55
BYD33D=0.15	LA7850=2.25	STK5337=4.85	TDA1013A=2.99	2SA747=4.95	2SD810=0.55
BYD33M=25	LB1645=2.00	STK5488=4.75	TDA1060=3.25	2SA794=0.60	2SD836=0.75
BYW95C=28	LM384=1.25	STK6962=2.50	TDA1082=2.75	2SA861=0.70	2SD838K=POA
BYX10=15	M293B1=15.00	STK7217=5.25	TDA1175=2.10	2SA893=0.50	2SD1047=2.25
BYX98=3.25	M710B1=6.10	STK7308=3.50	TDA1235=3.40	2SA949=0.80	2SD1271=0.75
OA91=0.12	M51365=3.99	STK7404=6.40	TDA1517=2.50	2SA1006=1.18	2SD1308=0.90
RGP15K=30	M54519=4.99	STK8250=5.00	TDA1557Q=4.50	2SA1062=1.00	2SD1403=2.85
AN3320K=7.50	M58658P=6.99	SK73410=2.85	TDA1558C=3.65	2SA1124=0.78	2SD1453=4.40
AN5071=2.29	MC1377P=4.25	SK773410/2=3.50	TDA1670=2.50	2SA1180=2.25	2SD1497=2.50
AN5138=4.30	MDA2060=3.50	STR450=16.50	TDA1904=0.80	2SA1302=3.00	2SD1651=1.80
AN5265=0.95	MDA2061=7.99	STR451=19.50	TDA2004=1.90	2SB524=0.65	2SD1889=3.15
AN5512=1.35	NE544N=4.50	STR1195=7.99	TDA2148=3.25	2SB618=3.05	2SD2125=4.15
AN5521=1.35	PA3029N=24.99	STR4090=11.15	TDA25410=3.10	2SB648=0.20	2SK193=0.30
AN5620=2.50	SA11251=6.99	STR11006=3.50	TDA2577=P.O.A.	2SB817=2.25	2SK176=8.00
AN5790=2.40	SA11293=3.5.15	STR16005=3.99	TDA2578A=2.25	2SB883=1.40	AF200=0.80
AN6250=2.99	SAA3004P=3.15	STR30115=2.75	TDA2653A=2.40	2SB1156=0.79	BC303=0.20
AN6652=1.00	SAA3027P=5.05	STR30125=5.99	TDA3030B=5.50	2SC372=0.30	BC877=0.50
AN6878=2.50	SAA5000=4.15	STR44115=5.99	TDA4503=3.00	2SC461=0.10	BC880=0.40
AN7110=1.00	SAA5230=12.50	STR50092=5.50	TDA6200=10.50	2SC536=0.20	BD142=1.50
AN7169=2.00	SA7000=8.99	STR50103A=3.85	TDA8214B=3.45	2SC741=3.00	ED226=0.30
APU2400T=9.45	SAB3021=3.99	STR50115=4.50	TD8372=7.25	2SC840=3.15	BD677=0.50
BA340=1.40	SAB3035P=5.45	STR50213=4.50	TD8380=2.50	2SC901A=3.50	BD791=0.60
BA536=1.50	SAB3210=2.99	STR53041=4.50	TD8405=8.00	2SC1123=0.45	BDT64C=2.10
BA3920L=2.50	SAJ210=3.15	STR54041=3.50	TD8732=5.95	2SC1185=2.25	BDT65C=2.10
BA5102A=1.10	SDA2516=3.00	STR56041=4.50	TEA2018A=1.50	2SC1317=0.15	BDX670=1.67
BA5406=1.80	SDA3002=11.15	STR58041=3.00	TEA1039=1.75	2SC1675=1.85	BF337=0.30
BA6209=1.00	SDA5243=10.15	STR80145=5.50	TEA2031A=1.80	2SC1756=0.35	BF479=0.30
BA6247=2.00	SL1454=18.95	STRD1816=3.99	TEA2164=3.25	2SC1819=0.78	BF760=0.40
BA7766=2.80	ST4451C=3.95	STRD6001=5.15	TEA2260=2.99	2SC1904=3.10	BF872=0.25
CNX36=90	STK032=8.75	STRD6108=7.00	TEA5170=1.40	2SC2200=2.50	BF996=1.00
CNX62A=0.75	STK0049=4.00	TA7119=1.30	TEA8172=1.99	2SC2271=0.55	BFX89=2.50
CNX82A=0.80	STK0060=7.99	TA7210=8.95	TMS3741=5.50	2SC2440=3.00	BU502=1.25
HA1350=2.00	STK435=3.50	TA7230=1.00	TPU2732=19.99	2SC2580=2.35	BU508A=0.80
HA1457=8.99	STK439=3.99	TA7245=2.00	U2829B=1.70	2SC2671=1.20	BU2525=4.10
HA11223=1.35	STK1040=6.35	TA7256=3.99	UAA1008=300	2SC2706=3.50	BUT13=2.25
HA11244=2.99	STK2029=4.75	TA7722=8.99	UAA4009=7.00	2SC2753=0.40	BUW41B=0.80
HA11713=1.00	STK2240=6.50	TA7280=1.90	UC3844=1.50	2SC2898=2.50	BUX80=1.80
HA11715=2.10	STK30422=4.75	TA7281=2.00	VCU2133=13.00	2SC3156=4.00	BUX98A=4.50
HA12411=5.75	STK3082=5.25	TA7302=2.25	VPU2203=12.50	2SC3178=2.25	MJ15024=6.50
HA17741=4.99	STK4017=3.85	TA7318=4.90	XR2207=4.85	2SC3212=3.50	MJ13009=2.00
IRF840=2.50	STK4042=7.99	TA7328=1.50	UPC1018=1.10	2SC3279=1.15	S2055AF=1.85
KIA6283=2.50	STK41122=9.25	TA7604=3.50	UPC1163=1.15	2SC3306=2.50	T1P41C=0.35
L4964=4.99	STK41312=6.50	TA7680=2.00	UPC1185=5.00	2SC3356=0.60	TIP42C=0.40
LA3300=1.30	STK41412=5.50	TA7698=4.75	UPC1212=1.70	2SC3459=3.50	TIP40=0.85
LA3350=1.99	STK41512=6.80	TA8200=3.50	UPC1278M=2.20	2SC3679=3.50	TIP147=0.98
LA4182=1.65	STK41612=5.15	TA8215=3.00	UPC1536=5.25	2SC3795=2.00	TIP2955=1.10
LA4422=1.25	STK41912=6.85	TA8221=5.75	15/80H=2.50	2SC3973B=2.75	TIP3055=0.95
LA4446=2.90	STK4272=5.99	TA8618=1.80	15/85H=2.50	2SD200=1.80	TIPL761=1.89
LA4500=2.00	STK4352=4.85	TA8694=4.99	BTA25=3.99	2SD350=4.10	TIPL=7.63
LA4700=4.40	STK4773=8.20	TBA520=0.95	24004=1.20	2SD371=2.99	7808=0.38
LA7279=1.50	STK5315=4.75	TBA2800=2.50	2N3055H=0.55	2SD551=6.99	7809=0.38
LA7830=1.99	STK5326=4.99	TCA2705=2.99	2N6130=0.40	2SD621L=4.00	7818=0.38

KONIG

Your Reliable Partner

Konig line output transformers and full video repair kits are reduced in prices. Please ring for Prices - Quality comes from Konig Parts



Please phone us for the types not listed. Please add 60p post & packing and then add 17.5% to the total.

Trade Counter now open -
Mon-Fri 9.00AM-5.00PM
Sat 9.00AM-3.00PM

J.J. COMPONENTS

r/o 243-247 Edgware Road,
The Hyde, Colindale NW9
Tel: Sales Hotline 0181 205 9055
Fax: Admin 0181 205 2053
Free fax orderline only : 0800 318 498

Repair Monitors?

How many times have you been unable to fix a monitor because you can't get a part?

The Logitron catalogue is full of components specially selected for monitor repair. From Caps to Cables, Flybacks to Fuses, Schematics to Switches, Semiconductors to Solder; you name it, we have it in stock. We have over 7000 products for the repair of every popular brand from Acer to Zenith, and countless 'anonymous' Far Eastern types too.

Find out why every major monitor repair centre in Europe buys from Logitron. Call for a catalogue now!

LOGITRON

☎ 0181 987 7000
Fax 0181 747 9112

LOGITRON LTD
The Hogarth Centre
Hogarth Lane
London W4 2QN

communicates with the microprocessor chip when a menu is required and when data transfer is occurring, either over air or via the RS232 port.

At power up the microcontroller chip automatically selects the 'Home Channel', which carries the electronic programme guide in its data stream. The chip also controls a video output chip for selection of PAL CVBS, PAL S-VHS or RGB outputs. It provides standby control and monitors the front panel switches. Current receivers use a 76-pin surface-mounted microcontroller chip.

Fig. 4 shows a typical microcontroller/microprocessor control system.

Power Supply

The power supply will be of the switch-mode type because of its high efficiency and low cost. The receiver's basic logic supply will be 3.3V, with some 5V sections around the microcontroller and UHF modulator. There will also be 12V, 14V and 20V lines.

Increasing use is being made of integrated chopper/control chips such as the TOP range from Texas Instruments. Expect to find these and systems like them in many future power supply circuits. The devices are rugged and not easily destroyed by a fault condition.

Other Features

Other features of such receivers will be parental control and a PIN code to prevent unauthorised tampering and provide identification in case of theft.

When the receiver is switched on from cold it will go through a routine of checking and then tuning itself to the default frequency – usually that of the Home Channel. Once all is well a picture is available and the user knows that a service can be selected or the programme menu seen. As with analogue receivers, the manufacturer will have pre-programmed the receiver for the services available in the country of sale. Most receivers allow the user to change this into an order of preference.

Two kinds of digital satellite TV receiver are likely to be made available: basic ones, possibly subsidised, for services from a particular broadcaster; and more expensive types able to receive digital signals from anywhere in the section of the Clarke belt accessible in a given area. These will probably not have a conditional access system – to decode scrambled signals it may be necessary to purchase a decoder module and smart card.

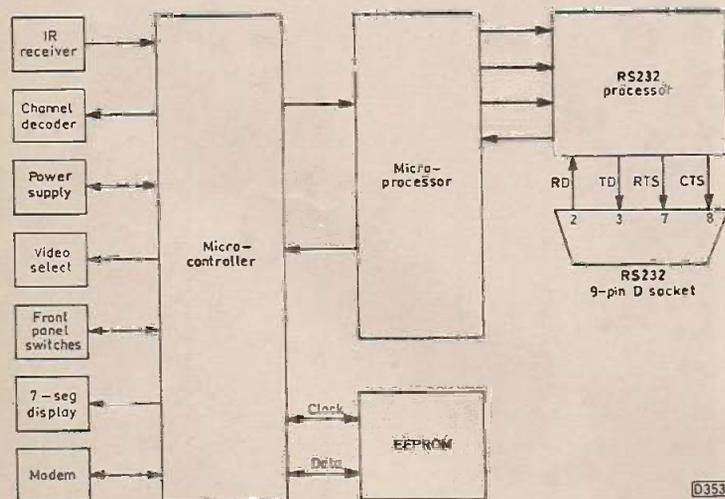
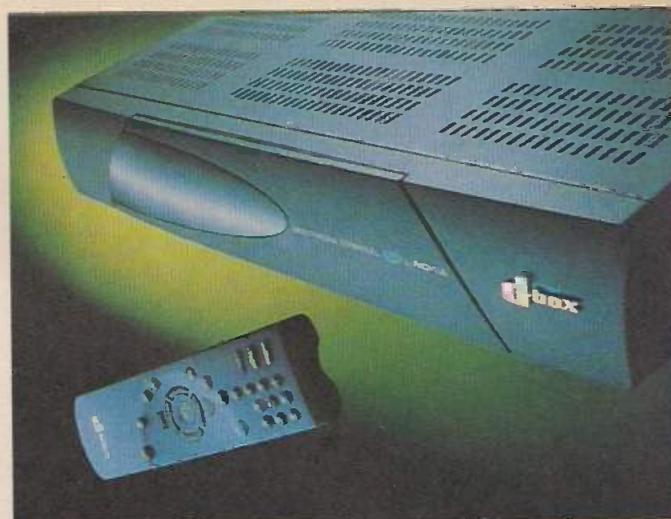


Fig. 4: A typical digital satellite receiver control system. The RS232 connector pins shown are receive data (RD) 2, transmit data (TD) 3, request to send data (RTS) 7 and clear to send data (CTS) 8.



Nokia's famed d-box digital satellite TV receiver.

Aerials

While dish installation will become easier as riggers gain practice, it will not be as easy as with an analogue system. The practice of alignment "on picture" may not be as simple because of the go/no go nature of digital reception. A good-quality signal-measuring instrument will provide the quickest and most satisfactory means of securing good and consistently high-quality reception. In most respects this will resemble a portable spectrum analyser.

Small dishes will be OK for digital TV. Terrestrial receivers operating at UHF can use the familiar roof-top Yagi aerial but, because of the type of modulation used, a set-top aerial will provide excellent pictures in most service areas.

Satellite digital TV reception requires the use of high-quality cabling and connectors to prevent reflections where there are items that have a poor match at 75Ω. Reflections can cause inter-symbol interference, and may prevent a picture being resolved at all. Because of the ruggedness of the transmission system, this may not be such a problem with a terrestrial installation – but this should not be an excuse for poor installation work.

Cable

Cable subscribers will have interesting additional services. Fully interactive operation with some of them is a distinct possibility, because of the provision of a fast data link going upstream to the network's head-end. The speed of the return path is much greater than that available with the public telephone network, because of the greater bandwidth available with coaxial and fibre-optic networks.

Modem

All future digital receivers will probably include a modem which, with satellite and terrestrial receivers, will be connected to the telephone system. Modems used in cable set-top boxes will be much faster devices.

Corrections

The wording above the arrow on the right-hand side at the top of Fig. 1 last month was omitted because of some sort of printing computer mix up. It should have said "variable bit-rate data" – the buffer is used to read out data at a constant rate.

The first word in line six under the heading "The MPEG Data Packet" last month should have been TSD not PSI.

Launch of Hot Bird 3

Peter Brough was present at the launch of the Hot Bird 3 satellite. He describes the significance of the launch and Eutelsat's future plans

The Hot Bird 3 satellite was successfully launched on September 2nd from Kourou, French Guiana. It will be stationed at Eutelsat's 13°E entertainment TV orbital position, adding twenty more high-power (110W) transponders and extending the frequency coverage at this slot to the upper section of the DBS band – 12.1-12.5GHz.

The launch was carried out by the European satellite agency Arianespace, using an Ariane 4 rocket. It was Arianespace's 99th launch.

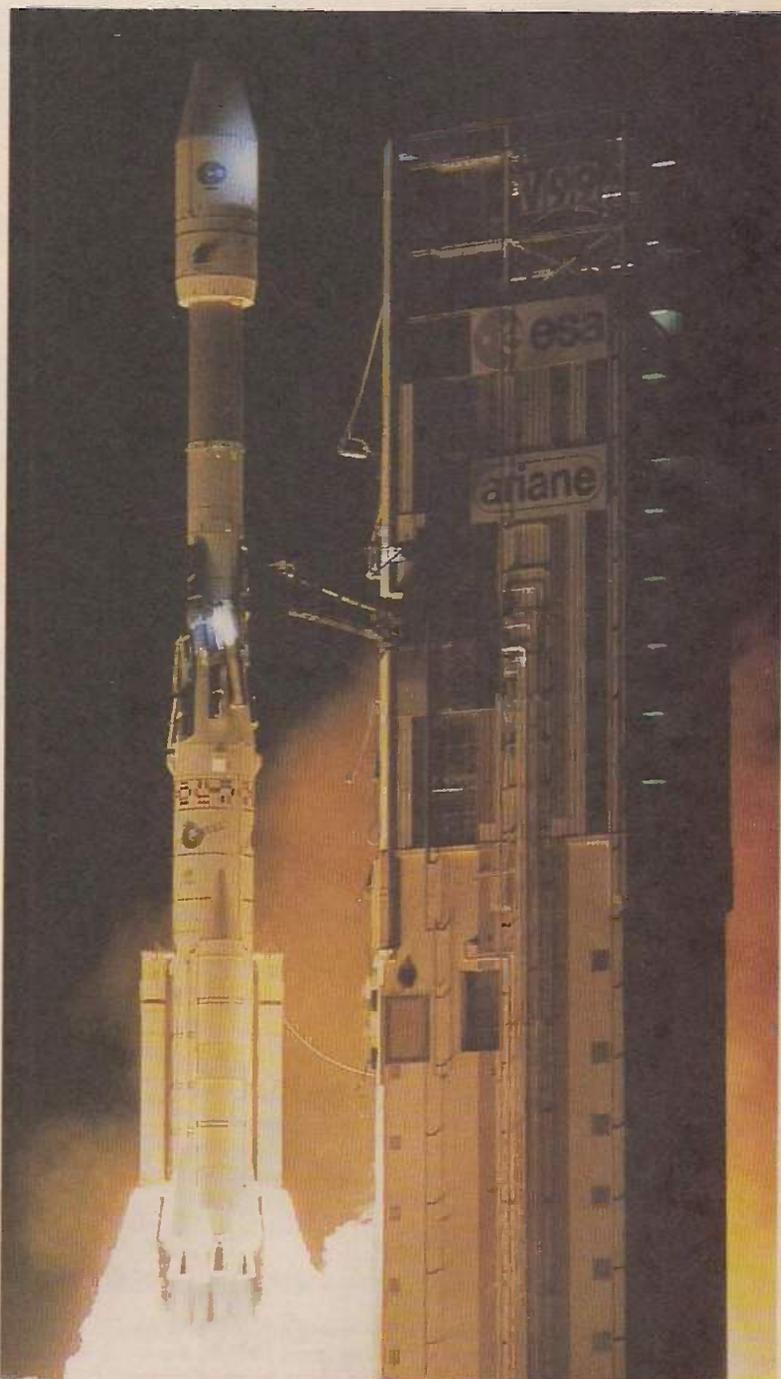
To date Eutelsat has had a much lower impact on UK viewers than SES, which operates the Astra satellites at 19.2°E. Eutelsat's aim is to extend the range of TV and multimedia services it provides and increase its share of viewers.

Background

Eutelsat operates satellites at a number of orbital positions. Other significant ones are 10°E (Eutelsat II F2) and 16°E (Eutelsat II F3). But its most important position is 13°E, where there are now four co-positioned satellites – Eutelsat II F1 and Hot Birds 1, 2 and now 3 – which provide Europe, North Africa and the Middle East with a wide variety of analogue and digital TV services. The first Hot Bird was actually a modified Eutelsat series II satellite, which was originally to be known as F6. It was launched in March 1995, and started to provide commercial broadcasts in December 1995. Hot Bird 2 was launched in November 1996.

Hot Bird 3

Hot Bird 3 has been built by the Anglo-French company Matra Marconi, about half of whose staff are based in the UK. It's an impressive craft, not least because it is the largest TV satellite to be built in Europe. Its launch mass



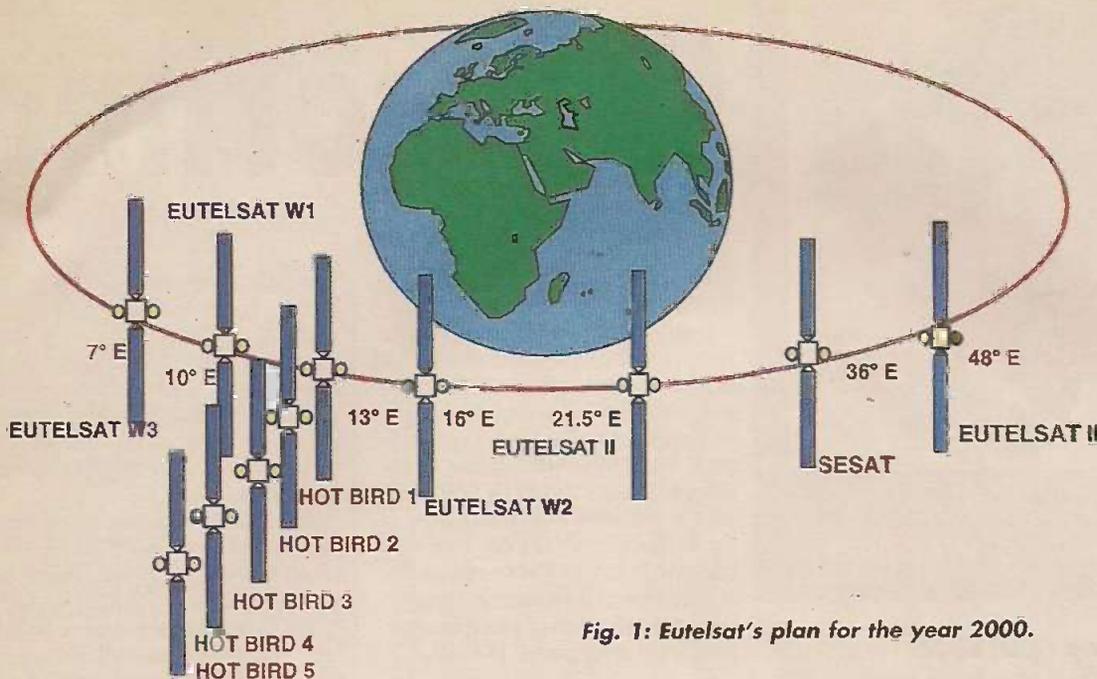


Fig. 1: Eutelsat's plan for the year 2000.

was three tons, the dimensions being 2.8 x 1.7 x 2.5m (height, length and width). The solar array span is 27.9m.

Hot Bird 3 has twenty transponders which operate in the DBS band. Its twenty downlink channels are transmitted between 12.1-12.5GHz. Nineteen of the transponders have a bandwidth of 33MHz, the bandwidth of the twentieth being 50MHz. Life expectancy of the satellite is fourteen and a half years.

The craft has three transmission systems: a wide beam that covers the whole of Europe from the Azores in the west to Kazakhstan in the east provides an EIRP of 49dBW; a super beam that covers Europe and North Africa provides an EIRP of 53dBW; and a steerable beam which can cover all parts of the globe visible from 13°E, providing an EIRP of 51dBW. It's the first time that the latter system has been used with a European TV satellite. It will enable service providers to offer their programming to a wider audience. Most satellite TV viewers in Europe will be able to use a 60-80cm dish to receive the transmissions.

The Launch

Hot Bird 3's launch went as planned, at just after 8pm local time. The Ariane 4 rocket was in fact carrying two satellites, Hot Bird 3 and the weather satellite Meteosat 7. Hot Bird 3 was the first to separate from the launch vehicle, around twenty one minutes after the launch, followed by Meteosat 7 some three minutes later.

The 13° Slot

The launch of Hot Bird 3 increases the number of transponders at 13°E to 72. When Hot Bird 4 is launched at the end of this year there will be twenty more transponders, bringing the total to 92. Hot Bird 5, due for launch next year, will replace Eutelsat II F1 and increase the number of transponders at 13°E to 98. This is enough to provide some hundred analogue channels or about 800 digital channels using video compression techniques. Hot Bird 3 has two transponders intended for analogue use and eighteen for digital TV transmissions.

Most UK households with satellite reception facilities

have an Astra receiver and dish for BSkyB broadcasts. Not surprisingly, Eutelsat has been promoting dual-satellite systems that use two LNBS to receive signals from 13°E and 19.2°E. It has also devised and encouraged satellite equipment manufacturers to incorporate a system known as DiSEqC (see elsewhere in this issue) which enables a satellite receiver to control several LNBS.

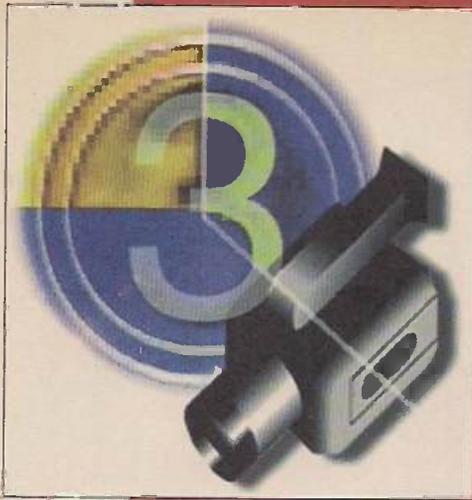
During IFA '97 Giuliano Berretta, Eutelsat's commercial director, revealed that almost 65m homes in Europe, the Middle East and North Africa receive programmes broadcast from the Hot Bird satellites. For comparison, SES says that 68m homes in Europe receive broadcasts from the Astra satellites. According to Eutelsat's figures, a little under three million homes in the UK receive programmes from the Hot Bird satellites, over 850,000 using direct-to-home systems.

So what will we get from Hot Bird 3? The two analogue channels have been taken by the Hungarian Magyar TV and the Greek ET1 services. New digital packages will be available from Swiss TV, Slovenian/Croatian TV, Poland and Germany. Other broadcasters will use the extra capacity offered by Hot Bird 3 to enhance their existing digital packages. These include the Italian company Telepiu, the Greek Filmnet Hellas and the French companies TPS and MCM.

The Future

Looking to the future, Eutelsat says that Hot Birds 4 and 5 will offer a system called Skyplex. This will make it possible to uplink digital services from a number of sites and downlink them as a single multiplex. There will also be home multimedia and interactive services, such as fast internet access.

Eutelsat is also planning a W series of satellites - W1, W2 and W3 will be at 10°E, 16°E and 7°E respectively (see Fig. 1). The use of the 29°E slot remains unresolved. According to Eutelsat it has this position booked: SES, which is planning to launch Astra 2A at 28.2°E, says the application to use 29°E has expired. Eutelsat disagrees. With Astra 2A due for launch this December, it won't be long before we find out whose transponders will be serving us from this direction.



Reports from David C. Woodnott

Sony CCDF550E

The E-E picture was marred by striations and scrolling clock/date information. The cause of this was traced to C717 (22 μ F, 16V) on PCB CT21. A replacement capacitor and service restored normal operation. D.C.W.

Sony AC88P and BCA80

This AC adaptor and separate charger plate combination was brought in to be checked because of poor charging. The AC88P was OK, but the adaptor unit wouldn't charge a battery. It has provision to charge from one to three batteries in sequence automatically. The usual cause of such failure is that the three protection thermal link fuses are open-circuit, as they were in this case. Replacing them restored normal charging. It's as well to check the customer's batteries, as the most likely cause of the problem is a short-circuit battery. D.C.W.

Hitachi VM500E

These full-size camcorders often arrive with complaints about intermittent mechanical operation. As previously reported, they respond well to replacement of the mode switch, belts and pinch roller assembly. This particular one required slightly more attention, for which we'd not estimated because of the "I know what that will be" attitude – we never learn, do we?

A tape was stuck in the mechanism, and no functions were available. Internal inspection revealed that the mechanism retaining plate, which holds all the gearing etc. together, had become almost

Camcorner

detached from its normal site because the three screws that hold it in place had become loose. After removing the tape manually we had to replace the loading motor holder and worm-gear assembly, which had suffered badly from its experience. The M45454B loading motor drive chip also had to be replaced. This is the same chip that's used in the Panasonic NVM7 etc. – so we had one in stock! These measures restored normal operation, though at a somewhat lower profit margin than we'd anticipated. D.C.W.

Sony CCDTR305E

This model seems to suffer more than most from corrupted or missing memory data. The symptoms could be very confusing if a means of checking the data was not available. In this case the symptoms were monochrome E-E pictures with reduced height (NTSC mode?) and no playback signals. The mechanism performed normally. The cause of the problem was that the page D data was missing from the memory. All was well when this data had been reprogrammed.

We've had similar though not always exactly the same symptoms with this model before. The cause of the failure has never been found. The camcorders have all continued to operate after reprogramming. D.C.W.

Hitachi VME31E

This handycam style unit didn't power up and there were no functions. The ceramic fuses (F551 and F553, both 1-6A) on the power supply PCB had failed. The cause of the failure was the fact that the mechanism had become jammed, damaging the loading drive chip IC909. Once this chip had been replaced and the mechanism had been repaired all was well – the supply loading arm had become detached from the coaster assembly, which is a common fault previously mentioned in this column. D.C.W.

Hitachi VME1E

In a previous report a while back I said that capacitor leakage prob-

lems are uncommon with this model. The report related to a capacitor in the power supply. At the time I wrote "we hope not to regret having said that the fault was unusual". Well I do now regret saying that, having had several of these units in since then with leakage-caused faults.

Several 47 μ F capacitors on the camera head (sensor) PCB are prone to leakage. So are several others on the main VCR PCB. C406 (100 μ F) in particular causes problems – E-E and playback picture disturbances (pulling on whites, sync cramping – you name it!).

Will this model follow the Canon E60? With the E60 you need to replace all the electrolytics to achieve a viable, long-lasting repair. D.C.W.

Canon UC1000E

We received two of these camcorders from the same source and with the same fault symptoms – neither would power up or show any semblance of life. One of them had stopped recording the sound prior to its complete failure, but had been OK otherwise. Internal inspection showed that in both units the 2A ceramic fuse had failed.

As no short-circuits could be detected, new fuses were fitted and the machines were then tried. They both powered up and worked in all modes, except that one of them did not record the sound. The cause of this turned out to be a faulty microphone, a problem we've had previously with similar models. The fuse failure couldn't be explained initially, as the units continued to operate on extended test. We were using our bench power supplies.

The camcorders had come in their cartons, with one AC adaptor and DC connector between the two of them. The charger was OK, but when we checked the connector assembly we discovered the cause of the fuse failure. It had been assembled with the polarity of its contacts reversed! As it's a sealed unit, a replacement was required. We informed Canon in case other units are affected. A good job the unit was in the box! D.C.W.

ELC EAST LONDON COMPONENTS
AUDIO TELEVISION VIDEO
COMPONENTS AT VERY KEEN PRICES
TEL: 0181-472 4871 FAX: 0181-503 5926

REMOTE CONTROLS from
£5.99 each, £5.50 5+
VIDEO HEADS from £6.99

Over 200 models at very attractive prices.
AKAI, ANSTRAD, FERROUSON, FISHER,
GOLDSTAR, HINARI, HITACHI, LOGI,
MATSUI, ORION, PANASONIC, SAIHSO,
SHARP AND MANY MORE
VIDEO SPARES

**ASTRA 1 D
CONVERTER**
£16.99

Satellite Finder Kit
PG1733



VCR TOOL KIT



**TDAB178S
REPLACEMENT**
£7.99

**BABY 10
REGULATOR**
£11.99

EQUIVALENT BOOK 97/98
ICS, TRANSISTORS, DIODE
31700 TYPES £19.99

RESONATORS, THERMISTORS

HITACHI TH502 £2.00
9500S £1.30
TRIPLERS UNIVERSAL £4.99
WITH FOCUS £7.99
CUC2410 £16.99

POWER SUPPLY MOD KITS
TV ON/OFF SWITCHES

**RF PLUG &
SOCKET**



ELC EAST LONDON COMPONENTS
63 PLASNET GROVE, EAST HAM,
LONDON E6 1AD. TEL: 0181-472 4871

two minutes walk from Upton Park Tube Station

VISIT OUR SHOP
OPEN MON-SAT 9AM-7PM

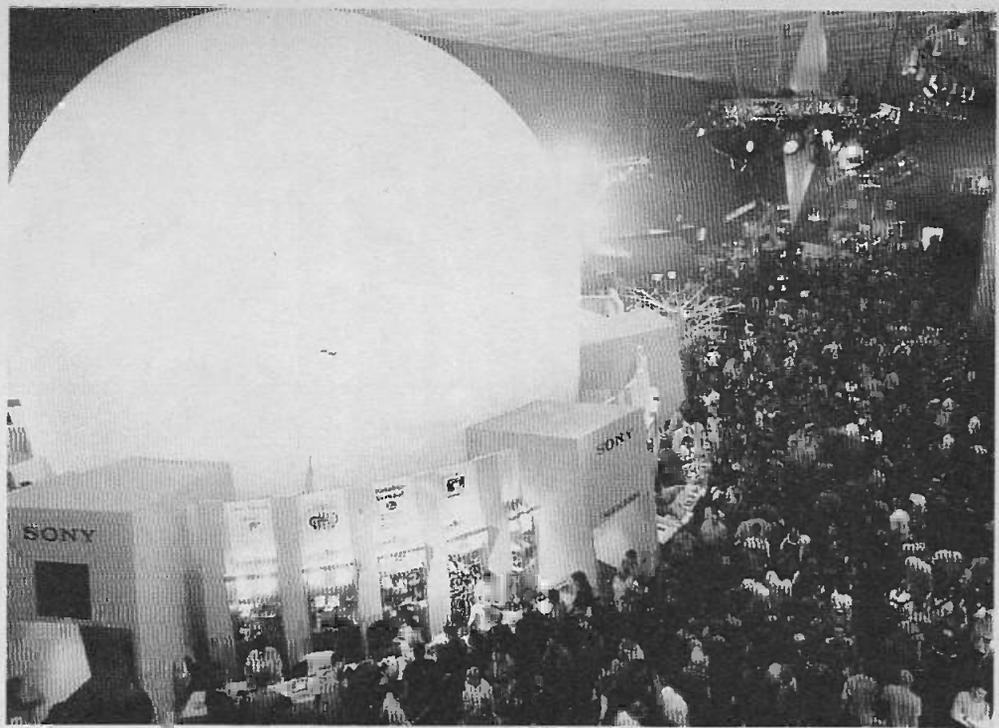
100's OF TOOLS, COMPONENTS
INSTRUMENTS, REPAIR KITS.

BOOKS & CABLES TO CHOOSE FROM
ADD £1.50 P/P + 17.5% VAT

ALL GOODS DESPATCHED SAME DAY
PRICES SUBJECT TO CHANGE WITHOUT
NOTICE VISA ACCESS ACCEPTED. MIN
ORDER £5.00

LINE OUTPUT TRANSFORMER
OVER 100 MODELS AT LOW PRICES

AKAI	MATSUI	AN5151	6.99	LA7835	1.99	STK5730	6.00	TD41915	2.50
CT2570E	1420	AN5152	2.50	LA7836	1.00	STK5822	5.80	TD41916	3.00
CT2370	1442B	AN5153	2.99	LA7837	3.00	STK7218	7.00	TD41918	4.00
1450	1630	AN5154	1.90	LA7838	6.00	STK7228	6.50	TD41920	4.00
CTV44RS	1465	AN5155	2.80	LA7839	30.00	STK7308	4.25	TD41921	7.00
BABY 10	1480A	AN7178	4.25	M49181	8.50	STK7348	4.50	TD41922	4.00
CTV7471	1490	AN7178	1.90	M49481	6.50	STK7366	9.00	TD41924	7.00
ANSTRAD	MITSUBISHI	BA3119	17.00	M4948A-84	16.00	STK9250	8.00	TD41957	7.00
CT2528ETX	BA3119	BA3122	2.99	M54543L	2.99	STK9250	6.50	TD41958	2.00
CTV2200	BA3122	BA3122	2.99	M54545L	2.99	STR3125	5.99	TD41908	1.00
CTV2210	BA3122	BA3122	2.99	M54548L	4.25	STR4211	5.99	TD42003	1.00
TYR124	BA3122	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD42004	1.99
BUSH	PHILIPS	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD41975A	3.00
2020T	KT3	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD42575	2.50
2114	KT4	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD41978	2.00
2114	KT4	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD42579A	2.00
2114	KT4	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD42582	3.00
ZX2000	KT40	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD42600	5.75
ZX3000	KT40	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD42658A	3.50
ZX3000	KT40	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43506	4.00
FERROUSON	SA	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43560	3.25
TX85 86	CTX ES	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43561	3.50
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43562A	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43565	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43578B	6.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43580	9.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43582A	6.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43585	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43586	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43587	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43588	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43589	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43590	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43591	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43592	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43593	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43594	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43595	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43596	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43597	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43598	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43599	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43600	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43601	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43602	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43603	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43604	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43605	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43606	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43607	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43608	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43609	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43610	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43611	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43612	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43613	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43614	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43615	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43616	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43617	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43618	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43619	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43620	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43621	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43622	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43623	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43624	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43625	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43626	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43627	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43628	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43629	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43630	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43631	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43632	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43633	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43634	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43635	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43636	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43637	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43638	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43639	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43640	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43641	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43642	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43643	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43644	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43645	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43646	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43647	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43648	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43649	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43650	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43651	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43652	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43653	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43654	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43655	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43656	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43657	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43658	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43659	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43660	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43661	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43662	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43663	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43664	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43665	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43666	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43667	3.00
TX90	CF1	BA3122	2.99	M54549L	4.50	STR4211	5.99	TD43668	



IFA '97

The Internationale Funkausstellung (IFA), which is held in Berlin every other year, is the premier European show for new consumer electronics systems and products.

George Cole reports on this year's innovations

Many significant new products were presented at the 1997 Internationale Funkausstellung in Berlin. The European launch of DVD was announced, and there was much to be seen in the fields of digital TV, flat-screen displays and digital audio broadcasting (DAB). There were 812 exhibitors at this year's show, which covered a floor space of some 130,000 square meters.

DVD

The DVD digital disc system was launched in Japan at the end of 1996 and in the USA last spring. Panasonic and Thomson have both released small quantities of DVD players in Germany, but a large press conference was held at the IFA to announce the official European DVD launch date. Spokesmen from Sony, Philips, Toshiba, Panasonic, Hitachi and Pioneer, and representatives from many of the major Hollywood studios, were present. The big news is that DVD will be officially launched in Europe next spring, when both hardware and software companies will release products. One or two hardware companies may launch players at the end of this year however (see later). There will be some 40-50 titles at the launch, from companies such as PolyGram, Warner Home Video, Universal, MGM and Columbia Tristar.

Sound System

European DVD discs will have, MPEG-2 multi-channel

(5.1 channel) sound, not Dolby Digital (AC3) as many expected. The DVD standard is confusing to say the least, largely because it has been made flexible. As a result, companies have interpreted the standard in different ways.

On the audio side, DVD hardware and software destined for NTSC territories must use two-channel Dolby Digital (see September issue for further information on the system) as the standard audio track. Hardware and software produced for PAL territories must carry two-channel MPEG-2 audio. Software developers can however choose to use Dolby Digital, MPEG-2 or several other audio formats for the multi-channel sound track (if one is provided). This means that a PAL DVD disc could offer MPEG-2 stereo and multi-channel Dolby Digital. Many people think that this will happen.

A number of companies, including Denon, Pioneer and Yamaha, have introduced Dolby Digital decoders for the European market. Panasonic's and Thomson's current European DVD players offer a multi-channel Dolby Digital output with no provision for multi-channel MPEG. Hollywood studios were expected to support Dolby Digital on grounds of cost, but this has not happened.

The first DVD discs will be single-sided and, with most programme material, there will not be enough space to store video, features such as multi-lingual sound tracks, and two types of multi-channel audio. The

decision to opt for MPEG-2 multi-channel sound in Europe means that many players are likely to have dual MPEG-2/Dolby Digital audio decoders and outputs. I spoke to Ray Dolby, founder and head of Dolby Laboratories, about the MPEG-2 decision. He was quite sanguine, believing that many European DVD titles will offer Dolby Digital as an optional sound track, and added that when dual-layer and double-sided discs arrive there will be enough space for more than one type of multi-channel sound track.

It has also been confirmed that the DVD standard has dropped the use of Macrovision's Colour Strip analogue anti-copy system. This introduces colour distortion on the screen when a DVD disc is copied on to an analogue medium such as VHS tape. It works well with the NTSC system, but causes problems with PAL sets. DVD discs will now use the AGC component of Macrovision's system.

The film industry sees DVD as a means of achieving cost savings. In addition to the discs being cheaper to produce than VHS cassettes, fewer localised products are required for Europe. At present, software companies have to produce 26 versions of the same VHS title to cater for Europe's language differences. These differences can be covered by just four versions of a DVD disc.

Hardware

A number of DVD players were exhibited. Philips showed Model DVD730, a multi-standard (PAL/NTSC) player that's also backwards compatible with Video CD and audio CD discs. It may seem odd to offer a multi-standard DVD player, not least because the Regional Coding system prevents a European DVD machine playing NTSC discs and vice versa. But not all programme material will use the regional coding system. Promotional discs and 'Golden Oldie' ones may not. The DVD730 is expected to sell in the price range £430-£500. Model DVD930 is also multi-standard and includes a remote control handset with jog/shuttle control. It will cost £40-£60 more than the DVD730. Both players incorporate a pin-code system that enables parents to control access to discs.

Mitsubishi had the DVS5000, which is also compatible with Video CDs and audio CDs. It's multi-standard, with MPEG-2 and Dolby Digital multi-channel sound outputs.

Panasonic's second-generation DVD player, Model DVDA350, incorporates a new highly-integrated LSI chip which combines six functions, including an MPEG-2 video decoder, a video DA converter and a Dolby Digital decoder. The new chip is also claimed to produce sharper results with trick-play features such as still frame and slow motion. The player's scart connector provides composite, YC and RGB video outputs. It's a multi-standard machine, and has a dual MPEG-2/Dolby Digital decoder. There are two viewing modes. One is optimised for high-quality DVD material. The other reduces the picture disturbances, such as the 'building-block' effect, occasionally seen with Video CD. Model DVDA350 is due to be launched in Germany this month, at a price of some £570.

JVC's display featured a see-through model of the company's XV1000 DVD player, which was launched in Japan last April. Pioneer has been the leader in the LaserDisc market, so it was no surprise to find the company showing a DVD/LD/CD combi-player. Sony announced that it will launch two DVD players in Europe next spring; both will offer MPEG-2 and Dolby Digital audio.

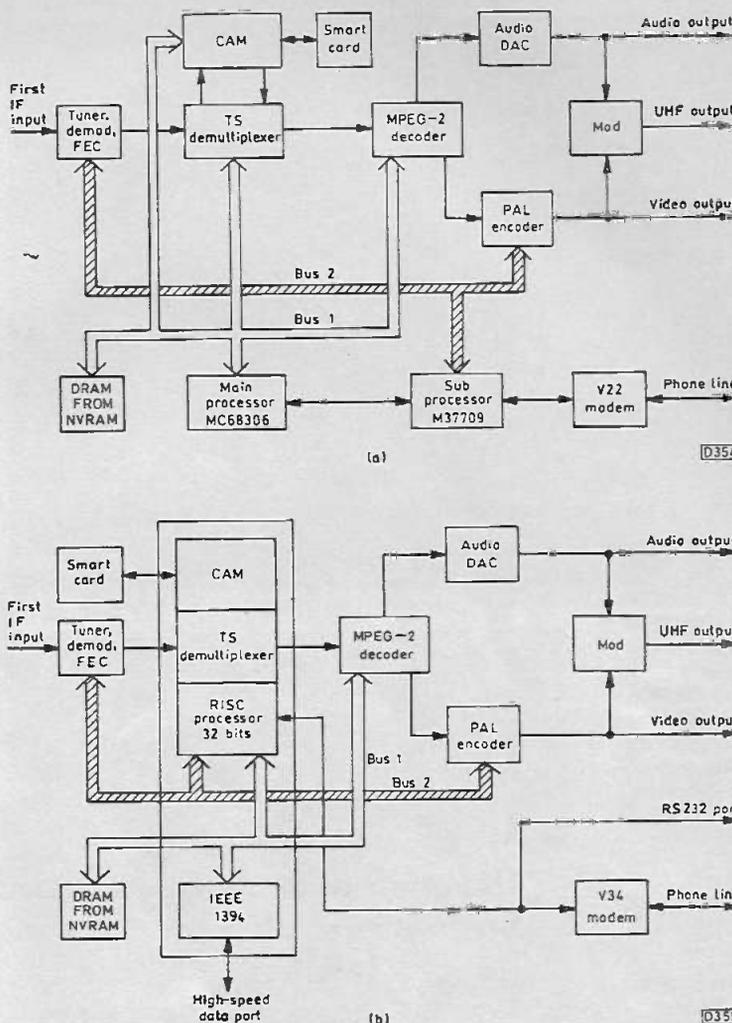


Fig. 1: Block diagrams showing the main items and interconnections in the Mitsubishi DSD2000 DVB receiver (a) and the DSD3000 receiver (b). The DSD3000 has a high-speed IEEE 1394 data port and an RISC (reduced instruction set computer) processor.

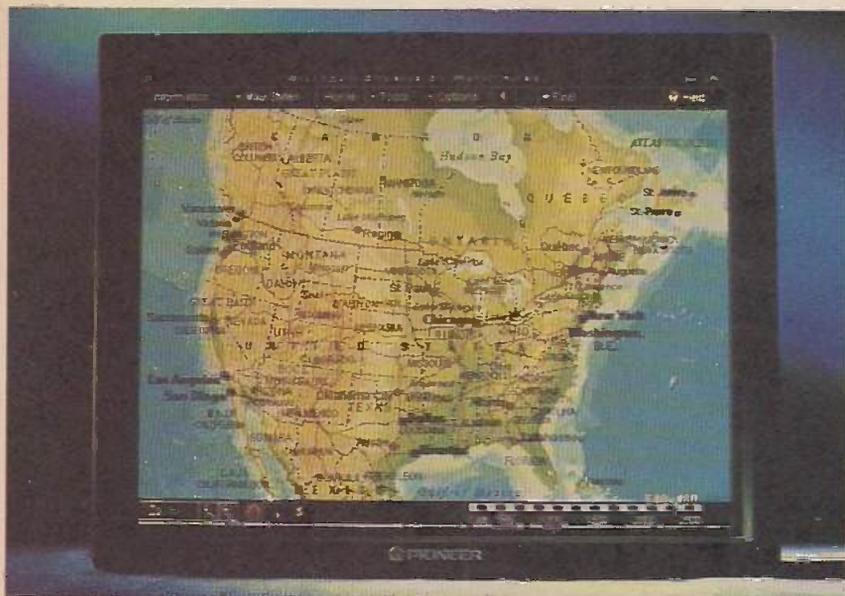
Other DVD Products

DVD is designed for more purposes than just watching movies, and a number of other DVD products were on show at the IFA. Toshiba, Mitsubishi and Pioneer showed DVD-ROM drives. Panasonic had the first Notebook PC with a built-in DVD-ROM drive, Model CF63, which has a 13.3in. TFT active-matrix colour display and can also handle CD-ROMs, Video CD and audio CD discs. Some people think that this type of product will be popular with business travellers on long-haul flights. They'll be able to watch movies as well as look at spreadsheets!

The Pioneer DVRS101, a DVD-Recordable (DVD-R) drive, is due for imminent release in Europe. The DVD-R format uses write-once discs with a capacity of 3.68-3.95Mbytes. It's likely to be used mainly for data archiving.

Hitachi and Matsushita showed DVD-RAM drives: the discs have a 2.6Gbyte storage capacity. DVD-RAM makes it possible to use and reuse DVD discs like video tape or a floppy disc. It took fourteen months to finalise the DVD-RAM specification, which was completed this August. Eleven companies were involved in developing it.

Hitachi estimates that the world market for DVD drives will be more than 70m units a year by 2000, 30m of which will be of the DVD-RAM type. This uses



Above:
Pioneer's
Model PDPV1
has a 40in.
colour plasma
display with
4:3 aspect
ratio.



Right:
Matsushita's
DVD-RAM
drive.

phase-change technology to alter the physical structure of a disc coating that consists of rare earth elements. A laser with a wavelength of 650nm and a power output of 30mW is used to write data on the disc. A lower-powered laser (3mW) reads the data. The read-erase-write-read process can be repeated over 100,000 times.

DVD-RAM uses a one-beam overwrite system. Each recorded 'spot' represents two bits of data, the start one bit and the end another. This doubles the data capacity of the disc. DVD-RAM discs come in two forms, single-sided (2.6Gbytes capacity) which can be played using an ordinary DVD-ROM drive, and double-sided (5.2Gbytes capacity) which is housed in a caddy and can be played only by a DVD-RAM drive (though future versions of DVD-ROM drive may be compatible with caddies).

Hitachi demonstrated its GF1000 DVD-RAM drive, which was launched in limited quantities in June. The company stresses that it sees Data VHS (D-VHS) as the future video recording medium for digital broadcasts, with DVD-RAM used mainly for data storage. But the

demonstration included an MPEG-2 video clip on a DVD-RAM disc. The sound quality and the picture quality were both excellent. A single-sided DVD-RAM disc can store up to 200 minutes of MPEG-1 (i.e. VHS quality) video or an hour of MPEG-2 video. Double-sided discs have twice the capacity. Whatever its supporters may say, DVD-RAM looks a good bet as a future home video recording system.

One DVD standard yet to be set is DVD Audio, the successor to CD audio. The final specifications for DVD Audio are expected to be agreed this December. This did not stop Technics jumping the gun with a DVD Audio disc demonstration on its stand. The music was recorded with a sampling rate of 96kHz and 24-bit coding – this compares with 44.1kHz and 16 bits for music CDs.

Two other issues were to the fore at IFA '97 – rival DVD formats that could confuse the public. Philips, Sony, Hewlett-Packard and others have proposed the DVD+RW (Rewritable) format, which stores up to 3Gbytes of data on one side of a disc. Hitachi's technical staff were being diplomatic about DVD+RW, while pointing out that over seventy issues still need to be resolved with this format.

The Divx format (formerly known as Zoom TV), which would use low-cost (about £2 each) play-and-dispose discs, caused consternation amongst some DVD supporters. Warren Lieberfarb, president of Warner Home Video and one of the main forces driving DVD in Hollywood, felt that Divx is "a pay-per-view format that can be done much better with existing VHS and electronic delivery".

One is left feeling that the DVD story has yet to reach its final chapter.

Digital TV

Spring 1998 is likely to see the start of digital TV in the UK. Some European countries have had digital TV services for a while now. They all use the DVB (Digital Video Broadcasting)/MPEG standards: most are broadcast from either the Astra satellites at 19.2°E or the Hot Bird satellites at 13°E.

Canal Plus has been offering a service for well over a year in France. The company had a large stand at the IFA. It plans to introduce an internet service for its viewers this year, also interactive services such as home shopping and banking. Canal Plus has joined forces with Philips and Sony to form SOPHI+, which has developed the iLink. This is a consumer interface that will be used in future multimedia digital products.

In Germany the digital service DFL, which is owned by the Kirch Group, has been available for over a year. It has attracted only about 30,000 subscribers to date. Next year however DFL is to join forces with media giant Bertelsmann and will be carried by Deutsche Telekom's cable network, which is available in some seventeen million homes. This is expected to increase greatly the number of digital TV viewers in Germany. In addition, digital TV services are to be launched by the state broadcasters ARD and ZDF via Astra. They will offer a free (i.e. non-encrypted) TV service. There is to be an electronic programme guide (EPG), and ARD will also offer a near-video-on-demand service.

Some companies, including Panasonic and Amstrad, demonstrated digital free-TV satellite receivers. Panasonic's DVB receiver/decoder offers MPEG-2 video and MPEG-1 (layer 1 and 2) audio. It has a 9-pin RS232 data connector, an RGB/CVBS scart and an S connector. Amstrad's Model SRD5101 has a 200-channel capacity and an RS232 interface.

Nokia Multimedia Network Terminals (NMNT) had a

large stand which was packed with digital decoders. The company has an exclusive deal to supply Bertelsmann, Kirch and Deutsche Telekom with a million digital decoders over the next three-four years. The famous Nokia d-box digital receiver, which was developed with the German company Beta Technik, was on show. It can receive signals with bandwidths from 2 to 54MHz, and decode video streams which are dynamically and continuously variable between 1.5-45Mbits/sec. It also has a data interface for connection to a PC, printer or CD-ROM drive. Other features include EPG, a built-in modem and optional wireless communication using DECT (Digital European Cordless Telephony). The operating system can be upgraded by means of software downloading.

Nokia also showed the MediaMaster 9500C for digital cable services. This receiver can handle QAM signals transmitted within a 2-10MHz bandwidth at UHF. It also has a built-in modem and EPG. Nokia and others have developed the MediaMaster 9600S, which is the first digital receiver with a common interface for both cable and satellite operation. A PC card (smart card) system enables the user to receive digital TV services with different conditional access arrangements.

Helmut Stein, senior vice-president of NMNT, had some interesting views on the future of digital TV. He believes that the MPEG-2 standard is "good for another five years", although variable-bit encoding (as used by DVD) may be introduced. He doesn't expect there to be any major hardware changes for a while, but prices may fall. Future digital TV terminals may have more memory, or use a high-speed data standard like IEEE 1394 (Firewire, which currently offers data speeds of up to 400Mbits/sec) or the Universal Serial Bus (up to 6Mbits/sec). Stein added that chipsets which can provide both QPSK and QAM demodulation are likely to be developed within a few years, enabling the same chipsets to be used for both cable and satellite decoders.

Other companies that showed DVB receivers included Grundig, Philips, Pioneer and Mitsubishi, which has co-developed two models, the DSD2000 and DSD3000. Both cater for pay-per-view and personal messaging services (see block diagrams in Fig. 1). The DSD3000 includes an IEEE 1394 port.

The Grundig Model DTR2000 is a sleek black box designed for cable or satellite digital operation. It uses a 32-bit processor (CPU) and has 2Mbytes of RAM and 1Mbyte of flash memory (non-volatile, with single-transistor cells). Other features include an RS232 interface, three scart connectors, an S video connector and phono audio sockets. No price details were available.

Internet/Interactive TV/Multimedia

IFA '97 proved that the lines between computer, TV and video equipment are becoming blurred. Mitsubishi showed a 28in. MUSE/NTSC set with a built-in modem and internet browser. Sanyo also displayed a 28in. internet TV set, while Sharp had its 32in. PC1 internet TV on show.

The Grundig Web Box links up with a TV set to provide internet operation. A Web Box user subscribes to an internet service provider of his/her choice and uses a smart card. The Web Box has scart and VGA outputs and uses an x86 processor (Grundig was coy about releasing processor power details) and 5Mbytes of RAM. It includes a 33.6kbits/sec modem. The Web Box was due for immediate release at around £230. Philips had four WebTV boxes on its stand, offering internet with your TV set.

Thomson demonstrated a Network Computer (NC)



which links to a TV set and enables the user to receive TV programmes and web pages at the same time. Some TV programmes now offer additional information via the internet. The NC also provides an EPG and the ability to set a VCR timer simply by selecting the programme required from an on-screen menu. It is to go on sale early next year.

The Philips DVX8000 Multimedia Home Theatre is a large black box which includes a DVD drive that handles both DVD Video and DVD-ROM. It has an FM tuner and connections for a LaserDisc player, VCR, cable box, satellite receiver and TV tuner. Its PC has a 233MHz Pentium MMX processor, 4Mbytes of video memory and a 32Mbyte RAM. Other features include a hard disc, a floppy disc drive, the Windows 95 operating system and internet software. It was due to go on sale in the USA in October at around \$5,000 (£3,000).

Philips' Ponte is described as an "all-in-one unit for family entertainment". It includes full-motion MPEG video for games, 3D Surround Sound, a built-in 33.6kbits/sec modem, a x16 CD-ROM drive, a 2Gbyte hard disc and an ISDN adaptor. A 166MHz Pentium MMX processor drives the system, and there are 16Mbytes of RAM. The Ponte is operated by remote control. It is to go on sale in Germany and Asia this autumn at around £1,000.

Grundig released details of its MINT (Multimedia Communication for Integrated Networks and Terminals) project, which will add extra features to home TV including internet access, e-mail, a video-phone and the ability to control other home electronic devices. It should be ready by the end of 1998.

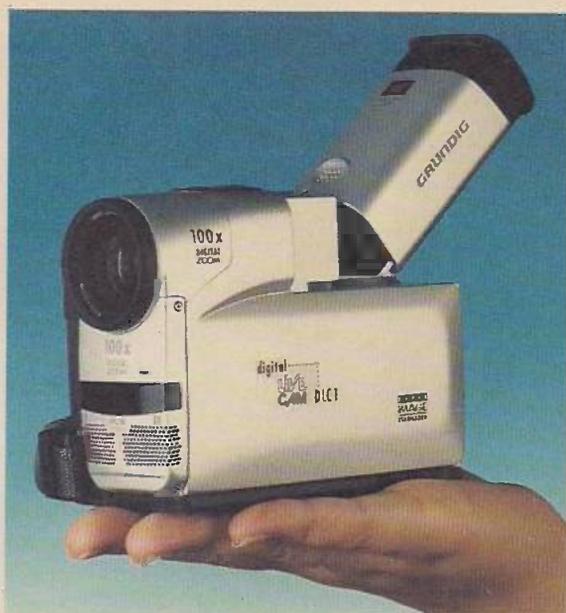
DAB

IFA '97 marked the official launch of DAB (Digital Audio Broadcasting). The WorldDAB Forum, which includes broadcasters, manufacturers, service providers and regulators from around the world, had a large stand that was packed with visitors.

A number of manufacturers, including Panasonic, Pioneer, Bosch, Grundig and Sharp, showed receivers. Sharp had a lovely looking hi-fi system with a DAB receiver. The UK Digital Radio Forum, which includes the BBC, NTL and many independent radio stations, was out in force. The BBC has been running a DAB service in Greater London since the autumn of 1995, and NTL/Classic FM have been running a simulcast service for a while. Next spring the BBC will expand its network of DAB transmitters to provide coverage of sixty per cent of the population. The Radio Authority will start advertising DAB multiplexes for independent radio

A typical NextView display. The NextView electronic programme guide is comprehensive and easy to use.

The Grundig DLG camcorder which records digital video on a Mini DV cassette.



Pioneer's combi-player will play DVD, CD and LaserDiscs.

services in the spring – the first commercial services could start in mid to late 1999.

It's interesting that a number of companies were promoting DAB under the "Digital Radio" banner. The idea is that consumers will latch on to this faster than they would to DAB, though the DAB logo remains.

DAB receivers will be expensive initially, at around £700-£1,000, but the prices of the chipsets will fall. Philips announced the development of its SAA3500 DAB channel demodulator and decoder IC. According to Philips it will enable manufacturers to produce a DAB car radio, using just a few chips, at consumer price level.

DAB can transmit a media mix, including sound, text, graphics, animation and even video. The German company TechnoTrend demonstrated a DAB PC board which costs some £670. There were also demonstrations of DAB car navigation systems that transmit maps and graphics.

The BBC presented a DAB science programme that included still pictures and text which can be downloaded into a PC. The question arises as to whether DAB becomes radio-with-pictures or just another form of TV. Glyn Jones, the BBC's Digital Radio director, was adamant that DAB is first and foremost a radio format, with each programme standing by itself without the need for pictorial content. But Bosch and Deutsche Telekom have demonstrated DAB transmissions with moving video pictures.

The main difficulty with DAB at present is getting any firm idea as to when receivers will be launched and how much they will cost. DAB is nevertheless an exciting

development that looks likely to be a major force in radio during the 21st century.

Television

Believe it or not, good old CRT sets were present at IFA '97! Philips showed lots of widescreen TV sets, including the 32PW9763 which includes PALplus and Dolby Pro-Logic. A number of companies, including Grundig, Samsung, Thomson and Sony, demonstrated PALplus products. The format failed to take off in the UK but has done much better in mainland Europe.

Philips maintains that there is a three-track pattern with widescreen TV in Europe. France and Germany are the largest markets. In smaller countries such as The Netherlands, Belgium and Switzerland sales account for 18, 9 and 10 per cent of total sales respectively: sales growth in these three countries is the highest in Europe. In countries such as Spain, Italy and the UK widescreen TV accounts for only around one-two per cent of sales. Philips adds that 90 per cent of 32in. TV sets are expected to be of the widescreen type by the year 2000.

Mitsubishi's Wide 36 has a 36in. screen, weighs a back-breaking 66kg and includes 100Hz display technology and Dolby Pro-Logic. It was launched in Germany this summer at £2,300. Toshiba showed its new 28in. and 32in. models with built-in Dolby Digital decoders – they are due to arrive in the UK about now. Although European DVD discs will have MPEG-2 multi-channel sound (see earlier), Toshiba points out that there are many NTSC LaserDiscs with Dolby Digital sound and adds that we are likely to see PAL DVD discs with Dolby Digital. Philip showed Model 14PT2663, a 14in. portable with stereo sound. It's designed for teenagers and as a second set.

NextView, the electronic programme guide for analogue TV, was also being pushed at IFA '97. It shares the field blanking interval with teletext, transmitting data which can be decoded by TV sets. NextView offers programme information, easy VCR recording and more. Thomson plans to introduce NextView products this autumn and industry predictions are that by the year 2000 40 per cent of all sets sold in Europe will incorporate a NextView decoder.

Flat-screen Displays

Nearly every major manufacturer showed flat-screen display technology at IFA '97. More interestingly, some released details of launch dates. It seems that the hang-on-the-wall TV set will finally arrive in Europe some time next year.

Sharp was the only company that backed LCD technology. It had lots of LCD monitors on its stand, including an 18in. Super TFT model which had a wide (140°) viewing angle. It looked very good, though Sharp has at present no plans for a commercial launch. The same goes for the company's prototype 40in. LCD TV.

Pioneer showed a 40in. colour plasma display prototype, Model PDPV1. Interestingly, it has a 4:3 aspect ratio. The company plans to introduce the set in Europe next year and says that it is working on three types of flat-screen technology, plasma, digital reflective imaging (for data projectors) and organic electroluminescent. It has invested \$50m in plasma display production and equipment, and will invest a further \$10m this year.

Other companies that showed plasma display sets included Grundig, Philips, Matsushita, JVC and Thomson – all with 42in. screens. Philips plans to launch its flat-screen TV in Europe towards the end of the year. Sony has decided that its Plasmatron TV sets are too expensive for the consumer market. It is collab-

orating with Philips and Sharp in developing flat-screen displays.

Sony bucked the trend with its KV28FD1 and KV32FD1 flat-display Trinitron CRT sets, which will be manufactured in Germany to a UK design. They are designed for both TV and PC viewing. The new sets, due for launch in Europe by the end of the year, use tempered glass to provide strength and at the same time reduce weight. The flat-display CRT is the same height and depth as a conventional tube. It has a fine pitch aperture grill (central pitch 0.6mm), and a high-focus electron gun which has an optimised focal length of 27-35mm and an increased cross-beam angle. This is claimed to improve focusing by around 20 per cent. In addition the tube has a high-precision deflection yoke of the type used in display monitors for air traffic control. Other features of the sets include 100Hz display, a PALplus decoder, a second tuner for picture-in-picture displays, a 500-page text memory, Dolby Pro-Logic processing, NextView compatibility and a Sony Virtual Sound Stage processor. There were no price details.

JVC showed an interesting new projection system based on a device that's called a Direct-Drive Image Light Amplifier (D-ILA). This is a reflective LCD device with 140,000 pixels. It offers the equivalent of 1,000-line resolution and 1,000 lumen brightness. Fig. 2 shows the projection arrangement. The D-ILA device is small (0.9in. diagonal dimension) with a pixel pitch of 13.5 microns. High brightness is the result of the reflective surface being over 93 per cent of the total. By aligning the liquid crystals vertically, very fast response times are achieved (the rise and fall times are less than 16msec). This results in a contrast ratio of 1,000:1. I saw a demonstration of the D-ILA system and was amazed at the quality achieved - details were clear and sharp. JVC is still developing the technology, and says that the first D-ILA devices will be aimed at the professional market.

VCRs

The arrival of the DVD overshadowed VCRs a little, but there is still a lot of life left in the VHS format. Philips and JVC both showed D-VHS machines. JVC's was a massive black box. The D-VHS format is intended for recording digital TV broadcasts, and can store up to 44Gbytes of data in a special VHS cassette. This data capacity is the equivalent of seven hours of MPEG-2 video, 21 hours of S-VHS quality video or 49 hours of VHS quality video.

JVC will launch its first D-VHS recorder in the USA towards the end of the year. The format will probably reach Europe in 1998. Philips expects D-VHS recorder prices to be comparable with those of high-end VHS machines.

The Philips VR778 analogue VCR includes NextView compatibility.

Digital Cameras and Camcorders

There were many digital cameras on show, from companies such as Philips, Sanyo, Hitachi and Panasonic. As with conventional digital still cameras, they record images on a chip card. Most use JPEG compression, though the Hitachi camera offers JPEG and MPEG. The images can be displayed on a TV screen or downloaded into a PC for display.

Sony has resurrected the name Mavica for its Models MVCDF5 and MVCDF7. The original Mavica, which was first demonstrated in the early Eighties, recorded analogue images on a floppy disc. The latest versions store JPEG images on a disc. The advantage of a floppy

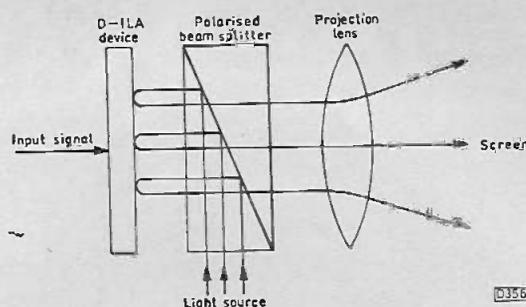


Fig. 2: The JVC D-ILA projection TV system.

disc is that it's a low-cost device that can be used with virtually any PC.

The Mini DV digital camcorder format was also to be seen around IFA '97. Panasonic announced the development of the first 80-minute Mini DV cassette, which provides 25 per cent more recording time than a 60-minute cassette. The tape is just 5.5 microns thick, which compares with 7 microns for the 60-minute version. In the long-play mode the cassette can store up to two hours of video. The new cassettes will be launched early next year.

Mini DV camcorders on show included the Sony DCRSC100E, which uses an infra-red laser link to transmit audio and video to a TV set for playback. Other models seen included the JVC GRDVX, the Grundig DLC1 and the Panasonic NVDX100EG. The latter is a three-chip camcorder that weighs less than 700g.

Panasonic also unveiled its first DV video recorder, Model NVDV5000, which can use both DV and Mini DV cassettes and has an IEEE 1394 input connection. It will be launched next summer.

CD and MD

Although most of the interest was focused on DVD, there were also a number of interesting CD and MD developments.

Philips showed a CD Rewritable (CD-RW) kit which is designed for both home and professional users. It includes software from Adaptec to enable data to be selectively erased and written. CD-RW discs are less reflective than ordinary CDs, and can only be used with a new generation of multi-play audio CD machines and CD-ROM drives. The Philips domestic CD recorder, Model CDR870, was due for European release at the end of October. Philips announced that next year many of its CD audio products will be compatible with the CD-RW format.

Philips also plans to introduce audio players that are compatible with the CD Text format. This stores text information, such as track name and lyrics, on a music CD. The new players will have LCD screens and are due for launch next spring.

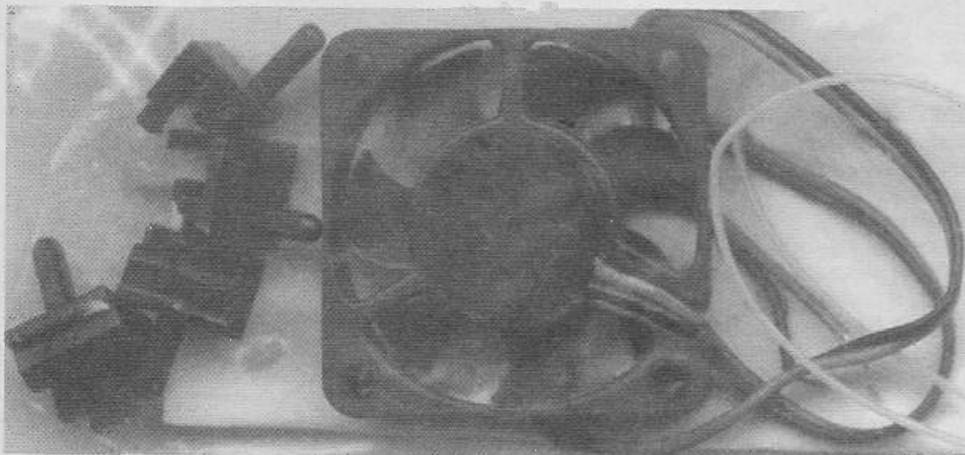
Pioneer showed its consumer CD recorder Model PDR04, which is already on the market.

There were many Mini Disc products on show by companies that included Sony, Aiwa, JVC and Sharp. According to Sony 2.9m MiniDisc players were sold world-wide in the past year: 6.3m units are expected to be sold this year. Sony suggests that one million MiniDisc players will have been sold in Europe this year. A Sony spokesman said that MiniDisc technology is still alive, but the arrival shortly of rewritable CD systems must put considerable pressure on the format.

One thing is certain: the next few years are going to be very interesting in the consumer electronics market.

Note that prices given in £s are approximate equivalents and not firm prices.

Satellite WORKSHOP



Jack Armstrong

Pace MSS500

A local TV aerial chappie brought this Pace MSS500 receiver along. "LNB short" he said, "but it ain't – I checked it. The cable's all right too."

When I put the receiver on the bench and connected the LNB cable the magic words flashed on the screen. I tried the usual remote control cure-all – pressing the reset sequence "menu, zero, store, >, <". This corrects the installation settings without affecting the channel tuning, but it had no effect on the fault. This disappointed me – I love to see the installer's face when I perform this feat of magic.

As I could find nothing wrong with the LNB current-detect circuit, it had to be capacitor trouble. A replacement kit cured the fault.

One reason why the fault had occurred was that someone had already replaced C11 and C12. The capacitors that had been fitted were of the original value (1,000 μ F) and voltage rating but were not, as they should be, low-ESR types. As a result they'd not lasted very long. The SatCure kit I use includes the Pace recommended replacement type for C11. It's an ultra high reliability, 1,500 μ F electrolytic. This capacitor is not cheap – but I don't like having a receiver bounce on me during my guarantee period.

The SatCure silent, miniature cooling fan kit provides a nice excuse for me to increase my profit. When it's connected to the 5V supply the fan ticks over very slowly. It is especially good for the version of these receivers with an internal positioner board, as this runs rather warm.

Although the fan has not been

approved by receiver manufacturers, my customers think that it's a marvellous idea: it provides just enough air movement to get rid of 'hot spots'. One customer even fitted a fan in his TV set's cabinet, using a 6V DC adaptor to power it. The fan takes negligible current, is made of plastic and can't short anything out should it become dislodged. I found this fan kit at SatCure's new web site, which is at

<http://www.netcentral.co.uk/satcure/>

Amstrad SRD510

Four of these receivers arrived from another shop that employs an "engineer". I'm sure that he has no 'Eng' after his name, and would be lucky to be classed as a 'technician'. Judging by the state of the receivers, he never learnt to solder.

The first SRD510 failed to light up. The reason for this was immediately obvious: someone had fitted an IP3842 IC instead of a UC3842 or similar in the power supply. Most 3842 power supply chips will work in these receivers, but not the IP version.

The second SRD510 was also dead. A power supply kit had been fitted, but the UC3842 chip was the original one. This was easy to see – there was no brown flux around its solder joints. When I fitted a new IC the receiver worked perfectly.

The third receiver lit up, but the picture it produced was intermittent. Tapping the receiver made the picture come and go. I've had this fault so many times that it bores me! The cause is capacitor C55, which sits near the

edge of the PCB. One lead hadn't been soldered. I've come to the conclusion that the PCB was probably held in a frame for passing over the solder bath during manufacture, and that the frame caused 'shadowing' of this particular capacitor lead. Hence a poor solder joint.

The fourth receiver failed to light up, but my oscilloscope showed that the power supply outputs were pulsing weakly. The rectifier diodes on the secondary side of the power supply all tested OK (no shorts), and replacing the capacitors on the primary side made no difference. Next stop was the chopper transformer itself, which was in fact the culprit.

As I didn't have an LLP001 or LLP004 transformer in stock, I used an LLP006. The LLP006 and LLP007, which are used interchangeably in Models SRD540/545/550, produce 28V for the tuning supply instead of the 23V in the earlier models. I've used these transformers to replace the LLP001/004 without any apparent problems, though it's a good idea to replace all the electrolytic capacitors in the power supply at the same time. Incidentally the additional supply voltage does not increase the SRD510's tuning range.

Nokia SAT800

I recently had a telephone call from London about one of these receivers. The problem was described as "horizontal streaks on decoded channels". The receiver concerned was being used with an IF distribution system, and apparently several other receivers at the same location exhibited the same problem. I suspected a batch of faulty decoder ICs, but Nokia Technical proved me wrong. I was told that the customer's receiver was too close to his TV set, the effect being created by radiation from the latter. This turned out to be correct. The satellite receiver was on top of the TV set: moving it to a

side table cured the problem.

I've on previous occasions mentioned that a satellite receiver shouldn't be placed on top of other equipment, because it can cause overheating and can also radiate into a TV set. This is the first time that I've come across the opposite effect.

Customers

The telephone rang. A voice said "I'm looking at your advert – 'satellite receivers repaired for £39' – and want to know what it would cost to fix my MSS200?"

"Er, £39" I replied.

"As much as that? Oh, thanks. Click. Brrrrrrrrr.

It rang again. This time the voice said "I threw out the user handbook for my SVS300 by mistake. Have you got one I can buy?"

"I've only got my workshop copy."

"I've spent two hours on the phone. British Telecom gave me another number. When I rang that I was given another number. On trying that one I was given the first number. Then I started phoning all the advertisers in *What*

Satellite? magazine. Eventually someone suggested that you might be able to help."

"I've only my workshop copy" I repeated.

"Well, could you make a photocopy and post it to me?"

"I suppose so, though it would be a breach of copyright. But if no one stocks the original and BT itself can't help..."

"How much?"

"I guess £10 should cover it. I'd have to drive into town, pay the travel agent to use her photocopier, drive to the Post Office..."

"HOW much?!!!" Click.

Brrrrrrrrr.

These guys have no idea. I can usually earn around £1 a minute at the workbench. If I take the time to go off on a jolly jaunt in the van, I think that I should be paid for a reasonable percentage of that time. This last caller had probably already spent more than £10 in phone calls. Ho hum.

Pace PRD800/900

I've been doing some good business recently replacing electrolytic capacitors in Pace PRD800 and PRD900 receivers. Apart from

Jack Armstrong is willing to try to sort out readers' satellite TV receiver problems via e-mail. You can reach him via the internet at:

jack@netcentral.co.uk

One model per message – state make/model and fault symptoms. If you have no e-mail facilities you can write to him c/o Television, Room L302, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Please enclose two first class stamps.

power supply failure, the symptoms can vary. One obvious sign is a low LNB supply voltage. There can be another cause of this however: check the 1Ω resistor R543 which protects the LNB supply – it's next to the tuner.

I like to replace the full kit – Relkit 2 from SatCure (01270 761 928). It is nice to see the customer's face when you point out that the fault has been cured and, in addition, the picture no longer has the annoying streakiness which developed so slowly the spouse didn't even notice it!

Test Case 419

Although it is not the highest-profile consumer electronics company, Mitsubishi has nevertheless always produced good-quality products that have given little trouble to their owners or to repairmen. It took rather longer than it might have done to deal with a recent faulty Mitsubishi TV set however, perhaps because the technician was not quite on the ball. In addition, the fault was an unusual one.

The patient was a large set, Model CT25M3 (Euro 14 chassis), the complaint being "small picture". As it's a rental set, it was first seen at the customer's home, where Colin-on-wheels found that the picture had narrowed by about 1.5in. on each side, with a small gap at the top and bottom. He decided that it was a workshop job, and brought it back for Technocrat's attention.

At least the fault wasn't an intermittent one! Technocrat welcomed the set, whose symptoms seemed to be straightforward. With a test-pattern input, the fault was very clearly displayed. TC's first move was to check the HT output from the power supply. He obtained a reading of 143V at test point TP9A, which was within two per cent of the specified figure. So clearly the cause of the trouble was not a reduced supply to the line output stage.

Attention was turned to the line output stage itself. The set has an EW diode modulator circuit that's driven by a small TEA2031A chip which is mounted on a sub-panel. This 8-pin chip tends to run very warm. Having had experience with similar devices in certain Ferguson TV chassis, TC was sure that he would find the cause of the trouble in this area. There are three presets here, PCC phase, PCC amplitude and width.

They all worked the way they should, but a correctly sized picture could be obtained only with extreme settings – it was also necessary to tweak the height potentiometer on the main PCB to obtain sufficient field scanning. TC could have left things like this, but it was obvious that all was not well – and neither Colin-on-wheels nor the service manager would be well pleased if the fault bounced back once the set had been returned to the customer. So the fight had to go on!

TC went back to the power supply and, using VR951, wound the HT voltage (B4) up and down: it should be set at 145V. At 150V or so (living dangerously!) the picture started to overscan horizontally, but was now very bright. The height still fell short of normal. TC returned the setting to 145V and went back to the line output stage. What, he pondered, could affect the width in this way?

TC replaced the EW modulator diodes D551 and D552, but this made no difference. He started to think about a replacement line output transformer or EW modulator drive sub-panel. At this point he was joined by Resident Workshop Sage, who was returning from our kitchen with the coffee. Sage looked at the test-pattern display, listened to TC's account of his tests so far, and made a suggestion – backed up with a bit of theory about the working principles of line output stages. The upshot of this was that, after a brief check with the oscilloscope, a single component was ordered and fitted. It finally cured the problem.

What was the faulty part, and how could it affect both the vertical and horizontal scanning? See page 65 for the solution to the problem.



TOSHIBA

Service Briefs

More know-how from Toshiba, based on
Technical Bulletins CDH66 and CDH67

TV Sets

Models 1450RB, 1450TB, 1752TB, 2151RB and 2151TB (C4ER Chassis)

Stuck in standby: Check whether the 2SC1740S-Q standby control switch transistor Q831 is open-circuit. If so, fit a replacement – part no. 23114528. Alternatively the power protection thyristor D471 may have come into operation. There are two likely causes of this. First a short-circuit between pins 1 and 2 of the TA8403K field output chip IC301. Replace the chip, part no. B0377890. Secondly the 2SA933S current sensing transistor Q340 could be leaky. Part no. for replacement is 23114530.

Models 2145DB and 2545DB (C3SSR Chassis)

Dead set with the HT voltage low at 50V. HT returns to 125V when the line output stage is isolated: Check whether the UZ18BSB 18V overvoltage detection zener diode D474 is leaky. Part no. is 23316342.

Model 2163 (C6S Chassis)

Line jitter, may be intermittent: This fault can arise when the TB1229N video/colour decoder/timebase generator chip Q501 is faulty. The part no. is B0101547.

Model 2550TB (C4ER Chassis)

Stuck in standby. Power protection thyristor D471 operates at switch on: The leads of the 220Ω, 0.5W resistor RN02 are too long. One is bent back to the PCB by the plastic chassis frame and is shorting to the power protection PCB track. The cure is to cut off excessive wire. You will find RN02 along the back edge of the chassis, in the centre.

Models 2557DB, 2857DB and 3357DB (C5SS Chassis)

Dot or vertical worm-like pattern on bright areas of the picture. The pattern stays with the bright area

when this moves: Peaking coil L910 in the emitter circuit of transistor Q910 on the CRT base panel open-circuit. Replace L910, part no. 23289479.

Woofers make a 'plop' noise on channel change: Replace capacitor C664 (10μF, 16V).

Teletext subtitle dropout: The modification shown in Figs. 1 and 2 will correct this.

Models 2563DB and 2863DB (C6SR Chassis)

Stuck in standby: Check whether the 2SC1815Y standby control switch transistor Q831 is open-circuit. If so, fit a replacement. Part no. is A6317440.

Projection TV

Models 48PJ6DB and 55PJ6DB (C5SS Chassis)

Bottom of picture is initially blank, with a bulge upwards at the left-hand side. Fault clears as the set warms up: The 2SC1815Y V-stop transistor Q350 on the DPC PCB is leaky. This causes CRT blanking. Replace the transistor, part no. A6317440.

VCRs

All V3 Models

Tape stuck in machine; unloading gear will not lift the cassette housing: Cam lever K470 has a spigot broken off and cannot engage with the FL drive slider. Replace K470, using improved version – part no. 70031477.

Models V204B, V205B, V215B, V226B, V254B, V255B, V404B, V425B, V426B and V454B (V3 cat 1 Chassis)

Station tuning drifts off and becomes erratic. Machine eventually goes to standby: The +5V sup-

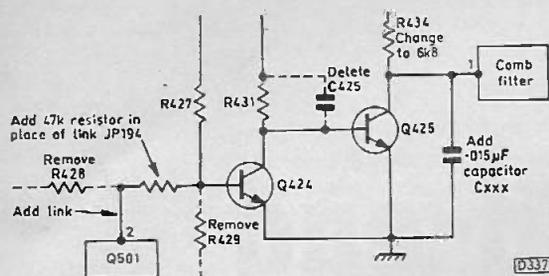


Fig. 1: Teletext subtitle dropout modification for TV Models 2857DB and 3357DB. Delete link JP194, R428, R429 and C425. Change R434 to 6.8kΩ. Add an insulated jumper wire link, an 0.015µF capacitor and a 47kΩ resistor in the positions shown above.

plies to the tuner and all outputs from the power supply are high because transistor TP091 (2SA1020-Y, part no. 70011386) is leaky and diode DP093 (1N4148, part no. 70010817) is short-circuit. Replace these items.

No playback, E-E or OSD video. The DC conditions and timing pulses at pins 10 and 11 (the I2C bus lines SDA and SCL) of the tuner-modulator are correct, but there is no burst of data when the remote control unit is tried. Service mode EEPROM data reads 00: Replace the 0010M tuner-modulator unit, part no. 70012019.

Models V226B and V426B (V3 cat 1 Chassis)

Continuous auto-tuning with no 33V supply at the tuner: Diode DP071 (BAV20) in the power supply has failed. Fusible resistor RP071 (47Ω) may have gone open-circuit. Replace these two items – part nos. 70012434 (DP071) and 70040125 (RP071).

Black streaks on peak white areas of the picture during playback of all tapes: The TA8892BN lumi-

nance/chroma processor chip IV001 is faulty. Replace the chip, part no. 70012632.

Models V705B, V726B and V856B (V3 cat 2 Chassis)

Intermittently dead at start up: The U4614B chopper control chip IP001 could be faulty, with the voltage at pin 11 jumping between 8V and 10V. Replace the chip, part no. 70011972.

No sound: Check whether the +9V supply to the audio PCB is missing. If so, zener diode DW011 (2.7V) could be open-circuit. Replace DW011, part no. 70012541.

Models V705B, V726B, V804B, V825B, V854B, V855B and V856B (V3 cat 2 Chassis)

No E-E sound – sounds as if the machine is in the wrong system: The multi-sound processor chip ICD03 or IN001 (depending on model) is faulty. Fit a replacement. Type is MSP3410B in Model V856B (part no. 70012643), MSP3410 in all other models (part no. is 70012438 for Models V705B and V726B, 70011885 for Models V804B, V825B, V854B and V855B).

VCR Spares

As previously reported a service kit is available for mechanism repairs to the R2000 Chassis (Models V212B, V213B, V312B, V412B, V423B and V513B) under part no. 70031719. It contains a drive belt (70011007), a reel belt (70011111), an idler arm assembly (70011106), a brake band subassembly (70011075), a pinch roller assembly (70011037) and a head cleaner assembly (70011036). Use of this kit will save £12.10 and make ordering easier. Toshiba advise that with telephone orders for any of the individual part numbers you will be asked whether you want the kit instead. Unfortunately it is not possible to implement this question with viewdata orders.

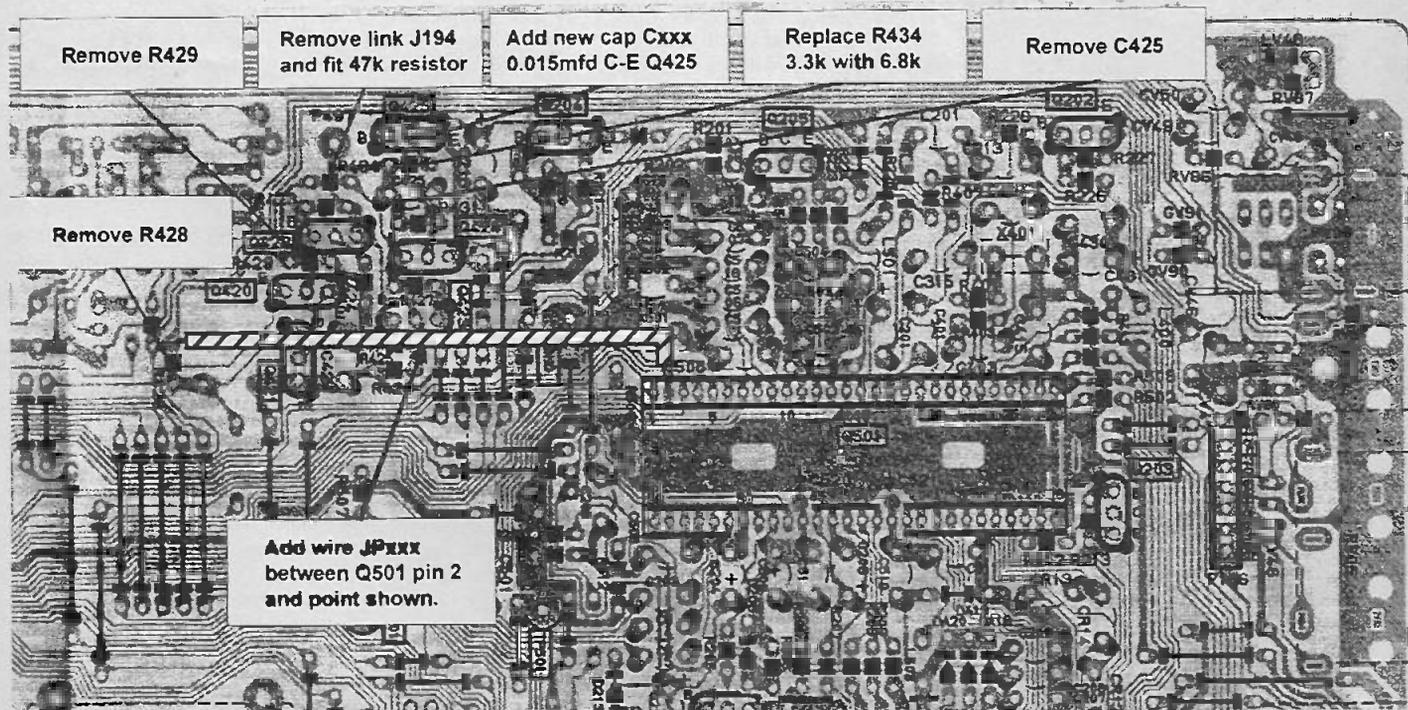


Fig. 2: Positions of the teletext subtitle dropout modifications. PCB shown from the print side.

Digital Head-end Cable Receivers

Digital satellite receivers of the cable head-end type are becoming available on the surplus market. But getting them to work may not be easy. Hugh Allison describes some of the problems and offers some tips

As we await the new dawn of television, when digital terrestrial and satellite transmissions start some time next year, the fact that there is already a healthy market in second-hand MPEG receivers may surprise some readers. The market is not in domestic type receivers however, but in unwanted cable head-end receivers. They are the ones that were used to decode the early programmes watched by multi-satellite enthusiasts – the ones that suddenly disappeared a couple of years ago, having ‘gone digital’.

Essential Items

Two items are, I feel, essential when you buy a digital head-end cable receiver – the handbook and the appropriate remote control unit. I know that it’s sissy to use a handbook, but the “when all else fails read the handbook” approach will not work with these units. They are as user-friendly as a cornered rat. The remote control unit is vital with most of them, since there is no other way of communicating with the brutes – and domestic multi-remote units do not seem to have the codes used with these professional receivers.

When you try to use a cable head-end receiver, bear two things in mind. First, there were probably a dozen or so receivers in the same room. Secondly, the man who originally set them up had probably been on a two-day course to learn how to tame the things.

Access Code

The first point is relevant because, unlike most domestic equipment with remote control, you have to tell a particular receiver that you want to talk to it on its own, not to any others that may be present.

Most receivers default to the access code 000. This is fine if your chosen receiver is new and unused – which is the case with a surprisingly large number of the receivers I’ve played with. If you are buying second-hand, try asking the seller what the code is, or try a bit of detective work with

the accompanying papers. One receiver I bought had in its handbook a line that said “write down here your access code”. Someone had written 003, which helped a lot.

If you are confronted with a receiver that lights up but doesn’t respond to any commands, it wants the access code to be keyed in. All you can do if you don’t know it is to start at 000 and keep trying. The receiver will usually signal that the code is correct by doing something subtle, like winking a LED at you just once. There is nothing secret about the access code. The receiver will tell you what it is when it’s working. Simply go to the diagnostics page and you will find the code amongst all the other data. Unfortunately, to get to this page you need the, er, access code!

Getting Started

Before you connect an LNB to your digital receiver you need to know the *exact* frequency of the LNB’s local oscillator. The reason for this is the relatively narrow bandwidth of digital receivers. We are looking at an accuracy of 1MHz in 1GHz.

Here are two ways of quickly checking the LNB’s local oscillator frequency:

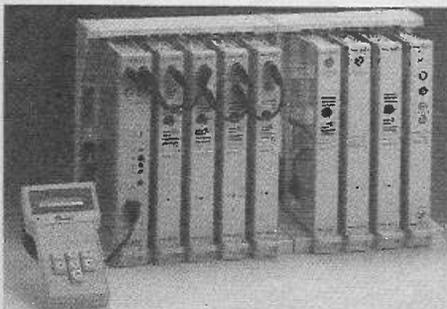
(1) Offset your dish to obtain a weak signal with an analogue receiver. Then, while watching the time display with a satellite teletext picture, adjust the receiver’s frequency for the most reliable clock updates.

(2) As with (1), feed in a weakish signal. Then tune the receiver so that the number of black sparklies equals the number of white ones.

If you know the frequency of the station used for the test, you can work out the exact local oscillator frequency.

Armed with this information, you can enter the local oscillator frequency, character rates etc., point the dish at a suitable satellite and get going. TV10 at 16°E provides a strong signal.

All the Italian digital channels and Reuters are relatively easy to receive in Southern England. But note that, in keeping with the unfriendly cornered rat act, most head-end receivers won’t let you store data (so that you can find the satellite again) until you are actually receiving signals from



the satellite. This makes it hard to store all the data you know about a station then vary one parameter at a time until reception works.

Some Tips

Not all receivers use the same standards. Watch exactly how a receiver wants to be told a parameter. Symbol rates for example may be direct entry, or you enter only a tenth of the rate published, e.g. 27,500 symbols may need to be entered as 2,750.

Remember that these receivers are incredibly complex, with a high count of obscure chips. They have all been ATE (Automatic Test Equipment) tested. Trying to repair an unknown, dead head-end receiver is going to be an uphill task. So, buyer beware!

Note also that most of the receivers on the second-hand market are probably obsolete and/or the manufacturer has gone out of business. If they are not already fitted, any accessories required, such as a card reader for encrypted services, will be difficult to obtain.

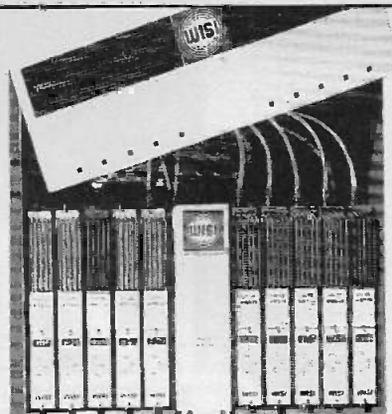
Where to Buy

Surprisingly, I've picked up a couple of head-end receivers at domestic car boot sales. Radio rallies are another good source, as are dealers mentioned in TV, satellite and associated magazines.

Prices vary from a fiver for an unknown receiver with no paperwork to about a ton for a brand new, boxed receiver with enough paperwork to keep a bureaucrat happy for a month. You pay your money and take your chance. Even the most basic, old but working receiver will give the multiset enthusiast a dozen or more new stations to watch.

The headend that says **YES** to

- *Quality*
- *Ease of use*
- *Agility*
- *Each module an almost total entity*
- *Superb value*



WISI TOPLINE HEADEND

Never before has it been possible to offer – CHECK THESE FEATURES
 at competitive prices – a superior, easy-to-use headend range with high quality channel processing that allows the user to retain perfect vision and sound. WISI's breakthrough in headend modular design has processors for satellite TV, terrestrial TV and radio. Each individual module incorporates its own control system enabling quick and easy set up. These channel processors come together in an "all-in-one" base unit which contains all necessary accessories for ease of ordering – no additional items required!

- Frequency agile freely selectable in the VHF or UHF range.
- Adjacent channel capable.
- B/G, D/K, I, L, M TV standards.
- Modular system for headend stations in SMATV and CATV systems.
- Modular for satellite TV, terrestrial TV, FM and satellite radio, SAT IF converters, TV modulators.
- Individually programmable modules.
- High output level.
- Wall mounting or 19" rack mount with lockable cabinet door.

U. K. STOCKIST

J.W. HARDY



A Breakthrough in Headend Design

May we send you full details?

J. W. HARDY COMMUNICATIONS, 231 Station Road, Birmingham B33 8E6 Telephone 0121 734 8478 Fax: 0121 789 7931

DO YOU OFFER A RADIO DECODING SERVICE TO YOUR CUSTOMERS?

If not, you could be losing out on a very lucrative additional source of income - especially if you already service car audio equipment.

The Joule A-400 radio decoding system has now proven itself as the most cost effective solution to all your decoding requirements. This CE approved, easy to use computer based system is now being sold overseas to Service Departments and Police Forces. It can now be supplied with the software to decode most of the latest RDS radios that contain their security codes within the main processor chip, as well as the more familiar eeprom based models.

Purchase the Starter Kit which includes bundled software to decode over 100 models for £375.00 + vat (additional software is available separately). Or, the Index Reader version which includes ALL available software for £275.00 + vat and covering literally hundreds of models (codes are supplied by phone or fax and cost £5.00 each or £10.00 for the Blaupunkt RDS models). You may also opt for a combination of the two systems tailored to suit exactly your requirements which can lead to even more profitability.

Contact us now for a free brochure and demonstration disk (please state 3.5" or 5.25"), or visit our Internet Web Site at <http://www.elecsys.com>. You can download info, price lists and demo software from this site.

Electronic Sound Systems

Hilton Road, Aycliffe Industrial Estate
 Newton Aycliffe, Co. Durham DL5 6EN
 United Kingdom

Tel: 44(0)1325 307442 Fax: +44(0)1325 300189

Email: elecsys@elecsys.demon.co.uk

DiSEqC

Explained

K. Rutherford describes the DiSEqC satellite TV switching system, which was devised by Eutelsat to simplify LNB selection and control various other satellite reception parameters

It's time we took a look at the DiSEqC (Digital Satellite Equipment Control) system to see what it does and how it works. To appreciate why it was devised, we have to go back a little to the days when Astra, at 19.2°E, reigned alone in the European DTH satellite TV firmament. It was all very straightforward in those days. The LNB could be switched between vertical and horizontal polarisation simply by altering its supply voltage. Provide it with 13V and it would pass on the vertically-polarised signals. Raise the supply to 18V and it passed on the horizontally-polarised signals instead. Since the LNB's supply went up the coaxial download, a neat installation was guaranteed with no need for any extra wiring. With a fixed dish system, nothing else was required.

Enter Hot Bird

Then Eutelsat launched its Hot Bird satellites at 13°E, tempting viewers away from Astra. A motorised dish system could of course be used for reception from the two orbital positions, but this is an expensive option when signals from only two fairly-closely spaced satellites are required. So the usual approach is to install a second LNB alongside the Astra one and realign the dish for a compromise setting or use a dual-focus dish.

The extra LNB requires power and must be able to feed its signals to the receiver. Many receivers have a second LNB input, with software to perform changeover switching between the inputs. But many receivers don't have this facility. So download swapping was necessary, or some sort of switching box had to be introduced to carry out the change over.

Dual-band Operation

At the same time that Hot Bird came along, signals were becoming available in the DBS band (11.7-12.5GHz) – Astra initially used the FSS band only (10.95-11.7GHz). The 'universal' LNB was introduced to provide reception in both bands, which have come to be known as 'high' and 'low' for obvious reasons. The universal LNB has two local oscillators, one working at 9.75GHz and the other at 10.6GHz. Some way of switching between the two was clearly required. So a 22kHz tone was added to the LNB supply: when the tone is present, the LNB switches to 10.6GHz local oscillator operation.

No one bothered about the high band until Astra 1E (11.7-12GHz) was launched. There had been some gnashing of teeth when Astra 1D extended the spectrum below the FSS band, providing sixteen channels between 10.7-10.95GHz. Where reception of 1D was required, it was sometimes necessary to change the LNB from one with a 10GHz local oscillator to one with a 9.75GHz local oscillator, the so-called 'enhanced' LNB.

The level of the 22kHz tone for switching to high-band operation was set at 600mV peak-to-peak ± 200 mV. Those wishing to switch to high-band reception get their receiver to produce the tone or use an adapter to produce it. Tone inserters have to be switched manually, or some receiver modification has to be devised. More recent receivers have built-in tone generation.

This is the way it was for some three years.

Switching Summary

The arrival of the universal LNB with its tone-switched low-/high-band operation made band selection simple while retaining the voltage switching for vertically- or horizontally-polarised signals. Few viewers bother with Astra 1E, but many have taken advantage of the 22kHz tone to switch between LNBs for Astra and Hot Bird – by using one of the tone-controlled switches that have appeared on the market. In fact at present tone switching is being used more often to select LNBs than to put an LNB into its high-band mode.

The need is now arising for those who use two LNBs to be able to switch one or both of them to high-band operation – as well as being able to select horizontal or vertical polarisation. This has been brought about by the advent of digital receivers which enable unencrypted services such as CNN to be viewed. The prospect of dig-

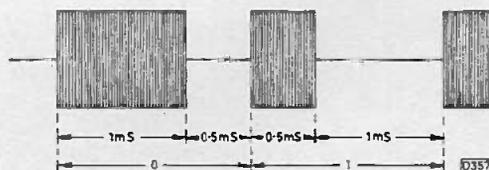


Fig. 1: DiSEqC zero and one bit codes.



Fig. 2: The basic byte sequence for DiSEqC Version 1.0 and 2.0 commands. Byte 1 is a framing code to alert the microcontrollers in the system. Bit A is one for a command from the master device, zero for a command from a slave device. Bit B is at one if an answer is required, zero if no answer is required. Bit C is at one to indicate a repeat command because no response has been received from the slave device, at zero to indicate that the command is not a repeat one. Byte 2 is for device address. The first four bits indicate which group of devices is being addressed, the second four bits indicating the specific device – four zeros indicate a command to all devices. Byte three tells the controlled device what to do. A fourth byte can provide further command information, e.g. dish position, skew control etc.

ital broadcasts from BSkyB, Cable and Wireless etc. will increase the need for head-end switching.

To summarise, we need a way of selecting H or V polarisation, high- or low-band LNB operation and between alternative LNBs. For future-proofing, we should have some additional control functions in reserve.

DiSEqC

Eutelsat has come up with the answer, a switching system called DiSEqC. It's hardly a snappy title, but it does mean what it says – digital satellite equipment control. It has already been accepted by equipment manufacturers as a new standard. The system has been designed so that its use can be extended without making existing installations obsolete.

The trick is to modulate the 22kHz tone, enabling it to carry digital information. A whole new set of commands can thus be devised and implemented. They are fed to the LNB(s) via the existing coaxial download.

Bursts of 22kHz tone are used to represent either zero or one. Fig. 1 shows the zero and one bit codes.

Levels

There are three levels of DiSEqC operation. These are known as Simple DiSEqC, DiSEqC Version 1.0 and DiSEqC Version 2.0.

Simple DiSEqC is used for switching between two universal LNBs. One long burst lasting 12.5msec or a series of nine one bits tells a DiSEqC switch to select LNB A or B, i.e. one satellite or the other.

Version 1.0 uses bytes of data for control purposes. It enables up to four universal LNBs to be controlled, with information on polarisation and oscillator frequency

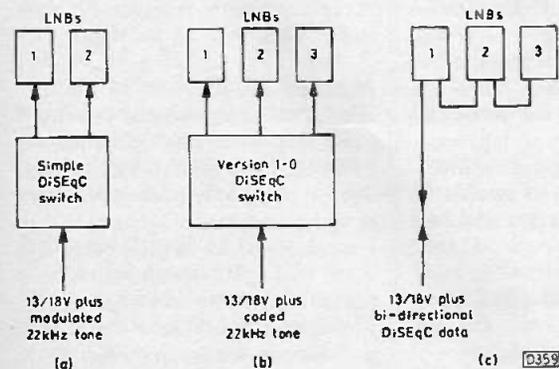


Fig. 3: Basic LNB control arrangements. (a) Simple DiSEqC with a switch to select between two LNBs. (b) A Version 1.0 switch controlling three LNBs. (c) An arrangement with three DiSEqC-compatible LNBs.

contained in the data stream. This is a unidirectional control system.

Version 2.0 is bi-directional, with provision for return messages from the controlled devices to the control section of the receiver. This enables the receiver to check the state of the controlled item. The system can thus be used for additional applications such as the control of a motorised dish. A single coaxial cable carries everything except the motor supply.

Fig. 2 shows the basic byte sequence used for Version 1.0 and 2.0 commands.

Receivers that implement Simple DiSEqC and Version 1.0 are already on the market, with ICs for the system in mass production. DiSEqC generators to enable older receivers to be used with the switching system are expected to become available.

Fig. 3 shows basic LNB control arrangements.

Trade Mark

Note that DiSEqC is a trade mark registered by Eutelsat. Development of the software for the control system was undertaken by Philips.

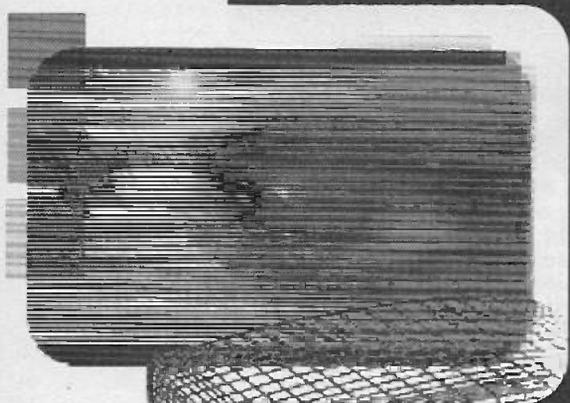
Opportunities at Mastercare

The Dixons Stores Group continues to do good business and remains the number one retailer of consumer electronics goods in the UK. Sales are once again up in all four of the company's chains – Currys, Dixons, PC World and The Link. Mastercare, the group's after-sales service subsidiary, contributes significantly to the company's success. It's responsible for product delivery, installation and repair: in short, it provides complete technical support.

Right now Mastercare has positions available at all technical levels. The company is seeking to recruit experienced supervisory, in-store, workshop and field service engineers. It runs a revolutionary training system that enables any engineer with an electronics qualification and fault-finding experience down to component level to join its brown goods team. Mastercare's award-winning Conversion Course is an intensive twenty-week programme that involves being taught and hands-on experience. It provides preparation for taking up one of the above positions.

Mastercare's commitment to training ensures that its staff are the best qualified in the business, whatever their speciality. Each engineer receives official training 'vouchers' which enable them to take up the training courses they need. In this way they can build on their existing knowledge, extending their proficiency to new technologies such as digital TV.

If the prospect of a secure job working for a company that invests in its staff to help it continue to provide its customers with the best possible service appeals to you, you can contact the Mastercare Recruitment Hotline on 01442 888 666. Or see the company's advertisement on page 75.



Reports from
Philip Blundell, AMIEEIE
Martin Abbott
Richard Flowerday
David Smith
Pete Gurney, LCGI
Giles Pilbrow
Michael Maurice
Alan J. Roberts
Terry Lamoon and
Stephen Leatherbarrow

Sharp DV5903H (D3000 Chassis)

One of these sets had a video problem – a digital video problem! The picture had a soot and whitewash look about it, and there was no sync or teletext activity. A video signal fed in via the scart connector didn't alter the symptoms.

Scope checks at the stand-up digital video unit showed that the correct composite video input was present at pin 39 of the VCU2136A AD/DA converter chip IC1404, but the digitised video output pins 5, 6, 7, 8 and 9 were not all active. As I was using a black-and-white staircase signal input, these pins should have all been active. I very carefully fitted a replacement VCU2136A chip, which restored the picture.

Since then I've had another VCU2136A failure. This time the symptom was a blank white raster. P.B.

Ferguson TX805 Chassis

For a dead set, check whether one of the series connected 68k Ω resistors RP41, RP42 or RP44 is open-circuit. Before you do so, check whether the mains bridge rectifier's reservoir capacitor CP31 is charged! P.B.

Sharp DV5937H

Field collapse was the problem with one of these sets. Checks

TV Fault Finding

around the field output chip IC500 showed that there was 42V at pin 8 but no 16V supply at pin 4. Fusible resistor R615 could have been open-circuit, but on this occasion D601 was open-circuit. Its part number is RH-DX0127CEZZ. P.B.

Philips 14TVCR240

If one of these combined TV/VCR units is dead, check the start-up voltage at pin 6 of the TDA4605 chopper control chip. The voltage here should be 10V when the power supply is running normally. You may find that it is low at around 3V. If so check the UG06B diode D6334 which is probably leaky. The Philips part number is 4822 130 83307. P.B.

Matsui 209R

You sometimes find that there is remote control lock-out with these sets, i.e. the remote control system will bring the set out of standby but won't accept any further commands. The thing to do is to replace the NVM3060-2201 memory chip IC403. Fit a genuine Matsui chip with the same mask code. It's advisable to replace C401 (1 μ F, 50V) and C417 (220 μ F, 16V) as well.

Before fitting the new chip, replace C606 (10 μ F, 50V) and C607 (47 μ F, 50V) in the power supply. Also cure any arcing, e.g. at the focus spark gap on the tube's base panel. Fit IC403 in a gold-plated 8-pin DIL socket – take care with handling. M.A.

Sony KVX2902U (BE3B Chassis)

When a valid signal was being received this set wouldn't accept commands from the remote control unit or the on-board keypad. This was useful, as it enabled us to note down the EVR settings before we replaced the EEPROM chip IC002.

Since a new memory chip didn't make any difference we then replaced the microcontroller chip IC001. This restored normal operation. Unusual, or what? R.F.

Toshiba 255R7B

The customer's complaint was that the picture fluttered and went all white. When we removed the back and examined the PCB we found that all the pins to the deflection coils were dry-jointed, with solder cracks round them. How the set could have worked remains a puzzle! When we'd resoldered the pins and fitted a new TDA3561A colour decoder chip there was a picture but no line or field lock. The original timebase generator chip was a TDA2579. As there was only a TDA2579A in the storage cupboard we fitted this. The set then produced excellent pictures. D.S.

Hitachi CPT1476R (NP84CQ Mk 3 Chassis)

This set was dead with no start-up voltage. The two 82k resistors R902 and R903 are suspect in this event, but were OK. The culprit was the 2.7V zener diode ZD910. A replacement brought the set back to life. D.S.

Matsui 1455

We had two of these sets in at the same time, both with field collapse. In the first one R310 (10 Ω , fusible) in the supply to the field driver and output stages looked OK but was open-circuit. In the second one R256 (39 Ω , fusible) had burnt up because the 12V zener diode D219 was short-circuit. These two components provide a supply for the multifunction chip IC202. D.S.

Alba CTV4800

No sound was the complaint. Voltage checks showed that there was no supply to the audio output

chip. As no shorts could be detected we replaced Q201 (2SC2703) which provides the supply. There was now a supply to the chip, but still no sound. So in went a new TDA1904 audio chip. This cured the fault. When extracting this chip, make sure that wire links W013 and W014 don't short to each other: the wires have enough play for this to happen. D.S.

Perdio CT1411

No picture was the complaint with one of these sets. When the first anode control was turned up the cause was found to be field collapse. There was no 12V supply as R414 (12Ω) was open-circuit and the 12V zener diode ZD401 was short-circuit.

With sets of this type, which use an Onwa chassis, it's advisable to replace certain components in the power supply – C909 (47μF, 25V), C910 (10μF, 50V) and the 8-2V zener diode ZD901. The capacitors should be 105°C types. Otherwise the HT could rise intermittently, though you will probably find that it is OK when checked. Unfortunately the circuit diagrams for Onwa sets are very difficult to read. D.S.

Hitachi CPT2476 (G6P Chassis)

"Poor sound" was the customer's complaint. The sound would very intermittently disappear, leaving a howl and hiss for good measure. The set had received previous attention: a quick check showed that the audio output transistors and just about every other associated component had been replaced.

On test, the fault showed up after several hours – there was a loud hiss. Oscilloscope checks showed that this originated in the IF section. The cause was obvious when the tinplate screen was removed from the board: the HA11485NT IF chip IC201 had virtually fallen out of the board because of dry-joints. Interestingly, the fault was not microphonic. A quick clean up and resolder cured the trouble. P.G.

Mitsubishi CT25A4STX (Euro 12 Chassis)

The fault was no tuning. Unless the 30V regulator IC955 or its feed resistor R951 is defective, which they weren't, it is an unusual fault with this chassis. The set entered the tuning mode, and the on-screen graphics indicated that tuning took place, but nothing appeared by way of a signal.

Checks around the digitally-controlled tuner revealed that pin BT was at 0V. The tuning voltage, which is generated internally, should be present here. The pin is decoupled by C102 (0.01μF, 25V) which proved to be the cause of the fault. P.G.

Huanya 37C-3

From the ringing and patterning that was present there was obviously an IF fault. Its cause, not surprisingly, was the IF chip IC201, which is type CD7607AP (the C is omitted from the marking on the chip). This device is hard to find. After a little research I decided that it's exactly the same as the TA7607AP. One of these was fitted, clearing the fault. P.G.

Matsui 2091/GoldStar CIT2180G

This set would come out of standby when the remote control unit was used but not when the set's on/off switch was used. The cause was transistor Q706, which was leaky base-to-emitter. A 2SC1815 proved to be a suitable replacement. G.P.

Sony KVB2912U (AE2 Chassis)

There was no teletext: the set would go into the text mode, but the only things displayed were the clock and a caption at the bottom of the screen. This said that there was no text available. The cause of the fault was the SDA5248-5C1 text decoder chip IC101 on board V. The part no. is 8-759-166-41. G.P.

Matsui 1498

There was sound but no picture. R430 (180kΩ, 1W) in the line output stage was open-circuit. G.P.

JVC AV21H1EK (JX III Chassis)

This set blew the line output transistor Q502 at switch on. One of the EW modulator diodes, D502 (BY228), was short-circuit. G.P.

Toshiba 255T7B

There was no picture: when teletext was selected, only a very dim image could be discerned. Scope checks showed that there were no RGB outputs from the TDA3561A colour decoder chip Q501. Voltage checks around this IC revealed that pin 24 was at about 0.5V instead of 9.6V. C511 (10nF ceramic), which is connected to this pin, was leaky. G.P.

Sony KVM2131U

There was pincushion distortion and

the pin-amp and H-size controls on board D1 had very little effect. C808 (47nF, 250V) was open-circuit. It's in parallel with one of the EW modulator diodes. G.P.

Panasonic TX21V2

The left-hand speaker would crackle very loudly whenever any part of the set was touched. The cause of the trouble was traced to R2081, a 10kΩ surface-mounted resistor on PCB B. When it had been removed we found that it was cracked. G.P.

Toshiba 2835DB

The on-screen display was white instead of green. When teletext was selected a peak white raster appeared. It was so bright the set shut down. Scope checks showed that RGB signals reached the TA8808BN colour decoder/time-base generator chip IC501, but the output was incorrect. A new chip, part no. B0384303 cured the fault. G.P.

Mitsubishi CT25A3STX (Euro 12 Chassis)

I'd had to replace the line output transistor a few weeks previously. This usually fails because the 47μF, 50V chopper drive coupling capacitor C906 becomes leaky. As a result, the HT can rise momentarily.

This time the problem was intermittent sound. The cause was dry-joints in the IF can. A blanket resoldering job cleared the trouble. I wonder if this will become a common fault? M.M.

Grundig CUC3400 Chassis

This portable set didn't produce any sound. The cause was simple: R367 was open-circuit and C366 short-circuit. These components decouple the supply to the audio output stage. M.M.

Philips G110 Chassis

After rebuilding the power supply there was a good picture but no sound. F2 showed on the screen. There was also no response to commands via either the front panel keys or the remote control unit. According to the service manual F2 means that there's a timing error, microcontroller chip IC7720 being a possible cause.

This was not the case however, the lack of sound being the clue. A single black wire supplies 9V to the Nicam board. It's connected to the cathode of D6661 on the component side of the main PCB. The wire had become detached – resol-

dering it restored full operation. M.M.

Toshiba 175T9B

This set came in because the picture was too high. There's no width or set-HT control in this chassis. A quick visual check in the line output stage revealed all. C464 (680pF), which tunes the line output stage, had at some time broken down and been replaced with a 9,100pF capacitor. Fitting the correct capacitor from Toshiba cured the width problem, but there was now lack of height. A height control tweak corrected this.

Whoever had fitted that capacitor shouldn't be repairing TV sets. The damage that might have been caused by higher (approximately 30 per cent) voltages could have caused severe damage with the risk of fire. M.M.

Mitsubishi Euro 12 Chassis

This set, a CT25A2STX, would sometimes work then switch to standby. At other times all it would do is to come on in standby. When it did work there was a regulation problem - the picture width varied with the brightness.

I always think that Mitsubishi sets are a little untidy inside, with yards of cabling that has to be unclipped before the chassis can be put into a reasonable servicing position. A check on the HT output from the power supply showed that it was bobbing around between about 145V and 178V. C906 (47µF, 50V), which is in the chopper transistor's base drive circuit, had made a mess of the panel and, when checked with a bridge, read about 10µF. C920 (100µF, 25V) had gone the same way. Once replacements, rated at 105°C, had been fitted everything was OK. A.J.R.

Philips G90AE Chassis

When this set was switched on there was a perfect picture but no sound. P1 was displayed in the top right-hand corner of the screen, followed a few seconds later by F7 at the top left-hand corner. Programme change was not possible, and the LED at the front blinked orange and green. After about five minutes the F7 disappeared, the LED stopped blinking, the sound returned and everything was OK.

Now the F7 code relates to a teletext fault, so I checked the supplies to the text chips. These were OK. It was time to bring out the

scope. A look at the supplies showed that they were clean. The next step seemed to be to check at IC7800's reset pin. At switch-on the voltage stayed high. It then started to fall from around 2.8V to 0.7V some five minutes later, when everything began to work.

The reset pulse is generated from the output of a 5V series regulator. At switch on this output was distorted by hefty 2V spikes, which then slowly reduced in amplitude. The regulator's 8.3V input is derived from the line output transformer. The reservoir capacitor here, C2843 (220µF), was the obvious suspect. It measured only 52µF when checked with a bridge. A new 220µF, 16V capacitor cured the fault. A.J.R.

Hitachi CPT1455 (NP84CQ2 Chassis)

This portable came in with no sound. Everything else was perfect. As the output stage was OK, the TDA4503 signal processor chip was suspect. When a new one had been fitted there was plenty of volume. A nice, easy one for a change! A.J.R.

Genexxa Portavision

I wonder where they invent these strange names?! This little 6in. colour portable had apparently been bought from a Tandy's outlet about a year previously. It seemed doubtful whether it would be worth looking at, but it had been booked in by Honey Bunny while I was out. It was dead, and when I removed the casing I found that the on/off switch had burnt out. This is not surprising: it was a blade type, similar to the ones you find in cheap transistor radio receivers, linked to the volume control. I raided the scrap box, where I found a similar type that fitted quite well.

The TV set then worked, but the switch sparked very badly when it was operated. I expect that it will be back next year with the same problem. But the customer was happy, as Tandy didn't want to know. A.J.R.

Philips 3LC2050

I've handled a few of these 3in., pocket-sized LCD-screen portable TV sets without too much difficulty. They also incorporate a stereo FM radio. The electronics are mostly on a single PCB. This one came in because it had no TV sound. After carefully dismantling it, the set can be run with access to both sides of the PCB. Vision and sound

IF processing is carried out by a UPC1416G surface-mounted chip, IC71. Its pins are easy to get at, and it was soon apparent that plenty of sound went in at pin 13 (from the sound detector) but none came out at pin 14, which feeds the audio amplifier. A new chip restored the sound.

If you should decide to look at one of these sets, beware of the supply to the display's backlight, which consists of a bright fluorescent tube. The HT (about 150V, at low current) can remain for ages when this tube fails. It packs quite a punch, as I found out on one occasion. Fortunately the HV circuitry is all contained in the fold-up screen, so for normal servicing you don't need to go near it.

Here's a quickie for no sound at all (TV or radio): check the 10Ω surface-mounted resistor R120. I've had this fail on a couple of occasions. A.J.R.

Grundig G1000 Chassis

This set wouldn't power up, and there was no LED light at the front. The power supply seemed to work, but was not receiving its start-up signal from the microcontroller circuit. While checking in this area I came to TR540 (BC847) whose base was held at 0.3V and wouldn't change with the standby signal. When I removed TR540 for test I found that it was leaky. A replacement got the set going again. T.L.

Hitachi C2565TN

The screen had no picture but plenty of flyback lines. There was not a lot of life coming from IC1401. A replacement restored the picture. T.L.

Sanyo CBP2180A

I've had field collapse with several of these sets. If a quick check at the field output chip IC451 shows that its supply is missing, go to the feed coil L451 (33µH). It can be dry-jointed or open-circuit. Something to watch out for. T.L.

Grundig GT2105

This set seemed to be dead. A quick check on the HT feed to the line output stage revealed a pulsating voltage. The line output transistor Tr302 was short-circuit. T.L.

Ferguson ICC9 Chassis

One of these sets was stuck in standby. While doing the standard checks on the supplies I found that the 5V feed to pin 24 of the microcontroller chip IR01 was low. The cause was TR87 (BC858B). It's

worth replacing TR85 (BC848B) as well when you get this problem. T.L.

Grundig G1000 Chassis

If the problem with one of these sets is no green, check TR802 (BC847) which goes leaky. It's a surface-mounted device. It is also worth checking TR904 (BF423) on the CRT base panel. T.L.

Toshiba 2857

This set came in because of a sync fault. In addition the picture would go blank. Gentle tapping produced a reaction. I eventually traced the cause of the trouble to the 27MHz crystal XT01, whose connections were very poor. A replacement solved the problem. T.L.

Philips Anubis A Chassis

After fitting a rebuild kit (SBC7021) the power supply wouldn't regulate. We could build up the supply to the set via a variac until the HT reached 95V: any further increase in the mains voltage resulted in overheating of the 150Ω surface-mounted resistor R3551 and, usually, failure of the BC848C surface-mounted transistor TR7537. To get the power supply to function

correctly we had to replace the three 36V s-m zener diodes D6557-9, also the 18V s-m zener diode D6555. To restore the set to life we also had to fit a new line output transformer.

Incidentally the surface-mounted transistors we've come across usually have printed on them a single letter/digit code, e.g. G3, M1 etc. Does anyone have a decode list for these? Our enquiries have led to nought. S.L.

Ferguson TX90 Chassis

A recent case of intermittent loss of sync was cured by replacing R130 (820Ω). In the fault condition the voltage at pin 26 of the TDA4500 chip IC102 was high at around 3.6V. The normal reading is 2.4V. S.L.

Nikkai TLG2501

EW distortion was the problem with this set. On investigation we found that R154 was open-circuit. As this is in the DC feed to the TDA8145 EW control chip we also replaced this item, along with the 100kΩ potentiometer RV105 which was faulty. The cause of all these problems was a defective EW coil, L103. We have been told that this

is not an unusual occurrence with these sets. S.L.

Mitsubishi CT2554TX

This set had a problem on the secondary side of the power supply, where the 650mA circuit protector Z902 was open-circuit. The 5V regulator it feeds was also open-circuit. This regulated supply is used by the teletext panel, and a check showed that there was a short across the rail. The cause was traced to the MAB8461-W115 chip IC7704.

When we'd replaced these components there was no sync. The cause was again on the text board, where IC7706 (SAA5243P/E) was responsible. S.L.

Ferguson B14R (TX80 Chassis)

This set came in dead with some whistling. When we increased the first anode supply we found that there was field collapse. A check on the supplies derived from the line output transformer showed that the 13V supply was missing. This was simply because the safety resistor RP68 (0.68Ω) was open-circuit. We could find no reason for its failure. S.L.

MANOR SUPPLIES

Where can you buy your TV/VCR spares and discuss your fault with a fellow engineer at the same time?

With Manor Supplies you can!!

Quality TV/VCR spares supplied for engineers by engineers.

SPECIALISTS in line output TX's. When you buy one ask for *KONIG*, in our opinion the best replacement transformer you can get!

- * Line output transformers * Triplers *
- * Remote Controls * On/Off switches *
- * Semiconductors * VCR spares *
- * Various Components for the TV/VCR Trade *
- * We stock: Remotes, Triplers, On/Off switches, Semi's & various TV/VCR spares *

CRT Tester & Reactivator Kit £68.00+VAT

Line Output Transformer Tester £26.50+VAT

Video to RGB Converter £104.00+VAT

* Shop * Mail Order *

172 West End Lane London NW6 1SD
Tel: 0171 794 8751/7346 Fax: 0171 431 5778

All major credit/charge cards accepted

TELETEST



Test Pattern Generators for TVs & PC Monitors

TELETEST
60 day
no quibble
money
back
guarantee!

Earn extra money repairing PC Monitors



TELETEST-2 for TVs and VCRs.

TELETEST-2 & TELETEST PC: £149.95 each
Carry Case & PSU: £9.95 each.
UK P&P £5.95, Overseas £15.95 Prices ex VAT

Still essential for Channel 5 retuning problems

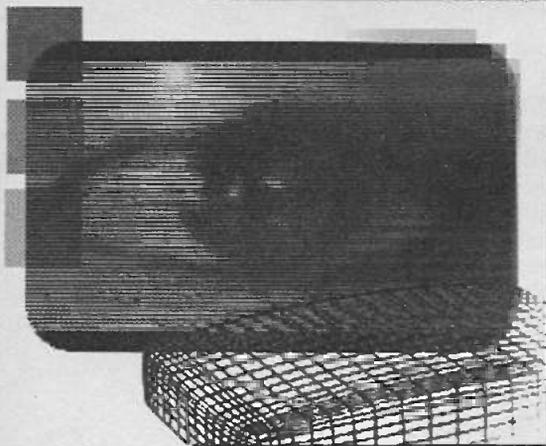
Web site: <http://www.ozan.co.uk>

Still essential for Channel 5 retuning problems

OZAN, FREEPOST, Wimborne, BH21 7BR

Freecall: 0500 009070 7am-10pm everyday

FREE info packs. Credit card sales. Technical help.



**Reports from
Michael Dranfield
Russ Phillips
and
Adrian Spriddell**

Samsung CVM496P

This monitor came in dead with the 2SC4744 line output transistor short-circuit. A new transistor and a service manual were ordered from Samsung. The transistor was fitted and, as no obvious cause of the failure could be found (dry-joints etc.), we switched on. This time the monitor came on but straight away tripped out to standby. We found that pin 13 of IC401 was going high to shut down the line oscillator. D459 was switching on because the line flyback pulses were excessive.

The cause of the problem was traced to the IRF9610 FET device Q459, which is in series with the primary winding of the line output transformer. It should regulate the 150V (B+) supply but had gone dead short. M.Dr.

Acorn AKF18

If one of these is dead with either the mains or the internal fuse (F801, 4AT) open-circuit, replace the mains rectifier diodes D801-804. R.P.

Acorn AKF40

When one of these is dead, check resistors R3420 and R3421 (both 750k Ω) which may have gone high in value or open-circuit. The BUT11AF chopper transistor Tr7432 may be short-circuit. Check the posistor. R.P.

Acer 7015

No colour was the complaint. Actually there was colour, but usual-

Monitors

ly only two (any two!) out of the three. So the display had a pronounced cast, which varied unpredictably. The annoying thing was that initially the fault occurred only in situ in the office, never in the workshop. The cause? The connector and PCB attachment had become stressed where the user had shoved the monitor back against the wall, opening up cracks along the card, around the D-MIN connector. Resoldering these items cured the fault. A.S.

Wescom GW500E

The problem was field collapse. A simple one: the field output IC had failed, also D501. A.S.

AOC CM336

The picture would close up. It looked as if the monitor suffered from line phase drift with temperature change. Heating and freezing Q852 and C945 produced a line-frequency change. We replaced both these items, also the associated 8-2V zener diode ZD151. When the 31k Ω phase and F/V presets had been readjusted we had a solid display. A.S.

Idek MF8617A

The CRT heaters were not alight and there was no menu display. R927 (SOC3A15) on the switch-mode 2 card was open-circuit. No reason for its failure could be found. A.S.

Compaq System 3200 Presario 460

This terminal was dead. The power supply was in the over-current mode because the line output transformer had failed. With one of these it should be an economic proposition to fit a Philips type AT2090/36, which seems to be readily available. A.S.

Amstrad CTM644-2

No operation on the primary side of the power supply called for the usual items to be replaced - R501 and the STK7308 chip IC501. This

time the 3-6V zener diode D507 had failed as well. A.S.

Escom EM1448LRPD

If the monitor is dead though buzzing, with the power supply in the over-current mode and a short-circuit SGSF464 line output transistor, replace C408 and C414 as well.

Excessive width and poor EW correction usually means that the BDT63C transistor is leaky. A.S.

Royal CX1469L

The customer complained that her picture would sometimes fade away to nothing. On test we found that the fault would often occur first thing after power-up, clearing a few minutes later. The display was fading up rather than down! We eventually traced the cause to an intermittent preset skeleton contrast control. A.S.

Mitsubishi XC1440ES

When this monitor was switched on the power supply fired up all right then went straight off again. After a brief investigation into what could be tripping, the overvoltage or over-current protection, someone had the presence of mind to short out the mains on/off switch, which turned out to have a rather high power factor at the neutral pole. Replacing it solved the riddle. A.S.

Lite-On CM1414EN

If the power supply has blown up you will probably have to replace the following items: D801-4 (four BY133 diodes); C828 (47 μ F); D806 (BZY55C18); the K794 FET Q801; the UC3842 chopper control chip; the 4N35 optoisolator; D818 (PR1503); R825 (0-39 Ω , 1W); and a 4AT fuse. A word of warning: it may be that the catastrophe was caused by arcing in the line output transformer. A.S.

Samtron SC428SL

If the primary side of the power supply is in order but there's no switch-mode operation, replace the start-up resistors R102 and R103. A.S.



Distributors of Electronic Components

TRANSISTORS/LINEAR ICs

Table listing electronic components including transistors and linear ICs. Columns include Part, Price, Part, Price. Includes sub-sections for RECTIFIER DIODES, I.C. SOCKETS, ZENER DIODES, VOLTAGE REGULATORS, and LEDs.

K.P. HOUSE UNIT 15, POP IN COMMERCIAL CENTRE, SOUTHWAY, WEMBLEY, MIDDLESEX HA9 0HB, ENGLAND. Telephone: 0181-900 2329. Fax: 0181-903 6126. E-Mail: grandata.ltd@btinternet.com

PLEASE PHONE US FOR TYPES NOT LISTED AS WE
HAVE OVER 5,000 ITEMS IN STOCK.
QUOTATIONS GIVEN FOR LARGE QUANTITIES

LINEAR ICs

Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
HA13001	110p	LA2800	350p	LA7096	200p	LF353	48p	MC3302	50p	SAB3029	525p	STK3102 II	600p	STK5478	380p	STR16006	500p	TA7281	200p
HA13002	200p	LA3120	200p	LA7113	275p	LF355	60p	MC3401	45p	SAB3035	275p	STK3106	230p	STK5479	300p	STR17005	500p	TA7282	160p
HA13006	400p	LA3150	200p	LA7116	125p	LF357	70p	MC3423P	100p	SAB3036	725p	STK3122 III	725p	STK5481	470p	STR20005	450p	TA7210	200p
HA13007	300p	LA3160	120p	LA7123	120p	LF358	120p	MC3488AP	250p	SAB3042	825p	STK3152 II	900p	STK5482	285p	STR20012	450p	TA7283	200p
HA13108	280p	LA3161	40p	LA7210	80p	LH2426S	600p	MC34063AP	300p	SAB3044	825p	STK4017	500p	STK5483	540p	STR30123	330p	TA7284	400p
HA13117	175p	LA3210	65p	LA7212	150p	LM301	26p	MN1220T	600p	SAB3064	130p	STK4019	480p	STK5486	450p	STR30130	330p	TA7288	200p
HA13118	140p	LA3226	60p	LA7214	150p	LM311	35p	MN1226	450p	SAB3209	225p	STK4021	380p	STK5487	525p	STR30135	275p	TA7291P	200p
HA13119	140p	LA3246	75p	LA7220	125p	LM319	165p	MN1228	600p	SAB3210	250p	STK4024 II	650p	STK5488	480p	STR30120	400p	TA7291P	325p
HA13127	350p	LA3200	140p	LA7222	110p	LM324	30p	MN1278	1300p	SAB6456	125p	STK4025	530p	STK5490	450p	STR30123	450p	TA7292P	200p
HA13128	400p	LA3301	10p	LA7234	110p	LM325Z	120p	SA1280	70p	SAB6468	225p	STK4026	450p	STK5492	450p	STR30125	550p	TA7294	450p
HA13130	450p	LA3361	100p	LA7225	250p	LM339	35p	MN3004	600p	SAB8051AF	700p	STK4028	500p	STK5495	450p	STR30125	550p	TA7299	200p
HA13135	500p	LA3365	100p	LA7292	275p	LM348	50p	MN3005	2000p	SBD2003	400p	STK4025	650p	STK5495	450p	STR40050	350p	TA7300P	75p
HA13139	600p	LA3370	70p	LA7294	200p	LM358	45p	MN3011	4000p	SOD2004	325p	STK4032 II	510p	STK5495	450p	STR40115	600p	TA7301	100p
HA13150A	1150p	LA3373	70p	LA7295	160p	LM358	80p	MN3101	110p	SOD2005	700p	STK4034 X	925p	STK6316	300p	STR40190	330p	TA7307	700p
HA13151	875p	LA3375	300p	LA7297	120p	LM381	190p	MN3102	110p	SOD2007	300p	STK4036	470p	STK6324B	600p	STR43111	950p	TA7310	100p
HA13403	400p	LA3376	300p	LA7305A	120p	LM382	130p	MN3207	375p	SIX2008	400p	STK4038	650p	STK6327	1200p	STR44115	475p	TA7312	120p
HA13406	75p	LA3380	60p	LA7308	70p	LM386	60p	MN3208	50p	SOD2112	450p	STK4039 II	800p	STK6331	800p	STR4511	550p	TA7313	100p
HA13408	350p	LA3390	250p	LA7311	200p	LM387	100p	MN6300B	350p	SOD2120	200p	STK4042 II	800p	STK6331	850p	STR50020	350p	TA7314	175p
HA13412	600p	LA3400	250p	LA7320	120p	LM389N	105p	MN6163A	700p	SOD2131	225p	STK4044	800p	STK6607	400p	STR50032	550p	TA7314	175p
HA13426	500p	LA3401	90p	LA7323	325p	LM393	45p	MTA001M	600p	SOD2208	450p	STK4046	950p	STK6722	725p	STR50103A	260p	TA7315	200p
HA13441	400p	LA3410	150p	LA7330	350p	LM431	45p	NE555	20p	SOD2412	775p	STK4048	1280p	STK6732	1000p	STR50113	500p	TA7317P	120p
HA13442	75p	LA3412	170p	LA7332	275p	LM4710	45p	NE566	45p	SOD2432	775p	STK4050 II	1600p	STK6822	900p	STR50115	600p	TA7320	200p
HA17524	250p	LA3600	60p	LA7332	225p	LM723	40p	NE588	80p	SOD5241	725p	STK4050 II	1600p	STK6822	900p	STR50115	600p	TA7322	130p
KA2102	100p	LA3805	100p	LA7340	300p	LM741DIL	18p	NE585	110p	SOD5343	1450p	STK4055	650p	STK6932	625p	STR50213	500p	TA7323	80p
KA2130	150p	LA3807	125p	LA7376	150p	LM741MET	45p	NE567	115p	SOD5640	200p	STK4101	500p	STK6962	275p	STR53041	400p	TA7324	75p
KA2131	110p	LA4030	180p	LA7391	550p	LM747	55p	NE571	290p	SOD5642	450p	STK4111	500p	STK6962	275p	STR53041	400p	TA7325	90p
KA2206	150p	LA4037	140p	LA7520	200p	LM1017	200p	NE592	85p	SOD5644	500p	STK4112	500p	STK6981B	600p	STR55014	450p	TA7326	200p
KA2209	125p	LA4203	140p	LA7520	200p	LM1038	140p	NE593	85p	SOD5655	500p	STK4121	480p	STK6982	600p	STR56041	550p	TA7328	110p
KA2210	230p	LA4051	160p	LA7535	175p	LM1049N	350p	SA1000	350p	SOD5655	500p	STK4122	560p	STK6982	600p	STR56041	550p	TA7330P	80p
KA2212	85p	LA4100	85p	LA7545	160p	LM1203	225p	SA11004	650p	SLA7020M	450p	STK4131	480p	STK7215	420p	STR59041	300p	TA7330P	80p
KA2213	130p	LA4101	80p	LA7550	275p	LM1203AN	225p	SA1005	325p	SLA7020M	450p	STK4132 II	600p	STK7217	470p	STR6001	525p	TA7331P	80p
KA2214	100p	LA4102	100p	LA7555	100p	LM1875T	375p	SA11006	300p	STA341M	180p	STK4133 II	750p	STK7225	500p	STR80145	475p	TA7333	100p
KA2224	50p	LA4110	120p	LA7620	500p	LM1881N	375p	SA11008	450p	STA401A	220p	STK4141 II	420p	STK7226	600p	STR8145	375p	TA7335	85p
KA2244	75p	LA4120	270p	LA7680	675p	LM1886	250p	SA10110	400p	STA403A	270p	STK4142	530p	STK7251	500p	STR90120	425p	TA7336	175p
KA2281	100p	LA4138	105p	LA7878	650p	LM1899	300p	SA11024	250p	STA405A	280p	STK4147 II	1450p	STK7253	600p	STR91206	600p	TA7337P	150p
KA2283	100p	LA4140	60p	LA7878	650p	LM1894N	200p	SA11025	250p	STA431A	250p	STK4151	680p	STK7258	440p	STR9308	300p	TA7339P	175p
KA2284	100p	LA4142	65p	LA7878	650p	LM1895N	275p	SA11026	400p	STA432A	220p	STK4152	650p	STK7309	400p	STRD1706	360p	TA7341	250p
KA2309	175p	LA4180	100p	LA7801	100p	LM2901N	35p	SA11027	400p	STA434A	270p	STK4161	650p	STK7310	470p	STRD1806	360p	TA7342P	75p
KA2401	150p	LA4182	110p	LA7802	300p	LM2902N	40p	SA11029	160p	STA435A	270p	STK4162	550p	STK7348	400p	STRD1816	360p	TA7343	120p
KA2412	225p	LA4183	100p	LA7806	260p	LM2903N	40p	SA11044	325p	STA431C	220p	STK4164 II	1175p	STK7356	425p	STRD1906	550p	TA7347P	120p
KA2912	125p	LA4180	150p	LA7820	100p	LM3909	100p	SA11044	400p	STA456C	240p	STK4172 II	680p	STK7358	440p	STRD3035	300p	TA7348P	125p
KA2913A	175p	LA4182	180p	LA7823	200p	LM3911N	200p	SA11056	300p	STA471	210p	STK4181	680p	STK7402	560p	STRD4200	550p	TA7349P	175p
KA2914A	200p	LA4190	300p	LA7824	130p	LM3914	160p	SA11057	375p	STA901M	280p	STK4182 II	750p	STK7402	650p	STRD4512	400p	TA7354P	60p
KA2242	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11058	225p	STK0025	420p	STK4191	700p	STK7408	675p	STRD5441	475p	TA7357	340p
KA2243	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11059	225p	STK0029	360p	STK4192	700p	STK7410	1500p	STRD5541	450p	TA7358	85p
KA2244	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11060	225p	STK0030	360p	STK4193	700p	STK7410	1500p	STRD5541	450p	TA7359	85p
KA2245	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11061	225p	STK0031	360p	STK4194	700p	STK7410	1500p	STRD5541	450p	TA7360	85p
KA2246	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11062	225p	STK0040	510p	STK4221 II	1200p	STK7561	650p	STRD610	450p	TA7362	150p
KA2247	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11063	225p	STK0049	510p	STK4221 II	1200p	STK7562	1000p	STRD6802	475p	TA7364	175p
KA2248	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11064	225p	STK0050	620p	STK4241	1250p	STK7563	800p	STRD6801	650p	TA7365	150p
KA2249	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11065	225p	STK0059	820p	STK4241 V	1050p	STK7573	400p	STRM6845	900p	TA7368P	65p
KA2250	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11066	225p	STK0060	820p	STK4241 V	1050p	STK7573	400p	STRM6845	900p	TA7368P	65p
KA2251	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11067	225p	STK0061	820p	STK4241 V	1050p	STK7573	400p	STRM6845	900p	TA7368P	65p
KA2252	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11068	225p	STK0062	820p	STK4241 V	1050p	STK7573	400p	STRM6845	900p	TA7368P	65p
KA2253	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11069	225p	STK0063	820p	STK4241 V	1050p	STK7573	400p	STRM6845	900p	TA7368P	65p
KA2254	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11070	225p	STK0064	820p	STK4241 V	1050p	STK7573	400p	STRM6845	900p	TA7368P	65p
KA2255	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11071	225p	STK0065	820p	STK4241 V	1050p	STK7573	400p	STRM6845	900p	TA7368P	65p
KA2256	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11072	225p	STK0066	820p	STK4241 V	1050p	STK7573	400p	STRM6845	900p	TA7368P	65p
KA2257	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11073	225p	STK0067	820p	STK4241 V	1050p	STK7573	400p	STRM6845	900p	TA7368P	65p
KA2258	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11074	225p	STK0068	820p	STK4241 V	1050p	STK7573	400p	STRM6845	900p	TA7368P	65p
KA2259	100p	LA4192	140p	LA7830	90p	LM3915	160p	SA11075	225p	STK0069	820p	STK4241 V	1050p	STK7573	400p				

LINEARICs/JAPANESE TRANSISTORS

Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
TA8164P	100p	TA1180	120p	TA2760	400p	TA4661	225p	TA8391	675p	UPC100C	130p	2SA771	90p	2SA1177	25p	2SB561	30p	2SC738	15p
TA8184P	350p	TA1185A	190p	TA2780	600p	TA4670	475p	TA8395	360p	UPC109	950p	2SA773	50p	2SA1179	20p	2SB562	20p	2SC739	150p
TA8189P	130p	TA1190	80p	TA2791	275p	TA4680	375p	TA8405	550p	UPC1018	170p	2SA777	35p	2SA1182	20p	2SB563	20p	2SC740	110p
TA8200AH	325p	TA1200B	80p	TA2795	150p	TA4685	250p	TA8415	780p	UPC1020	200p	2SA778	10p	2SA1184	120p	2SB565	90p	2SC762	150p
TA8210A	300p	TA1206	50p	TA2822M	400p	TA4700A	80p	TA8416	625p	UPC1023	60p	2SA781	150p	2SA1185	200p	2SB566	50p	2SC783	85p
TA8205	220p	TA1235	300p	TA2824	85p	TA4714C	350p	TA8417	560p	UPC1024H	275p	2SA786	25p	2SA1186	500p	2SB569	30p	2SC790	50p
TA8207K	175p	TA1236	240p	TA2840	200p	TA4716C	450p	TA8421	300p	UPC1025	230p	2SA794	50p	2SA1198	40p	2SB560	500p	2SC792	380p
TA8210	260p	TA1251	150p	TA3047	100p	TA4718A	250p	TA8425	550p	UPC1026	95p	2SA798	30p	2SA1201	40p	2SB561	60p	2SC805	225p
TA8211AH	200p	TA1270	150p	TA3048	130p	TA4725	750p	TA8432	550p	UPC1028	150p	2SA812	60p	2SA1202	20p	2SB562	20p	2SC806	225p
TA8214K	260p	TA1327	200p	TA3080	300p	TA4730	750p	TA8435	600p	UPC1031	150p	2SA816	20p	2SA1204	225p	2SB563	40p	2SC829	15p
TA8215	300p	TA1328	200p	TA3083	200p	TA4740	200p	TA8440	300p	UPC1032	60p	2SA816	70p	2SA1206	60p	2SB563	45p	2SC839	20p
TA8215H	300p	TA1410	220p	TA3190	100p	TA4814A	300p	TA8442	200p	UPC1035C	110p	2SA820	20p	2SA1207	25p	2SB563	80p	2SC879	200p
TA8217P	120p	TA1412	36p	TA3301B	400p	TA4850	475p	TA8443	350p	UPC1043C	125p	2SA825	20p	2SA1208	70p	2SB564	12p	2SC870	100p
TA8220AH	500p	TA1506	275p	TA3310	120p	TA4851	325p	TA8444	200p	UPC1048	20p	2SA836	20p	2SA1209	100p	2SB564	20p	2SC871	175p
TA8221AH	600p	TA1508	175p	TA3410	150p	TA4852	325p	TA8451	325p	UPC1161	110p	2SA837	200p	2SA1210	120p	2SB564	45p	2SC300B	30p
TA8225H	475p	TA1512	170p	TA3420	200p	TA4856	200p	TA8453	200p	UPC1167	125p	2SA839	110p	2SA1215	600p	2SB569	35p	2SC330	15p
TA8227	250p	TA1514A	325p	TA3502	360p	TA4881	200p	TA8461	950p	UPC1170	200p	2SA844	20p	2SA1216	550p	2SB573	100p	2SC396	300p
TA8229K	200p	TA1515A	200p	TA3504	300p	TA4935	200p	TA8469	225p	UPC1173	200p	2SA844	25p	2SA1217	100p	2SB576	85p	2SC941	15p
TA8400P	200p	TA1516Q	360p	TA3505	275p	TA4940	200p	TA8490	250p	UPC1178C	250p	2SA854	30p	2SA1220	75p	2SB588	90p	2SC944	140p
TA8410K	200p	TA1517	150p	TA3506	260p	TA4942	200p	TA8492	250p	UPC1180C	250p	2SA854	30p	2SA1221	90p	2SB593	90p	2SC945	10p
TA8419P	200p	TA1520	200p	TA3507	450p	TA4944	175p	TA8493	250p	UPC1182	300p	2SA854	30p	2SA1222	50p	2SB593	200p	2SC950	40p
TA8432	200p	TA1519A	200p	TA3510	200p	TA4950	100p	TA8497	600p	UPC1186	80p	2SA872A	60p	2SA1225	250p	2SB597	20p	2SC959	225p
TA8505N	350p	TA1520	276p	TA3520	200p	TA5030A	100p	TA8730	225p	UPC1187	150p	2SA879	30p	2SA1232	180p	2SB598	20p	2SC980	40p
TA8506N	350p	TA1521	210p	TA3530	200p	TA5140A	200p	TA8732	300p	UPC1188H	350p	2SA884	100p	2SA1237	25p	2SB727	100p	2SC982	20p
TA8607P	320p	TA1522	110p	TA3540	200p	TA5330T	300p	TA8735	175p	UPC1191	150p	2SA885	45p	2SA1239	30p	2SB734	35p	2SC1001	950p
TA8611AN	250p	TA1524	200p	TA3560	250p	TA5332T	150p	TA8741	550p	UPC1198H	200p	2SA887	20p	2SA1240	45p	2SB737	20p	2SC1008	20p
TA8615A	300p	TA1529	200p	TA3560	60p	TA5500	400p	TA8808T	325p	UPC1210	160p	2SA893	15p	2SA1242	40p	2SB739	22p	2SC1010	226p
TA8622N	500p	TA1540	420p	TA3561A	300p	TA5600	450p	TA8809T	360p	UPC1215V	125p	2SA896	26p	2SA1244	120p	2SB744	66p	2SC1012	75p
TA8632N	560p	TA1541	500p	TA3562	260p	TA5660P	250p	TA8905	400p	UPC1222	130p	2SA899	40p	2SA1245	55p	2SB750	60p	2SC1013	170p
TA8644N	425p	TA1542	250p	TA3562T	200p	TA5700	200p	TA8905	400p	UPC1228	120p	2SA900	40p	2SA1246	100p	2SB753	100p	2SC1016	140p
TA8645A	375p	TA1543	200p	TA3563	300p	TA5702	200p	TA8905	400p	UPC1237	225p	2SA904	20p	2SA1248	35p	2SB754	80p	2SC1030	150p
TA8653N	150p	TA1552Q	350p	TA3564	325p	TA5708	275p	TA8905	400p	UPC1228HA	45p	2SA907	650p	2SA1249	100p	2SB764	30p	2SC1046	250p
TA8655AN	900p	TA1553AQ	325p	TA3565	220p	TA5709	375p	TA8905	400p	UPC1230	200p	2SA909	500p	2SA1252	20p	2SB765	70p	2SC1047	20p
TA8690N	700p	TA1555Q	375p	TA3566	280p	TA5800	850p	TA8905	400p	UPC1237HA	70p	2SA912	70p	2SA1253	30p	2SB772	25p	2SC1090	25p
TA8691N	450p	TA1557Q	300p	TA3567	350p	TA5820	370p	TA8905	400p	UPC1238	120p	2SA913	30p	2SA1254	50p	2SB774	25p	2SC1091	25p
TA8701AN	275p	TA1558Q	300p	TA3568	300p	TA5850	175p	TA8905	400p	UPC1245	150p	2SA913	90p	2SA1257	30p	2SB775	100p	2SC1061	85p
TA8719N	400p	TA1559Q	300p	TA3569	300p	TA5850	175p	TA8905	400p	UPC1248	150p	2SA913	90p	2SA1258	70p	2SB776	110p	2SC1069	175p
TA8720	625p	TA1571	300p	TA3580	700p	TA5930	225p	TA8905	400p	UPC1245V	130p	2SA916	30p	2SA1261	150p	2SB788	35p	2SC1070	65p
TA8739P	450p	TA1572	175p	TA3586	50p	TA6100Q	150p	TA8905	400p	UPC1247H	250p	2SA921	40p	2SA1262	110p	2SB791	130p	2SC1079	300p
TA8772N	460p	TA1574	125p	TA3590	200p	TA6101Q	120p	TA8905	400p	UPC1274	250p	2SA928A	25p	2SA1263	280p	2SB794	40p	2SC1092	40p
TA8850	25p	TA1576	170p	TA3591	360p	TA6111Q	225p	TA8905	400p	UPC1278	240p	2SA934	30p	2SA1265	200p	2SB810	15p	2SC1096	120p
TA8120S	40p	TA1578	130p	TA3602A	200p	TA6600-2	700p	TA8905	400p	UPC1287	240p	2SA934	30p	2SA1283	50p	2SB816	160p	2SC1106	180p
TA8286	120p	TA1589	275p	TA3602	225p	TA6610-2	1100p	TA8905	400p	UPC1297CA	325p	2SA937	20p	2SA1284	60p	2SB817	175p	2SC1114	415p
TA8530	100p	TA1591	275p	TA3611	450p	TA6612-2	700p	TA8905	400p	UPC1298	320p	2SA939	140p	2SA1286	60p	2SB819	60p	2SC1115	280p
TA8540	90p	TA1596	200p	TA3640	350p	TA7000	900p	TA8905	400p	UPC1313HA	100p	2SA940	50p	2SA1289	50p	2SB822	40p	2SC1124	270p
TA8560	90p	TA1598	160p	TA3645	400p	TA7010T	120p	TA8905	400p	UPC1318	150p	2SA942	60p	2SA1291	150p	2SB823	60p	2SC1125	250p
TA8560	90p	TA1603	160p	TA3652	400p	TA7012	120p	TA8905	400p	UPC1318H	300p	2SA949	70p	2SA1293	110p	2SB825	135p	2SC1161	110p
TA8510AS	100p	TA1602A	200p	TA3652	400p	TA7021T	200p	TA8905	400p	UPC1330HA	80p	2SA950	18p	2SA1294	450p	2SB826	75p	2SC1162	300p
TA820	55p	TA1670A	200p	TA3652-TX1600	400p	TA7050	100p	TA8905	400p	UPC1335V	320p	2SA951	60p	2SA1295	50p	2SB827	200p	2SC1164	600p
TA820M	35p	TA1675	200p	TA3653	85p	TA7052	120p	TA8905	400p	UPC1350	115p	2SA952	30p	2SA1301	250p	2SB828	200p	2SC1165	75p
TA920	100p	TA1701	300p	TA3654	80p	TA7053	200p	TA8905	400p	UPC1352C	450p	2SA953	30p	2SA1302	300p	2SB829	200p	2SC1170	180p
TA950	100p	TA1771	200p	TA3655Q	85p	TA7053	200p	TA8905	400p	UPC1352C	450p	2SA953	30p	2SA1303	400p	2SB835	75p	2SC1170	180p
TA980	200p	TA1870A	275p	TA3656	300p	TA7057Q	225p	TA8905	400p	UPC1362	250p	2SA957	185p	2SA1304	110p	2SB837	80p	2SC1172	150p
TA9802AP	80p	TA1872A	275p	TA3720	175p	TA7072	100p	TA8905	400p	UPC1363	190p	2SA958	60p	2SA1306	110p	2SB861	110p	2SC1173	33p
TA9802P	170p	TA1905	80p	TA3724	300p	TA7077	175p	TA8905	400p	UPC1363C	300p	2SA963	120p	2SA1307	100p	2SB863	220p	2SC1193	210p
TA9808P	230p	TA1905A	80p	TA3725	300p	TA7211	100p	TA8905	400p	UPC1364	350p	2SA965	30p	2SA1309	50p	2SB865	50p	2SC1210	100p
TA9815P	150p	TA1906A	80p	TA3730	400p	TA7220	65p	TA8905	400p	UPC1365	350p	2SA965	25p	2SA1310	50p	2SB865	50p	2SC1211	100p
TA9820P	150p	TA1910	80p	TA3732	170p	TA7222	170p	TA8905	400p	UPC1366	130p	2SA968	55p	2SA1317	30p	2SB885	45p	2SC1214	15p
TA9830P	150p	TA1914	180p	TA3735	400p	TA7230A	150p	TA8905	400p	UPC1370C	300p	2SA970	25p	2SA1318	25p	2SB891	35p	2SC1215	25p
TA9835P	150p	TA1914	180p	TA3735	425p	TA7231A	80p	TA8905	400p	UPC1373	85p	2SA979	35p	2SA1319	25p	2SB892	25p	2SC1216	200p
TA9835P	150p	TA1950	175p	TA3760	250p	TA7233	60p	TA8905	400p	UPC1377C	200p	2SA984	25p	2SA1320	45p	2SB895	60p	2SC1222	15p
TA9837P	500p	TA2002	80p	TA3765V	325p	TA7240	175p	TA8905	400p	UPC1378	180p	2SA985	60p	2SA1322	80p	2SB896	60p</		

REPLACEMENT VIDEO HEADS

Model	Price	Model	Price	Model	Price	Model	Price	Model	Price
AKAI		VHSAN3	800p	HRD750, HRD830, HRD860	3300p	NVFS100	5000p	TL51100	3100p
VS105, 112, 115, 116, 120, 125, 126, 201, 202, 205, 220, 240, 244, 245, 247, 248, 250, 301, 303, 304, VSP8, VSP2	1000p	VHSAY3	1200p	HRD250, HRD257	2200p	NFC-1	4550p	VHR120, 130, 14, 141, 143G, 145P, 151, 15, 16, 171, 220, 223, 244, 274, VHR310, 330, 4100, 4105, 4200, 430, 4300, 4400, 4500, 5080, 5100, VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000P, 88015P, VHRD4400, 4410, 4500, 4600P	3100p
VP7100, VS9300, VS9500	650p	VHSBP1	850p	HRD180, 190, 230, 610, 3V59, FV12L, FV20B, 26, 30, 32, 33, VC1411	2050p	N9011, 9012, 9013E, 9014E, 9014G, 9015, 9016, 901A, 902A, 9033, N9034, 9040, 9053, 9054, 9055, 9066, 9063, 9065, 9066, 906, 9077, N9086, DX1000, 1600, PX1200	1150p	VHR2610, 6700, 4800	3100p
VP7200, VS9700, VS9800	1200p	VHSBY2	1600p	HRD370, HRD430, HRD470, 3V58, FV13H	2300p	91191A, 914C, 915A, 916A, 917, 9110, 9120	2400p	TL5200	4250p
VS1	1250p	VHSEH1, VHSDD2	1800p	HRD530, HRD700, HRD840, HRD870	3000p	PVC660, 740, 744, 754, 763, 764, PV2300, 2400, 760, 794, 770, 774	1650p	VHR5300, VHR6500, VHR7400	4500p
VS2	1200p	VHSEY1, VHSY2	1400p	HRD900, HRD950, HRD980, HRD970	3000p	N830, N831, N830, N831, N832, N833, N834, N835, N836	700p	VHR3500EX	2150p
VS3	1350p	VHSF21, VHSF22	1300p	GR1, GR2, 3 V41	2800p	82611AH1 (FOR MODEL DX3000)	3000p	VHR176, 235, 335E, 4150, 4160, 4350, 7500, 7260, 8250	1950p
VS10	1350p	VHSF31, VHSF32, VHSF34, VHSF35, VHSF36, VHSF37	1300p	BR9060, HRD330, 337, 440, 441, 637, 641, 660, 670, 720, 730, 740, 820, HRFC100, SR3300MS, FV44L	2100p	DX4000, N9610, NS7000	3150p	VC488	4200p
VS100	2100p	VHSTJ1, VHSTJ2, VHSTJ3, VHSWJ3, VHSYJ2	700p	HRD950, HRD960, HRD980, FV45	5000p	N9052, N9530, DX2000	3400p	VC779	1800p
VS335, 37, 38, 38EG, MKII, 53, 55, 66, 765, 766, 767, 768, 865, 867, VSF30, 33, 4, 400, 410, 420, 430, 440, 441, 450, 455, 480, 490, 497, VSG51, 54, 55, VXS450, VXS470	2250p	VHSHV4, VHSWH1, VHSXH1, VHSYH2	1600p	HR5500, HR5550, 5800, 9000, FV395, SR5600, SR5368E	5550p	VCP1	1700p	VC789	2900p
VS512, VS515, VS516	2250p	VHSXJ3	700p	FV22L	1400p	PVC2300, 2400, 740, 744, 760, 764	1400p	VC790	2750p
VS462, 465, 467, 467E, VEG2, VSF12, 15EK, 15EQH, 300, 301, 310, VSF320, 330, 340, 350, VSG30, 35, 34, 35	2300p	GRUNDIG		FV24L	2600p	VC810, VC820, VC830, VC840, VC850, VC860, VC870, VC880, VC890, VC900, VC910, VC920, VC930, VC940, VC950, VC960, VC970, VC980, VC990, VC1000	3500p	VC799	2900p
VS11, VS12	1200p	VS410, 415, 435, 450, 455, 460, 500, 505, 510, 520, 521, 530, 545	1800p	VR182VL, VR202VL	1950p	D1000X, D1500X, D4500, VPCD100, D120, D200X, D5000	1600p	VC800	2750p
VS6, VS8, VS9	2400p	BARCELONA, MVS5400, 440, 500, 600, SE100, 6100, 6110, 9100	1600p	FV67HV, FV68TX, FV77	3800p	VH3, VH555, VH600, VH700, VH844, VH900, VH1000 (ALL MODELS), VH11, VH2A	1100p	VC801	2750p
VSX9	2250p	TVR4500, 4510, 5510, VS400, 440, 441, 500, 505, 510, 518, 600, 610, VS5160, VS6190, 700, 900, 901, 902, 905, 920, 921, 201, 205Z, SE2100, 5110	1400p	R2000 SERIES	4000p	VH1000 (ALL MODELS), VH11, VH2A	1100p	VC802	2750p
VSX100, 1110, 650, VSF500, 510, 550, 560, 580, 590, 600, 650, VSG60, 64, 65, VSG70, 73, 74, 75, VSG80	3600p	MADRID, SE2140, VSS40, VSS480	3000p	VR2000	4000p	D1000X, D1500X, D4500, VPCD100, D120, D200X, D5000	1600p	VC803	2750p
VS155, VS165	2300p	MVS550, 620, VSS50, 620, 630, 640, 790, 930, 940	2400p	FV42L	1950p	VR6460, VR6520, 64VR60, VR6420	725p	VC804	2750p
VSF20, 22, 23, 24, 25, 26, 27, 422, 425, 426, 427, 485, VSF10, 11, 180, 190, VSF200, 210, 220, 221, 222, 230, 240, 260, 281, 282, 285, 270, 275, 280, VSF290, 510, 550, VSG20, 204, 205, 206, VSG21, 211, 212, 215	2400p	VS160, GV280	4600p	VR160L, VR172L	3300p	VR6711, VR6520, 64VR60, VR6420	1800p	VC805	2750p
VSF210, 220, 221, 222, 230, 240, 260, 281, 282, 285, 270, 275, 280, VSF290, 510, 550, VSG20, 204, 205, 206, VSG21, 211, 212, 215	2400p	VS160, VST40	4400p	VR1200, HRJ205	3000p	VR6711, VR6520, 64VR60, VR6420	1800p	VC806	2750p
VSG217E, 23, 24, 25, 405, 411, 415, 417, VSP 100, 100EM, 110, VSP88, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VS170	4600p	HRJ200, HRJ205	3000p	VR6711, VR6520, 64VR60, VR6420	1800p	VC807	2750p
VSP88, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	MVS660, SE6160, VERONA, V5660, V5680	3500p	HRJ605K, HRJ606K, HRJ605E, HRJ300, HRJ305, HRJ315, HRJ316E, HRJ318E, HRJ615, HRJ715, HRJ815, HRJ400, HRJ405, HRJ407MS, HRJ41, OEK, HRJ415, HRJ416	5850p	VR6420	725p	VC808	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	GRUNDIG		MATSUI		VR6711, VR6520, 64VR60, VR6420	1800p	VC809	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	MV5710, 720, 910, SE7120, 9120, VST710, 716, 720, 800, 810, 910, 920, VST720, 721, 722, 910, 920, 921, MV2105, 2115, SE2120	1700p	VX500E, 800A, 810A, 820, 80A, 770B, 773B	1200p	VR6711, VR6520, 64VR60, VR6420	1800p	VC810	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	HINARI		VX735, VX755, VX990	1600p	VR6711, VR6520, 64VR60, VR6420	1800p	VC811	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VXL2, 3, 4, 20, 25, 35	1000p	VX735, VX755, VX990	1600p	VR6711, VR6520, 64VR60, VR6420	1800p	VC812	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VXL5, V20H	1060p	VX735, VX755, VX990	1600p	VR6711, VR6520, 64VR60, VR6420	1800p	VC813	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VXL6	1230p	VX735, VX755, VX990	1600p	VR6711, VR6520, 64VR60, VR6420	1800p	VC814	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VXL7	1300p	VX735, VX755, VX990	1600p	VR6711, VR6520, 64VR60, VR6420	1800p	VC815	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VXL8, 9, 10, 11, 19, 90, VCR34H, VTV 100, 200	1100p	VX900	2650p	VR6711, VR6520, 64VR60, VR6420	1800p	VC816	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	YACCHI		HR330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC817	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VT1, 14, 15, 16, 30, 33, 34, 330, 340, 503, 640, 5030, VTP10, 30	1000p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC818	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VTT, VT7, VT18, VT19	2000p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC819	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VT35, VT350, VT38, VT39	2300p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC820	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VT100, 110, 111, 112, 113, 115, 118, 120, 125, 128, 220, 225, 400, 405, VTS10, 413, 414, 415, 416, 418, 510, 515, 517, 518, 520, 525, 526	2400p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC821	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VTM625, 626, 725, 210, 211, 215, 726, 727, 728, 820, 821, 825, 920, 921	1400p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC822	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VT3000	550p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC823	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VT4000, VT4200, VT5000, VT5500	1100p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC824	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VT777, 680, 6500, 6700, 6800, 7000, 8000, 8030, 8040, 8100, 8300, 8500, VT8700, 9000, 9300, 9500, 9700, 9900	1000p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC825	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VT8, 9, 56, 57, 570, 575, 576, 580, 585, 588	3200p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC826	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VT130, 135, 138, 145, 250, 255, 258, 420, 425, 426, 428, 430, 431, 435	2400p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC827	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VT436, 435, 536, VTL30, 301, VTM630, 635, 636	1900p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC828	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VT62, VT60, VT61E, VT62E, VT63, VT64, VT640	1100p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC829	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VT168, VT150, VT260, VT450, VT498 (4 HEAD)	2200p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC830	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VT530	2050p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC831	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VT522, VTM212, 620, 622, 720, 722, 822, 922, 925	1650p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC832	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VT60E	2800p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC833	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VT70, VT75, VT580, VT585, VT588	3100p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC834	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VT540, 545, 546, 548, VTD660, 665, VTM588, 640, 645, 646	3200p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420	1800p	VC835	2750p
VSP98, 88K, 8111, VSP9, VSR100, 100E, 100EM, 110, VSK400	1250p	VTM730, 731, 735, 736, 740, 745, 746, 748, 753, 754, 830, 831, 835, 838, 840, VTM841, 845, 930, 931, 935	2600p	HS330, HS302, HS302, HS310, HS273, HS9500	1350p	VR6711, VR6520, 64VR60, VR6420			

PINCH ROLLERS

Model	Price	Model	Price	Model	Price	Model	Price	Model	Price		
AS10, VS9300, VS8500, VS9700, VS9800, VP7100, VP77	140p	FVHP615, 618, 620, 622, 710, 711, 715, 716, 720, 721, 722, 725, 730	140p	BR5600, 605, 747, 777, 920, 925	140p	NS7900	140p	681, 682, 684, 685, 693,			
VS1, VS2, VS3, VS4, VS5, VS6, VS8, VS9, VS12, VS15	140p	FVHP810, 830, 840	140p	BR5100, HR110, 111, 120, 220, 225, 455	1100p	ORION		VC699, 700, 772, 775, 780, 781, 7810,			
VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, 240, 244, 245, VS247, 248, 250, 512, VS515, 516	140p	FVHP905, 906, 907, 908, 910, 911, 915, 916, 918, 970, 975, 980, 990, FVHP5000, 5005, 5050, 5075, 5100	140p	HRD140, 141, 142, 143, 150, 152, 157, 158, 160, 565, 566, 725, 755	1350p	VH1, VH2		VC785, 786, 787, 793, 800, 7810, 7822, VCT723,			
VSX9	140p	FVHD230, 250, 270, 370, 20000, FVHP3, 210, 250, 300, 310, 1100	140p	PINCH ROLLER ASSEMBLY		VC150, 180, VH3, 33, 200, 201, 205, 212, 250, 254, 288, 300, 303, 312, VH404, 655, 700, 704, 712, 770, 780, 844, 900, 1000, 2948, 3030, 3312	140p	VCA10, 30G, 60, 103, 105, 106, 111, 113, 131, 211, 244, 254, 33, 35, 36,			
VS201, 301, 303, 304, 603, 606, 607, VS28	140p	FVHP1200, 1250, 1320, 1332, 1340, 1340, 1400, 1410, 1440, 1500, 200	140p	HRD1520, 510, 520, 521, 522, 525, 527, 560, 600, 610, 620, 637, 641, HRD550, 720, 830, 840, 910, HRJ205, HRJ5800	350p	VH2A, VP2948	140p	VC331, VC370, VCT73, VCT72,			
VS22, 23, 25, 35, 37, 38, 53, 66, 75, 422, 425, 426, 427, 462, 465, 467, VS485, 765, 766, 767, 768, 865, 867, 965, 967, VS477, VS4650	140p	FVHP2304, 420, 430, 440, 445, 470, 475, FVSP1905, 485, 290	140p	BR7030, BR5600, HRD160, 170, 171, 180, 190, 210, 211, 217, 227, HRD230, 271, 300, 320, 321, 330, 337, 350, 400, 440, 444, 1, HRD470, 590, 530, 700, 750, 950, HRJ5000, 5500, 9000	875p	COMB 15000, 16000, HV03, LVH50, NEVH, NEVHM, NEVHML, TVP230RC, VCP, VH04, 30, 103, 300, 358, 360, 362, 400, 416, 512, VH530, 532, 535, 536, 600, 630, 635, 640, 666, 730, 735, 744, 774, 790, VH800, 820, 850, 888, 893, 900, 930, 940, 942, 974, 1012, 1040, 1050, VH1060, 1070, VH1100, 1120, 1204, 1440, 1500, 1680, 1800, 2004, VH2151, 2308, 22042400, 2500, 2500, 2600, 2700, VH2980, 2970, 3050, VH3060, 4000, 4006, 4010, 4012, 4015, 4015, 4020, 4300, 5020, VP 10, 200, 220, 225, 245, VR821, 925, 1032, 2948, 2985, 2957, 2966, 2979, 2980, VTV3000, VXL20, 25, 30	140p	PHILIPS	140p	686, 688, 6948	
VS220, 21, 12, 15, 180, 200, 210, 220, 221, 222, 230, 240, 30, 33	140p	FVHD140, FVHD40, FVHD55, FVHP1, FVHP10, FVHS10, 30	1350p	PINCH ROLLER ASSEMBLY		VR6460, VR6920	140p	VCA10, 30G, 60, 103, 105, 106, 111, 113, 131, 211, 244, 254, 33, 35, 36,			
VSF330, 4, 500, 550, VSP88, VSR100, VSX400, 450, 470	140p	GOLDSTAR		HRD560, HRD550, HRD580, HRD660, HRD860, HRD960	700p	VR2020, VR2021, VR2022, VR2023, VR2024	140p	VC331, VC370, VCT73, VCT72,			
VSF260, 261, 262, 265, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	GHV151, 1221, 1232, 1233, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 140p		HRJ600, HRJ605, HRJ815, HRJ9200	875p	VR6540	140p	VC331, VC370, VCT73, VCT72,			
VSF441, 440, 450, 455, 480, 490, 497, 510, 560, 580, 590, 599, 600	140p	GHV1891, 1900, 2145, 3000, 3010, 4400, 4410, 51, 8000, 8200, GHV8210, 8215, 8430		MITSUBISHI		DV856, 586, VR702, 703, 6485, 6585, 6589, VR445, VR6442, VR6542, VR6643, VR6843, VR6943, 44559	140p	VCA10, 30G, 60, 103, 105, 106, 111, 113, 131, 211, 244, 254, 33, 35, 36,			
VSF520, 521, 523, 24, 25, 30, 33, 34, 35, 51, 54, 55, 60, 64, 68, 70, 73, 74, 75	140p	GHV1295, 1296, VCP4000, 4100, 4100, 4200, 4300, 4301, 4305, VCP4306, 4310, 4311, 4315, 4316, 4320, 4321, 4325, 4326, 4350, G5E1290, 1291, 1295, 1296, 1297, 1891, 1910, 20005, 2000	140p	HS12, 5300, 5424, 5600, HSB11, 12, 16, 21, 27, 31, 32, 41, 51, 52, 82, HSE12, 16, 17, 21, 22, 27, 31, 32, 41, 51, 52, 82, HSM1000, 110, 120, 15, 0, 16, 170, 190, 210, 22, 25, 250, 27, 33, 34, 35, 36, 37, 370, 380, 45, 450, 5, 4, 55, 55, 57, 58, 59, 68, HSM52, 9, HSS11, 14, 15, 17, 19, 25, 5600, HV F125, 190, 303, 85, SV8900, 8930	750p	VR6660, 6860, 6861, 6862, 6863, N-1700, VR2870, VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF620, 621, 622, 625, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	HITACHI		PINCH ROLLER ASSEMBLY PART NO: 948020010		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VCA10, 30G, 60, 103, 105, 106, 111, 113, 131, 211, 244, 254, 33, 35, 36,			
VSF641, 440, 450, 455, 480, 490, 497, 510, 560, 580, 590, 599, 600	140p	VT7, 11, 14, 16, 17, 18, 19, 33, 34, 35, 350, 38, 39, 88, 330, 680, 4200		HS120, HS320, HS301, HS302, HS303, HS304, HS310, HS320, HS330, HS360, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF660, 661, 662, 665, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT9000, 5230, 5500, 6500, 6800, 7000, 8000, 8300, 8500, 8700, 930, VT9500, 9700, 9900, VM900	140p	HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF680, 681, 682, 685, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT8, 52, 57, 61, 62, 63, 64, 65, 85, 86, 88, 100, 110, 111, 113, 115, 118		HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF700, 701, 702, 705, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT120, 122, 125, 128, 130, 135, 138, 145, 150, 168, 170, 175, 220, 225		HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF720, 721, 722, 725, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT250, 255, 258, 260, 400, 405, 410, 413, 414, 415, 416, 418, 420, 425		HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF740, 741, 742, 745, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT426, 428, 430, 431, 435, 438, 450, 498, 510, 515, 517, 518, 520, 525		HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF760, 761, 762, 765, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT526, 530, 535, 536, 540, 545, 546, 548, 570, 575, 576, 580, 585, 588		HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF780, 781, 782, 785, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT640, 630, VTP660, 665, 70, 770, 774, 775, 780, 785, 860, 861, 865		HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF800, 801, 802, 805, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT720, 725, 728, 730, 731, 735, VTM736, 740, 745, 746, 748, 753, 754, 820, 821, 822, 825, 830, 831		HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF820, 821, 822, 825, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT835, 838, 840, 841, 845, 920, 921, 922, 925, 930, 931, 935		HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF840, 841, 842, 845, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT980, 85, 890, 895VM200, 2300, 2380, 3200, 3280, 500, VMS7200	140p	HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF860, 861, 862, 865, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT1000, 1000, 2000, VTLCS50, VTM598, 620, 622, 625, 626, 630, 635	140p	HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF880, 881, 882, 885, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT1100, 1100, 2100, VTLCS50, VTM598, 620, 622, 625, 626, 630, 635	140p	HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF900, 901, 902, 905, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT1200, 1200, 2200, VTLCS50, VTM598, 620, 622, 625, 626, 630, 635	140p	HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF920, 921, 922, 925, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT1300, 1300, 2300, VTLCS50, VTM598, 620, 622, 625, 626, 630, 635	140p	HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF940, 941, 942, 945, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT1400, 1400, 2400, VTLCS50, VTM598, 620, 622, 625, 626, 630, 635	140p	HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF960, 961, 962, 965, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT1500, 1500, 2500, VTLCS50, VTM598, 620, 622, 625, 626, 630, 635	140p	HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF980, 981, 982, 985, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT1600, 1600, 2600, VTLCS50, VTM598, 620, 622, 625, 626, 630, 635	140p	HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF1000, 1001, 1002, 1005, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT1700, 1700, 2700, VTLCS50, VTM598, 620, 622, 625, 626, 630, 635	140p	HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF1020, 1021, 1022, 1025, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT1800, 1800, 2800, VTLCS50, VTM598, 620, 622, 625, 626, 630, 635	140p	HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF1040, 1041, 1042, 1045, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT1900, 1900, 2900, VTLCS50, VTM598, 620, 622, 625, 626, 630, 635	140p	HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF1060, 1061, 1062, 1065, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT2000, 2000, 3000, VTLCS50, VTM598, 620, 622, 625, 626, 630, 635	140p	HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF1080, 1081, 1082, 1085, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT2100, 2100, 3100, VTLCS50, VTM598, 620, 622, 625, 626, 630, 635	140p	HS100, HS320, HS301, HS302, HS303, HS304, HS700		VR2025, VR6580, VR6581, 495B6, VR3260, 6349, 6448, 6449, 6548, 6648	140p	VC331, VC370, VCT73, VCT72,			
VSF1100, 1101, 1102, 1105, 270, 274, 275, 280, 290, 340, 350, 410, 420, 430	140p	VT220									

VIDEO SERVICE KITS

<p>AMSTRAD VCR700 <i>Contents</i> BELT SET, PINCH ROLLER, REEL IDLER, VIDEO LAMP Order Code: SK41 £5.50</p> <p>FERGUSON & JVC 3V42/43 HRD455/HRD725 <i>Contents</i> BELT SET, PINCH ROLLER, CLUTCH MECHANISM, TENSION BAND Order Code: SK37 £16.00 Order Code: SK38 £9.00</p> <p>3V58/59/64/65 HRD170/180/210/230/300/320/370/400/430/530/700/750 HR55000 <i>Contents</i> BELT SET, PINCH ROLLER, IDLER ARM, TENSION BAND Order Code: SK44 £7.00</p> <p>3V29/3V30 HR7200/7300/7350 <i>Contents</i> BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SK05 £5.00</p> <p>3V35/36, 38/39/49 HRD110/111/120/225 <i>Contents</i> BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SK04 £5.00</p> <p>3V31/3V42 HR7900/7610/7650/7655 <i>Contents</i> BELT SET, T/U REEL TABLE TYRE, PINCH ROLLER, REEL IDLER, T/U CLUTCH, T/U IDLER, TENSION BAND, VIDEO LAMP Order Code: SK33 £11.00 Order Code: SK34 £5.00</p> <p>3V39/39/39/39/49 HRD110/111/120/121/225 <i>Contents</i> BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, T/U CLUTCH, T/U IDLER, REEL IDLER, TENSION BAND Order Code: SK35 £10.00 Order Code: SK36 £5.50</p> <p>3V29/3V30 HRD7200/7300/7350 <i>Contents</i> BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, REEL IDLER, T/U CLUTCH, T/U IDLER, TENSION BAND, VIDEO LAMP Order Code: SK31 £10.00 Order Code: SK32 £5.00</p> <p>3V44/45/48/53/54/55/57 HRP50/HRD140/150/158/160 HRD250/257/565/566/755 <i>Contents</i> BELT SET, PINCH ROLLER, CLUTCH MECHANISM, TENSION BAND Order Code: SK39 £15.00 Order Code: SK40 £9.50</p> <p>FISHER FVHP905/906/907/908/910/911/916/918 <i>Contents</i> BELT SET, PINCH ROLLER, IDLER, GEAR IDLER UNIT, TENSION BAND Order Code: SK57 £13.00 Order Code: SK58 £5.00</p> <p>FVHP615/618/620/622/710/711/715/716/720/721/722/725/730/830/840 <i>Contents</i> BELT SET, PINCH ROLLER, IDLER, GEAR IDLER UNIT, TENSION BAND Order Code: SK68 £11.00 Order Code: SK69 £30.00</p>	<p>HITACHI VT11/V733 <i>Contents</i> BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SK08 £5.00</p> <p>VT11/V733 <i>Contents</i> BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, FF/REW IDLER, CLUTCH PLATE, TENSION BAND Order Code: SK45 £13.00 Order Code: SK46 £3.75</p> <p>VT52/61/62/63/64/65/85/86/546 <i>Contents</i> BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLATE, TENSION BAND Order Code: SK49 £14.00 Order Code: SK50 £3.00</p> <p>VT400/406/410/412/414/15/18/420/25/26/28/430/31/35/48/450/498/510/520/25/26/30/35/38/540/545/46/48/570/75/576/580/85/88 <i>Contents</i> TIMING BELT, PINCH ROLLER, FF/REW ARM, CLUTCH BASE, TENSION BAND Order Code: SK52 £9.75</p> <p>VT100/110/111/113/115/118/120/125/128/130/135/138/145/150/175/220/225/250/255/258/260/VT130 <i>Contents</i> BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLATE, TENSION BAND Order Code: SK51 £14.00</p> <p>PANASONIC NV2000/NV2010/NV7000/NV7200/NV7800 <i>Contents</i> BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SK03 £5.00 Order Code: SK02 £5.00</p> <p>NV300/NV330/NV333/NV340/NV366 <i>Contents</i> BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRE Order Code: SK01 £5.00</p> <p>NV2000/NV2010 <i>Contents</i> BELT SET, PINCH ROLLER, FF IDLER, PLAY IDLER, TENSION BAND, VIDEO LAMP Order Code: SK13 £5.50 Order Code: SK14 £3.50</p> <p>NV7000/NV7200/NV7800 <i>Contents</i> BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND Order Code: SK11 £8.50 Order Code: SK12 £3.25</p> <p>NV300/NV330/NV333/NV340/NV366 <i>Contents</i> BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND Order Code: SK15 £7.00 Order Code: SK16 £3.25</p> <p>NV67/NV69/NV610/NV611/NV612/NV614/NV615/NV616/NV618/NV630/NV6120/NV6130/NV6400/NV665 (PK/ACV/AG1810 (PK)) <i>Contents</i> LOADING BELT CAPSTAN, BELT, PINCH ROLLER, IDLER, TENSION BAND Order Code: SK27 £8.00 Order Code: SK28 £3.00</p> <p>NV332 <i>Contents</i> BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND, FF/REW TYRE Order Code: SK29 £12.00 Order Code: SK30 £5.10</p> <p>NV230/250/260/280/430/450/460/470/650/810/890/AG1200PK/AG1500PK <i>Contents</i> BELT SET, PINCH ROLLER, IDLER, TENSION BAND Order Code: SK23 £5.00 Order Code: SK24 £3.25</p>	<p>NV600/NV688 <i>Contents</i> BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND Order Code: SK25 £12.00 Order Code: SK26 £6.00</p> <p>NV730/NV770 <i>Contents</i> SLOT IN BELT LOADING BELT, PINCH ROLLER, IDLER UNIT, TENSION BAND Order Code: SK19 £5.00 Order Code: SK20 £3.00</p> <p>NV370/NV380/480/630/780/830/850/AG2100PK/AG2200PK <i>Contents</i> BELT SET, PINCH ROLLER, IDLER TYRE Order Code: SK21 £5.00 Order Code: SK22 £2.75</p> <p>NV771/NV788 <i>Contents</i> BELT SET, PINCH ROLLER, IDLER UNIT, TENSION BAND Order Code: SK17 £5.00 Order Code: SK18 £4.00</p> <p>SHARP VC381 <i>Contents</i> BELT SET, PINCH ROLLER, REEL IDLER, TENSION BAND, VIDEO LAMP Order Code: SK47 £8.00 Order Code: SK48 £3.25</p> <p>VC500/VC571/VC581/VC582/VC583/VC584/VC5F3 <i>Contents</i> BELT SET, PINCH ROLLER, REEL IDLER, TENSION BAND Order Code: SK60 £9.50 Order Code: SK61 £5.00</p> <p>VC781/VC7810/VC7822/VC785/VC786/VC793/VC800/VC100/VC102/VC104/VC104/VC202 <i>Contents</i> BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND Order Code: SK64 £13.50 Order Code: SK65 £3.75</p> <p>VC881/VC882/VC884/VC885/VC893/VC899/VC8F9/VC700 <i>Contents</i> BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND Order Code: SK62 £13.50 Order Code: SK63 £5.00</p>
--	---	---

FOR MORE DETAILS OF OVER 500 TYPES OF SERVICE KITS... PLEASE RING US!

SPECIAL OFFERS!

See Page 46

REPLACEMENT VIDEO CASSETTE HOUSINGS

Name	Models	Code	Price	Name	Models	Code	Price	Name	Models	Code	Price
AKAI	V535, V553, V555, V558, V575	CH18	3200p								
GRANADA	VHS0P1, VHSYJ2	CH05, CH01	1100p, 2800p								
GOLDSTAR	GHV1290P, 1291P, 1296P, 3400, 73401, GSE1296P, GSE1891P, 200010, 200510, VCP4200, 4300, 4301, 4305, VCP4306, 4311, 4315, 4316, 4320, 4321, 4325, 6HV51, 1221, 1232, 1240, 1241, 1242, 1244, 1246, 1248, 6HV8000, 8200	CH25, CH26	2000p, 2900p								
FERGUSON & J.V.C.	3V38, 3V39, 8943, 8944, 8951, 3V35, 3V36, 3V49, HRD 110, 111, 120, 121, 225, 3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V57, 8945, 8947, 8948, HRD 140, 141, 150, 157, 158, 160, 250, HRD257, 455, 565, 566, 725, 755, 8948, 8950, FV108, 12L, 13H, 14T, 20B, 21R, 22L, 26, 395, HRD230, 430, 530, 3V58, 3V59, 3V64, 3V65, FV11R, 8950, 8951, HRD170, HRD180, HRD370	CH01, CH02, CH03, CH04	2800p, 2800p, 2800p, 2800p								
				FERGUSON	FV37H, FV3905, VR3905, VR3916, 3926, 3946, 3948, 3976, 3986, 3995, 3997, 6548, VR3916, 3926, 3946, 3948, 3976, 3986, 3995, 3997, 6548	CH27, CH01, CH02	2400p, 2800p, 2800p				
				NATIONAL PANASONIC	NV730	CH06	4300p				
				N.E.C.	N830EG, N831EG, N831EG, N832, N833EG, N855	CH01, CH02	2800p, 2800p				
				PHILIPS	CASSETTE LIFT ASSEMBLY (69120366) DV136, 190, 286, 471, 562, 761, VR6180, 6182, 6185, 6285, VR6290, 6291, 6293, 6362, 6367, 6383, 6467, 6468, 6470, VR6561, 6670, 6760, 6761, 6870, 6970, VR6443, VR6448, 49SB6	CH05, CH22, CH23, CH24	1100p, 2900p, 2500p, 2500p				
				SHARP	VCA100, VCH851, VCH852	CH22	2900p				

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

AMSTRAD MOD KIT

☆☆ FITS : VCR 4500, 4600, 4700, 5200, TVR 1,2,3

PRICE : £2.75 + VAT each

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

MODE SWITCH

NV2000, 2010, 7000, 7200, 7800 (VSS0048)	
NV230, 260, 430, 810, 870, 2300, 4300 (VSS0110)	£3.50
NV830 (VSS0091)	£2.25
NV300, 333, 340, 366, 688, 777, 778 (VSS0060)	£2.10
NVG21, 25, NVH65, NVD80 (VSS0175A)	£3.75
	£2.00

AUDIO CONTROL HEADS

AMSTRAD ORIGINAL NO: 150751
 Used on: AMSTRAD TVR1, 2, 3, VCR4600, 4800MKII, 4700, FUNAI VS2, VCR4600, 4800, 5200, 5500, 6600, VIF3000, 5000
 Also fits: FIDELITY, FUNAI, HINARI, PROLINE, SCHNEIDER, TOWADA, UNIVERSUM ORDER CODE: AH01 PRICE: 1350p

AMSTRAD ORIGINAL NO: 153134
 Used on: AMSTRAD DD8900, 8904, VCR2000, 6000, 6100, 8600, 8602, 8603, VCR8604, 8700, 8704, 8714, 8800, 9005, 8244
 Also fits: ANTECH, BONDSTEC, CASIO, CROWN, FIDELITY, GOLD-HAND, GRANADA, HINARI, MARQUANT, OMEGA, PROFEX, SCHNEIDER, SEG, SENTRA, SHINTOM, TASHIKO, TATUNG, TOWADA, UNIVERSUM ORDER CODE: AH02 PRICE: 1450p

Replacement Audio Control Video Sound Head for National Panasonic

PART NUMBER	MODELS	PRICE
VBR 0091	NVG7 etc	875p
VBR0050	NV300, NV340 etc	875p
VBR0061	NV777 etc	875p
VBR0103A	NV250, NV450 etc	625p
VBR0125		625p

VIDEO TOOLS

VIDEO CLEANING STICKS

Price 17p each 15p each pack of 10pcs
 13p each pack of 25pcs
Order Code: SP14

VIDEO MAINTENANCE TOOLS

Set of 8 Allen keys packed in a plastic wallet
Order code: TOOL 9, Price 125p
 Specifically designed for video maintenance

UNIVERSAL HEAD EXTRACTOR

Hand tool designed for extracting hard to remove heads without damage to either the head or the mounting assembly. Adjustable so as to suit various heads.
Order code: TOOL 8, Price 600p

VCR ALIGNMENT KIT

CONTAINS: SET OF 7 HEAD & TAPE PATH ALIGNERS

- RCA TYPE AUDIO & CONTROL HEAD POSITIONING TOOL
- RCA ADJUSTMENT TOOL FOR TAPE GUIDE POSTS
- RCA TYPE BACK TENSION TOOL
- TENSION ADJUSTMENT TOOL FOR VARIOUS USES
- VCR ADJUSTMENT TOOL

3 REVERSIBLE SCREWDRIVERS
 SPRING HOOK

SET OF 8 ALLEN KEYS

0.77mm	0.90mm
1.27mm	1.50mm
1.60mm	2.00mm
2.40mm	3.00mm

CIRCLIP PLIERS
 MICRO SCREWDRIVER

VCR HEAD EXTRACTOR

Order code: TOOL 10, Price 2900p

TRANSPARENT REPAIR/ADJUSTMENT CASSETTE

This transparent videocassette replaces a normal videotape during measurements, adjustments and inspection. The mechanical parts come into sight and become accessible.

Order code: TOOL 23, Price 500p

BACK UP BATTERIES

PHILIPS

Part Nos: 138 - 101138, 138 - 10313 1.2v 90mA
 Order Code: BB01
 Part Nos: 138 - 10229, 2.4v 100mA
 Order Code: BB02

Price: 75p

Price: 135p

FERGUSON

Part No: 00E6 - 067 - 001 1.2V 100mA
 Order Code: BB03
 Part Nos: 00E6 - 606 - 8001 2.4V 100mA
 Order Code: BB04

Price: 90p

Price: 150p

SATELLITES

MAKE & MODEL	CODE	PRICE
PACE PRD800, PRD900	SATPSU1	600p
PACE SS9000, 9200, 9010, 9210, 9220	SATPSU2	550p
AMSTRAD SRD510, SRD520	SATPSU3	600p
AMSTRAD SRD500	SATPSU4	600p
AMSTRAD SRX340, SRX345, SRX350	SATPSU5	600p
PACE D100/150	SATPSU6	650p
CHURCHILL D2MAC	SATPSU7	650p
PACE MSS100	SATPSU8	730p

MAKE & MODEL	CODE	PRICE
PAGE MSS200/300 APPOLL	SATPSU9	900p
PAGE MSS500/1000	SATPSU10	1230p
FERGUSON SRD4	SATPSU11	650p
ECHOSTAR SR5500	SATPSU12	1600p
ECHOSTAR 6500/7700/8700	SATPSU13	2750p
AMSTRAD SRD600	SATPSU14	2600p
MIMTEC (Surensen)	SATPSU15	700p
AMSTRAD SRD700, SR950, SRX100, 301, 501, 502, 1002, 2001, SRD2000 SAT250	SATPSU16	650p

SATELLITE TUNERS

PAGE PRD800/MSS200 2Ghz (221-2077062)
 ORDER CODE: TUNER01 PRICE: 1400p + VAT

PAGE PRD900/MSS1000 2Ghz (221-21770112)
 ORDER CODE: TUNER02 PRICE: 1400p + VAT

SWITCH MODE TRANSFORMERS

PAGE 9000
 ORDER CODE: PACE9000 PRICE: 800p

PRD800/PRD900
 ORDER CODE: PRD800 PRICE: 550p

SATMETER

The Satmeter is a professional portable satellite strength meter designed for the installation and maintenance of satellite TV systems. The Satmeter can be used as stand alone with powering the LNB as well as in loop.

Through operation with satellite RX powering the LNB.

* Acoustical signal: On signal strength * LED indicator: Vert/Hori

* Frequency Range: 900 to 2050 Mhz * Input impedance: 70 Ohm

* Power amplifier: 18db * Detection Range: -60 to -10 DBM

* Max. input signal: -10 DBM

ORDER CODE: TOOL22

PRICE: 8500p

REPLACEMENT TV SWITCHES

GRUNDIG

PART No: 29703, 29102
 USED ON:
 C7500, C8500, C8502, C8712... ETC
 Order Code: SW1 Price: 140p

PHILIPS

USED ON:
 K30, K35, K40, KT3, KT4
 Order Code: SW13 Price: 95p

SONY

USED ON:
 KV1612, KB1612, KV1614, KV2052, V2056
 KV2062, KV2067, KV2212... ETC
 Order Code: SW5 Price: 150p

USED ON:
 KV1400, KV1440, KV2040, KV2060
 (POWER SWITCH 26mm)
 Order Code: SW12 Price: 125p

SONY

USED ON:
 KV2020
 (POWER SWITCH 21mm +Remote)
 Order Code: SW6 Price: 200p

SONY 2 PIN FUNCTION SWITCH

Order Code: SW9 Price: 35p

FUSES

TIME LAG (20mm)		QUICK BLOW (20mm)		
CURRENT RATING	ORDER CODE	PRICE	ORDER CODE	PRICE
100mA	FUSE36	75p	FUSE37	60p
160mA	FUSE01	75p	FUSE17	60p
250mA	FUSE02	75p	FUSE18	60p
315mA	FUSE03	75p	FUSE19	60p
400mA	FUSE04	75p	FUSE20	60p
500mA	FUSE05	75p	FUSE21	60p
630mA	FUSE06	75p	FUSE22	60p
800mA	FUSE07	60p	FUSE23	60p
1A	FUSE08	60p	FUSE24	60p
1.25A	FUSE09	60p	FUSE25	60p
1.6A	FUSE10	60p	FUSE26	60p
2A	FUSE11	50p	FUSE27	60p
2.5A	FUSE12	50p	FUSE28	60p
3.15A	FUSE13	55p	FUSE29	50p
4A	FUSE14	55p	FUSE30	50p
5A	FUSE15	60p	FUSE31	50p
6.3A	FUSE16	60p	FUSE32	50p

CERAMIC PLUG TOP

CURRENT RATING	ORDER CODE	PRICE
5A	FUSE33	100p
5A	FUSE34	100p
13A	FUSE35	100p

32 mm CERAMIC SLOW BLOW

CURRENT RATING	ORDER CODE	PRICE
8A	FUSE44	185p
10A	FUSE45	185p
15A	FUSE46	185p
20A	FUSE-7	210p

NB. All fuses are made in the UK and fully meet BS4265 & BS1362 safety standards and should not be compared with cheap imported types

20mm CERAMIC TIME LAG

CURRENT RATING	ORDER CODE	PRICE
6.3A	FUSE38	100p
8A	FUSE39	100p
10A	FUSE40	100p
3.15A	FUSE41	85p
4A	FUSE42	85p
5A	FUSE43	85p

38mm CERAMIC TIME LAG

CURRENT RATING	ORDER CODE	PRICE
10A	FUSE48	825p

** ALL THE ABOVE PRICES ARE FOR PACKS OF 10 FUSES **

VOLTAGE TESTER

A terminal screwdriver incorporating continuity & voltage with Euroslot

ORDER CODE: TOOL11

PRICE: 220p

SPRING HOOK

Spring Hook, to unlock springs in audio tape recorders & VCRs

ORDER CODE: TOOL20

PRICE: 265p

FAULT FINDING / COMPARISON BOOKS

Satellite Fault Finding Guide Issue 1.
Listing about 1,000 faults for over a range of 24 different brands.

Order Code: BOOK05.

Price £8.50 - No VAT.

TELEVISION Edition 6

Lists more than 8,450 faults with 460 pages covering 58 different brands

Price: 1600p only - no VAT. Order Code: BOOK02

Satellite Repair Manual Edition 4

A comprehensive guide to receiver reviewing, featuring stock faults and installation tips.

Price £15.00 Only No VAT Postage 100p
Order Code: BOOK03

SEMICONDUCTOR COMPARISONS 1997/8

Listing more than 31,600 Semiconductors with suitable alternative complete with descriptions and base information.

Price: £15.50 - No VAT. Order Code: BOOK04

SEMICONDUCTOR COMPARISONS 1997

The new 1997 Jaeger Semiconductor with 952 pages packed with information on over 80,000 semiconductors in much greater detail plus marketing data on SMD devices and a separate generic table of all type designations.

Price: £40.00 only - No VAT (+ £5 Postage).
Order Code: BOOK06

Video Recorders Edition 4

Lists more than 4500 faults for 43 different brands

Price £12.75 - No VAT. Order Code: BOOK01

SERVICE AIDS

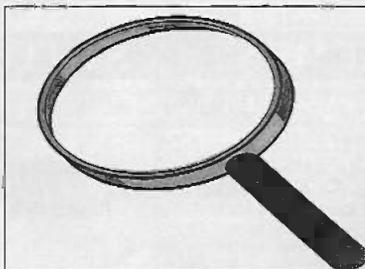
DESCRIPTION	VOLUME	CODE	PRICE
VIDEO HEAD CLEANER	75ML	SP01	125p
SWITCH CLEANER	176ML	SP02	140p
SILICONE GREASE	200ML	SP03	170p
FREEZE IT	170ML	SP04	280p
FREEZE IT	400ML	SP16	570p
FOAM CLEANER	400ML	SP05	155p
ANTI-STATIC	150ML	SP06	155p
AEROKLEANE	135ML	SP07	185p
AERO DUSTER	150ML	SP08	290p
AERO DUSTER	400ML	SP17	550p
PLASTIC SEAL	200ML	SP09	230p
GLASS CLEANER	250ML	SP10	155p
COLDKLENE	250ML	SP13	225p
EXCEL POLISH 80	250ML	SP18	145p
ADHESIVE 120	400ML	SP19	190p
LABEL REMOVER 130	200ML	SP20	240p
REFURB 140	400ML	SP21	240p
TUBE SILICON GREASE	50 GRAMMES	SP11	200p
TUBE SILICON SEALANT WHITE	75ML	SP22	250p
TUBE SILICON SEALANT CLEAR	75ML	SP23	250p
TUBE HEAT SINK COMPOUND	25 GRAMMES	SP12	140p
DRIVE CLEANER	200ML	SP24	130p
SCREEN CLEANER	200ML	SP25	145p
COMPUTER CARE KIT	-	SP26	2100p

All the above items are manufactured by Servisol
If you purchase more than one Servisol Product, postage & package will be charged as follows:

300p for 2-5 cans 500p for more than 5 cans

SOLDERING ACCESSORIES

DESCRIPTION	CODE	PRICE
ANTEX SOLDERING IRONS		
25 WATT 240 VAC (XS25W 240V)	S101	900p
15 WATT 240 VAC (XS15W 240V)	S102	900p
25 WATT SPARE ELEMENT	S103	450p
15 WATT SPARE ELEMENT	S104	450p
SOLDERING STAND & SPONGES		
SOLDERING STAND (MADE BY ANTEX)	S108	350p
SPARE SPONGE	S109	55p
SOLDER		
18 SWG 500 GRAMMES	S110	500p
20 SWG 500 GRAMMES	S111	650p
22 SWG 500 GRAMMES	S112	700p
DESOLDERING AIDS		
SOLDER MOP STANDARD GAUGE 1.2MM X 1.5M	S107	80p
SOLDER MOP 1.2MM X 10M	S113	400p
DESOLDERING PUMP	S105	320p
SPARE NOZZLE	S106	60p



I.C. PROTECTORS

ICPF10, ICPF15, ICPF20,
ICPF25, ICPF38, ICPF50,
ICPF75

ICPN5, ICPN10, ICPN15,
ICPN20, ICPN25, ICPN 38,
ICPN50, ICPN75

PRICE: 30p EACH ONLY

CAN'T FIND WHAT YOU'RE
LOOKING FOR?

RING US...AS THIS IS ONLY
A SELECTION OF THE
ITEMS THAT WE STOCK

GRANDATA LTD

Tel: 0181 900 2329

Fax: 0181 903 6126

REPLACEMENT LINE OUTPUT TRANSFORMERS

Part No.	Code	Price	HITACHI	LOT44	4515 01 19	LOT169	1500p	TUF 14520 F	LOT40	1500p	094-010200.7	LOT59	1400p	1-439-303-31	LOT94	1300p
AKAI			2424593	LOT44	4515 01 24	LOT137	1500p	TUF 14521 F	LOT39	1500p	094-010210.6	LOT58	1400p	1-439-303-32	LOT94	1300p
45150344	LOT56	1850p	2432101	LOT79	4515 01 46	LOT136	1500p	TUF 14567 F	LOT39	1850p	094-010270.0	LOT36	1825p	1-439-311-10	LOT95	1550p
101-21-017-03	LOT278	1300p	2432461	LOT169	4515 03 01	LOT169	1500p	TUF 14568 F	LOT40	1500p	094-010380.7	LOT245	1800p	1-439-311-11	LOT95	1550p
101-220005-03A	LOT72	1600p	2432611	LOT80	4515 03 02	LOT180	1500p	TUF 14584 F	LOT41	2000p	094-010520.8	LOT386	1825p	1-439-311-12	LOT95	1550p
D 050/37	LOT27	1450p	2432651	LOT80	4515 03 04	LOT169	1500p	TUF 14586 F	LOT42	1800p	094-010571.1	LOT285	1450p	1-439-311-31	LOT95	1550p
D 053/37	LOT207	1550p	2432761	LOT169	4515 03 05	LOT180	1500p	TUF 15806 F	LOT256	2000p	610.018.6620	LOT189	1550p	1-439-331-22	LOT95	1550p
D 056/37	LOT56	1650p	2432961	LOT37	4515 03 06	LOT168	1550p	TUF 70012 F	LOT78	1500p	610.018.6637	LOT215	1800p	1-439-331-22	LOT96	1550p
O 059/37	LOT206	1400p	2432981	LOT37	4515 03 08	LOT22	1250p	TUF 70012 F	LOT78	1500p	SHARP			1-439-331-41	LOT96	1550p
O 069/37	LOT56	1650p	2432982	LOT37	4515 03 09	LOT178	1500p	TUF 70012A	LOT78	1500p	RTRNF 1220 CEZZ	LOT39	1850p	1-439-332-00	LOT99	1600p
FCM 2015 AL	LOT78	1500p	2433011	LOT171	4515 03 10	LOT192	1550p	TUF 70018	LOT7018	1500p	RTRNF 1783 CEZZ	LOT202	1800p	1-439-332-21	LOT99	1600p
FERGUSON			2433012	LOT171	4515 03 13	LOT178	1500p	TUF 70018 F	LOT7018 F	1500p	RTRNF 1786 BMZZ	LOT211	1850p	1-439-332-41	LOT100	1600p
00 D-3-508-001	LOT38	1250p	2433014	LOT171	4515 03 14	LOT174	1400p	TUF 70161	LOT7161	1500p	RTRNF 1786 BMZZ	LOT211	1850p	1-439-332-52	LOT100	1600p
00 D-3-508-002	LOT38	1250p	2433212	LOT168	4515 03 15	LOT22	1250p	TUF 70162	LOT7162	1500p	RTRNF 1786 CEZZ	LOT214	1850p	1-439-332-52	LOT101	1450p
00 D-3-508-003	LOT276	1400p	2433291	LOT172	4515 03 18	LOT22	1250p	TUF 70162A	LOT7162A	1500p	RTRNF 2000 BMZZ	LOT307	1450p	1-439-333-11	LOT100	1500p
00 D-3-515-001 PL1	LOT779	1600p	2433301	LOT246	4515 03 19	LOT30	1250p	TUF 70162B	LOT7162B	1500p	RTRNF 2002 CEZZ	LOT307	1450p	1-439-333-12	LOT100	1500p
00 D-4-208-001	LOT79	1600p	2433441	LOT188	4515 03 20	LOT190	1650p	TUF 70162G	LOT7162G	1500p	RTRNF 2002 BMZZ	LOT308	1350p	1-439-333-12	LOT100	1500p
00 D-4-208-002	LOT240	1250p	2433442	LOT181	4515 03 22	LOT196	1550p	TUF 77001 B	LOT77001 B	1500p	RTRNF 2004 BMZZ	LOT307	1450p	1-439-333-12	LOT100	1500p
00 D-4-235-002	LOT79	1600p	2433451	LOT81	4515 03 24	LOT194	1550p	PHILIPS			RTRNF 2004 BMZZ	LOT308	1350p	1-439-333-12	LOT100	1500p
00 D-4-235-002 HTI	LOT81	1350p	2433452	LOT82	4515 03 25	LOT22	1250p	4822 140 10142	LOT142	1800p	RTRNF 2006 BMZZ	LOT308	1350p	1-439-333-12	LOT100	1500p
00 D-4-235-00210G	LOT81	1350p	2433453	LOT82	4515 03 26	LOT198	1550p	4822 140 10145	LOT134	1450p	RTRNF 2006 BMZZ	LOT308	1350p	1-439-333-12	LOT100	1500p
00 D-4-260-004 HTI	LOT38	1260p	2433455	LOT234	4515 03 28	LOT27	1450p	4822 140 10146	LOT112	1700p	RTRNF 2007 BMZZ	LOT307	1450p	1-439-333-12	LOT100	1500p
00 H-0-701-2400	LOT182	1450p	2433521	LOT95	4515 03 29	LOT193	1650p	4822 140 10151	LOT102	1700p	RTRNF 2023 BMZZ	LOT310	1500p	1-439-333-12	LOT100	1500p
06 D-3-083-001	LOT82	1250p	2433581	LOT22	4515 03 30	LOT119	1850p	4822 140 10161	LOT103	1250p	SONY			1-439-333-12	LOT100	1500p
06 O-3-083-002	LOT82	1250p	2433721	LOT83	4515 03 31	LOT207	1850p	4822 140 10171	LOT104	1500p	3753100	LOT275	1500p	1-439-333-12	LOT100	1500p
06 D-3-084-001	LOT23	1400p	2433751	LOT101	4515 03 34	LOT56	1650p	4822 140 10176	LOT114	1150p	1-439-243-00	LOT91	1800p	1-439-333-12	LOT100	1500p
06 D-3-087-001	LOT23	1400p	2433752	LOT250	4515 03 35	LOT193	1650p	4822 140 10194	LOT105	1600p	1-439-243-11	LOT91	1800p	1-439-333-12	LOT100	1500p
06 D-3-088-001	LOT84	1450p	2433891	LOT291	4515 03 38	LOT27	1450p	4822 140 10198	LOT116	1600p	1-439-243-12	LOT91	1800p	1-439-333-12	LOT100	1500p
06 D-3-093-001	LOT204	1800p	2433892	LOT23	4515 03 40	LOT200	1400p	4822 140 10201	LOT104	1500p	1-439-243-31	LOT229	1700p	1-439-333-12	LOT100	1500p
06 D-3-095-001	LOT87	1000p	2433893	LOT84	4515 03 41	LOT56	1650p	4822 140 10206	LOT118	1550p	1-439-243-32	LOT229	1700p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2433894	LOT23	4515 03 43	LOT196	1550p	4822 140 10246	LOT111	1500p	1-439-243-41	LOT229	1700p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2433952	LOT33	4515 03 44	LOT56	1650p	4822 140 10247	LOT105	1500p	1-439-244-00	LOT48	1800p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434000	LOT200	4515 03 46	LOT261	1550p	4822 140 10254	LOT107	1450p	1-439-244-11	LOT48	1800p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434141	LOT33	4515 03 50	LOT27	1480p	4822 140 10263	LOT117	1550p	1-439-244-21	LOT48	1800p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434141	LOT33	4515 03 51	LOT27	1480p	4822 140 10269	LOT107	1450p	1-439-244-31	LOT48	1800p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434274	LOT44	4515 03 75	LOT56	1650p	4822 140 10271	LOT208	1650p	1-439-256-00	LOT45	1650p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434274	LOT44	4515 03 75	LOT56	1650p	4822 140 10274	LOT213	1450p	1-439-256-11	LOT45	1650p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434274	LOT44	4515 03 75	LOT56	1650p	4822 140 10282	LOT122	1300p	1-439-256-21	LOT45	1650p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434274	LOT44	4515 03 75	LOT56	1650p	4822 140 10283	LOT104	1500p	1-439-256-22	LOT45	1650p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10284	LOT125	2150p	1-439-276-21	LOT230	1700p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10285	LOT110	1200p	1-439-280-00	LOT92	1600p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10286	LOT132	1500p	1-439-280-13	LOT92	1600p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10287	LOT122	1300p	1-439-286-00	LOT46	1300p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10288	LOT124	1450p	1-439-286-11	LOT46	1300p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10289	LOT106	1250p	1-439-286-12	LOT46	1300p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10290	LOT284	1450p	1-439-286-13	LOT46	1300p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10291	LOT284	1400p	1-439-286-21	LOT46	1300p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10292	LOT286	1400p	1-439-286-22	LOT46	1300p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10293	LOT109	1200p	1-439-286-12	LOT47	1400p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10294	LOT128	1300p	1-439-289-00	LOT47	1400p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10295	LOT127	1550p	1-439-289-21	LOT47	1400p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10296	LOT116	1600p	1-439-289-22	LOT47	1400p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10297	LOT73	1150p	1-439-289-31	LOT47	1400p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10298	LOT109	1200p	1-439-294-00	LOT93	1450p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10299	LOT103	1250p	1-439-294-11	LOT93	1450p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56	1650p	4822 140 10300	LOT109	1200p	1-439-294-21	LOT269	1550p	1-439-333-12	LOT100	1500p
06 D-3-095-002	LOT87	1000p	2434553	LOT234	4515 03 75	LOT56										

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: Thorn 2000 series colour TV in complete, restorable condition. Standards switching must be intact. Prefer 19in. set. Also spare panels, tripler, LOPT and service manual. Early (pre-1950) TVs bought. Mike Wilkinson, 35 Stopham Road, Maidenbower, Crawley RH10 7JF. 01293 884 605. E-mail

Mike@Wilkinson.talkland.com

Wanted: Circuit diagram for the Philips Model 14CT3005/05S, particularly the section showing the field timebase. Photocopy fine. C. Brooks, 10 Fords Close, Bledlow Ridge, High Wycombe, Bucks HP14 4AP.

Wanted: Operational details/data sheets for the following: M50436-616SP micro-controller; SUF.743 tuner; IFG-395 IF block. All used in the Sony Model KV14UTV. P.T. May, 8 Benlears Acre, Liverton, Newton Abbot, Devon TQ12 6GF. 01626 821 528.

Wanted: Service manual for the Osaki TV Model P1402R. Photocopies will do for a circuit diagram only. F. Nedza, 40 Brynhyfryd, Glynneath, West Glamorgan SA11 5BA. 01639 720 429.

Wanted: IF/AF board, part no. 29504-112.01GB for the Grundig Model ST63-260CTI (CUC2600 chassis). G.M. Dresser, 13 Oswald Close, Ramsey PE17 1EW. 01487 711 247.

Wanted: For the BBC microcomputer, any information/instructions on how to use the word processing ROM VIEW A2.1, OS1.2. Photocopies OK of book/manual information. Also require circuit diagram (photocopy OK) of the switch-mode power supply (Astec) used in the BBC B microcomputer - no. AA11660? D. Lee, 16 Devonshire Place, Cloughton, Birkenhead, Merseyside L43 1TU16.

Wanted: The 3.5in. start-up disc for an Amstrad PCW9512 was lost when it was sent for service. If I supply a blank disc and cover costs, would someone be prepared to copy the start-up program? Alternatively, is the disc available anywhere? Donald Welsh, 4 Newton Estate, PO Morningside, Bulawayo, Zimbabwe.

Wanted: For Canon portable VCR Model VR30B/Panasonic NV180, spares or machine in any condition. E.J. Richman,

13 Parkway, Seven Kings, Ilford, Essex IG3 9HS. 0181 590 4947.

For disposal: Free to good home! Various panels, chassis, TV speakers, TV stands, back covers, some CRTs, scan coils, channel selectors, LOPTs, turntables, VCR decks etc. Also seventeen CTVs, some workers some untested, £5 each or £65 the lot. No offers. M. Stephens, 01706 223 347 (Lancashire).

Wanted: Supply of tapes for the Philips VR2020 VCR (2000 system). Preferably new and either VCC360 or VCC480. Paul Hardy, 43 Sheridan Avenue, Caversham, Reading RG4 7QB. 01189 475 869.

Wanted: Service manuals (purchase/loan/photocopies) for the Canon E6E and E90E camcorders. Adrian Tullett, Unit 4, Hawkins Lane, Burton-upon-Trent, Staffs DE14 1QH. 01283 510 599.

Wanted: The following back issues of *Television* - January, February, May and June 1991. T. Moore, Alpha Electronics, 51 Deanwater Close, Birchwood, Warrington WA3 6ER. 01925 824 442.

For disposal: 25in. version of the *Television* TV project, housed in teak-effect cabinet (31in. wide, 22.5in. deep, 31in. high). Multiple spares including scan coils. All boards plug in. Full documentation. In-built crosshatch generator. Used as family set for approximately three years. Has been in storage since. Could deliver up to 50 miles or so to genuine enquirer if cost met. J. Austin, 0151 677 9048 (answering machine during daytime).

Wanted: NTSC video camera or camcorder in working condition, for use with video printer. Also Panasonic VFK0259 tension post adjustment fixture (VHS-C). Dave Syddall, Watson House, Moorside Road, Edgworth, Bolton BL7 0JY. 01204 853 413.

Wanted: Service manual for the Aiwa AD-R650K audio cassette deck. Photocopy OK. Nicholas Arnold, 19 Bond Street, Bournville, Birmingham B30 2LB. 0121 458 1187.

For disposal: Collector's radio, Ducati RR2403.1, with original 6A8, 6K7, 6Q7, 6V6 and 6X5 valves. Covers 200-550, 30-50 and 17-20 metre wavebands. In good working order. Offers please. W.S.

Molyneux, 98 Penkett Road, New Brighton, Wallasey L45 7QA. 0151 639 2890.

Wanted: Line output transformer and circuit diagram (photocopy OK) for the Orion/Plustron Model CTV55. R.J. Gregory, Oakwood Television/Video, 6 Hillside Avenue, Chaddesden, Derby DE21 6SP. 01332 675 828.

Wanted: Setting-up details for the mode/loading switch used in the Grundig VS910 VCR. Nicholas Jackman, 36 Ferrybank, Arklow, Co. Wicklow, Ireland. 0402 31138 (00 353 402 31138 from UK).

Wanted: Capstan motor assembly, used but in working order OK, for the Saisho Model VRS4400. Must be complete with spindle/pulley. Also used in the Saisho 4000, 5000, 3650, 3800 and VX12 (not 12X), and the Matsui VS877, 888, VX6000, 730, 765 and 850. Also require a tube base panel, numbered PC1054A, for a Ferguson TX9 portable. Brian Milne, 22 Aldwych Place, Blackburn, Lancs BB1 9QP. 01254 246 127.

Wanted: Can anyone supply a TDA2571A IC for the Philips KT3 chassis, or perhaps suggest an alternative or modification? The chip seems to be unobtainable now. Also require a circuit diagram for the Apricot monitor Model XJ9850 (photocopy OK). A. Tomkinson, 10 Lodge Court, Station Grove, Wembley, Middx HA0 4AP. 0181 903 5574.

Wanted: Instruction leaflet (photocopy OK) for the Rank Aldis Visual synchro recorder Model 162S-2, serial no. 670139, with PA system included. William C. Mulvenna, Flat 4, James Court, Kansas Avenue, Antrim Road, Belfast BT15 5AZ.

Wanted: Cabinet and back mouldings for a Decca Model DP9454 16in. TV set. A non-working, scrap set would be ideal. D.R. Howard, TV Services, Swincombe Cottage, West Road, Sawbridgeworth, Herts CM21 0BP. 01279 726 345.

Wanted/for disposal: Require circuit diagram/manual for the Philips PM5506 pattern generator. Have for disposal 405-line TV sets, valves, tubes etc. D.P. Bunker, 326 High Street, Berkhamstead, Herts HP4 1HT. 01442 864 334 or 01494 545 229 (work).

What a Life!

A Gloucestershire idyll - Don Bullock does a stint on the Home Front. And a happy ending to the saga of Miss Drudge

The days were shortening, the sun was getting watery and the mists would come rolling up. I wanted to get back to Spain, but Greeneyes had arranged that we should spend a fortnight at our UK base in Gloucester. So I had to face up to a stay of duty here, and the thought of it made me nasty. I stood in the shop and watched the innocents passing by.

"Look" I said to Greeneyes, "every one of them is scurrying home to get a fix of the national drug. Off to watch their silly, flickering TV screens. They ought to ban it."

"The day they do that, we stop eating" Greeneyes said sweetly. "And by the look of you that would be no bad thing."

"You'll change your tune when they start to troop in, with their silly mouths going" I said, feeling my head and wishing I'd gone easier on the whiskey the night before. "Free won't be cheap enough, immediately won't be soon enough, and perfection won't be good enough. We ought to have chosen better lives. We should have been traffic wardens." I paused and looked her up and down. "Specially you" I said, relishing my clever and cruel wit.

Tom's Decca

Before long our first pest, er customer, struggled in with his set. It was harmless old Tom Mugg. He put the set down on the front edge of the counter and wiped his brow.

"Hot today, innit, Mr Bullock!" he gasped.

"No, it's cold" I said, drawing the pad towards me. "Name?"

He stopped wiping his brow and looked at me askance. "You know me, Mr Bullock" he wheezed. As he turned to me his kneecap caught the

sharp edge of his set. "Oh, bugger" he gasped.

So I wrote "O. Bugger" on the card and waved him out.

His set was a 20in. Decca Model DT9476, which is fitted with the 145A series chassis. It had a noisy raster, with no programmes, although the digital channel display was working. We didn't have the manual but, as always, the people at Tatum were very helpful - both with advice and faxing us a circuit diagram of the tuning system. I soon discovered that there was no tuning voltage supply at the tuner. Checks in the tuning voltage DA converter stage showed that QR10 had no base bias because RR68 (33kΩ) was open-circuit. It's rated at 0.5W, so I fitted a 1W replacement. The results were excellent.

Elvis Pelvis

Our next customer minced in with a Sanyo CBP2145 (E2-B21 chassis). He looked like a well-greased wop. "You won't mend this set" he warbled, "nobody can. It's been everywhere. Wagging the aerial plug helps."

I decided I didn't like him. So I ignored his comments. "Name and trouble?" I asked.

"Elvis Pelvis" he said, smoothing his well-permed hair.

"And you name?" I said cleverly.

As he left, looking over his shoulder, I yanked his set on to the bench. I soon wished I'd asked him what the fault was, because it seemed to be all right. But after a while the sound cut out and the picture quality became degraded, taking away the colour.

I opened up the set and found pounds of fresh solder everywhere. When I withdrew the chassis, I noticed that the symptoms became

worse as the tuner drew level with the back of the runners. Starting at the tuner, I began disturbing - gently - every component in that plane. Before long I came to a lin. loop of black-covered jumper wire. One end was connected to a point marked J6. As I moved the wire over it fell out of its solder blob and the fault became permanent. Retinning and resoldering the link cured the fault.

After putting the set back together I sneaked off to lunch while Greeneyes guarded the fort.

I returned to find Greeneyes chatting and falling about with Mr Pelvis, who was happily forking out and gibbering in his silly way.

"They don't have assistants like you at Snoddies" he was saying, "or Crubbs Foodstore - or that new place on the ring road that does them while you wait."

"Don't they then?" she simpered, "are they really that bad?"

"How come you can waste time flirting with a prat like that?" I asked when he had wiggled out.

"He's nice" she said, "and different."

Filth

I spun round to see an unkept, ruddy specimen, unwashed, unshaved and unclean.

"Snoddies wants thirty five poun's just t' come" he said, "an' I en't paying it. You'll 'av t' come 'n' do 'im. Name's Bottler."

I stepped aside, exposing son Paul who had just started his mug of tea. Looking a little ill at ease, he took the address and agreed to call in half an hour.

He returned from what he reckoned was the dirtiest house he'd ever seen - which is something, in this trade - with a Baird television

set that was covered with sticky goo and smelt like a tip. He assigned the repair to me, and made for the soap and water while I washed the cabinet down with spray cleaner.

The set was fitted with the Ferguson TX9 chassis – the original version. Its symptoms were a loud spluttering on the sound and a weak, flickering and grainy picture. I soon found a sooty crater at one end of C136 (10nF, 1.5kV) in the ramp reset circuit in the power supply. Resoldering this removed the spluttering. I then turned to the picture trouble.

"I suspect the tuner" I said to Paul.

"It's usually the IF module in this chassis" he said. I looked at him and thought of the impertinence of the young.

I fitted a tuner, but it didn't help. Then Paul found an IF module in a scrap set. We fitted this and it did the trick.

When Paul delivered the set Mr Bottler emerged with dignity, paid our bill, thanked Paul for our swift and efficient attention and ran down Snoddies, which made him feel good. He gave Paul a big, fat tip.

Brisk Customer

As I stood gazing out of the shop window a smart little car drew up across the road. A thin fellow got out, grabbed a satellite receiver-decoder from the passenger seat and stood looking about him. Then he saw the shop, and me. He raised his right arm like a rifle and, looking along it with his left eye closed, strode towards me and entered the shop.

"You're the one" he said.

I looked behind me. Then he put the receiver down.

"Name's on it" he said, "ring me." And off he went.

A sticky label on the set said "Dead" and "Smith". But no telephone number. It was an Amstrad SRD510. When I opened it up I found the remains of C86 (100µF, 16V) all over the place. It's part of the 9V regulator circuit on the main board.

When I'd cleaned up the chassis and fitted a replacement capacitor the receiver worked well.

Straight from The Horsefly

Our next customer came to us, chauffeur-driven, straight from The Horsefly. He had trouble opening the boot. So Paul went out to help him unload his Toshiba 14in. portable – Model 1400TBW. The

customer, who was huge, followed him in then plopped on to a chair and laughed to himself. I eyed him sharply.

Then he looked at the set and said, thickly, "Wha'sh my Line? That'sh a good 'un, cn't it? Wha'sh my Line?"

"Professional soaker?" I suggested. His smile faded, so I shut up and pulled the pad towards me. "Name?" I asked.

"Popeye" he said.

I looked at him then filled in the job card. "Give us a ring tomorrow, Mr Eye" I said.

Field collapse was the problem, and I saw that the 7.5Ω fusible resistor R317 was open-circuit. One end is connected to pin 6 of the line output transformer, the other to the rectifier which produces the 24V supply for the AN5515 field output chip IC303. The chip was the cause of the trouble. It was dead short between pins 1 and 2. A replacement and a new resistor restored the picture.

When Mr Eye returned he was sober and correct. "Sorry about yesterday" he said, "I was celebrating – the missus had just left me."

I smiled at him.

"Never mind the grinning" he said, "she's back."

End of Day

As the day slipped by, Greeneyes decided to run Paul into town. I sat alone in the shop with a cup of tea, willing the clock to creep round to closing time.

Then a car drew up outside and out jumped Fred and John, two fishing mates of mine.

"The bream are biting at Haw Bridge" they said, "how about a couple of hours with us in the morning?"

"Done!" I said. Just then an emaciated fellow in a long, old-fashioned and unbuttoned raincoat came in with a GoldStar CIT4902 14in. portable.

"Dead" he announced. "It's me sister's. Name of Taylor."

I filled in the job card and waved him out, but he stood there.

"What's the matter?" I asked

"I shouldn't have done it" he said, looking at the floor and shuffling.

"Shouldn't have done what?" John asked.

At this point the cove sprang to life and danced around the shop. "Stop this nonsense" he cried. "I'm off!" Then, flinging his hands behind him under his mac, he strode off in long springy steps, like a



"Hot today, innit, Mr Bullock."

newly cleansed sinner.

As John and Fred looked at each other in amazement I settled to the set, which is fitted with the PC-04A chassis. It was dead, with no standby light. The chopper power supply is based on a TDA4601 chip (IC801), which needs an 8.5V start-up supply at pin 9. I thought this would be missing, but it was present. There was no voltage at pin 5 however, which is connected to pin 9 via a 100kΩ resistor (R814P). This resistor proved to be open-circuit, a replacement curing the trouble.

As we were about to lock up, I saw that the skies were leaden though the sun was trying to break through. Then I noticed an attractive, long-haired lady walking serenely towards the shop. She was wearing a gay summer dress and a straw hat.

I felt sure I recognised her face. A young man was by her side. As they reached the shop, she smiled and came towards us.

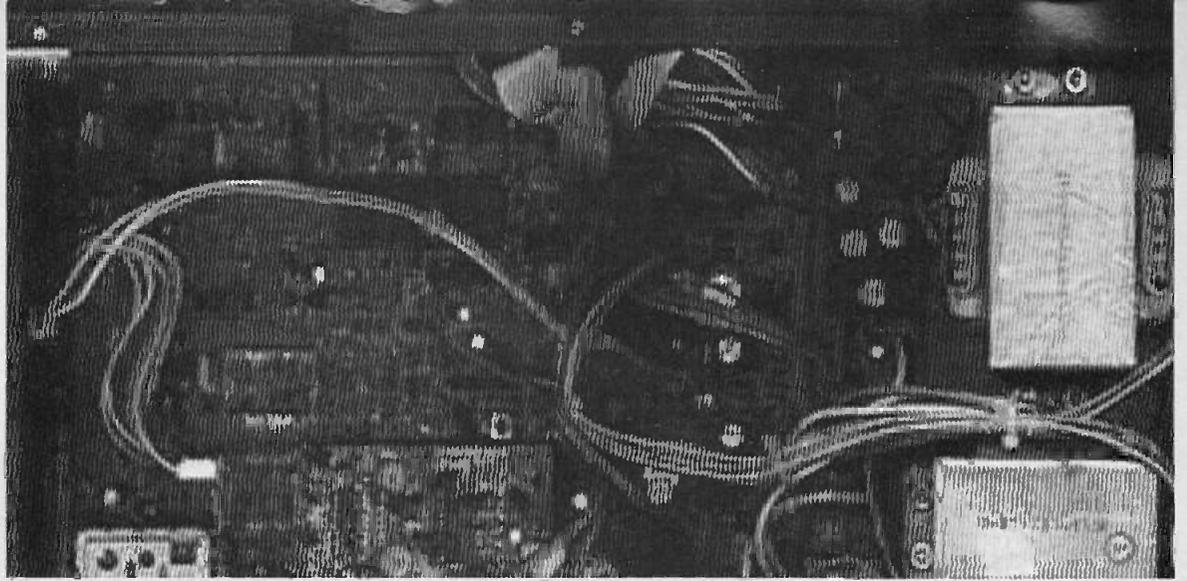
"Miss Drudge!" I exclaimed.

She laughed and shook her head. "Not any more, Mr Bullock. Meet my husband Arthur. Dr Arthur Saviour!"

"But, your mother . . ." I said weakly.

The lady's face clouded. "Sadly, she passed away – suddenly. Her doctor, Arthur, saw to everything. And, well, we've our own lives now."

Things aren't always as bad as they seem.



Satellite Notebook

**Reports from
Hugh Cocks
and
John C. Priest**

Pace D100 MAC Decoder

This decoder had stopped working during a thunderstorm. Once the usual power supply components had been replaced (the power supply circuitry is the same as in PRD800/900 series receivers) the decoder sprang to life, with the usual 'ping' from the power supply.

When I tried to test the unit however the results were very strange. As soon as the receiver came across a MAC signal it produced a blank screen with normal MAC sound, which was rather confusing.

After a while I inserted the customer's BBC Prime viewing card and was immediately rewarded with a normal MAC picture. It seemed that the on-screen graphics ("please insert card" etc.) had made the decoder blank out. When no message was present, the decoder worked normally.

In all likelihood this fault had been present before the power supply failure, probably caused by excessive heat. The customer wasn't bothered, as it seems that the decoder has a very limited life here now – at the end of October, BBC Prime via Intelsat 601 at 27.5°W is due to cease. Viewers have been sent a letter offering them a replacement smart card for BBC Prime via Intelsat 707 at 1°W, operated by Norwegian Telecom. But 707 does not provide signals in this neck of the woods. It seems that to continue viewing BBC Prime a digital receiver will be needed to pick up the signal from Eutelsat at 13°E. H.C.

Thomson SVA1 VideoCrypt Decoder

This decoder said that any new series 11 Sky viewing card inserted was "invalid". When an out-of-date series

10 card was inserted the message was "incorrect card". This caused the decoder's owner much confusion initially, as he not unnaturally blamed the card. When he checked it with a neighbour's receiver he found that it was OK. He then got in touch with us.

Reception of the non-card VideoCrypt broadcasters QVC and Channel 5 was fine. I checked the power supply for any excessive ripple on the outputs, but everything was normal. When I changed the card reader, the "invalid" message stubbornly remained with an 11 series card inserted.

I then did what I should have done first – check the 5V supply to the card reader with a series 10 card inserted. The check can be made at link J258, which is just to the right of the card reader.

The 5V supply is present here only when a 'valid' VideoCrypt card has been inserted (even an out-of-date one). The voltage was a little high. It comes from transistor TP09, which is clamped to the front right of the metal frame.

Cutting link J258 and inserting a 100Ω resistor in series reduced the supply to the reader a little, which did the trick. The decoder then recognised a series 11 card when it was inserted in the slot.

The new card must be a little less tolerant than earlier ones of a higher supply voltage. This decoder's supply was just high enough to stop normal operation. H.C.

Pace PRD Series Receivers

Intermittent remote control operation has been the problem with several PRD series receivers recently. In all cases I have found that one leg of the infra-red receiver IR1 was dry-jointed.

A good test is to tap the right-hand front of the case. This will either restore or remove the contact. The poor joint is usually visible. H.C.

Memory Loss

The owner of a Uniden UST8008 receiver phoned to say that it would not receive most channels after having been unplugged from the mains supply for a while. I expected to find that, as occurs with the UST7007, the memory battery needed replacement. It was quite a surprise therefore to find an 0.47F, 5.5V capacitor next to IC121 on the PCB. It was open-circuit. As the receiver was a bit long in the tooth and didn't receive all the channels, the owner opted for a new one. He was amazed to find that Astra 1, 2 and 3 no longer had to be selected (for some reason Astra A, B and C were kept separate).

I have found that memory loss seems to be quite common with EchoStar SR5500 receivers nowadays. The memory battery is located on the front, vertical panel and can be removed from a clip arrangement. Reprogramming these receivers is a hard task however, far more costly than the battery replacement. Make sure that you have the manual to hand, and at least an hour or two available for the task. The installation code is 7907878. H.C.

No Signal

The owner of a Pace MSS100 receiver called to say that it wasn't producing pictures. I went along to the job armed with a new LNB, just in case. Initial checks showed that there was no voltage at the dish, though the receiver was working correctly.

Behind the receiver I found a Far Eastern diplexer which was being used to enable the same cable to supply both terrestrial and satellite signals. There was a companion box by the dish. When the indoor unit was moved, pictures suddenly appeared. I opened the unit and found that the RF choke which supplies DC to the roof made poor contact with the main downlead's F socket. Resoldering the connection cured the problem. I also inspected the roof diplexer, whose internal connections were sound. H.C.

BT SVS250

For no decoding and no on-screen messages (or the messages fading out a few minutes after powering up) replace C45 (1µF, 50V). It's next to the PTU111 chip on the decoder PCB. Use a 105°C type. As a precaution, replace C1, C3 and C11 as well – they are in the same area. J.C.P.

Pace MSS100

An intermittent or constant blue screen with "no signal" displayed is becoming a common problem with these receivers. You can spend time

tracing the video output from the tuner module via emitter-follower Q101 to pin 20 of the video and audio processor chip U500, but it's quicker to check for 12V at pins 17 and 45 of this chip. You can also check this at coils L10 and L11 close to the chip. If the 12V supply is missing, go to the LM7812 regulator U3 which lies flat on the PCB at the front left-hand corner, just behind the programme down button. It's fed with 17V via D19 and D18 in series and you'll probably find that the cathode of D18 is haloed. Desolder, using braid, and resolder. For good measure, treat all the connections to D18, D19 and U3 in the same way.

Once you've removed the top of the receiver a quick test, before making any voltage or scope checks, is to flick D18's cathode lead with a finger nail. If the problem is caused by a haloed joint, the fault will come and go with movement of the lead.

Whether it's a good idea to mount a 7812 flat on the PCB in an area of low headroom, i.e. poor ventilation, is another matter. Most

receivers that are more than a year old have noticeable discoloration of the PCB beneath U3. I have an MSS100 in the workshop and have, as an experiment, fitted the 7812 with a small U-shaped heatsink and replaced the plastic rivet with a 6BA screw and nut and an insulated washer. J.C.P.

Cable Trouble

A Canal Plus subscriber decided to install his own digital receiver and fit a new LNB to his Eutelsat dish. He used a universal type, which the French call a "Tete universal". The existing downlead was retained. We were called in because the results were poor.

I went along armed with a "Tete" and a known-good analogue receiver. Analogue reception was OK, and changing the LNB made no difference. The digital receiver produced a 22kHz tone to tell the LNB to switch bands. All that was left was the cable.

It looked reasonable, but when I replaced it the digital receiver immediately locked to the Canal Plus package. H.C.



I.C.H.E.

P.O. BOX 142, NOTTINGHAM, NG9 3RX, ENGLAND
Tel: +44 (0)115 932 0152 Fax: +44 (0)115 944 4004
E-Mail: tony@iche.com

**YOUR SOURCE FOR
SPECIALIST PARTS FOR COMPUTER MONITOR
& COMPUTER REPAIRS**

WELTREN ICs

MONITOR SCHEMATICS

MYSON ICs

MONITOR FLYBACK
TRANSFORMERS

MONITOR PROCESSOR ICs:
ZILOG, TOSHIBA, MOTOROLA, etc

OTHER SPECIALIST ICs
(CALL FOR DETAILS)

"MONITOR WIZARD"
COMPUTER MONITOR PATTERN GENERATOR

"CAPACITOR WIZARD"
ESR METER

CHECK OUT OUR WEB SITE !!

<http://www.iche.com>

"ALWAYS THE FRIENDLY PROFESSIONAL SERVICE"



We welcome letters from our readers and try to publish as many as we can. You can send them typed, handwritten, or on disc. Address them to the Letters Editor, Room L302, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Checking Tape Heads

In the December 1996 letters page I commented on the dire consequences of checking whether a tape head is open-circuit by measuring its resistance. Subsequently J. LeJeune suggested as a constructional feature a circuit that would check the continuity of a tape head by including it as part of an oscillator. I spent a few happy hours trying to come up with an arrangement that would be simple to construct and would prove beyond doubt whether a head was open-circuit or not. Then I suddenly realised that it's very easy to miss the blindingly obvious (once it has been pointed out!) when searching for the solution to a problem, also that if you are not careful you can end up with a workshop full of little black boxes designed for one-off purposes. A head can be tested for continuity without any additional equipment by inducing into it sufficient voltage to obtain a reading directly with a digital voltmeter.

To prove the point I used a hand-held demagnetiser designed for quarter-inch heads. This was in preference to the flimsier cassette-type, usually identified by a red-painted metal end pole, which doesn't generate sufficient magnetic field. J. LeJeune's "broom-handle coil" certainly seems to be more than capable of this job!

For reasons known only to myself, I keep a selection of knackered tape heads. So I began my

Letters

tests with a four-channel, quarter-inch head removed from a Teac 3340 reel-to-reel machine. When a digital meter switched to its 2V AC range was connected across one of the coils, the 'fruit-machine' effect you get with some meters prior to connection immediately stopped. Be certain that the meter is switched to an AC range before connecting it to the head – the whole purpose of the exercise is defeated if the meter is left switched to a resistance range! When the face of the energised demagnetiser was slowly brought up to the head, a voltage reading of 0.6V was obtained at the closest point: the voltage decreased as the magnetic field was withdrawn.

The same test carried out with a control head from a Panasonic G deck and one taken from a Ferguson 3V29 VCR produced a reading of 0.025V AC, falling to zero as the field was removed. The voltage reading obtained across various single video heads was on average 0.02V AC. Do not allow the head to come into contact with the demagnetiser. Just in case you are wondering, I also tried this with an erase head taken from a Dokorder 7140 (another four-channel machine). This produced a reading of 0.21V AC.

These are all small voltages, but they are enough to produce a definite meter reading and thus prove the point. Even though some of the heads had been worn almost to the pole pieces, at least I could prove that they were not open-circuit.

At the age of sixteen I had a Philips N4416 reel-to-reel tape machine. When all guarantees had expired, I decided to maintain it myself. Then I decided that it could really do with a third head to provide an echo facility. Bringing my Meccano set into play, I added a third head as a clip-on attachment to the right of the main block. All that remained to be done, after meticulous alignment, was to provide suitable amplification. Not caring to much at the time about impedance matching, I connected the extra head directly to the microphone input. It worked!

Those of you who have a microphone preamplifier connected to a

suitable monitor can listen directly to the output from a suspect audio and/or control head. You will find that many one-piece music systems have a microphone input facility for budding singers and DJs. There's also the mic. input with a few VCRs! Amongst other things, there will be grossly incorrect equalisation of the resulting sound, but you could always listen to the degausser instead. Fifty Hertz sounds pretty much the same regardless of any playback curve!

A proper tape head preamplifier could be built into a little black box, but this is where we came in!
*Peter Graves,
Clapton, London.*

Pace Mods: Correction

The article on Pace PRD Series receiver upgrades in the last issue (October) was originally written as two separate articles. In combining them, a bit of confusion could arise. The 199-channel upgrade applies *only* to single-input receivers: consequently, the instruction to fit one resistor under U4 and "remove any other resistors" also applies *only* to single-input receivers.

The J17 wideband audio upgrade would be difficult to implement without a component layout: this is supplied with the kit.

Finally the SatCure post code was incorrect. The correct address for the kits mentioned in the article is SatCure, PO Box 12, Sandbach, Cheshire CW11 1XA. Please send two stamps with any enquiry. You can see the list for free at our web site:

<http://www.netcentral.co.uk/satcure/>

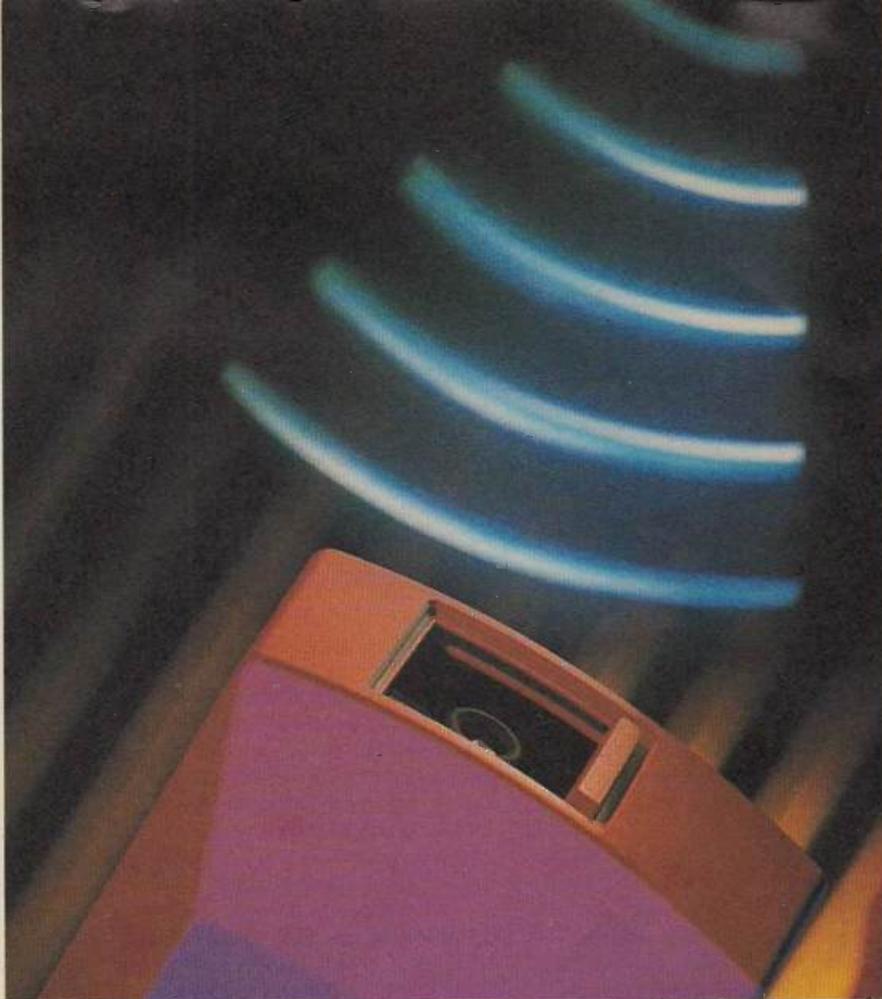
*Martin Pickering, B. Eng.,
Sandbach, Cheshire.*

Two Wires or Three?

The use of two-wire mains leads with consumer brown goods is almost universal these days. But how safe is this arrangement? During the last two days I have experienced situations which cast serious doubt on the "no earth required" concept.

In the first case I supplied a customer with a DIY aerial kit. While he was in a precarious position,

The excellent, inexpensive Bull Electrical CCTV colour camera lacks a sound channel. It's not difficult to add a sound module based on a kit from Maplin. Eugene Trundle describes how he modified the kit and installed a sound facility in the camera



Adding sound to a CCTV camera

For many months Bull Electrical has included a colour CCTV camera in its advertisements in this magazine. Lots of readers have probably purchased these cameras at the bargain price of £119. I bought one some months ago, and was so pleased with it that we immediately bought two more for security/surveillance in the shops.

Features

The camera is very light and slim, and has a standard tripod mounting. It's operation is fully automatic, adjusting for light levels down to 7 lux and a wide range of colour temperatures. The lens is a 4mm, f2.8 type that focuses from about 25cm to infinity. Consumption is about 150mA from a 12V DC supply. The video output is a standard 1V peak-to-peak at 75Ω, with PAL colour. I haven't been able to check on this, but the resolution is certainly no greater than the specified 320 lines: even so, the colour picture is excellent. I may be wrong, but the impression I get from the internal construction, the part numbers and chip types is that the camera is manufactured by Sony.

The Project

A drawback for some applications is the lack of a sound facility. I understand that a sound kit is available from Bull Electrical at about £23, but that it's external to the camera and doesn't incorporate any ALC (automatic level control) of the type universally used with consumer camcorders.

With a memorable barbecue coming up to get on video, and a quiet period for repairs in the workshop, I decided to see what could be done. The aim was to have the sound facility entirely within the camera, to incorporate a degree of ALC – and to do it more cheaply than the Bull kit!

Sound Circuit

The project makes use of an SL6270 microphone preamplifier chip, which incorporates AGC. It combines the functions of an audio amplifier and a voice-operated gain-adjusting device (VOGAD). A constructional kit is available from Maplin Electronics. This comes complete with an electret microphone for less than £14, including VAT and post/packing – the

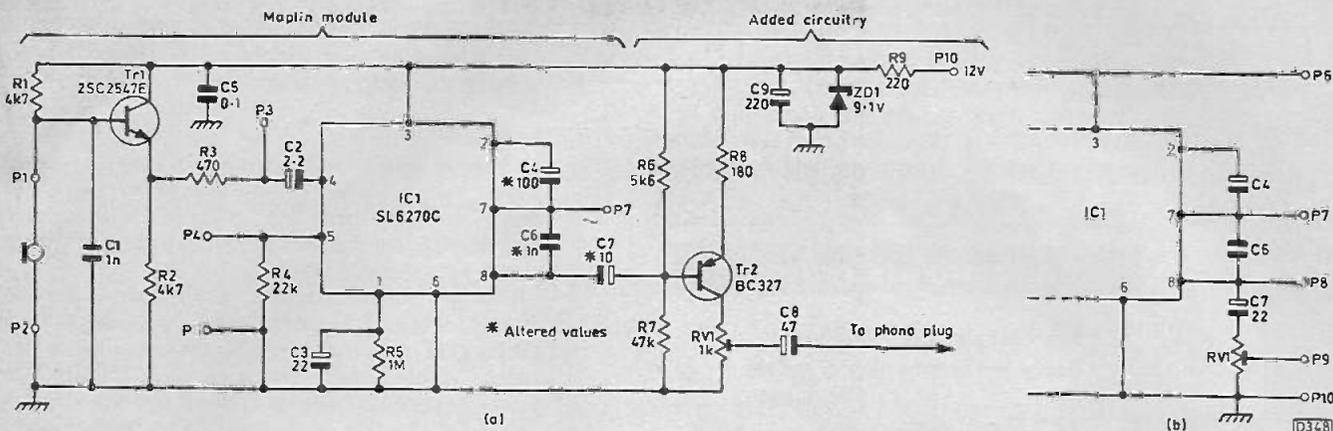


Fig. 1: (a) Circuit diagram of the modified Maplin kit. (b) The modified section of the Maplin kit in its original state.

catalogue number is LP98.

As it stands, the Maplin circuit provides a gain of about 50dB with a frequency response of 300Hz-3kHz. These two characteristics are set by components connected to the chip. The maximum output of about 100mV RMS is not sufficient for our needs however, because a TV set or VCR requires an input level of about 500mV RMS. The frequency response is also too limited. So some modifications were devised.

The circuit is shown in Fig. 1. The values of C4 and C6 in the original kit were changed from 2.2µF to 100µF and from 4.7nF to 1nF respectively. C4's higher value extends the LF response to about 50Hz, while C6's lower value increases the HF response to beyond 10kHz. To overcome the gain problem, a one-transistor amplifier (Tr2) with a gain of about 15dB was added. C7 was changed to 10µF and used to couple the output from the chip to the base of the added transistor, which uses the original preset gain control RV1 as its collector load. In practice this will need to be turned almost fully up. Finally a simple zener diode voltage stabiliser was added to provide the sound circuit with a similar operating range as the camera itself. The sound circuit's current consumption is about 12mA at 12V.

Construction

The Maplin PCB is very compact. So care is required when fitting the extra components to avoid short-circuits and to keep them within the overall height of the Maplin assembly - otherwise the module will not fit inside the camera's case.

I removed the old C7 then fitted Tr2's collector lead in the position that had been occupied by the old C7's negative lead. The new C7's negative lead was fitted in the position previously occupied by the old C7's positive lead. The extra components are mounted off the PCB. C9, a radial type, and ZD1 were soldered between pins 2 and 6 of the PCB. R9 was soldered between pins 6 and 10, with the latter isolated from the rest of the circuit by cutting the print track. The output coupling capacitor C8 sits at the new phono output socket, on the rear panel (see Fig. 2).

It's important to test the modified circuit before fitting it in the camera, and to ensure that the joints on the print side of the PCB are 'low-profile', with no sharp spikes.

Fitting the Module

It is essential that the camera is treated with great care, using anti-static precautions when its processor and image-sensor boards are handled.

I drilled a 3mm diameter hole in the front, right-hand side of the case to let the sound through, then used epoxy resin to fix a small flexi-plastic sleeve (10mm inside diameter, 6mm long, cut from a phono plug) concentric with the hole, on the inside. This is a push fit for the electret microphone that comes with the Maplin kit.

A 6.5mm hole was then punched in the aluminium rear connector panel, between the video output and the power jacks, to take a phono audio output socket, e.g. Maplin type YW06G.

The screened leads supplied with the kit were used for the microphone and output connections, with careful shrouding (for insulation) around the coupling capacitor C8. This is a radial type which is soldered direct to the centre tag of the added phono socket.

The PCB was stuck to the camera's top case screening plate, immediately behind the centre plastic fixing pillar, using three of the adhesive pads supplied with the Maplin kit. Align the PCB so that it sits across the screening plate, with RV1 closest to the pillar, and ensure that nothing shorts to the metal plate. See Fig. 2.

Make an insulator, 4cm x 4.5cm, from cardboard of the type used for visiting cards (or something similar). Punch a 6mm hole in the insulator so that it will fit over the middle fixing pillar and completely cover the top of

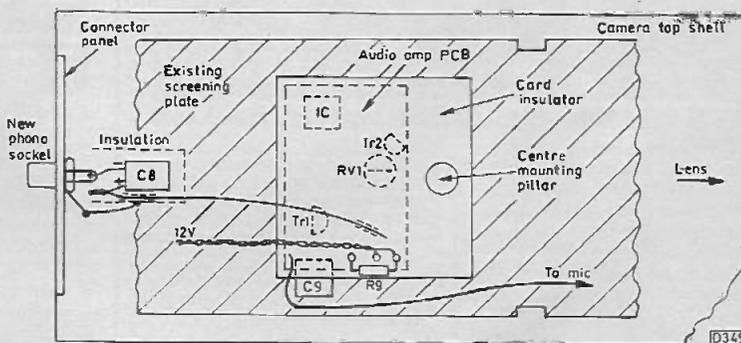


Fig. 2: Mounting the audio module behind the camera's processor PCB. The camera is depicted lying on its topside. The audio module's card insulator should cover it completely and be a tight fit on the pillar.

the audio PCB. This prevents short-circuits to the camera's video processor board. If you've got this right, the latter can be refitted without fouling the audio PCB – though there's no room to spare!

Run thin black and red leads from pins P5 (chassis) and P10 (12V) on the audio board to the camera's 12V supply. Carefully dress them, and the screened leads.

around the camera PCB's other (channel-section) screening shield. I would again emphasise the need for care in handling, and regard for ESD risks, while dealing with the camera boards.

In Use

The added circuit works very well, the cost of the parts working out at about £16. The twin phono output sockets can be easily used with a VCR or TV scart connection or with an RF modulator (see Test Report last month for a suitable type).

As with all ALC-governed sound systems, the background noise rises in quiet surroundings while any very loud sound is followed by a second or so of complete silence as the AGC system recovers. Despite these points, the sound quality is as good as that with many a camcorder I've had on the bench. The data file with the Maplin kit tells you how to alter the ALC attack and decay times, but I found that the 20dB/sec decay rate (set by R5) is fine for general use. If wind noise is a problem, the value of C4 can be decreased from the suggested new one: this will suppress low frequencies at the expense of body in speech tones when the camera is used indoors.

Although I've had no need for this myself, it is possible that the use of filters and DC blocking capacitors, along with a compact RF modulator such as the Multiview type, would make it possible to achieve remote operation over long distances via a single coaxial cable – as is done with satellite LNBs.

Components required

- Maplin LP98 preamplifier kit
- Panel-mounting phono socket
- C4 100µF, 16V radial
- C6 1nF ceramic
- C7 10µF, 16V radial
- C8 47µF, 16V radial
- C9 220µF, 16V radial
- R6 5.6kΩ, 0.25W miniature
- R7 47kΩ, 0.25W miniature
- R8 180Ω, 0.25W miniature
- R9 220Ω, 0.25W miniature
- Tr2 BC327
- ZD1 BZY88C9V1

DJ Stephenson's
SATMASTER PRO

**AVAILABLE IN TWO VERSIONS:
 32-bit Windows 95/NT4.0
 or 16-bit Windows 3.1/3.11**

NEW! £149 PRO 5.1

TRY IT FREE ON:- <http://www.swiftpub.u-net.com>

- ✓ Already used by hundreds of leading broadcasters, teleport engineers and installation companies!
- ✓ Antenna aiming module with az-el and polar mount set-up angles. Fully automatic magnetic variation calculation!
- ✓ Dual/multi feed calculations for multi-satellite operation!
- ✓ Five link budget calculators! Up-down FM, two up-down SCPC/MCPC digital (BPSK, M-PSK and M-QAM any FEC) plus FM and digital downlink all with choice of CRANE or ITU climatic models. (Note: 5.1LE has downlink calculators only!)
- ✓ Displays footprint maps in BMP, PCX, TIFF and JPEG formats. Start-up collection supplied free!
- ✓ Huge databases of worldwide towns and satellite locations. Plus a 40,000 word technical help file!
- ✓ Easily the best work of its kind in the World!

NEW VERSION 5.1LE

PRICE CRASH!

ONLY **£49** 5.1 LE

Post:-
 UK: £1.50
 Europe: £2.50
 R of W: £6

Please state requirement, whether 16-bit or 32-bit.

DIGITAL SATELLITE TV

by Dr Frank Baylin

- ✓ A completely revised and expanded fifth edition of the popular Ku Band book!
- ✓ Provides a comprehensive introduction to digital satellite television!
- ✓ Organised into 16 chapters, the manual covers dish theory, uplinks, multiplexing and error correction, uplink operation and digital compression systems!
- ✓ It also includes communication fundamentals, troubleshooting and repair, and scrambling techniques!
- ✓ A 'must read' for anyone interested in modern satellite communication. Hundreds of pages!

Postage:-
 UK: £6.00
 Europe: £11.00
 Rest of World: £21

ONLY £36

WORLD SATELLITE YEARLY 1997 UPDATE

- ✓ All the latest information including footprints and characteristics of newly launched satellites as well as the latest in world-wide video transponder loading.
- ✓ Organised into two easy-to-use sections that are separated by tabs.
- ✓ Section 1 lists: a complete listing of footprint maps and other information describing over 25 newly launched satellites.
- ✓ Section 2 list: a complete listing of video programming available on every satellite. More than 200 pages.

Postage:-
 UK: £3.00
 Europe: £5.00
 Rest of World: £16

ONLY £39

All available by return post! Send stamped envelope for complete list.

SWIFT TELEVISION PUBLICATIONS

17 Pittsfield, Cricklade, Wilts, SN6 6AN, England
 Tel 44 (0)1793 750620 Fax 44 (0)1793 752399

Amstrad Service Centre

Audio

Television

Video

Telecommunication

The 'Amstrad Service Centre' is the exclusive returns centre for all standard customer returns on behalf of Amstrad and Betacom. For the first time we are offering to supply genuine Standard Customer Returns direct at market competitive prices. All of the products we offer for sale are supplied in original manufacturer cartons, both picture print and full colour gift type. All product is 'virgin' and has not been serviced by the Amstrad Service Centre or any other outside service agent. If you would like to receive a colour product catalogue and an up to date stock and price list please fax your full company details through to the facsimile number listed below.

Currently we have over 90 lines throughout the consumer electronics range starting with walkmans, clock radios, portable stereos, portable CD stereos, personal CD players, micro systems, CD micro systems, mini hi-fi, midi hi-fi, 14" television, 20" television, 28" television, non videoplus VCR, videoplus VCR and fans.

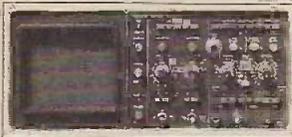
There are no restrictions on the sale of these products but if any are exported it is your legal responsibility to check the goods meet all electrical requirements and relevant regulations for the country of export. Export enquiries welcome.

Please mark all references from this advertisement for the attention of Mr T James, Operations Manager.

Switchboard 01630 655 797 Facsimile 01630 655 683

Amstrad Service Centre, Universal House, Tern Valley Business Park,
Market Drayton, Shropshire TF9 3SQ.

HOW DOES YOUR EQUIPMENT MEASURE UP? AT STEWART OF READING THERE'S ALWAYS 'SCOPE FOR IMPROVEMENT!'



PHILIPS PM3217 (This is a proper scope)
Dual Trace 50MHz Delay Sweep Incl 2 Probes
£400



HC3502
Dual Trace 20MHz 5mV/20V/Div; 0.2 µ Secs - 0.5
Sec/Div; X-Y; X5 magnifier; TV Sync etc
Hardly Used £150 Un-used £200

THE CLASSIC TEKTRONIX 400 SERIES



488 Digital Storage Dual Trace 100MHz Delay £300
486 Analog Storage Dual Trace 100MHz Delay £300
415 Dual Trace 20MHz Delay Sweep £200
485 Dual Trace 100MHz Delay Sweep £400

FLUKE PM3082 2+Ch 100MHz Delay TB Cursors £1200
PHILIPS PM3208A Dual Trace 40MHz Dual TB Delay Cursors IEEE £1750
TEKTRONIX 2456A R Trace 35MHz Delay Cursors etc £2800
TEKTRONIX 14545A Dual Trace 100MHz Delay Cursors £1900
TEKTRONIX 10544D Dual Trace 30MHz 50MHz Cam. Trg Dig Storage £1700
TEKTRONIX 2215 Dual Trace 60MHz Delay Sweep £600
PHILIPS 3085 2+Ch 50MHz Dual TB Delay £670
PHILIPS PM317 Dual Trace 50MHz SCOP/IMP/TC Dig Storage £200
GOLD 051100 Dual Trace 10MHz 50MHz With Delay £200
GOLD 05100 Dual Trace 20MHz £200
GOLD 05300 Dual Trace 20MHz £200

AND REMEMBER ALL OUR EQUIPMENT IS PROPERLY TESTED



MARCONI 2019A Syn AM/FM Signal Gen 800Hz-1340MHz £1850
MARCONI 2019 Syn AM/FM Signal Gen 800Hz-1340MHz £1500
MARCONI 2018 Syn AM/FM Signal Gen 800Hz-1340MHz £1000
MARCONI 2017 AM/FM Signal Gen 100Hz-102MHz £8750



FAIRBELL 55520 Syn AM/FM Signal Gen 100Hz-120MHz £325
FAIRBELL P50200 Syn AM/FM Signal Gen 100Hz-120MHz Portable £450
MARCONI 20225 AM/FM Signal Gen 100Hz-1GHz £2000
R.P. 8455A Syn Signal Gen 0.1-950MHz £1500
R.P. 8640A PhaseLock/Syn Sig Gen 500Hz-512MHz £750
R.P. 8640A AM/FM Signal Gen 500Hz-1024MHz £650
PHILIPS PM3151 Programmable Syn Func Gen 0.1MHz-50MHz £1500
PHILIPS PM3182 Programmable Syn Func Gen 0.1MHz-20MHz £1000
R.P. 3329A Syn Function Gen 21MHz £1200
PHILIPS PM3134 Sweep Func Gen 0.01Hz-20MHz Sine/Sqr/Tri etc £400
PHILIPS PM3182 Sweep Func Gen 0.1Hz-7MHz Sine/Sqr/Tri etc £200



CLASSIC AV8 Mk5 in Case
with Batteries & Leads £50

FLUKE 770MM 3 1/2 digit with
Carrying Case & Leads £60

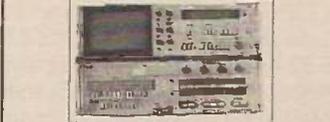
RACAL COUNTERS
9918 10Hz-560MHz £125
9916 10Hz-520MHz £150
9904 DC-50MHz £60

RACAL 1998 Counter 1.3GHz £650
RACAL 1991 Counter/Timer 1.60MHz £450
RACAL 1990 Counter 120MHz £300

SOLARTRON 7151 DMM 6 1/2 digit IEEE £450
SOLARTRON 7150 DMM 6 1/2 digit IEEE £300
True RMS

SPECTRUM ANALYSERS

R.P. 8500A 0.01-270MHz £2500
R.P. 8500A 100Hz-1.1MHz 75 dBm £2750
ARTECH 777 0.01-200MHz £1500
R.P. 182 with 8559A 0.01-210Hz £1500
R.P. 182 with 8558B 100Hz-1500MHz base £1500
R.P. 1413 with 8559A & 8558B 100Hz-180Hz £1500
Other 1413 Systems available



MARCONI 112370-110MHz £700-£1000
MARCONI 112370 with 112373 30Hz-1.5GHz £1500
R.P. 5382A Dual Channel 250Hz £2000
R.P. 8520C Sweep osc with 8520B 2-180MHz £1750
R.P. 8520C Sweep osc with 8522B 0.01-2.7GHz £1750
MARCONI 177015 AM/FM Sig Generator 10-120MHz £750
FAIRBELL D5C-2 Gen Osc 0.0001Hz-100 95Hz Sine/Sqr/Sweep/IEEE £200
GOLD 100 Sine/Sqr Oscillator 10Hz-100MHz £750
FAIRBELL LFS SineSquare Oscillator 100MHz-1MHz £150
R.P. 8150A Programmable Precision Pulse Gen 50MHz £950
MARCONI 2810 True RMS Voltmeter DPM £300
R.P. 3459A 6 1/2 digit Multimeter £700
DAYTON 1161A 105JA 6 1/2 digit True RMS with IEEE £100
SOLARTRON 7081 7 1/2 digit Multimeter £1500
EXP 371 Source Locking Microwave Counter 20Hz-18GHz £1500
R.P. 5342A Frequency Counter 10Hz-24GHz £7750
MARCONI 2440 Frequency Counter 10Hz-20MHz IEEE £1350
MARCONI 2437 Universal Counter/Timer DC-100MHz Un-used £125
MARCONI 2430A Frequency Counter 10Hz-50MHz Un-used £80
R.P. A275A Multi-Frequency LCR Meter £3000
R.P. 4261A LCR Meter £1350
RACAL 9348A LCR Databridge IEEE £250
MARCONI 2105 Mediation Meter 5000Hz-2GHz £2200
RACAL 9929 Automatic Mod Meter 50Hz-1.5MHz £2200
EYDISSA 252 Automatic Modulation Meter £150
FAIRBELL AP10070 PSL 0.10Hz-0.30Hz Antenna Imp £400
FAIRBELL H5025 0-60V 0-25A 1000Hz £400
FAIRBELL TSP302A 70V 5A/25V 10A 20A £220
THURLEY TSL1820 Precision PSU 18V 20A £175
THURLEY TSP3222 Prog PSU 32V 7A True-GPB Digital £450
THURLEY PL320 10V 2A Digital PSU with GPIB £100
RACAL 9104 RF Power Meter 10MHz-1GHz 100W-300W £225
MARCONI 2167 RF Amplifier 500Hz-80MHz 10W 47dB Gain £150
HUBBARD TRACKER Model 10001 Inc Carrying Case £125
STARBUCK 4021 Radio Test Set £200

BIRD 43 ELEMENTS
Type SA, 10A, 100A, 5A, 10A, 100A, 5A, 250, 250C, 250D, 500, 500D, 1000, £25 each.
100W, 250W, 1000W, £25 each, 1000W 665



PANASONIC VP8177A FM/AM SIGNAL GENERATOR
100KHz-100MHz; FM 0-100KHz; Output -19dB-99dB
AM 0-60%; 32 Preset Memory; Digital Display
Frequency & Output.

Used £450 Un-used £750
PANASONIC VP7637A STEREO SIGNAL GENERATOR
Generates Broadcast FM-RDS/ARI. Preset memory; GPIB
Used £400 Un-used £700



KENWOOD FL180A WDW/FLUTTER METER 0.003%-10%; Freq 3KHz/3.15KHz RMS/AVERAGE/PEAK; Weighted Filters; Digital Display of rms; 4 digit Freq Counter (0.01KHz-9.999KHz/0.01KHz-55KHz)
Used £400 Un-used £500

POWER SUPPLY Model HSP3010 0-30Volts; 0-10 Amps Current Limiting; 2 Meters.
Used £160 Un-used £200



GOODWILL GWT427 DUAL CHANNEL AC MILLIVOLTMETER 10Hz-1MHz in 10y/300V in/2 Ranges 5 Ranges 0.1% Low Distortion 5 Steps Output Attenuator
Used £100 Un-used £125

GOODWILL GAG-808G AUDIO GENERATOR SineSquare 10Hz-1MHz in 5 Ranges 0.1% Low Distortion 5 Steps Output Attenuator
Used £100 Un-used £80

GOODWILL GFC 8010C FREQUENCY COUNTER Range 1Hz-120MHz 8 Digit Display 1.5mV RMS Sensitivity
Un-used £75

ANALOGUE MULTIMETER Model HC260TR AC/DC Volts; DC Current 10Amps; 17 Ranges; Continuity Buzzer; Transistor Tester
Un-used £15

STEREO AUDIO BALANCE TO UNBALANCED CONVERTOR
for Car Radio Servicing
Un-used £20

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 if possible.
This is a VERY SMALL SAMPLE OF STOCK. SAE or Telephone for Lists. Please check availability before ordering.
CARRIAGE all units £16. VAT to be added to total of Goods and Carriage.

Long-distance Television

Terrestrial DX and satellite TV conditions and reception, news from abroad and the story of wartime TV transmissions from Paris.

Roger Bunney reports

This year's Sporadic E season extended well into August; there were SpE openings on many days during the first two-three weeks of the month. The weather went from one extreme to another, with very hot, humid periods then days with torrential downpours, thunder and chilly evenings. As an early autumn seemed to be approaching, the leaves here in Romsey, Hants started to brown and fall. A hard winter to come perhaps? Whatever lies ahead, here's a brief summary of SpE reception during the month:

- 5/8/97 TVE (Spain) ch. E2.
- 8/8/97 TVE chs. E2-4.
- 10/8/97 TVE E2-4; RTP (Portugal) E2, 3.
- 11/8/97 RTP E3; NRK (Norway) E2, 3; SVT (Sweden) E2.
- 12/8/97 SVT E4; NRK E2; RAI (Italy) IA; Video (Italy)

- E2; various unidentified signals.
- 13/8/97 TSS (Russia) R2 (test card at 1400); SVT E2-4; NRK E2, 3.
- 14/8/97 RTS (Serbia) E3; Video E2; RAI IA, B; TVE E2-4; RTP E3.
- 15/8/97 SVT E2; TVE E2.
- 17/8/97 RAI IA; Video E2.
- 20/8/97 TVE E2-4.

There were two main periods of enhanced tropospheric propagation during the month. Signals were received from Scandinavia over the 11/12th, with NRK chs. E5, 6, 8, 9 and 10, and DR (Denmark) chs. E7, 10, 11, 12 and at UHF. The 18/19th again produced reception from Scandinavia plus, this time, very strong signals from the Benelux countries. The usual French and Benelux Band III and UHF stations were received between these dates.

Satellite Reception

The EBU news feeds via Eutelsat II F4 at 7°E are to change from the present analogue form with sound-in-syncs to digital form. This will increase the number of channels from seven to twenty. The NTL System 3000 will be used, with MPEG-2 encoding. The change has been on the cards for two and a half years. Now, it seems, the equipment has actually been ordered. I hope that a little plastic box that can cope with this, with phono sockets, will appear in due course.

There continue to be plenty of analogue news feeds. Most dramatic during the month were the live transmissions from Montserrat,

showing the smoking volcano. The SNG truck on the spot used uplinking via the PAS-3R satellite at 43°W for Sky News – several NTSC offerings were also seen. Watch out for colour bars with the identification "SIS 28 UKI-736" flashing in sequence with "Montserrat for Sky News" and "SISLink Global Satellite Company".

I've been checking up on the ageing Eutelsat I F5 bird which is now in inclined orbit at around 25.5°E. It carried numerous SIS feeds during August, including a rich variety of programme inserts for Central TV's evening magazine programme. The 11.183GHz horizontal transponder is in regular use for Central's news and features.

Another old favourite that's very active is Intelsat K at 21.5°W. During the early evening on August 18th this bird brought us shots of a massive gathering of media folk around Brooklyn Bridge, NY. A presidential-type cavalcade complete with police outriders and escort cars led to a zoom which revealed the Rolling Stones in a mid-Fifties Cadillac. We were at a press meeting to mark the "Riches to Babylon" Canadian/US tour. This was seen via the 11.54GHz vertical transponder.

Various items, including the Backstreet Boys opening the Virgin Megastore in New York, were seen via Orion-1 Atlantic at 37.5°W. On August 14th we had the BBC Plymouth UKI-231 SNG truck covering the Jersey Battle of Flowers – as ever on a Thursday

Any ideas about the origin of this picture? Roy Carman, who received the signal via Orion 1 at 12.685GHz, would like to know more about it.



afternoon along St. Helier's Esplanade.

Julian Redwood (Christchurch) has recently bought a Nokia 9500S digital receiver and has been investigating its capabilities. He finds that digital sat-zapping is much more time consuming. It can take up to five minutes to program in a bit rate that's lower than the expected red menu 28Mbits/sec, and the receiver won't remember this once it has been switched off. According to NZ contacts there are several versions of this receiver: the 9500S V1.63 can identify various transmission characteristics.

Roy Carmen (Sandown, Isle of Wight) mentions the many news feeds about the flooding in East Germany/West Poland, via DFS-Kopernikus 3 and 2 at 23.5°E and 28.5°E respectively. DFS-2 is usually the more active satellite for sporting and news feeds, particularly during the early evening period, in the FSS and Telecom bands. Those who rise early, like Roy, were able to enjoy the GMTV morning entertainments from the beaches of South Spain via Intelsat K, courtesy of the UK1-76 Reuter TV Uplink. Signals were usually present by 0730, with pre-transmission rehearsals. The unit moved to a new location each day.

John Locker (Wirral) draws attention to orbital position 16°W, where the Cosmos 2054 satellite which downlinked live MIR pictures at 10.825/10.83GHz has been replaced by Altair-2. This new satellite has been received in Holland using a 1.2m dish. But John saw nothing when, over a three-four week period, he made occasional checks. It seems to be a matter of luck: it might just be worth a look should you pass by and can tune down that far – an Astra 1D converter can be used. Apparently the satellite has a 1° spot beam directed at Moscow – also an 0.6° inclined orbit. You might have better luck with the lottery!

Terrestrial TV News

Hungary: A partnership between Pearson TV Group of the UK and CLT has been awarded a ten-year franchise to run a commercial TV service using the former MTV-2 channels. This will give it coverage of some 86 per cent of the ten million population. The service is due to start this autumn and will use the RTL-Klub logo.

New Zealand: The MTV-UK music channel is now being

transmitted across the country on channels previously used for the Horizon service. Initially the programme was a repeat of the UK version of MTV, but some changes to reflect local preferences have since been introduced.

France: Canal Plus is to launch a news channel next spring, via satellite with terrestrial inserts.

UK: The Orange and One 2 One cellular radio networks have each been given two additional 5MHz sections of bandwidth, bringing the total for each operator to 30MHz. The additional bandwidth is for the expansion of mobile and data networks over the next decade.

Sri Lanka: Channel Nine Ltd. plans to start a Pay-TV service this December. The company intends to increase the service to an eventual thirty channels.

Ireland: The ERP of the Maghera/Gort ch. 1B transmitter has been reduced from 80kW to 40kW.

Lithuania: Most TV transmitting equipment is being replaced and many low-power (less than 10kW ERP) VHF transmitters are moving to UHF.

Spain: The 50-50-2MHz band has been allocated to Amateur use for an initial five year period, with restrictions near ch. E2 transmitter sites. Output powers of up to 10W fed to a 6dB gain aerial, with AM, CW or SSB operation, are permitted.

The Netherlands

Various new transmitters and transmitter changes offer UHF DX potential. Details are as follows:

Friesland: The ERP of the Irnsum ch. E28 transmitter has been increased from 10 to 150kW, with omnidirectional coverage.

Drenthe: Smilde is transmitting the Nozema service on ch. E25 at 250kW ERP. The PM5544 test pattern is used, with the identification "TV Drenthe" at the top and "Nozema, Smilde K25" below.

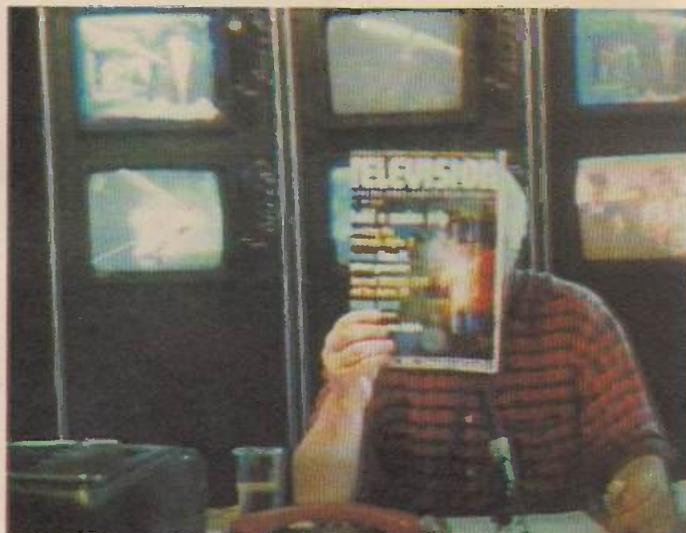
Flevoland: TV Flevoland is to test on ch. E26 at 50kW ERP shortly.

Overijssel: TV Oost plans to use Hengelo ch. E36 at 50kW ERP and Zwollekerspel ch. E22 at 200kW ERP.

Gronigen: TV Noord is to open a ch. E36 transmitter, ERP unknown.

Zeeland: TV Zeeland is to use Goes ch. E54 at 50kW ERP.

Gelderland: TV Gelderland plans to use Ruurlo ch. E40 at 50kW ERP, Tiel ch. E24 at 50kW ERP



Christian Man seen during a Dr Dish TV programme commenting on a recent edition of a well-known magazine. The programme is broadcast on the second Friday of each month via Kopernikus 2 (28.5°E). Photo from John Locker.

and Arnhem ch. E58 at 32kW ERP.

Satellite News

The London satellite uplink

NEW THOMSON MULTISTANDARD TVs with Teletext

<p>NICAM Stereo 14"</p> <ul style="list-style-type: none"> ■ 14" Screen Multi-standard ■ PAL and SECAM ■ NTSC (via Scart) ■ VHF-UHF Hyperband Tuner ■ S-VHS (via Scart) ■ 59 Channel Memory ■ Headphone Socket ■ Infra-red Remote Control ■ 240V AC Operation <p style="text-align: right;">£329.00</p>	<p>10" AC/DC</p> <ul style="list-style-type: none"> ■ 10" Screen Multi-standard ■ PAL-SECAM ■ NTSC (via Scart) ■ VHF-UHF Hyperband Tuner ■ 59 Channel Memory ■ Fasttext Teletext ■ 12-24V DC Operation ■ Infra-red Remote Control ■ 240V AC Operation <p style="text-align: right;">£369.00</p>
--	--

BOTH ABOVE TVs COVER THE FOLLOWING SYSTEMS
ALL VHF/UHF FREQUENCIES AND CABLE CHANNELS
PAL System I (FOR UK); PAL Systems B/G (For Europe);
SECAM Systems B/G (for Middle East etc); SECAM System L (for France)

<p>NEW NICAM MULTISYSTEM VCR THOMSON VPH6790 with VideoPlus +</p> <ul style="list-style-type: none"> ■ Covers PAL I (for UK); PAL B/G (for Europe); SECAM B/G (for Middle East etc); SECAM D/K (for Eastern Block); SECAM L (for France); NTSC 3.58 Playback & Record. ■ Hyperband Tuner ■ 99 Programmes ■ 4 Head ■ Video Plus + ■ Infra Red Remote Control <p style="text-align: right;">£499.00 inclusive of VAT</p>	<p>COM-800 MULTISYSTEM DIGITAL CONVERTER</p> <ul style="list-style-type: none"> ■ Professional quality, full digital processing ■ Accommodates input systems of NTSC 3.58, PAL and SECAM (optional 4.43 available) ■ Output systems: NTSC 3.58, NTSC 4.43 and PAL ■ 4M bit field memory, Static resolution 500 lines, dynamic resolution 300 lines ■ Accommodates two inputs and two outputs ■ Built-in time Base correction (T.B.C.) ■ Line conversion: 525 to 625 lines, 625 to 525 lines ■ Field conversion: 60 to 50 and 50 to 60 fields ■ AC mains powered <p style="text-align: right;">£449.00 inclusive of VAT</p>
--	---

(All above prices are inclusive of VAT, delivery by courier: £10.00)

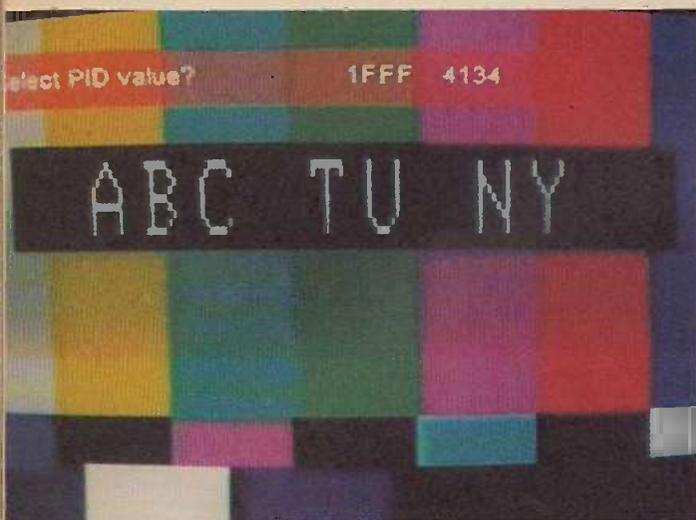
COMPREHENSIVE CATALOGUE
Features all the usual popular specialist products, together with many new items. Satellite, Multi-system TV's & VCR's, Converters, Decoders, Amplifiers and Aerials for domestic and TV-DXing.

AVAILABLE BY RETURN OF POST FOR ONLY £1, or ring with your credit card.

Aerial Techniques



11 Kent Road, Parkstone, Poole, Dorset BH12 2EH
Tel: 01202-738232 Fax: 01202-716951



A digital test pattern received by John Locker via Intelsat K at 21.5°W. You see it only if you have the correct PID (Programme ID) value.

provider SISLink has signed a contract with Sky News to provide SNG services in the UK and overseas. NTL has recently opened a new control room at the Crawley

Court, Winchester teleport to provide a 24-hour service with short-term booking for international access. If you see the caption "Tower Broadcast Centre", it's simply BT (London) which has bought out Brightstar and is using the analogue transponders.

It seems that both Multicrypt and Simulcrypt scrambling will be used in Spain, the former by the government-backed Via Digital TV package which has yet to come into operation, the latter by Canal Satellite Digital which is already in operation with over 100,000 Spanish subscribers. The Antena 3 TV group has been bought out by the state-controlled but privatised Telefonica company.

The German Kirch and Premiere cable operators are to scrap the DFI digital package, resolving another digital problem.

A new French sports channel is

being organised as an alternative to Eurosport. It's likely to be taken on by CanalSatellite next spring. A French channel for the elderly, Canal Soleil, should also open next spring.

The Indian government is to lift its DTH ban with the introduction of a Broadcasting Bill this winter. The Broadcasting Authority of India will be set up on January 1st to administer mainland and overseas broadcasts to India.

In early July Roy Carman reported difficulty with reception of the Kurdish MED-TV channel via Eutelsat II F2 at 10°E (10.972GHz vertical). It seems that the uplink was being jammed from the Turkish mainland (the service originates in and is uplinked from the UK). A complaint from Eutelsat seems to have resolved the problem. The MED-TV feed via Intelsat 603 at 34.5°W wasn't affected.

Wartime TV

The Benelux DX Club, Holland, recently included in its bulletin an article by Michael Ockenden entitled "TV Pictures from Occupied Paris". It was based on a feature that originally appeared in *After the Battle*, a series of magazines which was published in the early/mid-Eighties. I'd like to establish contact with the author if anyone has details.

The original article was well researched and contained dramatic photographs – of Nazis operating a camera, the tuning signal from Paris, the studio in 1943 and 1985 and others originating in the UK.

The basic story is as follows. While the BBC's Alexandra Palace service was closed down on September 1st, 1939, the High Command in Berlin decided to reopen the German 441-line service on October 2nd (it had been closed on August 24th), the intention being to entertain and inform wounded German troops. In mid-1941 a decision to dismantle the Eiffel Tower TV transmitter and aerials, which were no longer in use, and take them back to Germany was countermanded by the German Military Propaganda Department, which wanted to start a TV service for German military hospitals and nursing homes in the Paris region. There was support from the Luftwaffe, which hoped that the wideband VHF transmissions would

interfere with the RAF's Gee navigation system. The Paris studio and transmitter were first brought into operation on January 1st 1942, with help from French POWs previously employed by French National Radio. Regular broadcasts started in May, running for four hours daily.

Early in July 1942 WRNS operators monitoring the VHF spectrum atop Beachy Head resolved signal information at 46MHz. When the waveform of the strange signal was checked by Wing Commander George Kelsey and Squadron Leader Freddy Hunt, who had been active in TV before the war, at RAF no. 60 Signals Group it was confirmed as being a TV signal, from the Paris direction. Several 405-line receivers were acquired and modified to run at 441 lines, but interference from RAF navigation equipment at nearby sites swamped the TV signals.

A greatly improved aerial system was required to provide sharp pick-up from Paris and reject other nearby interference. Flight Lieutenant Frank Brownless very rapidly designed a massive curtain array of suspended half-wave dipoles with a quarter-wave spaced reflector screen, suspended between two 105ft high wooden lattice masts spaced 150ft apart. This provided a gain of 18dBd, with a vertical beamwidth of $\pm 6^\circ$ at the -3 dB points.

The system was erected between July 21st-24th 1942 and provided excellent reception. It collapsed during a September gale, but the results obtained justified a more substantial replacement.

The Paris service was subsequently expanded, with films in the morning and variety, live drama and sports as available in the afternoons and evenings. Two Telefunken cameras were used. Propaganda Kompagnien, Berlin supplied the all-important newsreels, with live German/French commentary added in the studio. There were some 1,400 441-line receivers in use locally, about 1,000 privately owned and 400 requisitioned for military service. Little was it realised that a group of avid viewers of Fernsehsender Paris was ensconced at Beachy Head, where useful information was being obtained.

D day came on June 6th 1944, followed by a rapid advance. The Paris TV service closed on August 16th. But the transmitter was not, as ordered by Berlin, destroyed. Kurt Hinzmann, who had been in charge of the service (he had been pre-war head of German TV), was invited back to Paris in 1946 to advise on broadcasting.

There is no evidence today of wartime TV monitoring at Beachy Head, but it remains an intriguing story.

GAS HOBS Standard domestic units, new and boxed, 3 burner, household gas, brown. Bargain at just £12.95 ref BAR316

INFRA RED FILM 6" square piece of flexible infra red film that will only allow IR light through. Perfect for converting ordinary torches, lights, headlights etc to infra red output using standard light bulbs. Easily cut to shape. 6" square £15 ref IRF2

HYDROGEN FUEL CELL PLANS Loads of information on hydrogen storage and production. Practical plans to build a hydrogen fuel cell (good workshop facilities required) £8 set ref FCP1

STIRLING ENGINE PLANS Interesting information pack covering all aspects of Stirling engines, pictures of home made engines made from an aerosol can running on a candle! £12 ref STIR2

12V OPERATED SMOKE BOMBS Type 3 is a 12v trigger and 3 smoke canisters, each canister will fill a room in a very short space of time! £14.99 ref SB3. Type 2 is 20 smaller canisters (suitable for simulated equipment fires etc) and 1 trigger module for £29 ref SB2

Type 1 is a 12v trigger and 20 large canisters £49 ref SB1

HI POWER ZENON VARIABLE STROBES Useful 12v PCB fitted with hi power strobe tube and control electronics and speed control potentiometer. Perfect for interesting projects etc 70x55mm 12vdc operation. £6 ea ref FLS1, pack of 10 £49 ref FLS2

NEW GEIGER COUNTERS IN STOCK Hand held unit with LCD screen, auto ranging, low battery alarm, audible 'click' output. New and guaranteed. £129 ref GE1

RUSSIAN BORDER GUARD BINOCULARS £1799 Probably the best binoculars in the world ring for colour brochure.

RUSSIAN MULTIBAND WORLD COMMUNICATIONS RECEIVER Exceptional coverage of 9 wave bands, (5 short, 1 LW, 1FM, 1MW) internal ferrite and external telescopic aerials, mains/battery. £45 ref VEGA

NEW LASER POINTERS 4 5mw, 75 metre range, hand held unit runs on two AA batteries (supplied) 670nm. £29 ref DEC49

HOW TO PRODUCE 35 BOTTLES OF WHISKY FROM A SACK OF POTATOES Comprehensive 270 page book covers all aspects of spirit production from everyday materials. Includes construction details of simple stills etc. £12 ref MS3

NEW HIGH POWER MINI BUG With a range of up to 800 metres and a 3 days use from a PP3 this is our top selling bug! less than 1" square and a 10m voice pickup range. £28 Ref LOT102.

BUILD YOUR OWN WINDFARM FROM SCRAP New publication gives step by step guide to building wind generators and propellers. Armed with this publication and a good local scrap yard could make you self sufficient in electricity! £12 ref LOT81

PC KEYBOARDS PS2 connector, top quality suitable for all 286/386/486 etc £10 ref PCKB. 10 for £85.

NEW LOW COST VEHICLE TRACKING TRANSMITTER KIT £29 range 1.5-5 miles, 5,000 hours on AA batteries, transmits info on car direction, left and right turns, start and stop information. Works with any good FM radio. £29 ref LOT101a

HIGH SECURITY ELECTRIC DOOR LOCKS Complete brand new Italian lock and latch assembly with both Yale type lock (keys inc) and 12v operated deadlock. £10 ref LOT99

***NEW HIGH POWER WIRELESS VIDEO AND AUDIO BUG KIT 1/2 MILE RANGE** Transmits video and audio signals from a miniature CCTV camera (included) to any standard television! Supplied with telescopic aerial. £169

CCTV PAN AND TILT KIT Motorize your CCTV camera with this simple 12vdc kit. 2 hermatically sealed CCD linear servo motors 5mm threaded output 5 secs stop to stop, can be stopped anywhere, 10mm travel, powerful. £12 ref LOT125

CCTV CAMERA MODULES 46X70X29mm, 30 grams, 12v 100mA, auto electronic shutter, 3.8mm F2 lens, CCIR, 512x492 pixels, video output is tv p-p (75 ohm). Works directly into a scart or video input on a tv or video. IR sensitive. £79.95 ref EF137.

IR LAMP KIT Suitable for the above camera, enables the camera to be used in total darkness! £8 ref EF138

UK SCANNING DIRECTORY As supplied to Police, MOD, M15 and GCHQ covers everything from secret government frequencies, eyes in the sky, prisons, military aviation etc £18.50 ref SCANB

INFRA RED POWERBEAM Handheld battery powered lamp, 4 inch reflector, gives out powerful pure infrared light! perfect for CCTV use, nightlights etc. £29 ref PB1.

SUPER WIDEBAND RADAR DETECTOR Detects both radar and laser, X K and KA bands, speed cameras, and all known speed detection systems. 360 degree coverage, front & rear waveguides. 1.1x2.7x4.6" fits on sun visor or dash £149 ref

CHIEFTAN TANK DOUBLE LASERS 9 WATT+3 WATT+LASER OPTICS

Could be adapted for laser listener, long range communications etc. Double beam units designed to fit in the gun barrel of a tank, each unit has two semi conductor lasers and motor drive units for alignment, 7 mile range, no circuit diagrams due to MOD, new price £50,000? us? £199. Each unit has two gallium Arsenide injection lasers, 1 x 9 watt, 1 x 3 watt, 900nm wavelength, 28vdc, 600hz pulse frequency. The units also contain an electronic receiver to detect reflected signals from targets. £199 for one. Ref LOT4.

NEW LOW PRICED COMPUTER/WORKSHOP/Hi-Fi RCB UNITS Complete protection from faulty equipment for everybody! In line unit fits in standard IEC lead (extends it by 750mm), fitted in less than 10 seconds, reset/lead button, 10A rating, £6.99 each ref LOT5. Or a pack of 10 at £49.90 ref LOT6. If you want a box of 100 you can have one for £250!

TWO CHANNEL FULL FUNCTION B GRADE RADIO CONTROLLED CARS From World famous manufacturer these are returns so they will need attention (usually physical damage) cheap way of buying TX and RX plus servos etc for new projects etc. £12 each sold as seen ref LOT2.

MAGNETIC CREDIT CARD READERS AND ENCODING MANUAL £9.99 Cased with filelays, designed to read standard credit cards! complete with control electronics PCB and manual covering everything you could want to know about whats hidden in that magnetic strip on your card! just £9.95 ref BAR31

WANT TO MAKE SOME MONEY? STUCK FOR AN IDEA? We have collated 140 business manuals that give you information on setting up different businesses, you peruse these at

your leisure using the text editor on your PC. Also included is the certificate enabling you to reproduce (and sell) the manuals as much as you like! £14 ref EP7



HIGH POWER DC MOTORS, PERMANENT MAGNET 12-24v operation, probably about 1/4 horse power, motor measures 100m x 75mm with a 60mm x 5mm output shaft with a machined flat on it. Fixing is simple using the two threaded bolts protruding from the front of the motor 4mm x 12mm). These motors are perfect for model engineering etc they may even be suitable as a cycle motor? We expect high demand so if you would like one or think you may require one in the future, place your order today! £22 ref MOT4. 10 pack £185 ref MOT5B

ELECTRONIC SPEED CONTROLLER KIT For the above motor £19 ref MAG17. Save £5 if you buy them both together, 1 motor plus speed controller mp is £41, offer price £36 ref MOT5A

RUSSIAN 900X MAGNIFICATION ZOOM MICROSCOPE metal construction, built in light, mirror etc. Russian shmp farm!, group viewing screen, lots of accessories. £29 ref ANAYLT.

AA NICAD PACK Pack of 4 tagged AA nicads £2.99 ref BAR34

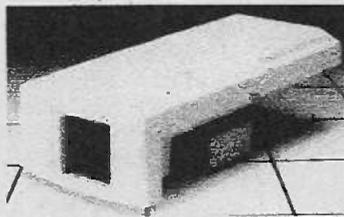
RUSSIAN NIGHTSIGHTS Model TZS4 with infra red illuminator, views up to 75 metres in full darkness in infrared mode, 150mm range, 45mm lens, 13 deg angle of view, focussing range 1.5m to infinity, 2AA batteries required, 950g weight. £199 ref BAR61. 2 years warranty

LIQUID CRYSTAL DISPLAYS Bargain prices, 20 character 2 line, 83x19mm £3.99 ref SMC2024A

16 character 4 line, 62x25mm £5.99 ref SMC1640A

TAL-1, 110MM NEWTONIAN REFLECTOR TELESCOPE Russian, Superb astronomical 'scope, everything you need for some serious star gazing! up to 169x magnification. Send or fax for further information. 20kg, 885x800x1850mm ref TAL-1, £249

YOUR HOME COULD BE SELF SUFFICIENT IN ELECTRICITY Comprehensive plans with loads of info on designing systems, panels, control electronics etc £7 ref PV1



COLOUR CCTV VIDEO CAMERAS. BRAND NEW AND CASED, FROM £99

Works with most modern video's, TV's, Composite monitors, video grabber cards etc Pal, 1v P-P, composite, 750mm, 1/3" CCD, 4mm F2.8, 500x582, 12vdc, mounting bracket, auto shutter, 100x50x180mm, 3 months warranty, 1 off price £119 ref XEF150, 10 or more £99 ea 100+ £89

YUASHA SEALED LEAD ACIDS FROM £2.50 12v 6.5Ah ex equipment batteries to clear at just £9.99 for a pack of four! ref XX1

A MAGNET THAT LIFTS 33 KILO'S! Just in this week are these incredible magnets that lift 33 kilo's! Price is £14.99 ref MAG33

25 SQUARE FOOT SOLAR ENERGY BANK KIT 100 6"x6" 6v Amorphous 100mA panels, 100 diodes, connection details etc to build a 25 square foot solar cell for just £99 ref EF112.

CONVERT YOUR TV INTO A VGA MONITOR FOR £25! Converts a colour TV into a basic VGA screen. Complete with built in psu, lead and sware. Ideal for laptops or a cheap upgrade. Supplied in kit form for home assembly. SALE PRICE £25 REF SA34

***15 WATT FM TRANSMITTER** Already assembled but some RF knowledge will be useful for setting up. Preamp req'd, 4 stage 80-108mhz, 12-18vdc, can use ground plane, yagi or dipole £69 ref 1021

***4 WATT FM TRANSMITTER KIT** Small but powerful FM transmitter kit. 3 RF stages, mic & audio preamp included £24 ref 1028

YUASHA SEALED LEAD ACID BATTERIES 12v 15AH at £18 ref LOT8 and below spec 6v 10AH at £5 a pair

ELECTRIC CAR WINDOW DE-ICERS Complete with cable, plug etc SALE PRICE JUST £4.99 REF SA28

AUTO SUNCHARGER 155x300mm solar panel with diode and 3 metre lead fitted with a cigar plug. 12v 2watt. £12.99 REF AUG10P3.

SOLAR POWER LAB SPECIAL You get 2 6"x6" 6v 130mA cells, 4 LED's, wire, buzzer, switch + 1 relay or motor. £7.99 REF SA27

SOLAR NICAD CHARGERS 4 x AA size £9.99 ref 6P476, 2 x

BULL ELECTRICAL

250 PORTLAND ROAD, HOVE, SUSSEX. BN3 5QT. (ESTABLISHED 50 YEARS).

MAIL ORDER TERMS: CASH, PO OR CHEQUE WITH ORDER PLUS £3.50 P&P PLUS VAT.

24 HOUR SERVICE £4.50 PLUS VAT. OVERSEAS ORDERS AT COST PLUS £3.50

'phone orders: 01273 203500 (ACCESS, VISA, SWITCH, AMERICAN EXPRESS)

FAX 01273 323077 E-mail bull@pavilion.co.uk

C size £9.99 ref 6P477

GIANT HOT AIR BALLOON KIT Build a 4.5m circumference, fully functioning balloon, can be launched with home made burner etc. Reusable (until you loose it!) £12.50 ref HA1

AIR RIFLES 22As used by the Chinese army for training purposes, so there is a lot about! £39.95 REF EF78. 500 pellets £4.50 ref EF80. *NEW MEGA POWER VIDEO AND AUDIO SENDER UNIT.

Transmits both audio and video signals from either a video camera, video recorder, TV or Computer etc to any standard TV set in a 500m range! (tune TV to channel 31) 12v DC

op. Price is £85 REF: MAG15 12v psu is £5 extra REF: MAG5P2

*MINIATURE RADIO TRANSCEIVERS A pair of walkie talkies with a range up to 2km in open country. Units measure 22x52x135mm. Including cases and ear-pcs, 2xPP3 req'd. £37.00 pr REF: MAG30

*FM TRANSMITTER KIT housed in a standard working 13A adapter!! the bug runs directly off the mains so lasts forever! why pay £700? or price is £18 REF: EF62 (kit) Transmits to any FM radio. Built and tested version now available at £45 ref EXM34

*FM BUG BUILT AND TESTED superior design to kit. Supplied to detective agencies. 9v battery req'd. £14 REF: MAG14

GAT AIR PISTOL PACK Complete with pistol, darts and pellets £14.95 REF EF82B extra pellets (500) £4.50 ref EF80.

HEAT PUMPS These are mains operated air to air units that consist of a aluminium plate (cooling side) and a radiator (warming side) connected together with a compressor. The plate if inserted into water will freeze it. Probably about 3-400 watts so could produce 1kw in ideal conditions. £30 ref HP1

3 FOOT SOLAR PANEL Amorphous silicon, 3' x 1' housed in an aluminium frame, 13v 700mA output. £55 ref MAG45

SOLAR/WIND REGULATOR Prevents batteries from over charging. On reaching capacity the regulator diverts excess power into heat avoiding damage. Max power is 60 watts. £27.99 ref SICA11-05

4X28 TELESCOPIC SIGHTS Suitable for all air rifles, ground lenses, good light gathering properties. £24.95 ref R7.

NICAD CHARGERS AND BATTERIES Standard universal mains operated charger, takes 4 batts + 1 PP3, £10 ref PO11D. Nicads - AA size (4 pack) £4 ref 4P44. C size (2 pack) £4 ref 4P73. D size (4 pack) £9 ref 9P12.

PHOTOGRAPHIC RADAR TRAPS CAN COST YOU YOUR LICENCE! The new multiband 2000 radar detector can prevent even the most responsible of drivers from losing their licence! Adjustable audible alarm with 8 flashing lights gives instant warning of radar zones. Detects X, K, and Ka bands, 3 mile range, 'over the hill' 'around bends' and 'rear trap' facilities. micro size just 4.25"x2.5"x7.5". Can pay for itself in just one day! £89 ref EP3.

STEREO MICROSCOPES BACK IN STOCK Russian, 200x complete with lenses, lights, filters etc etc very comprehensive microscope that would normally be around the £700 mark, our price is just £299 (full money back guarantee) full details in catalogue.

SECOND GENERATION NIGHT SIGHTS FROM £748 RETRON Russian night sight, 1.8x, infra red lamp, 10m-inf, standard M42 lens, 1.1kg, £349 ref RET1

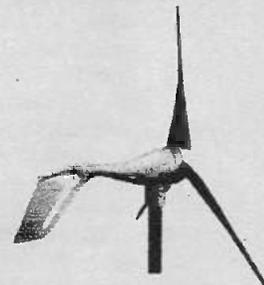
MAINS MOTORS 180 RPM 90X70mm, 50X55mm 50x55mm output shaft, start cap included. £22 ref MGM1

PC POWER SUPPLIES, CUSTOMER RETURNS, ALL FAN COOLED, OUR CHOICE, BARGAIN AT 8 PSU'S FOR £9.99 REF XX16

LOW COST CORDESS MIC 90 - 105mhz, 115g, 193 x 26 x 39mm, 9v PP3 battery required. £17 ref MAG15P1

JUMBO LED PACK 15 10mm bicolor leds, plus 5 giant (55mm) seven segment displays all on a pcb EF JUM1. Pack of 30 55mm seven seg displays on pcbs is £19 ref LED4, pack of 50 £31 ref LED50

12VDC 40MM FANS MADE BY PANAFLO, NEW, £4. REF FAN12



WIND GENERATORS 380 WATT

1.14 metre dia blades, carbon matrix blades, 3 year warranty, 12vdc output, 24v version available, control electronics included, brushless neodymium cubic curve alternator, only two moving parts, maintenance free, simple roof top installation, start up speed 7mph, max output (30mph) 380w. £499 ref AIR1

Check out our WEB SITE

full colour interactive

1997 catalogue

<http://www.pavilion.co.uk/bull-electrical>

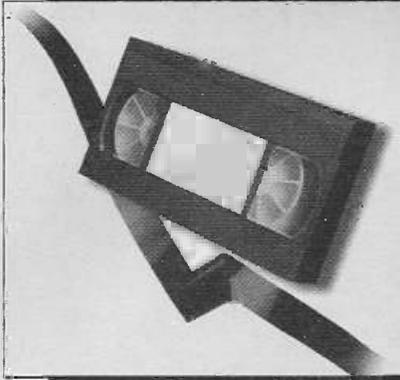
FREE COLOUR CATALOGUE WITH EVERY ORDER

*SOME OF OUR PRODUCTS MAY BE UNLIGENSABLE IN THE UK

WE BUY SURPLUS STOCK

FOR CASH

SURPLUS STOCK LINE 0802 660335



Reports from
Richard Flowerday
Shane Humphrey
Eugene Trundle
Michael J. Cousins
Stephen Webster
Terry Lamoon
Michael Maurice and
Adrian Farnborough

Panasonic NVHS1000

The customer complained about poor results from the AV1 scart socket – the machine was used extensively for tape copying. He also mentioned that the standby light didn't come on when the VCR was switched off using the handset.

On test we found that AV2 operation worked perfectly, but the E-E signal via socket AV1 was very weak and grainy with loss of sync. The cause of the trouble was the input switching chip IC3901, whose AV1 input pin had developed a leak to chassis. Replacing this chip also restored normal operation of the standby LED – the chip has an always 12V supply and a switched 12V supply and had developed an internal leak of some 20Ω between the two.

As we've experienced the problem previously, it occurs to us that static from an external source can damage the chip. R.F.

Panasonic NVG21

Occasional picture rolling was the complaint with this machine. When the fault occurred a band of noise would move slowly down the picture, which suggested that the control pulses were missing. This was confirmed by a scope check at TP2002 on the main PCB. So we turned our attention to the servo pack. The fault came and went when this was alternately heated and frozen. We eventually traced

VCR Clinic

the cause of the trouble to the 10μF, 16V coupling capacitor C240. What would we do without freezer?! R.F.

Panasonic NVHD605

There was a tape stuck in this machine and the error message H02 was present in the front display. This indicates a capstan drive problem. Replacing the capstan motor's stator unit (part no. VEK5927) restored normal operation. S.H.

Samsung VI611

One of these machines produced a blank, black screen when you tried to either play a tape or view a TV channel via the VCR's tuner, the symptom being present with both RF and AV outputs. We found that the PC 12V supply from the regulator had massive ripple on it. C6 (2.200μF, 35V) and C7 (47μF, 16V) both looked very unhappy. They had dried out because of the heat from a nearby large heatsink. Two new capacitors restored the pictures.

Here are a couple of other faults we've had with these machines:

- (1) Channel indicator and/or power light stays on when the machine is switched to standby. Transistor Q2 (KSA634H) short-circuit emitter-to-collector.
- (2) Lines across the picture and distorted sound when using the machine's tuner. The PC 12V supply had risen to about 17V because the 12V regulator IC1 was faulty. S.H.

Panasonic NVSD200 (K Deck)

We've seen the following symptoms several times since the warmer weather arrived: a stuck tape, sometimes with the error message F06 present in the front display. In almost every case the cause has been a 'warped' right-hand side

arm on the main shaft unit (part of the cassette housing mechanism). There is a tendency for this to warp, particularly when the machine is used in high ambient temperatures. Replacing the main shaft unit (part no. VXP1339) usually restores normal operation. Apparently an improved part is now used in the K deck. S.H.

Sanyo VHR135E

We've had several of these machines in with the same problem: intermittent loss of front-panel power and eject key operation. In every case the cause has been poor soldered joints at the pins of the connector (CN702) between the two front PCBs, TM1 and TM2. E.T.

Broken Flaps

Although this hint relates specifically to the Amstrad Model VCR4700, it could apply to many other models in various brand ranges. When the control flap/door's latching spigot breaks off, the door keeps falling open. More often than not you find that the spigot is no longer available as a spare part.

I have overcome the problem by removing the flap and inserting one, two or three split plastic washers (of the type commonly used on decks) as necessary on the hinge shafts. They increase the friction, so that the flap is stiff enough to stay up when closed.

This hint is presented with pride: it won our "workshop bodge of the year"! competition for 1997. E.T.

Tatung TVR634/734, Matsui VP9301 etc

When the little plastic spigot in the front left-hand corner of the deck becomes worn or broken there is excessive tape back tension. Various symptoms can arise. It's

part of the brake-release mechanism. E.T.

JVC HRS5800

This S-VHS machine came via another dealer. It had a tape jammed inside. After extracting this and carrying out a timing reset I stripped down the mode switch and cleaned it. But when the machine was switched on again with no tape inserted it tried to eject then shut down. The machine wouldn't power up from the front control, but would come to life when the mains supply was switched off then on, with pulses briefly resetting the microcontroller chips.

The cause of the trouble was eventually traced to ribbon cable CN601, which connects the mechanism control to the deck board. There was lack of continuity at pins 15, 17 and 18, with the data connections to the mode switch affected. Once good connections had been established the machine powered up normally.

When a signal was connected however there was no E-E sound (no, the machine was not set to simultaneous). The audio board is underneath, and when the bottom cover complete with 'power bulge' is removed it is very vulnerable. Resoldering a few dry-joints here finally restored normal operation. M.J.C.

Amstrad VS1000

This machine was dead. Unfortunately I don't have a circuit diagram, which made fault finding difficult. An investigation inside the power supply can reveal a blown mains fuse and a short-circuit STRD6008X chopper/regulator chip. On the secondary side of the chopper power supply there was a short-circuit 20V zener diode.

If you are not familiar with a particular circuit, a comparison with a similar one and its faults can be helpful. With the Panasonic NVJ35, failure of the 20V zener diode D1113 is usually caused by a 47µF capacitor (C1114) going low in value. The Amstrad machine has two 47µF capacitors on the primary side of the chopper circuit. They were both low in value. Replacements restored the machine to life.

This was not the end of the story however. When a satellite signal was connected the results were appalling, with weak sync and failure to decode encrypted channels. Inside the caged satellite board I found a number of blue-grey electrolytic capacitors which were all

either open-circuit or low in value. One of the offending capacitors was CA05 (100µF), which was mentioned in the January 1996 Satellite Notebook. M.J.C.

Hitachi VTM840

There was a tape stuck in this machine. Its control panel buttons had little effect, and the standby and operate LEDs were illuminated at the same time. In addition the word 'test' was present in the clock display. One of the three keyboard leads to the LED panel was open-circuit, probably because of fatigue from the hinged control panel arrangement, and there were dry-joints at more than one ribbon connector socket to the main PCB. Fitting a new lead and reflowing the PCB connector joints restored normal operation. S.W.

Matsui VP9401

The customer complained about occasional ripples on the playback picture. When the machine was tested, the symptom appeared after several hours' operation. On investigating the mechanism I noticed that the tension arm was bouncing. A slight touch settled it, and the ripples then disappeared. As the tension arm looked a little mucky I replaced it and reset the tension. This cured the problem. T.L.

Sony SLV373

This machine would stop in rewind or fast forward. A check on the waveform in the reel sensor circuit showed that its amplitude was very low. New sensors restored the waveform to normal and cleared the fault. T.L.

Toshiba V703B

There was no display though everything else worked correctly. I initially suspected the display itself, but then found that the -24.5V supply was missing. A ZX10 device provides protection: it had gone open-circuit. T.L.

Matsui VCP5601

This machine wouldn't accept a tape and the front LED was very dull. A check on the LT lines showed that the NO 6V supply was missing. Regulator IC111 was faulty - a replacement restored normal operation. T.L.

Aiwa HVG150

There were tape speed problems. You could see that the reels rotated sluggishly and were dragging. A check on the braking system

revealed that the sub-brake assembly was broken. It's situated under the cassette housing assembly. The replacement was inexpensive and restored normal operation. T.L.

Ferguson FV68TX

This machine appeared to be dead but was actually tripping. The cause was CP11 (220µF, 25V) which had dried up. A replacement restored normal power supply operation. M.M.

JVC HRJ205

The customer complained about tape chewing. On inspection I found that although the idler turned when the capstan motor was rotated it didn't swing between the spools. The idler's retaining circlip had come off and the various bits were lying in the machine. I didn't want to chance refitting the parts to the old idler as new ones are readily available. A replacement restored normal operation. M.M.

Panasonic NVG12

As this machine required a service the Panasonic VUD4103 maintenance kit was fitted. After doing this I found that there was a graunching noise and no drive when either rewind or fast forward was selected. So I stripped the gears on the underside. When the sliding gear was removed there was a lot of dirt and hair on the shaft. This prevented the gear from making contact with the idler gear. Cleaning out the muck, lubricating and reassembly cured the problem. M.M.

Mitsubishi M16

This machine would occasionally refuse to accept a cassette. It would also, again very intermittently, go into standby after ejecting a cassette.

A new mode switch made no difference, but removing and then refitting the cassette housing cured the fault for quite a long time, providing a clue to the cause of the trouble. The start sensor Q571 lurks under the deck, just to the left of the mode switch. It was clearly dry-jointed. A.F.

Mitsubishi HSB10/20

The symptom with one of these machines was severe playback colour dropouts. Fortunately for us an item we checked and replaced at an early stage in our proposed diagnostic investigation was the LA7331 chip IC6A0. This cleared the fault. A.F.

Sole UK
Agents for



TC-402D

Due to its weight and size, the TC-402D is the ideal instrument for the installation of FM and Terrestrial TV antenna, as well as CATV systems.

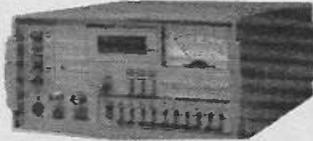
- Peak detection
- Built-in loudspeaker for AM and FM reception
- Frequency Indication with 4 digit LCD Display

- Multi-turn potentiometer to enable tuning
- Weight including batteries: 1.9 Kg

TC-90

Portable equipment, with many applications, designed to carry out any type of Terrestrial TV, FM Radio, CATV and Satellite TV installations.

- Frequency Sweep on Satellite
- Peak Detection
- Measurement of terrestrial TV from 20u V to 3V without the need of external attenuators.



- Rechargeable 12V / 2.6 Ah Battery
- Weight including batteries: 3.5 Kg



TC-80

The TC-80 has been designed for the reception of TV Satellite systems, the installation and testing of domestic and SMATV systems.

- Full Band Frequency Sweep
- Switchable 14V or 18V LNC Power Supply

- Rechargeable 12V / 2.6 Ah Battery
- Weight including batteries: 3.3 Kg.

Available from most wholesale distributors across the UK or direct from

COASTAL AERIAL SUPPLIES

Unit X2, Rudford Industrial Estate, Ford, Arundel BN18 0BD
Telephone: 01903 723726 Fax: 01903 725322 Mobile: 0976 241505

EX RENTAL TV-VCR STOCK

Small direct loads of Ex Rental Televisions. (from 25 units) mainly Ferguson. All F/S/Ts. Most switch on. Good gear – No Rubbish – Delivered. Ex Rental T/Vs from £12.00 (collected), Unchecked. Good switch on rate. Working T/Vs and VCRs, Cheapies to Nicams. Delivered or collect. Contract repairs, T/Vs, Computer monitors. For full details of any of the above, contact

Bob at T.H.V. TV
01547 530711

P.V. TUBES

104 ABBEY STREET, ACCRINGTON, LANCs. BB5 1EE
Tel: 01254 390936/236521 Fax: 01254 395361

TRADE COUNTER OPEN MON-FRI 9-5, SAT 9.30-12 NOON, CLOSED ALL DAY WED.

Please add VAT 17.5% to all prices. We accept payment by cheque, Cash, Access, Visa. Add £2 pp for orders up to 1K. Heavier parcels add £4. Next day delivery on L.G. Consignments POA. Goods will be despatched on the day we receive your order. If we are out of stock we will inform you ASAP. Please allow up to 28 days delivery.

CROWN TV/VIDEOS

10" AC/DC CTV	£163.00
14" RC CTU UHF/VHF	£122.00
14" RC UHF/VHF text	£145.00
21" RC	£184.00
21" RC text	£199.00
21" RC Nicam text	£225.00
28" RC Nicam text	£375.00
33" RC Nicam text	£749.00
Twin speed VCR with video+	£150.00

SATELLITE NEWS

60cm dish, wall mtd, boxed	£21.95
80cm dish, wall mtd, boxed	£39.95
Standard LNB	£24.95
Enhanced LNB	£24.95
0.8db enhanced LNB	£29.95
Digital universal 0.7db	£35.95
Twin enhanced LNB	£45.95
Multi LNB holder	£15.95
Astra ID converter	£19.95
D2 MAC decoder	£130.00
Pace MSS 100 rec. only	£120.00
Pace MSS 300 rec. only	£170.00

CHANNEL 5

JBX HIGH GAIN AERIAL
WIDE BAND
OR GROUP A/B/CD
£22.95 + VAT

PV Tubes has been established for 20(0) years and has supplied the TV and electronics trade with components and service aids since it began. In a continuing effort to maintain the industries requirements it is our intention to make available an increasing range of specialised service aids and skills.

The PV1 multi-purpose degaussing coil is an example of our commitment to supply quality product at competitive prices. The PV1 degaussing coil is intended for use with a 240v mains supply, although a 120v version is available upon request. This compact and cost effective unit will have major interest to TV Service Departments, TV manufacturers, TV Sales and Rental Companies, TV Broadcasting Authorities, Universities and Colleges, The Armed Forces, Aviation and Computer Companies.

Specialised degaussing systems can be designed and manufactured to suit specific applications within many engineering environments.

As part of the strategy in supplying specialised skills within the electronics industry, we are able to offer design, consultancy, and manufacture of electronic products, specific to those larger customer requirements.

SPECIAL BUYS

Qty(10)
UK MOULDED 13A
computer main lead – mfr.0.99 each
13A Fig 8 mains lead – 2 mtr. 0.99 each

WE ALSO STOCK

- TVs
- VIDEOS
- SATELLITE SYSTEMS
- I.NB/DISHES
- REMOTE CONTROLS
- VIDEO HEADS
- SEMICONDUCTORS
- VALVES
- SCANNERS
- AERIALS
- FUSES
- RESISTORS
- CAPACITORS
- LEADS
- CABLES
- SECURITY SYSTEMS
- VIDEO TAPE
- WALL BRACKETS
- MULTI METERS
- PLUG/SOCKETS

IF WHAT YOU NEED ISN'T LISTED – ASK! RING SHEILA OR EMMA

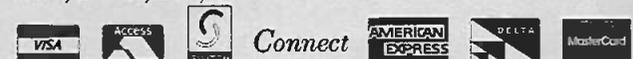
Is looking for . . .
ICs TRANSISTORS SEMIs an up hill struggle?

A phone call to us could get a result. We stock a very wide range . . . and with a World-wide database at our fingertips we are able to source even more. We specialise in devices with the following prefix (to name but a few):

- 2N 2SA 2SB 2SC 2SD 2P 2SJ 2SK 3N 3SK 4N 6N 17 40
- AD ADC AN AM AY BA BC BD BDT BDV BDW BDX BF
- BFR BFS BFT BFV BFX BFY BLY BZX BS BR BRX BRY BS
- BSS BSV BSW BTA BT BTB BTU BUK BUT BUY
- BUW BUX BUZ CA CD CX CZA DAC DG DM DS
- DTA DTC CU GM HA HCF HD HEE ICL ICM IRF J KA
- KIA L LA LB LC LD LF LM M M5V MA MAB MAX MB
- MC MDA J MLE MIF MM MN MPS MPSA MSH MPSU
- MRF NJM NE CM OP PA PAL PIC PN RC S SAA SAB SAD
- SAJ SAS SDA SG SH SE SN SO STA STK STR STRD STRM
- STRS SVI T TA TAA TAU TBA TC TCA TDA TDB TEA TIC
- TIP TIPL TEA TL TLC TMP TMS TPU U UA UAA UC UDN
- ULN UM UPA UPC UPD VN X XR Z ZN ZTX + others.

We can also offer equivalents (at customers' risk). We also stock a full range of other electronic components.

Mail, Phone, Fax, Credit Card orders & callers welcome



Cricklewood Electronics Ltd
40-42 CRICKLEWOOD BROADWAY LONDON NW2 3ET
TEL 0181 452 0161 & 450 0995 FAX 0181 208 1441

TELEVISION INDEX/DIRECTORY AND FAULTS DISCS PLUS REPRINTS SERVICE

INDEX DISC

Version 5 of the computerised index to TELEVISION magazine covers Volumes 38 to 46 (1988 – 1996). It has thousands of references to TV/VCR fault reports and articles, with synopses. A TV/VCR spares guide, an advertisers list and a directory of trade and professional organisations are included. The software is easy to use and very quick. It runs on any IBM or compatible PC with 512K RAM and a hard disc. Price £30 (3.5"HD, alternatively 3.5DD" or 5.25" if required) Those with previous versions can obtain an upgraded version for £15. Please quote the serial number of the original disc.

FAULT REPORT DISCS

Each disc contains the full text for TV, VCR, camcorder, satellite TV and CD fault reports published in individual volumes of TELEVISION, giving you easy access to this vital information. Note that the discs cannot be used on their own, only in conjunction with the Index disc: you load the contents of the Fault Report disc on to your computer's hard disc then access it via the Index disc. Fault Report discs are now available for Volume 38 (November 1987 – October 1988); Volume 39 (November 1988 – October 1989); Volume 40 (November 1989 – October 1990); Volume 41 (November 1990 – October

1991); Volume 42 (November 1991 – October 1992); Volume 43 (November 1992 – October 1993); Volume 44 (November 1993 – October 1994); Volume 45 (November 1994 – October 1995); Volume 46 (November 1995 – October 1996). Price £15 each (3.5"HD, alternatively 3.5"DD or 5.25" if required).

REPRINTS

Reprints of articles from TELEVISION back to 1986 are also available: ordering information is provided with the index, or can be obtained from the address below. Hard copy indexes of TELEVISION are available for Volumes 38 to 46 at £3.50 each.

All the above prices include UK postage and VAT where applicable. Add an extra £1 postage for overseas EC orders, or £5 for non-EC overseas orders. Cheques should be made payable to SoftCopy Ltd. Allow 28 days for delivery (UK).

SoftCopy Limited, 1 Vineries Close,

Gheltenham GL53 0NU, UK.

Telephone 01242 241 455

Answer to Test Case 419

- see page 709 -

Several things determine the picture width in a TV set. The main factors are the HT voltage supplied to the line output stage and, with a 110° set, the EW modulator circuit. In addition to providing compensation for geometric (pincushion) distortion, the EW modulator sets up the width. In this particular case the HT voltage had been checked and found to be correct. The EW correction drive circuit gave every sign of working correctly: but the presets had to be set at the ends of their ranges, suggesting that the cause of the problem lay elsewhere. What about the modulator circuit itself? TC had replaced the two diodes – which could hardly have been responsible for the fault symptoms – but had so far overlooked the associated tuning capacitors. This was the factor pinpointed by Sage.

During the line flyback, the line output stage is tuned to provide a half-cycle of oscillation. This lasts for about 12µsec, the resonant frequency being at around 41.5kHz. The half cycle drives the flyback and provides the pulse input to the EHT generating section of the line output stage. Tuning is provided by the capacitors associated with the EW modulator diodes (or a single capacitor in 90° sets) and the load inductance in the stage. After the half cycle, the circuit is damped by the conduction of the diodes in the circuit.

The three capacitors that contribute to the tuning in this particular circuit are C555, C556 and C568. The main one, C555 (9-InF, 1.6kV), had decreased in value somewhat. As a result, the amplitude of the flyback pulse and thus the EHT had increased. The tube's electron beams become 'stiffer' as the EHT rises, thus reducing the picture height as well as its width.

A new capacitor restored correct operation, enabling the presets to be set up normally.

NEXT MONTH IN TELEVISION

Servicing the Tatung Y2/Y2V Monitor Chassis

These VGA/SVGA chassis are used in a number of Tatung and various badged monitors. They have five operating modes, with line frequencies between 31.5-38kHz and frame frequencies between 55-87Hz. Depending on the mode, the sync pulses for both timebases may be positive- or negative-going. Russ Phillips describes the chassis and provides tips and guidance on servicing.

Digital TV – Modulation

Time to come to grips with the essence of the new transmissions, the modulation techniques used. J. LeJeune takes us from Morse code to the very latest ways of transmitting signals. This makes it easier to get to understand the new systems – QAM, QPSK and COFDM.

Surface-mounted Aluminium Electrolytics

Surface-mounted aluminium electrolytic capacitors play an important role in the compact PCBs used in camcorders and other modern equipment. They also give quite a lot of trouble. Nick Beer describes failure mechanisms and repair techniques, with notes on some models that are prone to this sort of fault.

Test Reports

Steve Beeching tries out the JBS soldering station which is being marketed in the UK by Willow Vale. It's ideally suited to dealing with flatpack ICs and other modern components.

Mike Hancox reviews the new 180° Satwalker horizon-to-horizon dish mount and finds it ideal for motorised systems.

Repairing Remote Controls

While many remote control units are cheap throwaway items, some of those used with upmarket video equipment etc. are very expensive – maybe £80 or so. This makes repair a feasible proposition. Chris Watton describes what can be done.

Published on the third Wednesday of each month by Reed Business Information Ltd., Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Filmsetting by Marlin Imaging Ltd., 2-4 Powerscroft Road, Sidcup, Kent DA14 5DT. Printed in England by BPC Magazines (Carlisle) Ltd., Newtown Trading Estate, Carlisle, Cumbria CA2 7NR. Distributed by MarketForce (UK) Ltd., 247 Tottenham Court Road, London W1P 0AU (0171 261 7704). Sole Agents for Australia and New Zealand, Gordon and Gotch (Asia) Ltd.; South Africa, Central News Agency Ltd. *Television* is sold subject to the following conditions, namely that it shall not, without the written consent of the Publishers first having been given, be lent, resold, hired out or otherwise disposed of by way of Trade at more than the recommended selling price shown on the cover, excluding Eire where the selling price is subject to currency exchange fluctuations and VAT, and that it shall not be lent, resold, hired or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever.



vista electronics LTD

Manufacturers of television tube and video heads

**SEND FOR
FREE**

COMPONENTS CATALOGUE

**TV/VCR COMPUTER
SPARES AND ACCESSORIES**

£10

**FREE
CARRIAGE
FOR ORDERS
ABOVE £10**

**VIDEO
HEADS**

**HIGH QUALITY
LOW PRICES
WIDE RANGE
FAST DELIVERY**

**FREE 1.5M ROLL OF SOLDER
BRAID WITH ALL COMPONENT
ORDERS ABOVE £25.00**

*We are committed to providing
the best service possible
to our customers*

TUBES

**THOUSANDS OF NEW,
B GRADE, AND REGUNS
IN STOCK**

SPECIAL OFFERS

A51-EAL	£55.00
A51-JAR	£55.00
A51-EFS	£50.00
A59-EAK	£69.50
A66-EAK	£72.00
A59-ECY	£69.50
A66-ECY	£72.00
A51-AEZ	£45.00
A68-EGD	£78.00
A66-EGW	£72.00
A34-EFU	£25.50
A33-LPE	£25.50
A34-EAC	£25.50

**ALL NEW TUBES
Carriage Extra**

**12 MONTHS GUARANTEE
Enquire for types not listed**

TELEPHONE COMPONENTS 01429 838057 FAX
TUBES 01429 837100 01429 837101

VISTA ELECTRONICS LTD, UNIT 1B, WINGATE GRANGE IND EST
WINGATE, CO DURHAM TS28 5AH



TV WHOLESALE

C.T.V.

UNIT 5, THE PHOENIX BUILDING, RUSHOCK
TRADING ESTATE, DROITWICH ROAD,
DROITWICH WR9 0NR
TELEPHONE: 01299-251522
0589-888021/0850 486147 (24HR)

SUPPLIERS OF HIGH QUALITY

GRANADA AND THORN

EX-RENTAL TELEVISIONS AND VIDEOS

LARGE STOCKS ALWAYS AVAILABLE

ALL AT COMPETITIVE PRICES

Satellite Receivers

Complete Range of Hand Sets

EXPORT ENQUIRIES WELCOME

OPEN: MON-FRI - 9.30-5.30

TEL: 01299-251522

Fax: 01299-251543

NOW OPEN
IN NORTH EAST - W. TREE TRADE WAREHOUSE
UNIT 9A/9B CARRMERE RD, LEACHMERE
IND ESTATE, SUNDERLAND SR2 NTE
TEL 0191 5211500
GRADED STOCK ALL BOXED TESTED + WORKING

WANTED - BULK BUYERS OF 'B' GRADE STOCK

TVs, Videos, Camcorders, Hi-Fi
also Microwave

EXAMPLE: 14" R/C £55

L/P Videos £60

All boxed, but untested

Mixed loads of various sizes Camcorders
also available in large quantities

THORN FSTS - Working from £35

FL VIDEOS - Untested

Lots of 10 - £150

14" Colour Tubes£15

20" Colour Tubes£29

21" Colour Tubes£35

SPECIAL OFFER - 'B' GRADE

Boxed Fully Tested L/P Videos £80

With Instructions VideoPlus £90

W. TREE TRADE WAREHOUSE

Unit 1, Sunshine Mills, Wortley Rd, Leeds

Tel: (0113) 2638804 Fax: 2310275

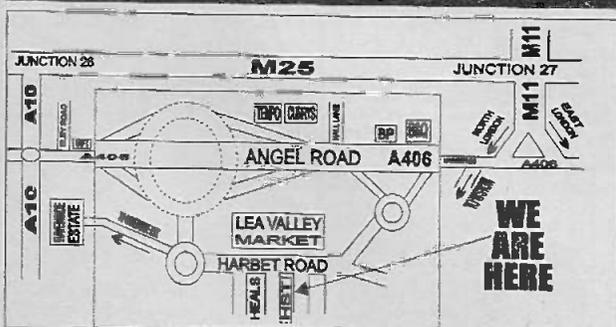
HST

APPROVED
TELEPRICE
DISTRIBUTOR

DISTRIBUTORS LONDON

Suppliers of high quality
**EX-RENTAL & GRADED
TV's AND VIDEO's**
Direct From Source

**PHONE FOR DELIVERY DAYS ON
0181 - 803 0505**



UNIT E2/3, HARBET ROAD, (off Angel Road), STONEHILL BUSINESS PARK,
LEA VALLEY TRADING ESTATE, LONDON. N18 3LD

DELIVERY SERVICE AVAILABLE

W.M.T.V.

THE LARGEST INDEPENDENT
WHOLESALE IN WALSALL

- SUPPLIERS OF HIGH QUALITY EX-RENTAL
TVs AND VIDEOS TO THE TRADE
AT COMPETITIVE PRICES

ALSO AVAILABLE: NEW B-GRADE PRODUCTS
- TVs, VIDEOS, AUDIO & MICROWAVES -
ALL TESTED & BOXED

Satellite Receivers and Export Enquiries Welcome

1/2 Mile off Junction 10 M6. Easy Parking Facilities

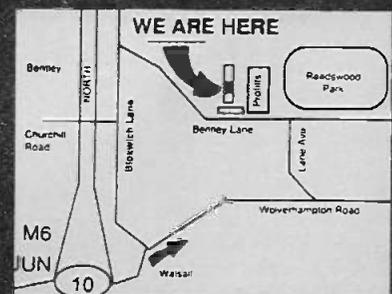
UNIT 3, BENTLEY LANE BUSINESS PARK

BENTLEY LANE, WALSALL WS2 8TL

Tel: 01922-724542. Fax: 01922-722208

Mobile: 0831-246622 (24 hours)

OPEN:
MON-SAT,
9-6pm
SUNDAY BY
APPOINTMENT
DELIVERY
SERVICE
THROUGHOUT
THE COUNTRY



TV WHOLESALE

WILTSGROVE LTD

28-29 RIVER STREET, DIGBETH, BIRMINGHAM B5 5SA

TEL: 0121-772-2733

FAX: 0121-766-6100

EX-RENTAL TV'S
20 MIXED TELEVISIONS
5 TEXT + 6 A/C + 5 BASICS
+ 4 PORTABLES
ALL WORKING STOCK WITH A/C
20 for £530

GENUINE UNTESTED STOCK

BASIC T.V FROM **£12.00**

R/CONTROL FROM **£16.00**

T/TEXT FROM **£20.00**

VCR FRONT LOADERS
+ REMOTE CONTROL FROM **£25.00**

EX-RENTAL VCR'S

5 MIXED SLIM VCR'S **£225**

10 MIXED VCR'S - **£375**

ALL WORKING STOCK, WITH HAND SETS

EX-RENTAL

10 MIXED TX100

5 x R/CONTROL **£399**

5 x TEXT

EX-HOTEL STOCK

TELEVISION

21" FST/R-C STEREO
CTV WITH UHF/VHF
TUNER **£75**

FERGUSON
GRADE B STOCK

TIOR 10" Colour
Television **£125**

OPERATES ON EITHER
MAINS OR BATTERIES

UNBEATABLE OFFER!!

JAPANESE BRAND
GRADED

28" NICAM FST
CTV
COMPLETE IN BOX

R.R.P **£599**
Our Price **£275**

COMPLETE WITH HANDSET INSTRUCTION BOOK

GRADED STOCK

5 MIXED VCR'S

3 x LP/SP
VIDEOPLUS
2 x LP/SP
VIDEOPLUS NICAM

£599

**** BRAND NEW ****

AKITA

14" CTV

* Teletext * 40 Channels
* OSD * Remote Control
* Sleep Timer * Mains Operated
* Scart Socket * UHF/VHF

with 12 months guarantee

£99.99

VPH-65

12X ZOOM, 8mm HI-BRAND
6 MODE PROGRAM AE

OUR PRICE
R.R.P ~~£399~~ **£269**

QUANTITY DISCOUNT & A
WIDE RANGE OF MODELS
AVAILABLE
(GRADED STOCK)

ALL WORKING STOCK IN ORIGINAL BOX, COMPLETE WITH ACCESSORIES

GRADED STOCK - FAX MACHINES

SAMSUNG SF30 - £89 WITH
SAMSUNG SF40 - £99 6 MONTHS GUARANTEE

AMSTRAD~PPF800
Fax Machine **£229**

Only **£229**

* Fully featured Plain Paper Fax.
* High Quality Copier.
* Integrated Digital Answer
Machine with Message Forwarding.
* PC Interface for -
Scanning
Printing
Transmitting &
Receiving faxes
DIRECTLY to & from
Your PC.
* Integral Telephone Handset.
* Mercury Compatible.



EXPORT
INQUIRIES
WELCOME

**BRAND NEW
JUST IN !!!!**

33" FERGUSON DOLBY PRO-LOGIC
TV
WITH 12 MONTHS G'TEE
ONLY
£679

***** BRAND NEW *****

FERGUSON

TV & VIDEO PACKAGE

21" TV + VCR VIDEOPLUS + PDC, LP/SP
with
12 mths
G'tee **£299**

FREE DELIVERY
ON
REASONABLE ORDERS, TO
MOST AREA'S IN THE U.K

WILTSGROVE
LTD

BRAND NEW

AKAI 28" NICAM
COLOUR TELEVISION

£279 with
12 mths
G'tee

LINE OUTPUT TRANSFORMERS

<p>FERGUSON</p> <p>59B2 - £9.95 59B3 - £9.95 59B4 - £9.95 59B5 - £9.95 59B8 - £9.95 59D2 - £9.95 59D3 - £9.95 59H2 - £9.95 59H3 - £9.95 59H4 - £9.95 59H5 - £9.95 59G2 - £9.95 59G3 - £9.95 59G4 - £9.95 59J7 - £9.95</p>	<p>66B2 - £9.95 66B3 - £9.95 66B5 - £9.95 66B8 - £9.95 66H2 - £9.95 66H3 - £9.95 66H4 - £9.95 66H5 - £9.95 2445 - £9.95 2452 - £9.95 2453 - £9.95</p> <p>FERGUSON</p> <p>22B1 - £11.45 22B2 - £11.45 22B3 - £11.45</p>	<p>22B4 - £11.45 22D1 - £11.45 22D2 - £11.45 22D3 - £11.45 22D4 - £11.45 26D1 - £11.45 26D2 - £11.45 26D3 - £11.45 22G1 - £11.45 22G2 - £11.45 22G3 - £11.45 22H1 - £11.45 22H2 - £11.45 22H3 - £11.45 26G2 - £11.45 26G3 - £11.45</p>	<p>26H2 - £11.45 2353 - £11.45 2373 - £11.45</p> <p>HITACHI</p> <p>CMT2130 - £12.95 CPT2174 - £12.95 CPT2176 - £12.95 CPT2178 - £12.95 CPT1808SF - £12.95 CPT2008SF - £12.95 C2119T - £34.95 C2164TN - £34.95 CPT2118R - £34.95 C2114R - £34.95</p>	<p>C2114T - £34.95 C2118R - £34.95 C2119R - £34.95 C2116RE - £34.95 C2116TE - £34.95 C2118T - £34.95 C2114RE - £34.95 C2146TN - £34.95 C2186TN-311 - £29.95 C1450R - £29.95 C14P216 - £29.95 C14P218 - £29.95 C1709T - £29.95 C1414T - £29.95 C1417TZ - £29.95 C1408T - £29.95 C1409T - £29.95</p>
--	---	--	--	--

WE REGRET TO
INFORM YOU THAT
THE VISIONCARE BRANCH
IN READING
HAS CLOSED DOWN.
VISIONCARE
CUSTOMERS
CAN CONTACT
WILTSGROVE LTD
BIRMINGHAM
THANK-YOU.

TRADE ONLY ALL STOCK SUBJECT TO AVAILABILITY, CARRIAGE & V.A.T

FREEFAX ORDERLINE: 0500 55 05 05

STARVISION

**SUPPLIERS OF HIGH QUALITY
EX RENTAL - EX DISPLAY
TV & VIDEO**

ALL SETS ARE FULLY SERVICED WITH
REMOTE CONTROLS AND ARE READY
FOR RETAIL SALE

MOST POPULAR MAKES ALWAYS IN
STOCK AT PRICES THAT WON'T SHOCK

ALL PRICES INCLUDE V.A.T.
NO MINIMUM QUANTITY

RING TODAY FOR LATEST PRICES
TELEPHONE

0121 502 3016 - 0121 505 1033

**STARVISION
UNIT A, BRUNSWICK PARK ROAD
WEDNESBURY, WEST MIDLANDS
WS10 9QR**

**CAMPION
WHOLESALE LTD.**

**QUALITY USED
TV & VIDEO**
COMPLETE RANGE OF TVs
VIDEOS AND SATELLITES

Most makes and models available
TVs from £3.00 • Satellites from £8.00
Videos from £15.00
Prices Ex-VAT

Free Delivery Service to most areas of the UK

U.K.s Largest Export Wholesaler
Specialists in conversions to most countries systems

UNIT 75, BARRACKS ROAD,
SANDY LANE INDUSTRIAL ESTATE,
STOURPORT-ON-SEVERN,
WORCESTERSHIRE DY13 9QB
Just 10 Mins from M5 Junct. 6 Worcs North

01299-879642 (3 lines)

FAX: 01299 827984

TUBES

This Month's Specials

**14" tube
new
from £19**

**14" Sony
tube
from £35**

**20" tube
48ECR
£59**

**20" tube
48EEV
£59**

**21" tube
51EBV
£50**

**21" tube
51EAK
£49**

**28" tube
66EAS
£69**

**28" tube
66ECY
£69**

**If you need advice on tube
types, tube compatibility,
prices or availability ring
Irene or Jane**



Carriage and VAT extra



EXPRESS TV

The Mill, Mill Lane,
RUGELEY, Staffs WS15 2JW

Tel: 01889 577600

Fax: 01889 575600

TV WHOLESALE

COLOURTRADE

ESTABLISHED 1973 - WHOLESALE ONLY

NEW 'B' GRADE

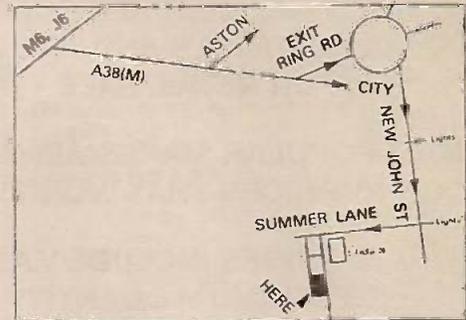
Major Brands ONLY. TV's - Video - Audio. Microwaves, Satellite Receivers, Decoders. Camcorders - Phones/Fax COMPLETE BOXED - WITH STAND - HANDSET - BOOK ETC MINT LATEST NICAM FASTEXT F.S.T.

EXPORT AGENTS FOR THE FOLLOWING

TV, VIDEO, HI-FI, CAMCORDERS, SATELLITE WHITE GOODS, HEATING EQPT., VACUUM CLEANERS, KITCHEN APPLIANCES, GARDEN EQUIPMENT, POWER TOOLS

FERGUSON

FULL RANGE - ALL CURRENT MODELS OF TV-VIDEO IN STOCK No minimum quantity



NATION-WIDE NEXT DAY DELIVERY SERVICE - VISITORS BY APPOINTMENT

Phone 0121-359 7020

FAX 0121-359 6344

221-222 BRIDGE ST WEST, HOCKLEY
BIRMINGHAM B19 2YU - JUST OFF M6-J6



BESCO LTD

YOUR PREMIER SUPPLIER FOR OVER 30 YEARS
NEW STOCKS ARRIVING DAILY

HI FI HI FI HI FI HI FI HI FI

100s OF UNITS IN STOCK!! - STOCK UP NOW FOR CHRISTMAS

Large stocks available A and B grade:

makes include: Kenwood, Aiwa, JVC, Sanyo, Akai, Pioneer, Panasonic, Goodmans, Alba etc.

CHRISTMAS SELLERS

Alba/Bush Ghetto Blasters, CD, Radio, Tape boxed £25

Alba/Bush CD Micro Systems boxed £35 • Alba/Bush CD Midi Systems boxed £40
most goods under half price

VIDEOS/TV's: A and B Grade

Bush/Alba long play boxed £60 • Roadstar long play boxed £50

Akai, Sanyo, JVC, Toshiba, Aiwa less than half price

21" Remote Control Crown/Bush, Alba boxed £60

EX-RENTAL TV/VIDEO ALL TESTED, SEEN WORKING

Philips complete with remote £45

Salora all models with remote £45, Grundig from £45 many other makes/models in stock
Cheaper Video/front loading from £25

ALL MAKES, MODELS & SIZES OF TV IN STOCK

Brown cabinet working TVs from £12 • Videos off the pile from £10

We stock Camcorders, Car Stereo, portable radio/CD
kettles, irons, toasters etc, etc.

ALL PRICES INCL. VAT. TERMS - CASH ONLY

* DISCOUNT ON BULK PURCHASES *

Send S/A Envelope for price list or call 01274 308186

Walker House, 16 Bottomley Street, Manchester Road, Bradford BD5 7LJ

Tel: (01274) 308186 Fax: (01274) 722229

TV WHOLESALE



LTD

TV & VIDEO WHOLESALERS

PENTIUM COMPUTER SYSTEMS - MORE STOCK AVAILABLE

TOP QUALITY GRADED TELEVISIONS

SONY KV25F1U KV25F2U KV29F1U KV29F2U

TOSHIBA 2557DB 2857DB

PANASONIC TX25AD2DP TX29AD2DP

ALSO WE HAVE THE FOLLOWING BRANDS IN STOCK

SHARP • SANYO • MITSUBISHI • JVC • HITACHI

• FERGUSON • TATUNG • SAMSUNG

PREMIUM BRAND VIDEO RECORDERS

AKAI • AIWA • FERGUSON • JVC • MITSUBISHI • PANASONIC

• SANYO • SONY

SAVE MONEY ON BRANDED AUDIO SYSTEMS

AIWA NX858 AKAI 500 PIONEER 240 SONY MHC 70

ALSO WE HAVE

TECHNICS • JVC • MITSUBISHI • SANYO • PHILIPS

Long Play Videos £60 Video Plus Videos £85

Nicam Stereo Videos £120

Special Offers on Branded Videos. Contact your nearest Branch.

All prices based on a quantity of 5 or more and subject to VAT.

**-HEAD OFFICE-
BIRMINGHAM**

208 BROMFORD LANE
ERDINGTON
BIRMINGHAM B24 8DL
TEL: 0121-327 3273
FAX: 0121-322 2011

CLEVEDON

UNIT 20
5C BUSINESS CENTRE
CONCORDE DRIVE
CLEVEDON
AVON BS21 6UH
TEL: 01275 341789

LONDON

UNIT 2
THE ROYAL LONDON EST.
29/35 NORTH ACTON ROAD
LONDON NW10 6PE
TEL: 0181-961 5005

PRESTON

UNIT 439
OAKSHOTT PLACE
WALTON SUMMIT IND EST
PRESTON PR5 8AU
TEL: 01772 312101

**THORNS
RENTAL
GRANADA**

CENTRAL TV WHOLESALE DISTRIBUTION LTD

THORN TX9, TX10, TX100 FST
please ring now for best prices

FOR BEST DEALS ON
DORICS MK4, MK4A Basics...
RING NOW!

GRADED TVs
AND VIDEOS:
POA

FULL RANGE OF
PANASONIC VIDEOS
NOW IN STOCK: POA

WORKING VIDEOS
NOW FROM ONLY:
£30.00

FOR ALL EXPORT
ENQUIRIES TV AND VIDEOS,
CALL OUR BIRMINGHAM
OFFICE NOW!

PHILIPS FST
G90 Teletext
working £75
B/W £35

**ATTENTION ALL BULK BUYERS
RING NOW FOR DIRECT LOADS**

**LARGE SELECTION OF SLIMLINE
VIDEOS, FULL REMOTE from £45.00**

**Finlandia Nicam TV
21"/24"/28" models:**
D66J25x8 D66J26x2 C51H26x17
C59HP6x7 C59HZx3 C66H25x8
C66HZ6x5 C59GZ7x4

SATELLITES, VIDEO CRYPT
SRX200, SRD400, PACE 9000 9200 IRD
PACE 800, VIDEOCRYPT, AMSTRAD
510 540 AND MORE: POA

WORKING PORTABLE
from only £35
LARGE SELECTION OF FST TVs
from £45

London contact: Joshi
Eley Estate, Nobel Road,
Edmonton N18
Tel: 0181-807 4090 Fax: 0181-884 1314

Birmingham contact: Mick
369 Startford Road, Sparkhill,
Birmingham B11 4JY
Tel: 0121-772 1591 Fax: 0121-766 6383

TV WHOLESALE

J. KAYS

MAJOR PARCEL OF MANUFACTURERS RETURNED GOODS

ALL STOCK IN '**A GRADE**' MANUFACTURERS ORIGINAL BOXES LIKE **NEW**

JAPANESE BRANDED

ALL CURRENT MODELS

21", 25", 28" TELEVISIONS, TO INCLUDE NICAMS, FST TEXTS,
VCRS, LONG PLAY, VIDEOPLUS, NICAMS.

HI-FI, 3 CD MIDI SYSTEMS, 3 CD MICRO SYSTEMS, ALL REMOTE AND HIGH POWER
PORTABLE AUDIO, CD GHETTO BLASTERS, REMOTES CDS ETC
CAMCORDERS, PALMCORDERS.

MICROWAVES

STOCK IDEAL FOR EXPORT

**151-153 SOHO RD, HANDSWORTH, BIRMINGHAM B21 9SU
TEL. 0121-551 1404, 0121 554 2637. FAX. 0121 554 1408**

No other consumer magazine in the country can reach so effectively those readers who are wholly engaged in the television and affiliated electronics industries. They have a need to know of your products and services.

CLASSIFIED

PHONE 0181-652 8339

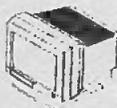
FAX 0181-652 8931

The prepaid rate for semi display setting is £13.50 per single column centimetre (minimum 4 cm). Classified advertisements £2.00 per word (minimum 20 words), box number £22.00 extra. All prices plus 17½% VAT. All cheques, postal orders etc., to be made payable to Reed Business Information. Advertisements, together with remittance, should be sent to Television Classified, 11th Floor, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS

SERVICE MANUALS & TECHNICAL BOOKS



PRICE CRASH



On our CD-ROM's

Due to the success of our CD-ROM compilations we can now offer them at a new reduced price of just £24.95 each (plus VAT). Now there is even more reason for you to change to this method of data purchase. Why spend £££'s on individual manuals when you can get dozens on just 1 CD-ROM and save a fortune.

We now have 8 Monitor CD-ROM's

Coming soon - TV Manuals on CD-ROM

DON'T DELAY - ORDER TODAY

Full details on the contents of each CD-ROM shown on our web site and our free PC Disc

All orders plus post/packing £2.94

We have the largest range of Service Information and Technical Data obtainable anywhere.

For Televisions, Video Recorders, Test Equipment, Computer Monitors, Vintage Wireless, Domestic Equipment etc etc. In fact practically anything electronic. Originals or Photostats as available.

Also available. Our catalogues on PC Discs detailing Hundreds of Technical Books and Repair Guides. Return coupon for your FREE Discs. The entire index of manuals we have is available on PC disc for just £5.00 inclusive with FREE updates.

MAURITRON TECHNICAL SERVICES (TV)

8 Cherry Tree Road, Chinnor, Oxfordshire, OX9 4QY

Tel:- 01844-351694. Fax:- 01844 352554.

Email:- sales@mauritron.co.uk Our catalogue is now on the Web at <http://dialspace.dial.pipex.com/mauritron/>

Please forward your PC Discs catalogues of CD-ROM'S and Technical Books for which I enclose 4 x 1st Class Stamps.

Please supply Index of manuals on PC Disc for £5.00 inclusive.

NAME _____ *Circle items required*

ADDRESS _____

POSTCODE _____ You may pay by Cheque, PO or Visa, Access, Delta, Electron, JCB, Mastercard, Eurocard etc

EXPIRES _____ SIGNATURE _____

SERVICE MANUALS

Thousands of different models available For most U. K. European, Far East & USA makes

Prices (Stock Items):-

VCR - £13.00

CTV - £8.00

MTV - £6.00

Other items, prices on request

P/P etc. (any quantity) add £2.00

Do not add any VAT

Cheque/PO with order only please.

D-TEC

PO BOX 1171, FERNDOWN, DORSET BH22 9YG

Tel: 01202 870656

Fryerns

Service Information **FES** Circuit Diagrams

TV's, VCR's SATELLITE AUDIO & HI-FI

Most models/makes old & new covered

Also fault guidance service available

Prices are from £3.75 + £2.50P/P

i.e. 1 item - total £6.25 inc

2 items - total £10.00 inc

3 items - total £13.75 inc

4 items - total £17.50 inc

Payment by credit card or Postal Order for next day delivery. Cheques to clear.

Tel/Fax: 01268 470899

Answerphone outside office hours

4 Pincey Mead.

Basildon, Essex

SS13 3EW

please note new prices



SERVICE INFORMATION

CIRCUITS and SERVICE MANUALS

from 1930s - 1990s

Radios, amps, radiograms, tuners, CDs, TVs, videos, cassette radios, ICE etc.

LARGE QUANTITY USED TV and VIDEO PANELS

BACK COPIES PW and TV MAG.

DAVE WILLIAMS

16 Church Street, Owston Ferry,

Doncaster, S. Yorks DN9 1RG

Tel and Fax: 01427 728046

Mail order only. No callers

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,

Gwent NP6 7HE

TEL: 01291 623086 FAX: 01291 628786

Visa, Access accepted

CLASSIFIED TEL: 0181 652 8339

REPAIR INFORMATION

NEW EDITIONS !! NEW EDITIONS !! NEW EDITIONS !!
OVER 17,250 FAULTS AVAILABLE
 BOOK FORMAT OR PC DISK VERSION

Fault Indexes in book format

Latest release - Edition 18 of the Television Magazine Index, Covers over 13,700 Television, Video, Satellite, Camcorder & Compact Disc faults, Large easy to read A4 format, The newest addition to a highly acclaimed series. In daily use in workshops across the UK (And beyond).

ISBN 1 898394 21X Edition 18: Complete set £14.75

Fault indexes on disk - Version 1.4

Our largest ever fault index database on disk, Covering a massive 17,250 !! Television, Video, Camcorder, Satellite, CD & Monitor faults listed in 16 years of Television. Packed with features and complete with manual, the database provides an EASY way to locate faults FAST. Requires PC or compatible (Supplied on 3 1/2" hd)

Version 1.4: Indexes on Disk £17.50

Low cost updates are available for all fault indexes.

NEW RELEASE - Equivalents guides - 2nd Edition.

The long awaited 2nd Edition of our equivalents guides now available, Over 6,300 entries - Equivalents covering Video, TV, Camcorder & satellites plus TV model-chassis guide. This single comprehensive book contains all FIVE guides.

Edition 2: Equivalents guides £5.95

PLEASE NOTE OUR NEW ADDRESS

E.C.S.
 Technical Publishing

316, Upton Road
 Noctorum, Wirral,
 Merseyside. L43 9RW
 Tel/Fax: 0151-522 0053

Please add £1.75 P & P to total (Europe £2.75, r.o.w please enquire).

THE "HOOKINGS" INDEX

More than 12,000 entries including remedies, where appropriate, from "TELEVISION" magazine.

Bang up to Date:
 Jan '87 to Nov '97

Only £10.00 inclusive for the set of three books covering TV, VCR, SAT, CD etc

Too good to be true?

Ring 01766 522444
 for free sample

WANTED

BILLINGTON EXPORT LIMITED
 Billingshurst, West Sussex RH14 9EZ

VALVES WANTED FOR CASH

(KT88 £60, PX4 £50, PX25 £105, DA100 £90, EL34 £15, EL37 £15, CV4004, ECC83 £3)

Valves must be Mullard/GEC/West European to achieve the prices mentioned.

Ask for our free Wanted List.

WE SUPPLY VALVES, C.R.T., VIDICONS ETC

Visitors, please phone for an appointment, we're a very busy export warehouse.

Tel: (01403) 784 961
 Fax: (01403) 783 519

WANTED

**PROJECTOR TV'S
 VIDEO PROJECTORS**

Tel: 0121 354 2393
 Fax: 0121 355 0108

LINAGE

AVO MULTIMETER Model 8, £45.00. 500 volt meggers £30.00. Prices plus VAT and p & p. Send SAE for lists of Surplus Instruments & Scopes etc. A. C. Electronics, 17 Apleton Grove, Leeds LS9 9EN. Tel: 0532 496048.

OCHRE MILL Technical Services, Grundig TV spares for most models to 1985, fast, friendly, helpful, sensible prices. Gt Lype Farm, Charlton, Nr. Malmesbury, Wilts SN16 9DR. Tel: 0666 823228.

PRIVATE RETAILER has excellent part exchange colour televisions and videos to clear. Tel: 01494 814317.

DECODER TO COMPUTER interface card with smart card connectors and diagram: £9. E.M.O., 62 Bridge Street, Ramsbottom, Lancs BLO 9AG. Tel: 01706 823036.

FOR SALE

Trade Only

Televisions from £5.00
 Telctext from £20.00
 Videos from £20.00
 Twin Speed Stereo from £25.00

Minimum quantity - 10 units

**BOURNEMOUTH
 WHOLESALERS
 01202 470443**

Technical Information Services

76 Church St, Larkhall, Lanark ML9 1HE

N.B.: There is a £2.50 Post/Handling Charge on all orders

Send an SAE For Your Free Quote & Catalogue

We have the world's Largest Selection of


 CD-ROMS
 COLLECTIONS
 OUT SEPT '97

SERVICE
MANUALS


 NEW
 CATALOGUE
 OUT NOW

VCR CIRCUITS £8.00 CTV CIRCUITS £6.00

CTV CIRCUIT COLLECTIONS

Ferguson from 1980's till present @ £45.00 • Bush £22
 Hitachi £45 • Mitsubishi £38 • Panasonic £30...etc...

Call for full list & prices of all 27 collections

Tel: 01698 883334/884585 □ Fax: 01698 884825

TOP SELLING BOOKS

PRACT VCR or TV REPAIRS
 £16.95 each (or £30 for Both)
 MICROWAVES: ENERGY & OVENS
 £12.95
 Data Reference Guide (Chassis/X-Ref)
 £9.95
 KUXO' SCRAMB' SYS' (New 5th Edn.)
 £35.00
 Buy, Sell & Service Used CTV/VCR/CD
 £9.95 each
 IC DATA BOOKS Various Titles
 £12.95 each
 With 100's of Titles, send SAE for Full List

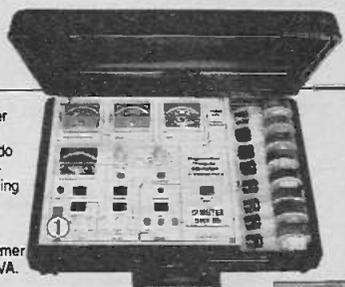
SERVICE MANUAL LIBRARY

BUY ANY MANUAL FOR £10.00
 or Swap at £5.00 Each (plus p&p)
 Initial Joining Fee £65.00
 (£20/annum, thereafter)

.....00o.....
NEW RELEASES:

3.5" Disk Drives
 (Installation & Circs): £9.50
 Data Ref' on 3.5" Disk: £5.00

TEST EQUIPMENT

- ① BMR 95 unique Regenerating-Computer and Analyser for CRTs, regenerates picture tubes even better, also if all other machines do not succeed, removes short filament-cathode-grid 1-grid 2, with FLASH-EX against remaining gas. 162 adapters available, list with 12,500 tubes-types, pays itself within 4 weeks.
- ② RTT 3 Safety isolated variable Transformer input 220/230 V, output 0-270 V / 4 A, 1100 VA.
- ③ AT 2 audio multi-function tester, substitutes 16 devices, has all usual sockets, cuts down repair time, takes you through all necessary test-steps by button controls.
- ④ CBE Screen-Demagnetiser with strongest field for screens up to 110 cm, 220/230 V, 2.7 A, 600 VA.

Ask for free catalogue
 S.E.M.E. Ltd., Manton Mowbray, Leicester
 Phone (0 16 64) 65392, Fax 63976
 IRL: Dänberg Electronics, Ranafst. Co Donegal
 Phone (0 75) 4 82 75, Fax 7 10 31
 Germany: U. Müter, Fax 0049 2388 57017

TRANS

TV LINE OUTPUT TRANSFORMERS

PHONE: 0181-948 3702 FAX: 0181-332 0583

ALBA · AMSTRAD · BUSH · DECCA · DORIC · BLAUPUNKT · FERGUSON · FIDELITY · GEC · GRUNDIG · GRANADA · HITACHI · HINARI · INDESIT · ITT · KIMARA · NIKKAI · MATSUI · MURPHY · OSAKI · NORDMENDE · LOEWE-OPTA · PANASONIC · PYE · PHILIPS · SANYO · SAISHO · SHARP · SONY · SOLOVOX · SUSUMU · TANDBERG · TELEFUNKEN · THORN · TRIUMPH · THOMSON · GOLDSTAR · BINATONE ·

FULL RANGE OF KONIG: VIDEO HEADS, BELT KITS, IDLERS, PINCH ROLLERS, TENSION BANDS. LARGE RANGE OF REMOTE CONTROLS IN STOCK

TIDMAN MAIL ORDER LTD · 236 SANDYCOMBE ROAD · RICHMOND · SURREY · TW9 2EQ

Approx. 1 mile from New Bridge.

Mon-Fri 9 am to 12.30 pm & 1.30-4.30 pm

CLASSIFIED TEL: 0181 652 8339

RECRUITMENT



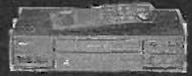
Looking for Real Job Satisfaction, Reward and Security?

At Mastercare we are committed to ensuring that all our Engineers enjoy some of the most stimulating and rewarding roles offered anywhere in the UK. A promise that you can rely on from the day you join us.



Looking for Training, Career Development and Prospects?

As part of the Dixons Stores Group, we represent one of the most progressive forces in retailing and consequently offer outstanding levels of training and career development opportunities. For structured career development there is no better place to be.



BROWN GOODS ENGINEERS

SUPERVISING ENGINEERS

£19,500 (OTE) plus car

An experienced engineer, you will supervise a number of in-store workshops which house the most up-to-date diagnostic equipment. In this wide ranging role, you will motivate, train and support your team as well as providing technical support when necessary.

IN-STORE ENGINEERS

£18,500 (OTE)

Based in a Currys Superstore, you will work in partnership with another engineer, whilst also becoming a highly respected member of the retail team. You will have your own fully equipped "mini-workshop", and will work a 4 day on, 3 day off, rota system operating Monday through to Sunday.

WORKSHOP ENGINEERS

£17,000 (OTE)

You will provide a high quality, technically excellent engineering support service to our in-store and field operations. Working a 39-hour week, Monday to Friday, in an advanced environment, you will benefit from on-going manufacturers' and internal technical training across the entire product range.

FIELD ENGINEERS

£16,000 (OTE) plus Car

Working a five day week, Monday through to Saturday, you will enjoy excellent technical back-up and considerable freedom. You will benefit from the support provided by your own CD Rom based lap top computer - a highly advanced personal management aid incorporating technical manuals and tips.

TRAINING OPPORTUNITIES

We offer re-training to people with experience of fault finding to component level and C&G 224 or equivalent. Our award-winning, full-time training programme is designed to build on your technical ability and customer-facing skills. We also seek individuals with a relevant qualification and/or some electronics engineering experience to join us as Repair Process Assistants.

Vacancies exist throughout London, the South, Scotland and the Midlands. All positions promise on-going manufacturer/internal technical training and offer an immediate entry pension scheme, profit related pay and discounts on all Curry, Dixons, PC World and The Link products.

To apply please telephone our Recruitment Hotline on 01442 888666. If you prefer, write to Nicky Woods, Mastercare Service & Distribution Ltd., Ground Floor West, Maylands Avenue, Hemel Hempstead, Herts HP2 7TG enclosing career details.



I.C.T.V. (Southern) Ltd

REQUIRES

EXPERIENCED CAMCORDER ENGINEER

Competitive Salary dependent on experience

For further information contact
Graham
on
Portsmouth (01705) 653654

TELEVISION FIELD BENCH ENGINEER

Required by

TALIS INTERNATIONAL

For South London Area,
Company car supplied.
Interested?

Phone Ron Viga
on
0181 288 5376 or
0410 439850

**Do you have 10 years
TV/Video repair experience?
Are you computer literate?
Would you like to see
television from the other end?**

If so, become an Outside Broadcast engineer. The position is based from Raynes Park in London and involves travelling to any of the 59 race-courses in the U.K. to transmit live television pictures of horse racing. You would be part of a team responsible for producing this coverage and as such would need to spend some time away from home each month. If you are interested then please apply in writing, enclosing a copy of your C.V. to:

**Mick Both,
Head of Engineering,
RaceTech,
88 Bushey Road,
Raynes Park,
London SW20 0JH**

WILLOW VALE ELECTRONICS LIMITED

TECHLINE

Technical Advice Engineer

Based Manchester

**DO YOU HAVE A HIGH LEVEL OF TECHNICAL EXPERTISE
ON CONSUMER ELECTRONIC PRODUCTS COUPLED
WITH THE RELEVANT PRACTICAL EXPERIENCE?**

We are looking for a Technical Advice Engineer to provide a high level advisory service on consumer electronic products, to engineers using our Techline service.

We offer a competitive salary for a keen, hard working teamplayer, with a real flair for electronic problem solving.

As the majority of time is spent in consumer liaison, confidence, a professional approach, an excellent telephone manner and the ability to cope with pressure, are essential.

INTERESTED? Then forward your CV with a covering letter and details of your current salary to:

Alan Dyson, Willowvale Electronics Ltd.,
Unit 4, Enterprise Ind. Estate, Reliance Street, Manchester M40 3AL

International Data Management Company
(brown goods repair database) has the
following two vacancies for

RADIO/TV ENGINEERS

French native speaker for data input into and translation of technical repair information (Full time)

2 Persons with full command of American English for data input into US technical database (initially 20 hours per week)

Both positions are office based and require computer literacy and keyboard skills and involve technical support for translators and data editors

If you are interested, please send your CV to:

Ms. T. Lisson
EURAS International
EURAS House, 51 Bristol Road
Keynsham, Bristol BS18 2BA

CLASSIFIED TEL: 0181 652 8339

RECRUITMENT

TV, Video and Audio Technicians

Within the electrical retailing market, customers are increasingly focusing on after sales service when making a buying decision. And that's where ScottishPower Retail scores. However, realising we can always improve, we are currently looking to strengthen this resource, with the overall objective of becoming recognised as the industry leader in after sales service.

Consequently, we require Field Engineers and Workshop Engineers.

Qualified to City and Guilds 224 or equivalent, you will be a fully experienced Technician, conversant with the appropriate new technology.

You will be capable of working on your own initiative with the minimum of supervision and share our commitment to customer care. In addition, you must possess a positive attitude and have a flexible approach to your duties.

You will be based at our Regional Service Centre at Mossend, Bellshill, Scotland.

In return, we offer an attractive salary and benefits package, together with first class career prospects.

Please write enclosing full cv to, Willie Wood, Personnel Manager, ScottishPower Retail Division, Unit 5, Broadwood Business Park, Cumbernauld, Glasgow G68 9SP.



ScottishPower

ALWAYS THE BEST ON OFFER

Careers

SPARES & COMPONENTS



H.S. WHOLESALE

Unit B3, Citadel Trading Park,
Garrison Road, Hull HU9 1TQ
Tel: 01482 222295/Fax: 222213



AERIALS FROM 1-99



CABLE FROM 8-95

RG6 SAT CABLE FROM 11-95

SCART/SCART

21 PIN LEADS

89p

2M FLY LEADS

35p

CABLE CLIPS

'F'

CONNECTORS

COAX PLUGS

POLES

BRACKETS

LASHING KITS

BOLTS

SADELTA

TV/SATELLITE

METERS

NOW IN STOCK & MANY MORE

SAT SYSTEMS ALL PACE RECEIVERS POA

LNB'S FROM £16.95

STOCKISTS FOR: ANTIFERRENCE

COASTAL

LABGEAR

LENSON HEATH

MERCURY

TELEVES

TRIAx

TOWER

BLAKES

PACE

WOLSEY

UNIFIX

PHILEX

CALL FOR CATALOGUE OF FULL RANGE

ALL PRICES + VAT + CARRIAGE + CREDIT CHARGE IF APPLICABLE

FOR SALE

Gamma UK Ltd

WORKING FRONT LOADING VIDEOS READY TO SELL

Standard Play	—	£32
Long play	—	£37
Nicam	—	£45

Working Fast Text CTV's from — £40
Portable F.S.T. Text CTV's from — £65

ALL PRICES PLUS VAT

0121 458 4093

RELAY

OMAGH LTD / COMPUTER SOFTWARE

DO YOU RENT TELEVISIONS?

DO YOU STILL USE A CARD SYSTEM?

DO YOU FIND IT DIFFICULT TO KNOW YOUR ARREARS TOTAL AT ANY GIVEN TIME?

If you do then we recommend our computer TV and Video Rental package.

This package includes

- ★ automatic updating of each customer's record
- ★ alphabetical print-out of each customer's arrears and payments missed
- ★ total arrears immediately available
- ★ easy to use and operate.

NEW HIRE PURCHASE PROGRAMME NOW AVAILABLE AS WELL

These programmes operate on all IBM compatibles running under MS-DOS. Free demonstration discs available.

WILLIAM J THOMPSON
Donaghian Post Office
Beragh Co. Tyrone
Telephone Beragh 58214 (0662.7)

CONTACT

TV AND VIDEO SERVICE TECHNICIAN

Bench Technician required for busy Crowborough, East Sussex workshop

Permanent position with good promotion prospects, competitive salary

Please phone

TECHLIVE LIMITED
on (01892) 665111

DUE TO FURTHER EXPANSION SERVICESPEED SLOUGH

Require

FIELD/BENCH TECHNICIAN

AND TECHNICAL INSTALLERS

For the repair and installation of CTV/VCR/Audio and Camcorder products

Top rates of pay

Tel: 01753 692408

For further details

RCS VARIABLE VOLTAGE D.C. BENCH POWER SUPPLY

£76 INC VAT - POST & INS £6

Up to 38 volts DC at 6 amps continuous, 10 amps peak
Fully variable from 1 to 38 volts.
Twin voltage and current meters for easy read out.
240 Volt AC input. Fully smoothed.

Size 145x113x45. 20 volt 3 amp model £44. Post £4.

RADIO COMPONENT SPECIALISTS

337 WHITEHORSE ROAD, CROYDON, SURREY, UK
Tel: 0181 684 1665

Lot of transformers, high volt caps, valves, speakers, in stock. Phone or send your wants list for quote.

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

CLASSIFIED

Tel: 0181-652 8339

Fax: 0181-652 8931

CLASSIFIED TEL: 0181 652 8339

MEASUREMENT

SOLUTIONS

**Meter
Repair Service**
In or out of warranty
Free Collection &
Free Delivery Available
0800-801978

**Test
Equipment
Catalogue Available**
Please call for your
**FREE COPY
TODAY**

DIGITAL SATELLITE & DIGITAL TERRESTRIAL



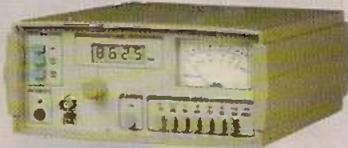
SATELLITE DISH ANALYSER



ANALOGUE TV/FM ANALYSER



TV AERIAL ALIGNMENT METER



ANALOGUE SATELLITE ANALYSER



TV & SATELLITE ANALYSER



TEL - 01604 787 888

Fax - 01604 787 999

E-mail - sales@satsol.co.uk

E-mail - support@satsol.co.uk

Internet Site - www.satsol.co.uk

**Stocking over 2,500 different
TV & Satellite items in depots located
throughout the UK. We don't just offer a Solution.
WE ARE THE SOLUTION - SATELLITE SOLUTIONS.**

