

THE LEADING UK CONSUMER ELECTRONICS TECHNOLOGY MAGAZINE

# TELEVISION

SERVICING·VIDEO·SATELLITE·DEVELOPMENTS

AUGUST 1999 £2.70

## Servicing Tesco Tellys



**Test Report:**

The HR monitor LOPT tester

Automated VCR soak testing

**Reception problems:**

DTT, RSL-TV, interference in TV outlets



**Fault reports TVs, VCRs, PC Monitors and Satellite**

**KÖNIG**  
**ELECTRONIC**  
The Ultimate Source

**Insist  
the box  
is**

**KÖNIG**



**No.1 for Video Parts**

**Available from all top distributors - Technical help line: 01635 278678**

# CONTENTS

August 1999

Vol. 49, No. 10

## BBC Funding 667

## What a Life! 670

A common Toshiba VCR problem, then various other video faults and strange customers. **Donald Bullock's** servicing commentary.

## Teletopics 672

Interactive satellite TV, mobile TV, the EU lead-free soldering edict and other news.

## Those Tesco Tellys 674

The TVs sold by Tesco generally employ straightforward circuitry and have predictable faults. So it's not



difficult to make a profit from repairs. **Chris Watton** reports on his experiences with the Amstrad PT9601 chassis.

## Satellite Notebook 678

## Cable TV News 679

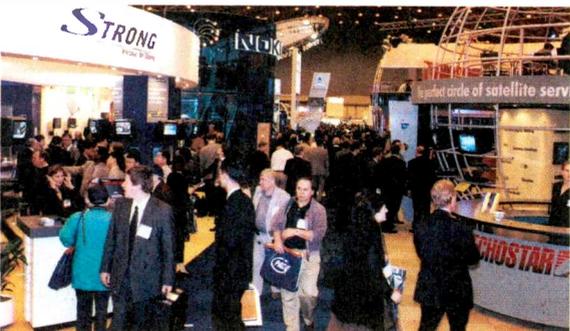
## Satellite Workshop 680

**Jack Armstrong's** column on satellite receiver servicing.

## Test Case 440 681

## At Mediacast '99 682

This year the emphasis was on interactive TV and internet services. **George Cole** reports



## Multiple Outlet Wallplates 686

In Part 2 of his article on TV wallplates **Bill Wright** describes the symptoms that can arise when the screening is inadequate and gives advice on dealing with such problems.

## VCR Clinic 690

## VCR Soak Tester 692

Here's the answer to the problem of VCRs that bounce because of intermittent faults. **Ian Rees** has developed an automated active soak testing system.

## Help Wanted 709

## TV Fault Finding 710

## Test Report: The HR Monitor LOPT Tester 714

**Alan Willcox** checks out a unit that's been specifically designed to test 32kHz diode-split LOPTs used in monitors.

## Camcorner 716

**David C. Woodnott** provides hints and tips on camcorder problems.

## Polarisation Puzzle 717

Some experimentation led to acceptable reception, under very unfavourable conditions, of the first RSL station in the UK, and also revealed a curious polarisation condition. **Keith Cummins** reports on reception of TV12 (Isle of Wight).

## DX and Satellite Reception 718

Terrestrial DX and satellite TV reception. Overseas and satellite news. The PLT problem. New aerial designs. **Roger Bunney** reports.

## Beeper for the Genie 721

A simple modification devised by **Martin Pickering** adds an audible capacitor OK check to the Genie ESR meter.

## Letters 722

DTT transmission conditions, the free STB problem, Channel 5 aftermath and other matters.

## Monitors 724

Hints and tips on PC monitor repairs.

## Service Notebook 726

**John Edwards** on recent servicing problems.

## Next Month in Television 727

### Editor

John A. Reddihough

### Production Editor

Tessa Winford

### Consultant Editor

Martin Eccles

### Publisher

Mick Elliott

### Advertisement

### Sales Manager

Matthew Harradine

0181-652 3033

### Advertisement Sales

### Executive

Pat Bunce

0181-652 8339

Fax 0181-652 8931

### Editorial Office

0181-652 8120

Fax 0181-652 8111

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.

August issue on sale  
July 21st.

Next issue,  
dated September,  
on sale August 18th.

Decode and recode car radios and CD players quickly with the Joule A-400 radio decoder.

Now sold worldwide to service departments and Police Forces.

C.E. Approved - meets all current regulations.

Prices start from £375.00 + VAT for the Starter Kit covering over 100 models of popular radios.

Call us now for a free information pack and demonstration disk on 01325 310278

# The Joule A-4000 Radio Decoder

If you already service car audio equipment, the A-400 could prove to be a very valuable additional source of income for your company.

**Electronic Sound Systems**  
**Hilton Road, Aycliffe Industrial Park**  
**Newton Aycliffe, Co. Durham DL5 6EN**  
**United Kingdom**  
**Tel: +44 (0)1325 310278**  
**Fax: +44 (0)1325 300189**  
**Email: [elecsys@elecsys.demon.co.uk](mailto:elecsys@elecsys.demon.co.uk)**

## For Your Radio Decoding Requirements

Please feel free to visit our Internet web site at [elecsys.com](http://elecsys.com) where you can download full details, pricing information and demonstration software. Or, visit us for an on-site demonstration.

# M.C.E.S.

*Specialists in the Service and Recalibration to original manufacturers specification of all types of:*

**Tuner units**  
**Combined tuner and IF units**  
**RF boosters and modulators**  
**Video upper drums**  
**LNBS**

Ring or email now for  
**LATEST PRICES**  
Telephone 0161 746 8037  
FAX 0161 746 8136  
Email [sales@mces.co.uk](mailto:sales@mces.co.uk)

15 Lostock Road  
Davyhulme  
Manchester  
M41 0ES  
[www.mces.co.uk](http://www.mces.co.uk)



**Wallis.** Remote Controls  
for  
TVs • VCRs • Satellite • Hi-Fi

**Can't Find a  
Particular  
Remote?**



**YOU CAN HAVE IT.**



World's Largest Range  
(Over 60,000 References)



Match or 'Make Free' Service



Competitive Prices From £6.50

For Further Information - Just Call Our Helplines

Tele: 0181-870 3388 • Fax: 0181-870 9988

**Suddenly - You'll Love Selling Remote Controls**

# BBC Funding

How to finance the BBC has always been a contentious issue. It's becoming more complex as broadcasting technology advances. BBC funding during the second half of its present ten-year charter, from 2002-2006, is at present being considered by a government panel headed by economist/banker Gavyn Davies. Several possible ways of boosting the Corporation's finances, in particular to enable it to increase its digital activities and output, are under consideration. One that has hit the headlines recently is the idea of a digital TV licence supplement. It has the advantages of simplicity and a strong precedent – the colour licence fee. Perhaps however it's already too late: we are now into the digital TV era, with no such licence supplement. That apart, would it have an adverse effect on viewers' willingness to migrate to digital TV?

Evidence presented to the panel by London Economics suggests that a "digital levy" would not have an adverse effect on the public's willingness to purchase digital TV equipment – the London Economics research was commissioned by the BBC. The fact that decoders are now available free and ITDV receivers are subsidised complicates the issue. How would the public react to a digital licence fee in these circumstances? London Economics has suggested a "modest" fee of £30-£35 a year as a digital supplement to the current £101 licence.

The idea of such a supplement has been around for some time, and is favoured by the BBC. The commercial TV companies are, not surprisingly, firmly opposed to it. Digital broadcasters ONdigital and BSkyB have argued that a

levy would have a "devastating effect" on their ability to gain extra subscribers. This seems to be an overreaction to say the least.

During its last financial year the BBC spent seven per cent (£154m) of its £2.2bn licence fee income on digital TV services. This includes setting up digital TV channels and developing the Corporation's internet activities. The Corporation now broadcasts BBC1 and BBC2 in widescreen digital TV format, and has launched BBC Parliament, News 24 and BBC Online, Europe's largest internet site. This obviously has to be paid for and, if we wish to maintain the position of public service broadcasting in the spectrum of broadcasting services available, some means of doing so on a sound, lasting basis has to be found. The BBC says that it needs an additional £200m a year to finance its digital TV activities.

An alternative suggestion, which is also being considered by the panel, is that the BBC should fund digital TV by introducing a limited amount of advertising, possibly during non-peak hours. The panel has been impressed by the experience of German state broadcasters ARD and ZDF, which are allowed to broadcast twenty minutes of advertising every weekday before 8pm.

Again not unexpectedly, the ITV companies have expressed disapproval of this idea. Their case was eloquently put by Richard Eyre, chief executive, ITV Network, in a recent letter to the *Financial Times*.

He argued that "The BBC is regarded as the prime example of public service broadcasting precisely because it carries

no advertising on any of its licence-funded services. Experience on the Continent has been that even a partial dependence on advertising begets changes in the nature of services, to enhance their earning capacity. This is why the chairman of the BBC said, in evidence to the Commons select committee on culture, media and sport in November last year, that allowing any advertising on BBC services would be 'the thin edge of the wedge'". Richard Eyre went on to question whether it was "acceptable for the BBC to spend licence payers' money on new programme streams that are not universally available". Any advertising would, he suggested, "reduce the sums available for investment in programming on the commercial channels". This is debatable to say the least. Advertising revenue is not a fixed sum that has to be shared around: it's something that will expand naturally as media opportunities increase. Richard Eyre concluded that "Entirely separate funding is the sine qua non of the BBC's distinctiveness and the guarantor of the diversity of the programmes enjoyed by British viewers".

A hybrid proposal is to go for a small digital licence fee and limited advertising. This sounds like a fudge, neither one thing nor the other, and unlikely to satisfy anyone.

One thing is certain. The debate will become a lot more heated once the Davies panel's proposals are made known. But the basic fact is that you can't have something for nothing. The BBC needs extra funding to enable it to play a part in the unfolding world of digital broadcasting. A digital licence fee seems to be a sensible way of providing it.

## COPYRIGHT

© Reed Business Information Ltd., 1999. 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 48 are available at £3.50 each from SoftCopy Ltd., who can also supply an eleven-year consolidated index on computer disc. For further details see page 727.

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. For further details see box on page 715.

## SUBSCRIPTION ENQUIRIES

**Telephone:** 01444 445 566  
**Fax:** 01444 445 447  
**Credit card orders:** 01622 778 000  
**Address:** Television, Subscriptions Dept, PO Box 302, Haywards Heath, West Sussex RH16 3YY, UK.  
**Make cheques payable to:** Television  
**Subscription rates:**  
**UK** £32.00 per year  
**Airmail Eire** £36.00 per year  
**Airmail Europe** £46.00 per year  
**Airmail Rest of World** £59.00 per year

## NEWSTRADE ENQUIRIES

Distributed by MarketForce  
**Telephone:** 0171 261 7704

## WEB SITE

For a full list of RBI magazines:  
<http://www.reedbusiness.com>

ISSN 0032-647X

 REED  
BUSINESS  
INFORMATION

# http://www.telepart.co.uk

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.

have you got

- I can't locate a Sony mode switch for a
- I can't locate a Hitachi pinch wheel for
- I can't locate a 2SK7865 transistor for
- I can't locate a remote control for a Finlux
- I can't locate a line output transformer for
- I can't locate an Orion
- I can't locate
- I can't loc
- I can

# HASSLE!!

Our experienced staff

WANT WANT WANT to help you.

## OUR PROMISE

If we can't find the part required immediately, we will HASSLE and HASSLE our suppliers. HASSLE and HASSLE the manufacturer. We

will make phone call after phone call, Fax after Fax on your behalf. WE WILL DO ALL THIS FOR YOU. We will do it willingly and we will do it for FREE



## Economic supply TV & Video parts *very very* Fast

### Remote Controls

Any 2 or more from the following list

# Top - 10

# £5.95 each

- 1 RCPOP1 Universal for Philips Tv's including 14CT4206 20CT4636/21CE4556/22CE2267/24CE2670 etc etc
- 2 RCPOP2 Fergy 36K3/51K7/51L3/51L7/51P7/A36F/A51F A51R8/59K7/59L7/59M2/59M3/59P7/RH885 etc etc
- 3 RCPOP3 Apollo SR1800/1900 Fergy IRD2000/SVR1 Astra Hitachi SRD1050D Pace PRD 800/900 Panasonic TVSD250 Manhattan 800/900 and many other satellite receivers.
- 4 RCPOP4 Amstrad SRD510/520/540/550/600
- 5 RCPOP5 Fergy 20A4/20B4/20C4/22b4/22D4/RCU1652 T722/T762/T731/T738/T741 JVC CT3S/RCU1652
- 6 RCPOP6 Fergy RHT10/B51ND/B51NX/B59F/C51NX etc etc
- 7 RCPOP7 Mitsubishi CT21A5STX/CT21A5ST/CT25A5ST etc
- 8 RCPOP8 Decca 8873/DUV9854/170, 180 Series/RC70 Tatung 8725/8731/8734/9725/9731/9734/9821 Samsung/Sanyo CBP2145 etc
- 9 RCPOP9 Fergy 14C2/14D2/14J2/14L2/16A2/16C2/20A2/20D1 20E2/T725/T740/T745/T750/T770 2256/2282/37101/37141/37311/37371 Logik 4094
- 10 RCPOP10 Panasonic TX2/TX3/TX3370/TXC78/TX21T1 Granada C16D52/C16D54/D51FK5 etc etc

**Bonus Deal** Too Complicated? Just phone our sales desk with the model No. for the cheapest remote we have for your set. It's a pleasure to help!

Stock held for over 5000 different models

Remote controls in stock for 1000's of models at exceptional prices. If we don't stock the remote for your model number - send the old one and we will even get one made for you. Average time taken 30 days.

### SEMICONDUCTORS

Just a few of the types stocked - all QUALITY products at KEENEST prices REMEMBER we can help you with over 34,000 different types

1N4001	2SC2482	AF200	BC637	BU208A	8ZV10	MPSA06	TA215H	TD4605-3
1N4002	2SC2500	AN5265	BC639	BU209D	CD4001	MPSA42	TA216H	TD46052
1N4003	2SC2655	AN5512	BC640	BU250AF	CD4013	MPSA56	TA2821	TD44953
1N4004	2SC2705	AN5515	BC846B	BU2508DF	CD4017	MPSA92	TA8251H	TD44950
1N4005	2SC2785	AN5021	BC8476	BU2520AF	CD4053	NE555	TA840K	TD47052
1N4007	2SC3225	AN5601K	BC848	BU2525AF	CD4066	NE555D	TA8427K	TD47263
1N4148	2SC3311	AN7174K	BC848B	BU326A	CD4069	DA47	TA8718N	TD47394
1N4936	2SC3425	AN7190K	BC848C	BU406	CD4094	P600A	TA8550B	TD48138
1N5362	2SC3785A	BA157	BC850C	BU426A	CN62A	P600J	TA611CX1	TD48140
1N5400	2SC3807	BA159	BC856B	BU500	CN82A	PK6E130A	TA670	TD48145
1N5401	2SC3885A	BA159	BC859	BU506D	CN83A	PK6E180A	TA6120U	TD48170
1N5402	2SC3892A	BA3910B	BC858B	BU506DF	CN717F	R2M	TA820M	TD48172
1N5404	2SC3953	BA3918	BC858C	BU508A	CN758	R2M	TA8920	TD48175
1N5406	2SC3955	BA4558	BC859A	BU508AF	CN758M	R4600	TA8200	TD48177
1N5408	2SC3973B	BA5406	BC875	BU508AFI	DCREG	RG2	TA01013A	TD48178F
1N5422	2SC4231	BA5412	BC959	BU508AH	DTA114ES	RG170G	TA01013B	TD48179S
1N914	2SC4517A	BA6209	BC971	BU509D	DTC124ES	RG1P5G	TA01015	TD48179S
2N2222A	2SC5129	BA6209N	BD131	BU509DF	DTC14EF	RG1P5J	TA01044	TD48180
2N3055	2SC5149	BA6219B	BD132	BU509V	DTC144ES	RG3P0M	TA01060	TD48190
2N3055H	2SC536	BA6247	BD136	BU806	FR605	S2000A	TA01085C	TD48218
2N3440	2SC5945	BA9201	BD139	BU807	FX749	S2000B	TA010130	TD48259D
2N3773	2SD1138	BA743	BD140	BU908	HI000L	S2000AF	TA01020A	TD48380
2N3904	2SD1207	BA785	BD234	BU405A	HA13119	S2000N	TA01170S	TD48391
2N4401	2SD1292	BAV20	BD21A	BUH515	HA13150	S2055AF	TA01175	TD49053
2SA1012	2SD1330	BAV21	BD243	BUH515D	HA13151	SA83035	TA01519A	TEA1039
2SA1013	2SD1398	BAV14	BD243C	BUH517	HM6251	SG264A	TA01521A	TEA2018A
2SA1015	2SD1426	BC107B	BD244C	BUK444500B	JCS01	SLK424A	TA01524A	TEA2029C
2SA1015Y	2SD1439	BC108	BD317	BUK544R	JC501	SL1431	TA015540	TEA2031A
2SA1016	2SD1441	BC108C	BD433	BU111	KA2206	SR2KN	TA015570	TEA2031A
2SA1020	2SD1453	BC109B	BD434	BU111A	KA22066	STA441C	TA015580	TEA2164
2SA1020Y	2SD1497	BC141	BD435	BU111AF	KBU62	STK4132H	TA01675A	TEA2164G
2SA1145	2SD1547	BC182	BD436	BU112A	KA6210AH	STK4141I	TA01904	TEA2165A
2SA1302	2SD1545	BC182L	BD437	BU112AF	KSR100A	STK4142I	TA02005	TEA2165A
2SA562	2SD1546	BC184L	BD438	BU116AF	LA4282	STK1152H	TA02006	TEA2260
2SA673	2SD1548	BC212	BD839	BU156A	LA4705	STK1192H	TA02030H	TEA2261
2SA683	2SD1554	BC212L	BD901	BUW11A	LA6324	STK3332	TA02030V	TEA5101A
2SA684	2SD1555	BC237	BD911	BUW12A	LA7116	STK5342	TA02050	TEA5101B
2SA733	2SD1696	BC237B	BD912	BUX4	LA830	STK6374	TA02541	TEA5101B
2SA833	2SD1650	BC238	BD940	BUZ17A	LA832	STK4581	TA02577A	TK1060
2SA940	2SD1651	BC238B	BF199	BUZ77B	LA833	STK7253	TA02576A	TK2460
2SA950	2SD1761	BC239	BF240	BUZ80	LA7835	STK730-060	TA02579A	TCP1060
2SA952	2SD1815	BC258	BF245A	BUZ90A	LA7837	STK73410H	TA02581Q	TIP110
2SA966	2SD1896	BC257	BF250	BUZ90AF	LA7838	STK7348	TA02593	TIP111
2SA970	2SD1877	BC307B	BF324	BV127	LC7132	STK3907	TA02611A	TIP112H
2SA984	2SD1878	BC308	BF420	BY133	LED3G	STR10006	TA02653A	TIP120
2SB1010	2SD1879	BC309B	BF421	BY184	LM1203N	STR11006	TA02822M	TIP255
2SB1143	2SD1884	BC327	BF422	BY227	LM317T	STR50020	TA03301B	TIP29E
2SB1243	2SD1887	BC338	BF423	BY228	LM324N	STR50103	TA03305	TIP305S
2SB650	2SD1889	BC337	BF458	BY229	LM339N	STR50103A	TA03360	TIP31A
2SB649A	2SD2012	BC338	BF459	BY255	LM358N	STR5142M	TA03561A	TIP41C
2SB688	2SD400	BC368	BF469	BY298	LM381	STR5041	TA03562A	TIP42A
2SB774	2SD400F	BC369	BF487	BY299	LM386N	STR5412	TA03565	TIP42C
2SB793	2SD467	BC372	BF494	BY399	N293B1	STR58041	TA03576B	TIP761A
2SB8922	2SD969A	BC346A	BF759	BY448	N494B1	STR59241	TA03924A	TIP791A
5C1383	2SD718	BC546B	BF759	BY476	M51182L	STR6620	TA03939P	TL072CP
2SC1740	2SD837B	BC547	BF788	BY014J	M54544L	STR61001	TA03650	TL072CP
2SC1740S	2SD856	BC547A	BF788	BY033D	M58655P	STR04429	TA03653B	TL072CP
2SC1815	2SD865	BC547B	BF871	BY033J	MC13002P	STR06008X	TA03653C	TOP204AI
2SC1815V	2SD968A	BC549	BF920	BY033M	MC1310P	STR06202	TA03653D	UC2829B
2SC1846	2SK1118	BC548B	BF920	BY0340	MC34053AP1	STR06202	TA03654	UC3842
2SC2023	2SK135	BC548C	BF981	BY02700	MC1100-8	STR97979	TA036540	UC3842
2SC2120	2SK1507	BC550B	BF990	BY958	MJ15003	T6071V	TA04500	UC3842
2SC2229	2SK241	BC550C	BF990A	BY958C	MJ2955	T9053V	TA04503	UC3844
2SC2230	2SK30A	BC556A	BF991A	BY960	MJE13005	T9064V	TA04505E	UCP1365C
2SC2235	2SK626	BC556B	BR100	BY966	MJE13004	TAT1405P	TA04505M	UCP1378H
2SC2236	7407	BC557A	BRX49	BY956	MJE305T	TAT280P	TA04510	UCP1394C
2SC2240	7805	BC557B	BSX20	BY976	MJE340	TA7281P	TA04600	UCP1488H
SC2274	7806	BC558B	BT139600	BY993C	MJF18004	TA7698AP	TA04600/23	UCP1498H
SC2310	7809	BC558C	BT151500R	BY996E	MJF18006	TA8205AH	TA04601	UCP574H
2SC2314	7811	BC535	BT405400S	BYX10	MJF19204	TA8207	TA04601D	ZTK33B
2SC2335	78L05	BC536	BT12800	BYX5500	MN650	TA8210H	TA04605	ZTK650

## USE your ACCESS or VISA

# over 34,000 types of transistors, IC's, diodes etc. or equivalents stocked

IF YOU DONT SEE IT LISTED ASK FOR QUOTE. GIVE MAKE, MODEL, LOCATION. REMEMBER TO ADD £1.50 POST & HANDLING U.K. MAINLAND ONLY. EXPORT AT COST. ADD 17.5% VAT TO TOTAL

# YOU!!



# NEED ECONOMIC

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)

BUT11A @ **99p** each BUT11AF @ **99p** each  
BU508A @ **69p** each Fully wired scart lead **99p**

**a slight inconvenience....**  
you must buy more than one.

BU208A X 5 £3.75	TEA2018A X 5 £5.75
BU508A X 5 £3.00	UC3842 X 5 £2.95
BU508AF X 5 £3.00	CNX62A X 5 £3.00
BU508D X 5 £4.45	S2000AF X 5 £5.25
BUT11A X 5 £1.45	TDA3653B X 2 £1.80
BUT11AF X 5 £1.90	TDA3654 X 2 £1.80
Philips type 1.2 volt Back up battery X 5 £3.40	
Philips type 2.4 volt Back up battery X 5 £6.00	
Scart - Scart lead 1.5m Fully wired X 2 £1.98	
Positor PT37, TH98009 (White) X 5 £3.75	
Thorn TX100 Green spot LOPTX each £12.95	

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

(please add £1.50 handling all + VAT)

## MAJOR STOCKIST PHOENIX

PSU repair - refurb kits

Look for the PHOENIX stamp of approval

Over **200,000** kits sold



KIT1 £6.95 Pace PRD800, PRD900, PSR800, PSR900 Ferguson ST700, Toshiba TU-SD200, SAT99  
KIT2 £5.95 Pace SS900, 9200, 9210, MRD920, Ferguson SRV1, Grundig GIRD2000, 3000, Philips STU801, Network 900, 9200, Bush IRD150, Nokia SAT1500, Maspro SRE250S, 350S, 460S, Alba SAT6000, Finlux SR6700, Thompson BR54  
KIT3 £8.95 Amstrad SR510, 520, 540, SRDR45, SRD550  
KIT6 £6.95 Pace D100, 120  
KIT9 £9.45 Pace MSS200, 300, Apollo  
KIT12 £16.45 EchoStar SR5500 (early PSU with adjuster)  
KIT15 £7.95 Mimtec (Sorenson PSU type only)  
KIT17 £3.95 BT SV8900  
KIT20 £5.95 Maspro ST 5 Grundig 150, 250, 280, 300 Matsui Rd600 Minerva  
KIT23 £9.95 Philips STU908

SRD5, SRD16, Grundig STR1, Maspro SRE250S/1, 350S/1, Philips STU802/05M, Manhattan 850, 950 Goodmans

KIT4 £8.95 Amstrad SRD 600  
KIT7 £6.95 Churchill D2MAC decoder  
KIT10 £13.11 Pace MSS500, 1000  
KIT13 £39.71 EchoStar SR6500, 7700, 8700  
KIT16 £5.95 Amstrad SRD700, SR950, SRX100, 301, 501, 1002, 2001, SRD2000, SAT250  
KIT18 £10.55 Amstrad SRD2000  
KIT20 £5.95 Maspro ST 5 Grundig 150, 250, 280, 300 Matsui Rd600 Minerva  
KIT23 £7.95 Nokia SAT1700 (mainly surface mount)

KIT5 £8.95 Amstrad SRX320, 340 etc (export models)  
KIT8 £5.95 Pace MSS100  
KIT11 £5.95 Ferguson SRD4  
KIT14 £33.95 Amstrad SRD600  
KIT16 £5.95 Amstrad SRD700, SR950, SRX100, 301, 501, 1002, 2001, SRD2000, SAT250  
KIT19 £3.95 Bush IRD155  
KIT21 £6.95 Amstrad SRD650  
KIT25 £16.95 Maspro ST-8

## SATELLITE FAULT FINDING GUIDE

NEW EDITION No. 5

You could say that what Martin Picking 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 database of on satellite TV 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. Originally entitled "Satellite Repair Manual", the 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 fifth edition, which has been completely updated and now has 300 pages and a more attractive cover. 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 draws, a list of manufacturers and supplier addresses, other useful information and a beginners section. Digital receivers are now available so the manual includes a chapter to deal with these too.

No self respecting workshop...  
...should be without this guide.

at £19.95 your first repair will return the cost!!!

# Economic Devices

32 Temple Street, Wolverhampton, WV2 4AN, UK Tele ++ 44 (0)1902 773122 Fax ++ 44 (0)1902 429052

# What a Life!

## All sorts of video equipment, all sorts of customers. Donald Bullock's day-to-day servicing commentary

The work really started to pile in once Steven had gone away to Cyprus on his honeymoon. Isn't that always the way?

"Tape jammed in Mr Pullet" the shiny-faced man said as he marched in with a newish Toshiba VCR. "Can't be much wrong, because it's not very old. Just as well too, 'cos I can't afford much."

As I booked the repair in, I heard Paul groaning in the background.

At almost the same time that Shiny-face left, a man wearing a cowman's smock came in. He was also carrying a Toshiba VCR. Identical to the first one in fact.

"I put the tape in, Mr Tarbuck, and started it playin'. Then it clicked and went off" he said. "An' I couldn't get the tape out to try another one. Take it out for me, there's a good chap. I'll pop back after market. Won't cost me anything, will it? Not for poppin' a tape out."

Paul, in the background, gave another groan.

"That's two more" he moaned. "What's the matter?" I asked.

### The Toshiba Problem

"It's these latest Toshibas" he replied. "I did two of them last week. There's a main cam lever to do with pulling the tape out of the cassette. It's a sort of metal rod with a ball at the end. The ball snaps off, and to carry out the repair you have to take the front off, take out the cam motor and cam, then the mode switch, cassette housing and pinch wheel. These all have to be put back again and set up. It's quite a business!"

The first one to come Paul's way had him guessing. So he'd phoned Toshiba. The technical wizard at the other end said "the ball

will have snapped off the main cam lever. You'll have to fit another one."

The two I'd just taken in had the same fault. So to make Paul's life easier I slipped out and made him a strong cup of tea. And one for myself, too.

### Telly/video Thing

While he was busy with the Toshiba VCRs I noticed that Mrs Gabber had bumped into Mrs Sapp outside the open shop door. They were having a great chat, and it was Mrs Gabber I could hear.

"... yes, we came home from our trip up town and found him dead. Absolutely dead! And he was only just three years old. The house is so quiet without 'im. He was on all the time of course..."

"What are you going to do about it?" asked Mrs Sapp.

"I've got him in the car. I'll get that Mr Bullock to take a look at him."

Then she came in.

"I've brought our telly/video thing for you to have a look at dear" she said. "Dead. But it can't be much. We don't hardly have him on. And another thing, he's only just over a year old. And my husband's a pensioner."

I followed her out to the car. The set was a GoldStar TV/video combination, Model KY14V30.

When she'd gone we put it on the bench. The power supply for both sections is on the TV chassis. It didn't take us long to find that the STR6707 power chip was short-circuit. So we fitted a replacement and tried the unit: the recorder and the TV were both in standby. When we pressed the standby switch the relay shattered.

We eventually found that the cause of the trouble was a leaky

zener diode, ZD802 (6.8V). It's in the base circuit of Q1801, which smooths the DC supply to the power chip. A replacement restored normal operation.

### Sport's the Word

Our next customer, Bob Chancer, brought in a Sony TV set, Model KVM1921U (BE2A chassis). He plonked it on the counter.

"See the match?" he asked.

"What did you think of that second goal? Ref wants shooting if you ask me. But - fair play - do you know..."

"I don't follow golf" I cut in, tapping the top of the set. "What's wrong with this?"

"Dead as a doornail" he exclaimed. "But - fair play - it's been a good 'un. We bought him to watch the Cassius Clay fight. The one that lasted ten seconds. Waste of time. But - fair play - ..."

I waved him out and took a look at the set. It was dead with no standby light. When I opened it up I found that there was 330V DC across the mains bridge rectifier's reservoir capacitor but no start-up voltage at the STR54041 chopper chip IC601. We'd have found the culprit, R602 (270kΩ, 0.5W), sooner had it not been hidden under the chopper transformer. In fact we removed the chopper transformer on spec before we found it.

Bob called back for it straight from a local football match. He was red about the gills and hoarse.

"Never had a chance, we didn't. I tell you, no team that puts a half-back in the goalie's place can expect to win. Bloody madness. But - fair play - ..."

"It's ready, Bob" I said. "A resistor had failed. Twenty five pounds to you."

"Twenty five pounds?" he spluttered. "But them resistor things are

only tuppence, aren't they?"

He paused for a minute, then continued.

"Nah – pair play – you got it done quickly. I'm happy at that, fair play . . ."

And he paid up and went.

### Transport

Mr Nuggins brought his set along in a wheelbarrow. It was a Matsui 21VIN, about two years old – a 21in. stereo model. He heaved it on to the counter and stood there clawing at his rib cage. Then he stretched and danced around trying to scratch the middle of his back.

"Don't know what makes me itch so" he said.

"Visitors?" I suggested.

"On my own this week. That's why I'm missing the set. It's dead."

As he gyrated out, I took the back off and saw that its 2.5A mains switch had died a violent death. There was a dead short across the mains input. I made for the BY127 diodes in the bridge rectifier circuit and found that they were all short-circuit. Once replacements had been fitted there was still a short-circuit across their output. The cause turned out to be the IRFBC40 chopper transistor T60020. This MOSFET device is rated at 6.2A. I fitted a BUZ91, which is rated at 8.5A, and also replaced the UC3843 chopper control chip.

As everything now checked out all right I switched the set on. There was an excellent picture.

### Electronic Screwdriver

There was a time when few TV sets with the excessive height symptom would have got as far as the bench. But that was the problem with the next set I pulled from the pile, a Sharp DV5161H. The reason why no one had turned the height control down was that there isn't one. In fact the only potentiometer on the chassis is the set-HT one. The picture geometry adjustments are all carried out via the 'electronic screwdriver' chip. I obeyed the instructions, as follows.

At the back of the chassis there's a teletext subpanel which has two connection plugs marked TA and TB. I fitted a wire link between pins 3 and 6 of plug TB. Then I switched the set on and pressed the remote control unit's mode button. The word SERV appeared on the screen. Once the added link has been removed the set is in the service mode and you can use the remote control unit's channel up/down buttons to find the required adjustment.

I called up 'vertical amp' and used the up/down buttons next to the mode button to get the correct setting. You finally press the mode button once to exit from the service mode. All the picture adjustments – grey scale, width, etc. are carried out in this way.

### A Decoder Thing

Mrs Rivetto is about seventy five. But she has false eyelashes, blue rinsed hair and an unshakeable belief that she's still eighteen.

"Hello sunshine" she trilled. "I've brought our decoder thing in. It went bang the other night and my silly old hubby says it's faulty."

It turned out to be a Ferguson SRD6. The mains fuse had gone to its maker and the BUT11AF chopper transistor was short-circuit. In addition the 2.2Ω fusible resistor was open-circuit. Once these items had been replaced the unit worked perfectly and produced good results.

Mrs Rivetto was delighted when she called back for it. "He'll be able to bury himself in his silly old telly again" she sang. "Me, I like to get off out. No good sitting about getting old, is it?"

### Sympathy

We've seen Mr and Mrs Hudson before. He's mild and well mannered, while his wife is loud and insensitive. He looked poorly, and the Philips CP110 TV set he was carrying was clearly almost too much for him. I helped him ease it on to the counter.

"You shouldn't have bothered Mr Bullock" she said, "good heavens, whatever next?"

"Aren't you too well today, Mr Hudson?" I asked.

"He's all right. Just likes a bit of sympathy" she replied.

He smiled faintly and looked embarrassed. Then they departed.

The set was 'dead', but there was plenty of life in it. Checks showed that the mains bridge rectifier's output was low at only 190V. The cause was reservoir capacitor C2656. It should have been 150μF but read only 70μF. A replacement restored normal working.

When they called back for the set I carried it out to their car. He was rebuked for his "laziness".

### Authority

Mr MacPhail, an ex-military man, strode in. He's used to authority and shows it. He looked at Paul and pointed to his car.

"In the boot my boy" he said,



"bring it in will you?"

Paul looked at me, then MacPhail, then went for the set.

"On here" MacPhail said, tapping the counter. "Blasted thing's playing games with me. I'll have none of that. When I switch it on it bursts into life. Then, before I've had time to sit down, it goes off. Three nights it's done that. I want it right, or out it goes."

Once he'd departed we tried the set, an Hitachi C2114T. The EHT came up, then the set switched itself to standby. I tried it again. Same thing. Then I opened it up, expecting to find a dry-joint in the line output stage or something like that. But everything looked fine. So I adopted a more professional approach and studied the circuit diagram.

Next time I switched the set on I had an analogue voltmeter connected across its 27V supply, which is used for the field output stage. The supply came up then decayed. I let the set cool down, upped the first anode control's setting then tried again, with one eye on the meter and the other on the screen. I was just able to detect field collapse before the set died.

In this chassis a protection circuit comes into operation when there's a short across the 27V supply. I replaced the TA8427K field output chip IC601 and tried again. This time the set came on normally.

# TELETOPICS

## Interactive Satellite TV

Successful launch of the Astra 1H satellite into orbit at 19.2°E has brought closer the start of interactive TV via satellite, using the Ku and Ka bands. The Hughes Space and Communications HS601HP satellite was launched in late June from the Cosmodrome at Baikonur, Kazakhstan. It has thirty transponders with an output power of 98.5W in Ku band, 70W in Ka band, from travelling-wave amplifier tubes. Ka-band operation is to be used for broadband interactive applications, in conjunction with low-cost user terminals. There are already two names for the interactive technology – Return Channel Technology (RCT) and

Astra Return Channel System (ARCS). Interactive services are due to come into use early next year.

For interactive use a Satellite Interactive Terminal (SIT) with a small fixed dish will be required. The present plan is to make SITs with three dish sizes available: a 1.2m dish will provide a data transmission rate of at least 2Mbits/sec, a 90cm dish a data rate of up to 384kbits/sec and a 60cm dish a data rate of up to 150kbits/sec. Communication will initially be based on existing Internet Protocols (IPs), with terminals requesting a time and frequency slot for transmission “on demand”. Future develop-

ments will include the use of asynchronous-transfer mode technology for the return channel to improve system performance.

The user return channel will be handled by SES's Network Operation Centre in Luxembourg. A number of uses are envisaged: for large and small businesses, the public sector and individual viewers. Services could include data collection and transfer between branch offices and a head office; delivery of prerecorded news feeds from remote sites; return channel services from temporary sites, for example for emergency operation; remote learning and training and many others.



Two precision video monitors in the Leader 5000 range are now available from TTI. The 5212 vectorscope and 5222 waveform monitor offer multi-channel inputs for both composite and component signals, with automatic PAL/NTSC selection. Line selection with the 5222 enables BITS, VIR and teletext lines to be observed. For further information apply to Thurlby Thandar Instruments Ltd., 2 Glebe Road, Huntingdon, Cambs PE18 7DX. Tel 01480 412 451, fax 01480 450 409.

## Business News

The proposed transfer of Daewoo Electronics to Samsung as part of a government-sponsored industrial rationalisation has fallen through. Samsung's car manufacturing company, which was to be transferred to Daewoo under the restructuring agreement, has been put under court receivership. Daewoo plans to sell its consumer electronics operation to foreign investors.

Thurlby Thandar Instruments (TTI) has acquired the test equipment business of Black Star from Prima Electronic Services. Black Star's range, much of which complements the current TTI range, includes TV and video test equipment, oscilloscope probes, frequency counters, function generators and precision measurement products. For further information contact Thurlby-Thandar Instruments Ltd., 2

Glebe Road, Huntingdon, Cambs PE18 7DX. Tel 01480 412 451, fax 01480 450 409 or check web site

[www.ttinstruments.co.uk](http://www.ttinstruments.co.uk)

Prima Electronics Services is to concentrate on contract manufacturing.

A.R.D. Electronics has been appointed an official distributor for Pace spares. A separate catalogue is available for these. It includes the more popular spares for analogue receivers plus full parts listings for the ONdigital and Sky Digibox models. Other Pace spares can be obtained to order. A.R.D.'s main 1999 trade catalogue has over 600 pages with comprehensive technical information and pictures to help with product identification. A.R.D. Electronics Plc is based at Shorten Brook Way, Altham Business Park, Altham, Accrington, Lancs BB5 5YL. Tel 01282 683 000, fax 01282 683 010.

## Lead-free Soldering

An EU ban on the use of lead in solder is expected to come into effect in 2004. The PCB industry has called for a delay, and dumping of scrap electronic products in landfills to be outlawed instead.

The ITRI, formerly known as the International Tin Research Institute, has launched what is believed to be the world's first Lead-Free Soldering Technology Centre at Brunel Science Park, Uxbridge, Middx. Research into lead-free soldering is not new at the ITRI: a scientific team has been investigating alternative solutions for over a decade. The new centre is to be officially opened next month.

## Video News

A number of new products have been announced by Sony. Four are based on use of the company's Memory Stick, a recordable IC memory card designed for use with PCs and digital audio-visual equipment. They are the Cybershot DSCF55 digital still camera, which uses JPEG compression to store images in the memory. At the highest resolution, 1,600 x 1,200 pixels, 40 images can be stored in the 16MB stick. The same 16MB stick can hold ten and a half minutes of movie filming with MPEG compression. The other products are a digital camcorder, Model DCRTRV10, a digital photo frame, Model PHDA55, and the DPPMS300 digital photo printer.

The Sony VCR Model SLVSE 80UX has several interesting features including a new Smart Dial Timer system and Super Trilogic Picture Control. To set the timer, a dial is turned to set the start and stop times and channel number: the sys-

tem enables up to eight different programme recordings to be made over a 24-hour period. Those with a long memory will recall that the first Philips VCRs used a system that worked like an over-clock timer! The picture control system analyses the tape quality then adjusts the video head output for optimum picture quality.

Sony has launched its first DTT IDTV sets. The KV28DS60 and KV32DS60 are 16:9 28 and 32in. models respectively, with 100Hz scanning, Dolby Pro-Logic and an EPG. Both can be upgraded to receive ONdigital pay-TV channels by using a PC-card module.

A new digital video recorder (DVR) developed by Replay Networks is to be distributed by Matsushita under the Panasonic label. It uses solid state and hard-disk memory for storage. A DVR that works on similar principles, developed by TiVo, is being distributed by Philips.



*This new range of products is based on the Sony Memory Stick (centre), a recordable IC memory card that holds 16MB of data. There's a digital still camera (top left) called the Cybershoot, a digital photo frame (top right), a digital photo printer (bottom right) and a camcorder (bottom left).*

*Could it be the start of a post tape/disc era?*

## Satellite TV

Eutelsat and SES have come to an agreement over the use of the disputed 29°E orbital position. Eutelsat claimed rights to the slot, but SES disputed this and launched Astra 2A at 28.2°E. Under the terms of the agreement SES will continue to use the BSS band (11.7-12.5GHz) and some frequencies (10.7-11.2GHz) in the FSS band for services and DTH broadcasting at 28.2°E. Eutelsat will use frequencies (11.2-11.7GHz) in the FSS band, and the telecom band (12.5-12.75GHz), at 28.5°E, in particular to ensure continuation of services currently carried by the DFS Kopernikus satellite. SES will use 12.5-12.75GHz at 28.2°E for operation outside Europe. Eutelsat's W1R satellite, to be launched next year, will occupy the 28.5°E slot. The agreement also covers mutually interference-free operation within the arc 16-21.5°E.

Eutelsat's Board of Signatories has given the go-ahead for the Atlantic Bird 1 satellite, which will take up position at 12.5°W in late spring 2001. This 20 Ku-band transponder satellite will cover Europe, North Africa, the near

Middle East, North and South America.

Recent announcements from BSkyB suggest that it will sign up a million SkyDigital subscribers well before the original target date of end-October. Some 800,000 subscribers had signed up by mid-June. A significant boost was given by the offer of free STBs.

By late summer the Open TV/BSkyB digital teletext service SuperText will have replaced the current analogue-based version. Viewers will have access to some 2,000 pages of news, sport, finance, weather, travel and leisure information, with page access at approximately two-five seconds instead of six to thirty.

Eurosat has launched the Manhattan Plaza, a compact stereo satellite receiver with low threshold and multilingual on-screen graphics. Features include 600 programmable TV and radio channels, dual input, DiSEqC version 1.0, machine-to-machine data transfer and auto tuning. For further information contact Eurosat Distribution Ltd., 1 Oxgate Centre, Oxgate Lane, London NW2 7JA. Tel 0181 452 6699, fax 0181 452 6777.

## Mobile TV

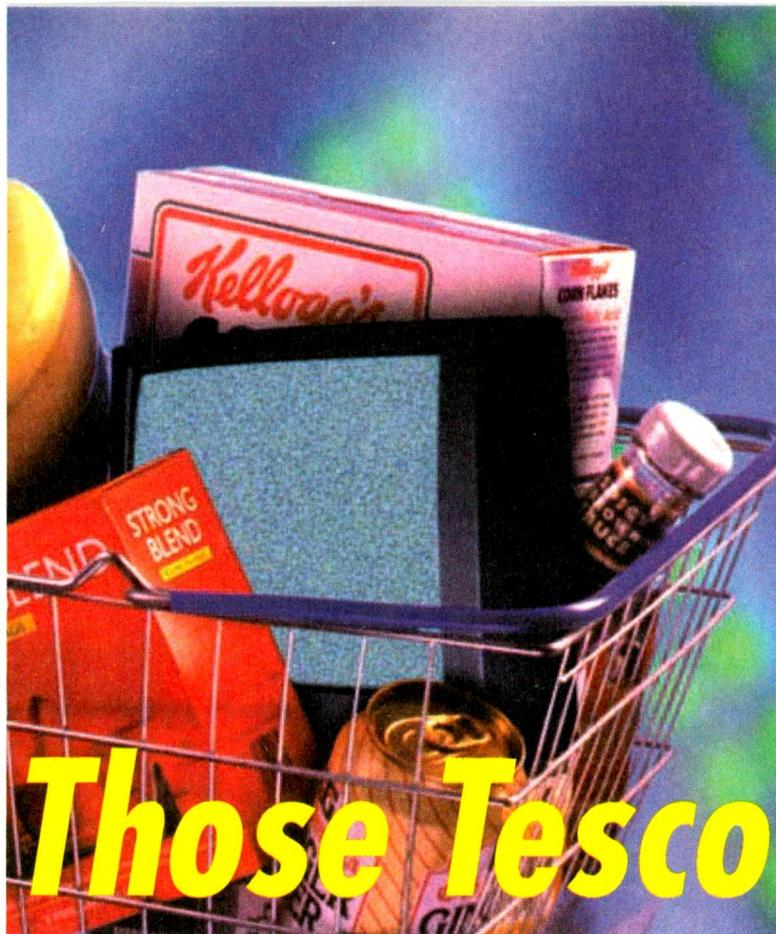
Hitachi is developing a system that enables TV signals to be transmitted via satellite to moving vehicles – for the benefit of passengers of course! The system, which will be able to provide up to 50 channels, is expected to be launched in Japan in 2002. Hitachi is establishing a consortium of companies to work on the project, including Toyota, Honda, Matsushita and NTT. A separate company will be formed, and Hitachi plans to apply for a broadcasting licence next spring. A satellite would be launched in 2001. Hitachi hopes to attract 46m subscribers for the service by 2010.

The BBC has demonstrated a mobile TV system using digital terrestrial transmission. The main problem is that the DTT transmission standard used in the UK is not sufficiently rugged for mobile reception – the bit rate has to be reduced by about 50 per cent. In addition, because vehicle aerials are mounted at a relatively low level, typically 2m, either higher-power or more transmitters would be needed. The BBC feels that mobile reception could be introduced when UHF spectrum space becomes available following the move from analogue to digital TV.

## Internet Offers

BSkyB has launched Sky Now, a free internet service that offers e-mail, a hub for on-line services and content from Sky News and Sky Sports. A PC is required for access.

BBC Worldwide's web service beeb.com has formed an alliance with ScottishTelecom, which owns Demon Internet, to provide a free internet access service, 'freebeeb.net', with unlimited internet access, free e-mail accounts and free webspace for personal websites. The package works with PC or MAC computers.



By carrying out repairs to these sets you could probably make as good a profit as Tesco did. The circuitry is straightforward and most faults predictable. **Chris Watton** reports on his experiences with them

# Those Tesco Tellys

**F**or years we've grumbled about other businesses getting involved in ours, about garages and supermarkets and so on selling audio and video products. But it's a fact of life that we just have to accept. We can still gain some advantage. The small repair business can make a bit of cash from repairs that Tesco and the like cannot do. After all, these items do go wrong. And forty quid from a repair is as good as forty quid from a sale.

Most of the sets sold in these outlets are of Far Eastern origin. They are generally quite simple to repair, as they use mainly lowish technology. Most have only simple text and mono sound. Fortunately they are simple to operate and don't have loads of features that viewers never use. They present a few problems for us, but then that's why we are here, isn't it? You find the sets riddled with poor solder joints, particularly on subpanels. These cause simple failures.

One popular set is the Amstrad-badged PT9601 chassis. This article takes a look at the circuitry used in the chassis and some of the faults that can be encountered. The 28in. version is similar but has a different panel layout.

## The Power Supply

We'll start with the power supply, see Fig. 1, as this has to work before anything else will. The circuit is of a well-known type, being based on a TDA4605 chopper control chip (IC1) and a FET chopper transistor (Q1). Features of the IC include soft start, a supply voltage level detector and burst operation during an overload condition.

A start-up supply for IC1 is provided by R2, D8 and C11. The running supply is produced by D6 with C11. Once this supply has been established, regulation is provided by feedback from pin 3 of the transformer to pin 1 of the IC via R9, D7, R12, ZD1 and P1, with C12 for smoothing. The output pulses at pin 5 of the IC drive the chopper transistor Q1: P1 adjusts the drive pulse width and thus sets up the output voltages. These are 115V (+B), 33V (+D), 16V (+E), 12V (+A), 8V (+C), 5V (+F) and 12.5V (+G).

The standby switching voltage comes from pin 41 of

the microcontroller chip. It's applied to the base of Q20, which controls the voltage at pin 1 of the LM317 regulator chip IC3.

When Q20 is switched on, there is no 12V supply.

The chopper FET fitted is type STH5N80. We've not seen it listed anywhere. A BUK454 is a suitable replacement.

## The Line Timebase

The line driver and output stages are conventional. An EW diode modulator is included in the 28in. version. Line drive is generated by a TDA8362 chip, which in addition to incorporating the timebase generator stages includes the IF strip and the colour decoder circuitry. The line drive output is at pin 37.

Various voltages are generated in the line output stage, as follows: EHT, focus, first anode (screen), CRT heater, 180V (+M) for the RGB output stages and 26V (+K) for the field output chip. Feedback pulses for the TDA8362 and microcontroller chips are derived from pin 3 of the line output transformer (smaller screen version). In addition, a voltage for the beam limiter circuit is derived from the earthy end of the transformer's EHT section.

The line output transistor is type BUH515D or BU2508D in smaller-screen sets, type BUH515 or BU2508A in the 28in. model.

## Field Output Stage

Smaller screen sets use a TDA3653B field output chip while the 28in. version uses a TDA3654. The field drive comes from pin 43 of the TDA8362 chip. The field ramp is generated at pin 42 of this chip, while pin 41 is used for linearity feedback.

## RGB Drive

The RGB output stage arrangement, on the tube base panel, also varies with tube size. In the basic chassis a TDA6103Q chip, IC201, provides the tube's RGB drives at pins 9, 8 and 7 respectively. There are 82k $\Omega$ , 0.5W feedback resistors between the IC's input and output pins. The 180V supply is fed to pin 6 of the chip via



the I<sup>2</sup>C bus for mode and page selection instructions. The video input is at pin 8, via an AV/TV switching circuit and an emitter-follower (Q451-3). Pins 1 and 10 are connected to the 5V line. The 27MHz crystal is connected to pin 3. RGB outputs appear at pins 15-17, with a fast-blanking output at pin 19.

### Audio Demodulation and Processing

In mono sets the demodulated audio signal appears at pin 50 of the TDA8362 chip. Tuning is set by a 6MHz filter at pins 5 and 7. With stereo sets there's a separate Nicam board which receives its input from the tuner

unit. There are three chips on this board, a TDA3845 IF amplifier/demodulator, an SAA7283 Nicam decoder and a TDA8425 for stereo switching.

### Dry-joints

The Nicam subpanel suffers from dry-joints. Symptoms can be no sound, low sound or one channel intermittent. The problems usually occur at the wire links, and as usual will show up when the joints are heated (they splatter) though they look OK. They must be cleaned and resoldered.

Dry-joints tend to be present at all the crystals used in the chassis. I assume that they get tarnished during storage, with the result that the solder doesn't flow correctly.

### The Cabinet

The back cover can be extremely tedious. Don't feel too bad if it takes four or five goes to get it back on, as it slots on to the PCB and into the front half of the set. It's best to place the set on its face and lower the cover on to it. With 28in. sets the front is so springy when the back is off that we find it best to place something beneath the tube, for fear that the set will snap in two!

To withdraw the chassis you will have to unsolder the lead from the tube's Aquadag earthing band to either the tuner or the can over the IF circuit. Remember to put it back.

When refitting the chassis, make sure that leads to the front panel don't get trapped in the plastic slots, as you won't be able to get the back on.

When the set is powered it will be in standby. To switch it on, press a remote-control unit number button or one of the channel up/down buttons on the set. If no signal is received, the set will revert to standby after five minutes.

### Fault Notes

Dry-joints at the chopper transformer TR1 are the usual cause when you find that the set is dead with the chopper FET Q1 short-circuit. Always replace the TDA4605 control chip as well when Q1 has failed.

If there's no start up check R2 (68k $\Omega$ ) and R22 (0-22 $\Omega$ ) in the power supply.

Check for dry-joints at L20 if there is no supply to the line output stage.

For no results, check the voltage at pin 41 of the microcontroller chip IC301. If it remains high (standby) when the channel-change buttons are pressed, proceed as follows. Short the base of Q20 to chassis. This should produce the 12V supply. Then check for 5V at pin 42 of IC301. If this supply is missing, check the 5V regulator IC2 and R22 (0-22 $\Omega$ ). If the 12V and 5V supplies are OK, check for the 10MHz clock signal at pins 31 and 32 of IC301: if this signal is missing, resolder the crystal. If the 10MHz signal is OK, check at pins 39 and 40 (SDA/SCL). If either is low, the memory chip may have failed. Suspect IC301 if these checks are all OK.

In the event of no picture with the EHT OK, check for dry-joints in the text area of the PCB. Also check the 27MHz crystal, which may be intermittent.

The line driver transformer could be faulty if the line output transistor is short-circuit. Check its leadouts. Also check the line output stage tuning capacitor C607 (7-2nF, 1-6kV) in smaller-screen sets.

For intermittent spots on the picture, check whether C1 is dry-jointed.

Intermittent line tear can be caused by faulty connections to the line driver transformer. Remove the transformer and resolder its leadouts.

For tuning drift check ZD2 and R25 (12k $\Omega$ ).

**Table 1: Jungle chip (TDA8362) pin connections.**

Pin	Use
1	Decoupling
2-3	Video demodulator coil
4	Video signal ident output
5	6MHz sound/volume control DC input
6	Audio switching
7	Output to 6MHz filters
8	Decoupling
9	Chassis
10	Supply voltage
11	Chassis
12	Decoupling
13	Off-air composite video input to switch
14	Luminance delay peaking
15	External composite video input to switch
16	Input to chroma switch
17	Brightness control input
18	R output
19	G output
20	B output
21	RGB switching
22	R input
23	G input
24	B input
25	Contrast control input
26	Colour control input
27	Hue control input
28	B - Y input from chroma delay chip
29	R - Y input from chroma delay chip
30	R - Y output to chroma delay chip
31	B - Y output to chroma delay chip
32	Crystal oscillator output
33	Filter for crystal oscillator PLL
34	Crystal 1
35	Crystal 2
36	Start supply
37	Line drive output
38	Line flyback pulse input
39	Filter for line PLL 2
40	Filter for line PLL 1
41	Field linearity feedback
42	Field ramp generator components
43	Field drive output
44	AFC output
45-6	Input to IF amplifier
47	AGC output
48	AGC reservoir capacitor
49	Tuner adjust (to AGC circuit)
50	Audio output
51	Decoupling
52	Decoupling

**ECG MACHINES?** 76v 10AH BATT/24V 8A TX Ex government ECG machines! Measures 390X320X120mm, on the front are controls for scan speed, scan delay, scan mode, loads of connections on the rear including video out etc. On the front panel are two DIN sockets for connecting the body sensors to. Sensors not included. Inside 2 x 6v 10AH sealed lead acid batts (generally not in good condition), pcb's and a 8A? 24v toroidal transformer (mains in) sold as seen, may have one or two broken knobs etc due to poor storage £15.99 ref VP2

**HYDROPONICS DO YOU GROW YOUR OWN?**

We have a full colour hydroponics catalogue available containing nutrients, pumps, fittings, environmental control, light fittings, plants, test equipment etc Ring for your free copy.

**PC COMBINED UPS AND PSU**

The unit has a total power of 292 watts, standard mother board connectors and 12 peripheral power leads for drives etc. Inside is 3 12v 7.2Ah sealed lead acid batteries. Backup time is 8 mins at full load or 30 mins at half load. Made in the UK by Magnum 110 or 240vac input, +5v at 35A, -5v at 5A, +12v at 9A, -12v at 5A outputs 170x260x220mm, new and boxed £29.95 Ref PCUPS2

**WINDOWS 95 CD**

As supplied with Hewlett Packard PC's these CDs have all the window files on them and were intended to be used to restore windows on a PC after a crash etc £15 REF SX06

**ALTERNATIVE ENERGY CD, PACKED WITH HUNDREDS OF ALTERNATIVE ENERGY RELATED ARTICLES, PLANS AND INFORMATION ETC £14.50 REF CD56**

**aerial photography kit** This rocket comes with a built in camera! it flies up to 500 feet (150 m) turns over, and takes an aerial photograph of the ground below. The rocket then returns safely with its film via its built in parachute. Takes standard 110 film. Supplied complete with everything including a launch pad and 3 motors (no film) £29.98 ref astro

**SATELLITE MODULATOR MODULES prices from just 9p**

Surface mount modulators full of components. Fitted with an F type connector and a uhf type connector. Pack of 100 £9.95 ref SS20

**PROJECT BOXES**

Another bargain for you are these smart ABS project boxes, smart two piece screw together case measuring approx 6"x5"x2" complete with panel mounted LED. Inside you will find loads of free bits, tape heads, motors, chips resistors, transistors etc Pack of 20 £19.95 ref MD2

**REMOTE HEATING CONTROLLERS WITH 30A MAINS RELAY**

from just 95p These units were designed to be plugged into a telephone socket. You then called the phone and some how it turned the heating on. Each box contains lots of bits including a mains 30A relay. pack of 20 £20 ref SS34

**PIR CAMERA**

Built in CCTV camera (composite output) IR strobe light, PIR detector and battery backup. Designed to 'squirt' pictures down the phone line but works well as a standalone unit. Bargain price £39.95 ref SS81J. These units are brand new modules designed to take 'pictures' of intruders and then transmit the pictures down the telephone line. The PIR detects the intruder, fires the strobe light this ensures a perfect picture even in total darkness. The picture is stored in memory inside the module and then sent by modem (not included) down the telephone line. The units also have a nicad battery pack included presumably to maintain operation in the event of mains power failure. Output from the camera is standard b/w composite 320x240 pixels with a 90x65 degree field of view. The picture quality is excellent. Each PIR also contains a video capture and compression unit. The infra red strobe has a range of 15m. The PIR has a range of 12m. Power requirements are 12v dc 400mA. Power supplies available at £5 ref SS80. The units are supplied with connection details etc but we do not have any information on using the compression and capture unit or interfacing to modems etc. The units do have operational PIR's, strobes and camera's (camera is 12vdc and gives out standard composite 1v p-p video) how you adapt these to work together is entirely up to you! Retail price for the units was in excess of £200 each sale price £39.95 ref SS81J. Power supplies £5 ref SS80

**TELEPHONES**

Just in this week is a huge delivery of telephones, all brand new and boxed. Two piece construction with the following features - illuminated keypad, tone or pulse (switchable) recall, redial and pause, high/low and off ringer switch and quality construction finished in a smart off white colour and is supplied with a standard international lead (same as US or modems) if you wish to have a BT lead supplied to convert the phones these are also available at £1.55 each ref BTLX. Phones £4.99 each ref PH2 10 off £30 ref SS2

**3HP MAINS MOTORS**

Single phase 240v, brand new, 2 pole, 340x180mm, 2850 rpm, builtin automatic reset overload protector, keyed shaft (40x16mm) Made by Leeson £99 each ref LEE1

**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

**CHIEFTANTANK DOUBBLE 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, 29vdc, 600hz pulse frequency. The units also contain an electronic receiver to detect reflected signals from targets. £199 Ref LOT4

**MAGNETIC CREDIT CARD READERS AND ENCODING MANUAL £9.95**

Cased with flyleads, 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

**Hi power 12v xenon strobe**

variable rate flasher modules and tubes £6. Useful 12v PCB fitted with control electronics and a powerful Xenon tube! just apply 12v DC to the input and the tube will flash. On the board is a small potentiometer which can be used to vary the flash rate! PCB measures just 70x55mm and could be incorporated into many interesting projects! £6 ref FLS1. Pack of 10 is £49 ref FLS2

**Hydrogen fuel cells now in stock**

Our new Hydrogen fuel cells are 1v at up to 1A output, Hydrogen input, easily driven from a small electrolysis assembly or from a hydrogen source, our demo model uses a solar panel with the output leads in a glass of salt water to produce the hydrogen! Each cell is designed to be completely taken apart, put back together and expanded to what ever capacity you like, (up to 10watts and 12v per assembly. Cells cost £79 ref HFC11

**We get over 8,000 hits a day.... check us out!**

<http://www.bullnet.co.uk>

**PHILIPS VP406 LASER DISC PLAYERS, SCART OUTPUT, RS232 CONTROLLED £24.95 REF VP406**

**SMOKE ALARMS** Mains powered, made by the famous Gent company, easy fit next to light fittings, power point. Pack of 5 £15 ref SS23, pack of 12 £24 ref SS24

**4AH D SIZE NICADS pack of 4 £10 ref 4AHPK**

**ELECTRIC FENCE KIT**

Everything you need to build a 12vdc electric fence, complete with 200m of fence wire £49 ref AR2

**SENDER KIT**

Contains all components to build a AV transmitter complete with case £35 ref V SX2

**10 WATT SOLAR PANEL**

Amorphous silicon panel fitted in a anodized aluminium frame. Panel measures 3' by 1' with screw terminals for easy connection. 3' x 1' solar panel £55 ref MAG45

**Unframed 4 pack (3'x1') £58.99 ref SOLX**

**12V SOLAR POWERED WATER PUMP**

Perfect for many 12v DC uses, ranging from solar fountains to hydroponics! Small and compact yet powerful works direct from our 10 watt solar panel in bright sun. Max flow 17 ltr. Max flow = 8 L per 1 5A Ref AC8 £18.99

**SOLAR ENERGY BANK KIT 50x 6"x12" 6v solar panels (amorphous) + 50 diodes £99 ref EF112**

**PINHOLE CAMERA MODULE WITH AUDIO!**

Superb board camera with on board sound! extra small just 28mm square (including microphone) ideal for covert surveillance. Can be hidden inside anything, even a matchbox! Complete with 15 metre cable, psu and tv/or connectors £49.95 ref CC6J

**SOLAR MOTORS**

Tiny motors which run quite happily on voltages from 3-12vdc. Works on our 6v amorphous 6" panels and you can run them from the sun! 32mm dia 20mm thick £1.50 each

**WALKIE TALKIES 1 MILE RANGE £37/PAIR REF MAG30**

**LIQUID CRYSTAL DISPLAYS Bargain prices,**

20 character 2 line, 83x19mm £3.99 ref SMC2024A

16 character 4 line, 62x25mm £5.99 ref SMC1640A

40 character 1 line 154x16mm £6.00 ref SMC4011A

**YOUR HOME COULD BE SELF SUFFICIENT IN ELECTRICITY**

Comprehensive plans with loads of info on designing systems, panels, control electronics etc £7 ref PV1

**LOW COST CORDLESS MIC**

500' range, 90 - 105mhz, 115g, 193 x 26 x 39mm, 9v PP3 battery required £17 ref MAG15P1

**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**

2x6"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 C size £9.99 ref 6P477

**5.25" FLOPPY DISKS**

pack of 500 disks £25 ref FDI

**REGISTER FOR OUR ELECTRONIC NEWSLETTERS BULL-ELECTRICAL.COM**

**BULL ELECTRICAL**

250 PORTLAND ROAD, HOVE, SUSSEX.

BN3 5QT. (ESTABLISHED 50 YEARS).

MAIL ORDER TERMS: CASH, PO OR CHEQUE

WITH ORDER PLUS £4.00 P&P PLUS VAT.

24 HOUR SERVICE £6.50 PLUS VAT.

OVERSEAS ORDERS AT COST PLUS £3.50

(ACCESS, VISA, SWITCH, AMERICAN EXPRESS)

phone orders : 01273 203500

FAX 01273 323077

Sales@bull-electrical.com

**30 WATTS OF SOLAR POWER for just £69, 4 panels each one 3'x1' and producing 8w, 13v. PACK OF FOUR £69 ref SOLX**

**200 WATT INVERTERS**

plugs straight into your car cigarette lighter socket and is fitted with a 13A socket so you can run your mains operated devices from your car battery £49.95 ref SS66

**THE TRUTH MACHINE**

Tells if someone is lying by micro tremors in their voice. Battery operated, works in general conversation and on the phone and TV as well! £42.49 ref TD3

**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 only using standard light bulbs

Easily cut to shape. 6" square £15 ref IRF2

**33 KILO LIFT MAGNET**

Neodymium, 32mm diameter with a fixing bolt on the back for easy mounting. Each magnet will lift 33 kilos. 4 magnets bolted to a plate will lift an incredible 132 kilos! £15 ref MAG33

**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

**ENERGY SAVER PLUGS**

Saves up to 15% electricity when used with fridges, motors up to 2A, light bulbs, soldering irons etc £9 ea ref LOT71 10 pack £69 ref LOT72

**12V OPERATED SMOKE BOMBS**

Type 3 is a 12v trigger and 3 smoke cannisters, each cannister will fill a room in a very short space of time! £14.99 ref SB3 Type 2 is 20 smaller cannisters (suitable for simulated equipment fires etc) and 1 trigger module for £29 ref SB2 Type 1 is a 12v trigger and 20 large cannisters £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 LASER POINTERS**

4 5mw, 75 metre range, hand held unit runs on two AA batteries (supplied) 670nm £29 ref DEC49J

**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 £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

**IR LAMP KIT**

Suitable for CCTV cameras, enables the camera to be used in total darkness! £6 ref EF138

**INFRA RED POWERBEAM**

Handheld battery powered lamp, 4 inch reflector gives out powerful pure infrared light! perfect for CCTV use, night sights etc £29 ref PB1

**SUPER WIDEBAND RADAR DETECTOR**

Detects both radar and laser, XK and KA bands, speed cameras, and all known speed detection systems. 360 degree coverage front & rear waveguides. 1" x 2" 7" x 4" fits on visor or dash £149

**LOPTX**

Made by Samsung for colour TV £3 each ref SS52

**LAPTOP LCD SCREENS**

240x175mm £12 ref SS51

**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 EP74

**HIGH POWER DC MOTORS, PERMANENT MAGNET**

12 - 24v operation, probably about 1/4 horse power body measures 100mm 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. £22 ref MOT4

**INFRA RED REMOTE CONTROLS**

made for TV's but may have other uses pack of 100 £39 ref IREM

**Online web catalogue**

bull-electrical.com

**ELECTRONIC SPEED CONTROLLER KIT**

For the above motor is £19 ref MAG17. Save £5 if you buy them both together, 1 motor plus speed controller rrp is £41, offer price £36 ref MOT5A

**SONY STEREO TV CHASSIS**

assemblies comprising complete TV PCB excluding tube and scan coils. Nicam stereo, mains input. Appear to be unused but sold as seen! Would probably be good for spares or as a nicam stereo TV sound receiver and amplifier. For KV29F1U and KV25F1U (BE3D) PCB nos 1-659-827-12 1-659-826-14 1-711-800-11 £20 ref STV1

**RCB UNITS Inline IEC lead with fitted RC breaker. Installed in seconds.**

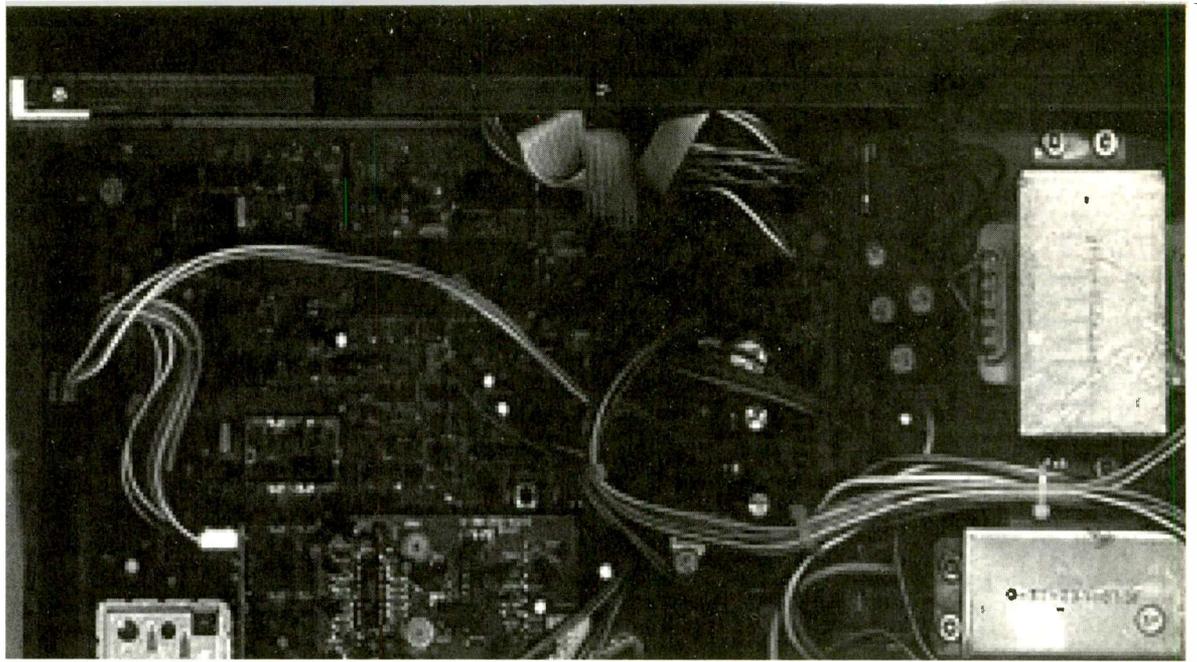
Pack of 3 £9.98 ref LOT5A

**RADIO CONTROLLED CARS etc**

No remotes but good strippers for servo's motors and receivers. Sold as is, no returns mixed types. £3 each ref RCC2

**VOICE CHANGERS**

Hold one of these units over your phone mouth piece and you can adjust your voice using the controls on the unit! Battery operated £15 ref CC3



# Satellite Notebook

*Reports from  
Christopher Holland  
Hugh Cocks  
Colin J. Guy and  
Pete Haylor*

## **Digibox: reception on only some channels**

The owner of a fairly recently installed Sky digibox rang to say that he was getting the message "no satellite signal being received" on some channels, others being OK. The ones he particularly mentioned as being absent were the BBC and Discovery channels. He confirmed that when 501 (Sky News) and 513 (CNN) were selected via the electronic programme guide they were received.

My initial conclusion was that the LNB was faulty, as the polarisation is horizontal with all the BBC programmes while vertical polarisation is used for Sky News and CNN. This fault, reception failure with one polarisation, is of course common with analogue transmissions. But changing the LNB made no difference. I then checked at the digibox end and found that the output went to 18V (for horizontal polarisation) when 101 (BBC1) was selected via the remote control unit. The no-signal message was still there however.

The cable was the one originally used for the analogue installation. It went to the dish via an involved route through the loft. When a new length of cable was temporarily run from the dish to the receiver via the sitting room window the horizontal channels immediately appeared. So there was a cable problem.

The owner wanted the new cable taken via a similar route through the loft. While we were installing it we came across the source of the trouble, a pair of Belling-Lee male and female connectors. Neither connector had the inner conductor

of the cable soldered to it. Loss of the horizontally-polarised signals was clearly because some of the higher voltage was dropped across the connectors.

At some stage we may come across the opposite fault, failure to receive the vertically-polarised channels. Theoretically the BBC channels would be received, but since the receiver's default frequency is a vertical channel it might not lock on to anything unless the default frequency is altered to a horizontal channel in the installation menu. **C.H.**

## **Pace SS9200 Series Receivers**

During the past few weeks we've had several of these receivers, including the MRD920 MAC version, that according to their owners suffered from "tuning to the wrong station". A tap on the cabinet would restore results temporarily.

In each case we found that soldered joints between the chopper transformer and the PCB had worked loose. The first joint to suffer is on the low-voltage side of the transformer, next to the edge of the PCB. This connection provides the tuning voltage. When the supply is removed, the tuner will go to the bottom of its tuning range. The audio tuning supply will not be present either – the result of this is hissing and some weak sound. Channel changing doesn't make any difference, apart from polarisation change.

It's taken several years for this condition to show up. It must be the result of heat from the transformer over the long term. **H.C.**

## **Nokia 9600: no sound**

A customer who subscribed to the Norwegian TV International channel via Intelsat 707 at 1°W complained that the sound was very weak. Analogue satellite channels received from Astra via a separate dish and receiver were fine.

The solution to the problem was simple. Nokia 9200/9600 series satellite receivers have a volume control on the remote control unit. The customer had inadvertently turned this down. When the TV set's volume control setting was increased there was very little difference, as very little sound was reaching the set.

Pace analogue receivers have a similar control. We make a habit of warning customers about this: it's good practice to keep the satellite receiver's volume control at around three quarters up, as indicated by the on-screen volume-bar display, then use the TV set's volume control. **H.C.**

## **BT SVS300**

I get quite a few of these disgusting Chinese-made receivers in for repair, probably because no one else will touch them. Most repairs are confined to power supply refurbishment, or replacing various electrolytics in the video stages or the decoder.

This one had a different fault however: when switched on from standby it went off almost immediately. It didn't take long to discover that the 12V supply was missing, because the regulator transistor Q807 had no base bias. R842 (1k $\Omega$ ) was then found to be open-circuit. It was buried under a pile

of carbonised hot-melt glue that was intended as support for Q807. C.J.G.

### BT SVS250/260/Matsui OP10

Here's my experience with these receivers to date. The number one complaint is that when the receiver has been in a "TV cabinet" for a few months its decoder section starts to play up, switching between scrambled and clear. This is because the electrolytic capacitors in the decoder have dried out. The best solution is to fit a reliability kit from one of the suppliers that advertise in *Television*. After doing this, don't refit the receiver in the enclosed cabinet: give it some fresh air.

You can copy from one of these receivers to another one provided it's the same model. The procedure is as follows – do it carefully. Connect both receivers to the mains supply, but don't switch on yet. Connect a 21-pin scart lead between the receivers. Switch the mains supplies on and put both

receivers in standby.

The receiver you copy from is referred to as the master, the other one the slave. Turn the slave receiver so that its front panel is shielded from the master receiver – so that when the remote control is pointed at the master receiver the slave receiver can't respond. There's a recessed button called "download" on the remote control unit. Place the remote control unit against the master receiver's sensor window and press download, using a pen or similar pointed tool.

The master receiver will start to flash the three horizontal bars "– – –", while the slave flashes "–". When downloading is complete, the master receiver flashes "end" and the slave receiver has the normal standby "–". Switch both receivers off and remove the scart lead. They will now have the same programme information.

These models will all work with a Philips CTU916 twin-card D2-MAC decoder, but have to be connected via a modified lead. Obtain a lead with a scart plug at one end

and three phono plugs, connected to pins 20, 2, 6 and 4, at the other. 20 is video, 2 audio, 6 audio and 4 earth. Connect the phono plugs to the satellite receiver and the scart plug to the Philips D2-MAC decoder's AUX1 socket. Connect a standard 9-pin scart-to-scart lead between the TV set being used and the Philips D2-MAC decoder's AUX2 socket. Select "Flat B/B" at the back of the decoder (usually by inserting a phono plug in a socket at the back) and you should have a good, clear picture.

**Model SVS300:** This model has a dedicated decoder socket, but you will still have to modify the scart lead at the satellite receiver end. Mark this end and remove pin 12. Carefully remove pin 19 and fit it in the hole vacated by pin 12. Reassemble the scart plug and fit it to the satellite receiver, with the other end of the lead to the D2-MAC decoder.

In use with a Philips D2-MAC decoder, when changing channels press "AV" until the picture appears. P.H.

## Cable TV News

The latest ITC report reveals that cable TV take-up has risen to 24.5 per cent of homes past, the highest level ever (the previous year's take-up was 22.4 per cent). Take-up has risen during each of the previous six quarters. On April 1st cable TV services were available to 12.15m homes: 4.24m took TV and/or telephony services. But subscriptions are down, at an average of £23.87 a month, from £24.29 in the previous year. Viewers seem to be taking smaller packages, with fewer premium channels. As a result the pay/basic ratio continued to decline to 129 per cent, the lowest since 1992. This may also represent a migration to pay-per-view instead of monthly subscription to premium channels.

Kingston Vision (Hull) is testing an interactive TV service using asymmetric digital subscriber line (ADSL) technology, which makes use of ordinary telephone lines. The trial, involving sixty of the company's employees, includes video-on-demand, home shopping and internet access.

NTL has announced business plans for its digital cable TV service – initial trials started in June, with a full commercial trial during July/August. The company expects to have 250,000 subscribers taking a low-cost, bundled service (TV, high-speed internet, interactive services and telephony) by mid-2000. NTL has set a target of 60 per cent total take-up in its franchise areas by 2003, with a high proportion of digital subscribers. The company is working with Real Media to create a broadband interactive advertising service for digital TV.

CWC, the UK's largest cable operator, is offering viewers in Manchester and the north west 130 digital channels, telephony and an on-line package for £9.98 a month, considerably undercutting BSKyB's entry-level digital package.

Within a matter of weeks British Telecommunications is expected to launch a multimedia service, including video and fast internet access, using ADSL technology over ordinary domestic telephone lines. The company has been testing the technology at a number of sites in West London since 1994.

## Essential Test Equipment



Repair PC Monitors,  
TV's & Videos....  
Faster!

**Teletest PC:** Like a pocket sized computer!  
**Teletest 2:** RF, video, S-video & audio outputs.

"The Teletest PC is a compact, battery powered and efficient unit at a very reasonable cost. It produces a stable display and all the patterns you need to test PC monitors without the need for a separate computer."



Chris Baker, B&B TV & Video Ltd, Kent



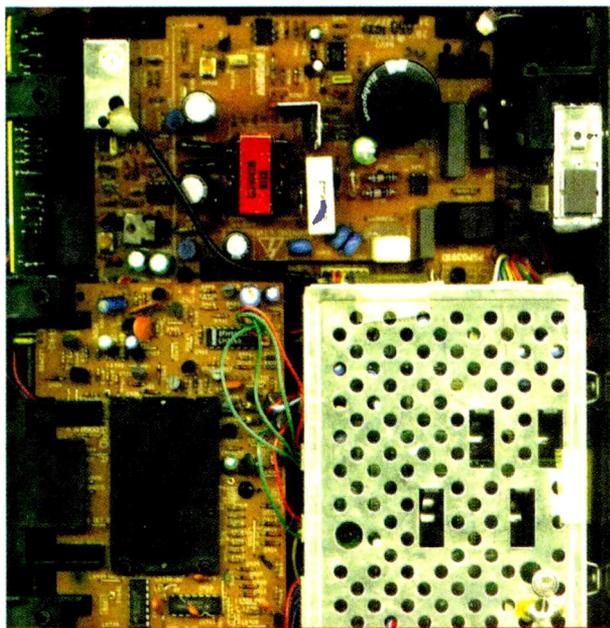
Freecall: 0500 009070  
for a free info pack

Tel: 01202 759911  
Fax: 01202 759922  
Web: www.teletest.co.uk

# TELETEST

Prices start £120 ex VAT, next day delivery.

# Satellite WORKSHOP



Jack Armstrong

## Amstrad SRD520

Barry, an electrician, has a rather cavalier attitude towards safety and a somewhat simplified view of scientific matters. His Amstrad receiver appeared to be well cooked.

"You've had this in the oven!" I declared.

"Nah. But I keep 'im covered up all right. Heat needs oxygen t' burn, and I ain't having none o' that."

I refrained from pursuing this subject and told him to leave his receiver with me. Barry toddled off to replace Mrs Jenkins' fuse. He makes his own, by cutting four-inch nails into pieces.

"My fuses is cheap an' 'em never melt" he once pointed out to me. Well, it was logical. While I was thinking about it, I took the top off his receiver's mains plug, removed the roll of aluminium foil and, for my own peace of mind, fitted a 3A fuse.

The receiver's right channel audio output was distorted. The RF audio output was as well, since the left- and right-channel signals are mixed before being sent to the modulator.

It took me almost an hour to

find the cause of the fault. R89 (15k $\Omega$ ), which is connected to TR21 behind the sync separator board, was open-circuit and hidden under black glue.

## BT SVS300

The note attached to this British Telecom badged receiver said "dead". On inspection I found that some idiot had replaced the 4.7 $\Omega$  and two 2.2 $\Omega$  fusible fuses with 47k $\Omega$  high-voltage types! The 10 $\Omega$ , 5W ceramic resistor was open-circuit, which wasn't surprising as the plastic-bodied chopper transistor had been replaced with a metal-tag BUT11A which was firmly bolted to the metal heatsink.

I replaced the ceramic resistor and fitted all the parts in Satkit 17, including the BUT11AF transistor, the optocoupler and the TL431 adjustable-voltage zener diode. Checks on the other components on the primary side of the power supply suggested that everything was now OK, so I connected the set to the mains supply. The result: perfect operation.

This was somewhat surprising. The decoder in this model often fails, with the result that you have to fit the items in Relkit 17 to get it going again.

## Internet Advantages

As you may have noticed, I'm a great fan of the internet. Web site order forms are becoming common, and often provide a quick and easy way of doing business. Some firms offer a discount if you use their web site order forms, because it enables them to automate the invoicing system.

One major supplier advertised a discount "if you order via the internet". Unfortunately this description was too broad, since orders sent by e-mail also fulfil the "via the internet" requirement, but require human intervention in the invoicing process. Consequently discounts with e-mail orders were being refused. One wonders how this would stand up in court! The order form system refused to accept certain order codes, despite the fact that these parts were listed in the

computer (this was confirmed by telephone). Promises to "ring back shortly" to sort out the problem were not fulfilled. Consequently orders had to be faxed through to avoid further delay.

Another problem, which is common with many 'professional' web sites, was the excessive use of pictures. These create long delays before the order form can be displayed on the screen. Luckily I had previously had excellent service from the company. Otherwise I might have gone elsewhere.

Many smaller companies, such as Telepart ([www.telepart.co.uk](http://www.telepart.co.uk)) and SatCure ([www.netcentral.co.uk/satcure](http://www.netcentral.co.uk/satcure)) provide easy-to-use order forms that list the available spares and appear on the screen without excessive delay.

Many repairers ignore the advantages offered by the internet. There is little excuse for this nowadays. A suitable computer or "internet set-top box" ([www.satelliteuk.com](http://www.satelliteuk.com)) can be bought quite cheaply and used for other purposes as well. Internet connection can be free, and even the cost of the phone call can be eliminated if you agree to accept a few adverts each week ([www.freecall-uk.com](http://www.freecall-uk.com)). The advantages include free technical help from manufacturers and like-minded repairers worldwide (contact [satcure@netcentral.co.uk](mailto:satcure@netcentral.co.uk)) as well as the possibility of discounts on orders.

Finally I should mention that my e-mail address is now

[jacksat@netcentral.co.uk](mailto:jacksat@netcentral.co.uk)

I change it from time to time to eliminate the build up of junk mail. It also ensures that those who buy *Television* on a casual basis don't continue to receive free help for very long! (The old address will continue to work for a few more weeks for the benefit of overseas readers who have to wait longer for their favourite magazine!)

## Rectified SVS260

The SVS260, another receiver from the British Telecom stable, is made by The Orient Power Video

Manufacturing Company Ltd." which is based in Kowloon, Hong Kong. I found its web site by using the Sherlock search system on my Apple Mac computer. Unfortunately I didn't get a reply to my e-mail message, so we are still lacking some service information – apart from the booklet that's available from SatCure (01270 753 311).

This particular SVS260 came in with the complaint that it was "humming". I thought this might refer to a buzzing noise from the mains transformer's laminations – there's no nasty chopper power supply in this receiver – but the transformer was silent. The audio output from the TV set's speaker was perfect, so I left the receiver on soak test for a few hours.

When I returned to it every channel was marred by a loud hum from the TV set's speaker. On a hunch, I squirted the large electrolytic capacitors with freezer spray. This had no effect – until the spray hit the rectifier diodes behind the capacitors. The noise then vanished instantly. Replacement of D405 and D406 at the rear right corner of the lower PCB provided a permanent cure. The diodes are black with a silver or white stripe to indicate the cathode end. I fitted two BYV95A diodes. This is a fast soft-recovery type with glass bead construction.

### Amstrad SRD700

I had a phone call from Wosname up Church Street about this receiver. It's identical to the Fidelity SR920+, with a power supply and main board that differ from those used in earlier Amstrad models.

"What's the transistor that's soldered underneath the power supply?" he asked.

"It's not a transistor. It's a TOP202 integrated circuit."

"Ah. OK. I'll see if I can order one." At that the line went dead – before I could offer him the Satkit 16 I had in stock. A week later however he appeared with the offending receiver.

"No joy. Have a look at it for me, there's a good chap. I'll be at The Lion and Swan. You can buy me a drink when you've fixed it!"

I muttered under my breath and carried the receiver to the workshop. It took no time at all to remove the screws, because as usual he'd lost them. The power supply tried to work, but the front panel LED was flickering – as was the blank raster on the monitor's screen. I removed the power supply and found that he had made quite a neat job of the repair, though I felt that he'd been over generous with solder on the TOP202. Hopefully he hadn't destroyed it with the heat!

A working power supply 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:

**jacksat@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.

another receiver produced pictures and sound, so I investigated the receiver's own power supply further. It appeared that he had used 85°C capacitors (OK temporarily), and hadn't replaced the optocoupler or the TL431 adjustable-voltage zener diode (judging from the lack of black teacle around the pins). When I replaced these two items the power supply sprang to life.

For improved reliability I fitted high-temperature capacitors in the power supply. I also replaced the electrolytics in the tuner module (as supplied in Relkit 16), because the decoded pictures had been very streaky. The Lion and Swan seemed very inviting. I hoped Wosname had brought his wallet with him!

## Test Case 440

TV repair jobs are sometimes easy, sometimes difficult and sometimes – well, we don't use that sort of word in a respectable magazine, do we? This is the story of a job that seemed to be nice and easy but turned out to be in the unmentionable category. With hindsight we'd have done better to give the customer a tenner to take the set away at the outset.

The set concerned was a Mitsubishi Model CT2146TX (Euro 6 chassis). It was no youngster, but was in good condition with a good tube. The customer was certainly happy to pay the repair charge for the dead-set fault – we replaced the 2AT mains fuse and the four bridge rectifier diodes. Only one of them had failed (short-circuit), but to be on the safe side we replaced them all. A tweak on the set-HT potentiometer VR901 and the grey-scale presets on the tube base panel completed the job, or so Television Ted thought.

But the set was back a few days later with the same symptom – no go. This time the cause was quite different: the 2SD1878 line output transistor Q552 had gone short-circuit collector-to-emitter (and to its base for that matter). After fitting a replacement, Television Ted switched the set on cautiously. It worked, and the HT voltage at TP91 was spot on at 112V. No other problem could be found. Ted put the cause down to a one-off fault, or maybe something to do with the previous power supply failure. The set went back on to the repaired-out bench. There was no charge, as goodwill is an important factor in the Test Case workshop's business.

When the customer returned to reception with his set a cou-

ple of weeks later, for the third time, the goodwill had worn very thin! Once again the set had failed because its line output transistor was short-circuit. It had failed for reasons unknown.

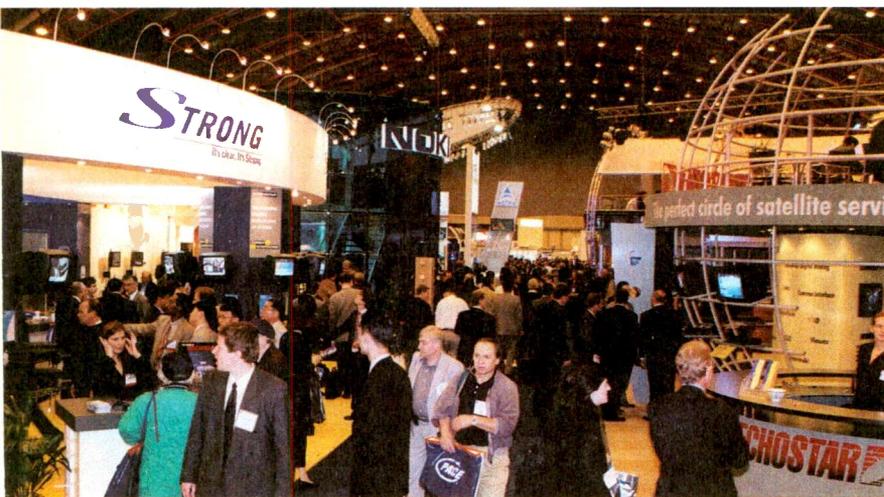
At this stage the economic situation was such that the total repair cost would exceed the value of the set. Had it been a rental set it would have been scrapped then and there, exchanged for something newer. But it was necessary to take the 'customer factor' into account. If possible, the set had to be repaired. So TV Ted set to work again.

He checked for dry-joints at the chopper transformer, the line driver and output transformers and other relevant points. Nothing that could have contributed to the transistor's failure could be found. Thinking that there might be a drive fault, Ted checked the values of R551 and C572 in the line driver stage. Both were OK, and the waveform at the collector of the driver transistor Q551 (waveform 10) was correct at 150V peak-to-peak, with very sharp rise and fall times. Further confirmation that the drive and loading conditions in the line output stage were OK was provided by the fact that the latest replacement transistor didn't get excessively hot while in operation.

Even so, it failed a few days later! It seemed likely that the cause of the trouble was some sudden event rather than continual heavy loading or excessive flyback voltage. A long monitoring session – of the supply voltage, the chopper transformer waveform, the line flyback waveform etc. – was required, with the help of a camera and a VCR, to find the culprit. What was it? For the solution, turn to page 727.

# At Cable & Satellite *Mediacast '99*

This year's Cable & Satellite show attracted thousands of visitors. There were some 260 exhibitors. Last year the focus was on digital TV programming. This year the emphasis was on interactive TV and internet services. **George Cole** reports



**T**he two European satellite operators SES, which owns the Astra series satellites, and Eutelsat, which operates the Hot Bird and other satellites, both had large stands that were dominated by internet and data delivery services. The move from analogue to digital broadcasting means that satellite operators can offer data services in addition to TV channels. It is significant that some telecoms operators are already carrying more data than voice traffic via their telephone lines. Before long data traffic could become an important source of revenue for companies such as SES and Eutelsat. Hence the emphasis on promoting the internet and data transmission at this year's show.

## **Astra-Net**

SES is offering Astra-Net, which can be used to deliver data, streaming audio or video and provide high-speed internet access. It operates in the Ku band at data rates up to 38Mbits/sec. Astra-Net is designed as a direct-to-home, small office/home office (SOHO) and direct-to-office service, though the primary markets are seen as being commercial.

Service/content providers send information to the Astra-Net Network Operations Centre (NOC), which transmits it to users via satellite as DVB/MPEG-2 compliant data, the 'return' path between users and the ser-

vice providers and NOC being terrestrial, either via telephone/modem, ISDN or an internet service provider. Users require a PC equipped with a DVB/MPEG-2 card and a 50cm dish with a universal LNB. Those who want to be able to receive both Astra-Net and satellite TV services require a twin universal LNB.

The PC requirement is relatively modest: a 90MHz Pentium processor or better, Microsoft Windows 95/98/NT, a sound card, a CD-ROM drive, a web browser such as Netscape Navigator or Internet Explorer (for fast internet services), 30MB of hard disk space and a modem or ISDN connection.

The Astra-Net PC card is supplied with software for the installation and positioning of the dish, and several types of delivery systems: package delivery (file transfer), streaming delivery (for real-time delivery of audio, video or updated information such as a 'financial ticker') and high-speed internet. The latter is capable of data speeds up to 400kbits/sec, which is about seven times faster than the fastest telephone modems and three times faster than ISDN. Data can be encrypted using the 56-bit Data Encryption Standard, and a sophisticated error detection/correction system checks that the data packets have been delivered correctly. If an error is detected, the Astra-Net receiver requests retransmission.

A Number of companies that offer services based on Astra-Net were present at the show. They included 4th Wave which provides high-speed internet access, Espresso which is a multimedia learning and teaching service aimed at schools, Europe Online Networks which has launched an 'internet in the sky', and deuro-media which offers digital TV and internet services.

## **ARCS**

SES was also showing prototypes of its forthcoming Astra Return Channel System (ARCS), which is due to be launched early next year. As the name suggests, ARCS is a two-way digital communications system. Ku band is used for forward data transmission via satellite at rates up to 38Mbits/sec. Ka band is used for transmission from a user dish at data rates up to 2Mbits/sec. This is more elegant than existing satellite data services, which often use a public-switched telephone line, ISDN or an internet service provider as the return path.

The first satellite to offer Ka-band capacity, Astra 1H, was launched on June 18th. Its orbital position is

19.2°E. Astra 1K, to be launched next year, will also offer Ka-band capacity and extend ARCS' coverage to Eastern Europe. SES says that ARCS will be aimed at broadcasters, businesses and the public sector.

In order to use the ARCS service, users or groups of users will require a PC connected to a dish and a Satellite Interactive Terminal (SIT). Dish size determines the maximum transmission bit rate: with a 60cm dish the maximum data speed is 150kbits/sec, with a 90cm dish it's 384kbits/sec and with a 120cm dish it's 2Mbits/sec. All ARCS systems can receive data at rates up to 38Mbits/sec. Nortel and Philips plan to launch SITs next year.

### Other Satellite Data Services

A DVB/internet service from EasyNet was on show at the Eutelsat stand. The system uses a PC, dish and DVB card for downloading data and digital TV programmes. Armstrong Data Services showed Web-Sat, a two-way service like ARCS. It requires a SIT, 70cm dish and PC. If users leave their PCs permanently switched on, they receive e-mails and data files addressed to them.

### Interactive TV

Interactive TV enables viewers to send data or instructions to the broadcaster or service provider. All interactive TV systems require special software, known as an Application Program Interface (API), to organise and manage the data.

One of the leading interactive software systems is OpenTV, which is used by a dozen digital TV networks including, in the UK, BSkyB, the BBC and Open. OpenTV software has been incorporated in over two million digital receivers: manufacturers that have licensed the technology include Matsushita, Pace, Philips and the French-based company Sagem. OpenTV was demonstrating interactive TV services from a number of broadcasters including TPS. This French broadcaster offers one of the most sophisticated interactive TV services in the world. Its services include home shopping, home banking and an interactive weather channel.

Music Choice, which offers some fifty music channels via SkyDigital, demonstrated a prototype music shopping service based on OpenTV technology. Using an on-screen guide, users would be able to purchase CDs, tickets and other items while listening to a music track. Music Choice hopes to have the service in operation by early next year.

Canal+ Technologies developed the Mediahighway API, which is used by a number of digital broadcasters around the world, including ONdigital in the UK and the various Canal+ digital TV services across Europe, including France, Spain, Italy and the Scandinavian countries. The French Canal+ digital service includes an 'interactive notepad' that gives viewers access to information related to a programme being viewed, for example match statistics with a sports programme.

### Hull's Telecom TV

Element 14, formerly part of Acorn Computers, demonstrated an interactive TV system designed for use with a telecoms system rather than a cable, satellite or terrestrial TV service. The Active 3875 set-top box incorporates MPEG-2 decoding. Element 14 has signed a deal with Kingston Vision, a subsidiary of Kingston Communications which runs Hull's telephone service. The technology used is ADSL (Asymmetric Digital Subscriber Line): it enables data to be transmitted via twisted-pair copper cables at speeds of typically about 2Mbits/sec. ADSL uses an HF data carrier that doesn't interfere with normal voice communication.

The interactive TV service is being provided by Yes Television, which is owned and operated by Elmsdale Media. The Kingston service will include TV programmes from BBC Worldwide, Pearson and Trans World International, films from Sony Pictures, Warner Brothers



and Buena Vista (part of Disney), educational services and travel services provided by British Airways. There will also be local and community services plus e-mail and internet access. A trial service involving 60 employees of Kingston Vision started in Hull in June.

Element 14 was showing, in a back room, a prototype MPEG-2 system that uses software only for decoding and demodulation. First impressions suggest that there is still some work to be done, but it could turn out to be an interesting development.

### Set-top Boxes and IDTVs

There was an impressive array of STBs and IDTVs on the Pace stand. No surprise, considering that the company is manufacturing STBs for digital cable, satellite and terrestrial services and for several IDTV manufacturers.

The Pace show included the first live demonstration of the STB used with Cable & Wireless's digital cable service. It includes a cable modem developed by Cisco Systems. There was also a prototype cable box developed for NTL. This uses an Hitachi RISC (Reduced Instruction Set Computer) processor chip.

LG showed IDTVs for the SkyDigital and ONdigital services.

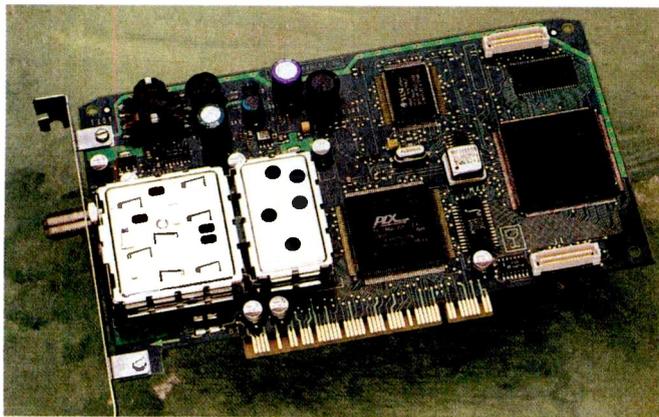
Nokia announced that owners of its new digital receiver, Model 9800, could receive software downloads from four major European satellite sites, Astra, Eutelsat, Sirius and Thor. Users call up the installation menu, select software upgrade and follow the on-screen instructions. The downloading process takes about 5-15 minutes.

French manufacturer Sagem displayed a full range of digital terrestrial, satellite and cable STBs. The ISD3100 and ISD3400 can receive all European free-to-air channels plus pay-TV packages that use Viaccess or Nagravision conditional access control. The company has been supplying digital TV equipment that complies with the MPEG-2/DVB standards to the professional and consumer markets since 1995. It has already supplied hundreds of thousands of digital consumer decoders – some 700,000 were delivered in 1998. The Sagem Telsat Turbo is a DVB-compliant satellite-to-PC receiver card. It provides demodulation and demultiplexing and transfers IP (Internet Protocol) data to a PCI bus. Internet access is at speeds up to a hundred times faster than the average PC modem (Fast Internet).

### Prototype Sidecar

SCM Microsystems demonstrated a prototype sidecar module that will enable SkyDigital STBs to receive digital terrestrial TV, using a plug-in PC type card. The module, slightly larger than a PC card, was connected to a box containing an RF front-end and demodulator. This was linked to an LNB.

**The Active 3875 STB is part of Element 14's system for delivering digital TV via existing telecoms networks.**



**The Sagem Telsat Turbo DVB-compliant satellite-to-PC receiver card.**

Once the required chip set is available the module will be smaller. SCM Microsystems also plans to launch an ONdigital sidecar to enable DTT viewers to receive SkyDigital programmes – subject to an appropriate subscription package being taken up.

There are still questions about the future of sidecars however. Development was prompted by the ITC, which wants interoperability between the digital satellite and terrestrial services. But there is still no simulcast agreement, which would enable one STB to decode both types of signals, between SkyDigital and ONdigital. There are also STB architecture differences – ONdigital's STB has less memory for example – while the available bandwidth (the DTT service has much less) will also limit the degree of interoperability. And now that the STBs are being provided 'free', it could be difficult to get people to buy sidecar modules.

**The Video Browser**

Danmere, a UK company, demonstrated the Video Browser, a new software technology for STBs to provide VCR control.

One function is to make it easier to set a VCR's timer when recording programmes via a digital STB. Those using a SkyDigital decoder have to set the VCR timer and set the decoder to the correct channel. This means that it is not possible to record programmes on different channels when using a VCR timer. ONdigital's STB is more flexible in this respect, having a built-in timer, but users still have to set two timers. Most VCR-satellite control systems, which automatically switch on the decoder at the required time and set the correct channel, are designed for analogue STBs. In addition, not all satellite systems work with all decoder brands.

To record programmes using the Video Browser you simply select the programme you want to record from an on-screen programme guide then press a button on the remote-control handset. Timer data is sent from the STB to the VCR via an infra-red link, and the Browser checks that the VCR has received the correct information. Danmere says that its Browser system can work with all VCR brands.

The Video Browser also provides a tape-indexing system that lets users see what is recorded on a tape. As a tape is being played, the Browser takes a series of 'snapshots' to create a video database of what's on the tape. This database consists of a set of thumbprint images that can be displayed on a TV set's screen. When a thumbprint is selected, the VCR

automatically finds the scene on the tape.

The Video Browser makes use of the fact that today's digital TV STBs are really powerful computers, with a processor, memory and an operating system. The Video Browser makes use of the operating system, employing tape positioning and indexing algorithms to control a VCR's functions. These algorithms can be used to create a unique signature database for each tape. The video database could be stored in the STB's memory: the database size and the number of tapes that can be indexed in this way depends on the amount of memory allocated to this purpose.

If memory space is limited, a cut-down version of the database could be stored inside the box, with the thumbprints held on tape. But in practice relatively little memory space would be required because the images are compressed. An STB manufacturer could also design a system that stored thumbprints at say five-minute intervals. In addition it's highly likely that future STBs will have a built-in hard drive for storing large amounts of data.

The tape-index system will work with both new and existing tapes, and recordings made with the Video Browser can be played back on any VCR. Danmere says that the tape-positioning system is accurate to within four seconds. The company has a lot of experience in the control of tape-transport mechanisms – several years ago it developed a data back-up system that enables a PC user to store hard disk data on a VHS cassette.

A scart cable is used for general communication between the Video Browser and the VCR. The Browser could also be used for downloading data such as pages from a web site. This would require only a small amount of tape storage, as about 9Mbytes of data can be stored per minute of tape time.

At present the Video Browser works with Microsoft's Windows CE operating system, as used by WebTV and OpenTV. Windows CE is used in millions of STBs around the world, including those for SkyDigital. But Danmere says that its software could be ported to other STB operating systems. Danmere is currently in discussion with broadcasters and STB manufacturers about licensing its technology.

Danmere says that the Video Browser, because it's software-based, would add little to the cost of an STB. It could also be used in future digital TV sets. The system cannot be built into a VCR however, because VCRs lack the architecture (processor, operating system, etc.) required for it to work. Danmere considers that though developments like recordable DVDs are in the pipeline the VCR will remain the dominant home video recording format for many years to come.

Video Browser seems to be a good idea, and the demonstration at the show was impressive. The problem for Danmere is that broadcasters such as BSkyB are known to be developing their own STB recording systems.

**Dish and Tuner Technology**

Sharp Germany had on display several pieces of technology that caught the eye, including a compact four-outlet LNB for feeding four separate households from a single dish. It can be used with both analogue and digital transmissions. The LNB will be available in Germany this autumn: no UK launch details were available.

Sharp has also developed a new satellite tuner, Model BS2W7XXXX, which can be used with both analogue and digital signals. It has two inputs, enabling viewers to receive signals via separate LNBs for say Astra and Hot Bird. The tuner should contribute to the development of compact, inexpensive STBs.

**Next Year**

In all it was another year of considerable progress. What will next year bring? The dates for Cable & Satellite Mediacast 2000 are May 15-17th 2000, at the same venue – Earls Court 2.

**The Pace digital cable STB currently being used in CWC's first UK digital cable trial.**





# Multiple Outlet Wallplates

In Part 2 of his article on TV wallplates **Bill Wright** describes the problems that can occur when the screening provided is inadequate, with a number of examples and advice on what can be done

**A**s domestic TV/video installations become more complex, good screening of all coaxial feeds is ever more important. In this article I'm primarily concerned with the screening properties of output plates, but most of what follows also applies to mast-head amplifiers, downlead cables, splitters and flyleads.

The traditional wallplate is fitted with one or at best two coaxial sockets. There's no screening, but the better designs minimise the amount of unshielded inner conductor and, assuming that the cables are prepared with proper regard to good RF practice, they work perfectly well almost all the time. But unwanted signal pick-up from outside sources does occasionally occur, and crosstalk between the two circuits is always a danger.

## Inferior Outlet Plates

Badly designed wallplates cause all sorts of problems. There are some truly awful ones on the market. Some manufacturers either don't know or don't care about good RF practice.

One particular double-outlet plate has a PCB (including a printed inductor, but with the other components not fitted) connected to one of the inner conductors. It appears to be intended for a diplexer or something similar. Because of the large area of unshielded copper track connected to the coaxial inner conductor, the PCB radiates and receives signal very efficiently, which is a great detriment to the outlet's proper function. The UHF through loss is between 6-15dB! The amount of crosstalk between the two sockets is similarly disastrous.

Outlets like this will introduce an impedance mismatch, leading to standing-wave effects. I've cured many a strange reception fault merely by removing one of these beastly things and fitting a decent outlet. Other culprits have included an outlet in which the soldered

screen connection easily but invisibly breaks, and one where the centre pin pushes back and contacts the rear of the steel back-box.

## Pre-echo

In strong-signal areas enough signal can be picked up directly by a poor-quality outlet plate (and flylead) to compete with the signal from the aerial. This effect is called 'pre-echo', and is particularly a problem with communal aerial systems (see *Television* March 1996).

## Interference from Satellite Receivers

Some satellite receivers radiate an alarming amount of UHF noise, particularly on ch. 25. This became a common problem a few years ago, and we were advised to fit double-screened coaxial leads. You might think that if the aerial feed is looped through the satellite receiver in the usual way any signal pick-up at the outlet plate would be insignificant, but this is not the case. Interference can even come from next door's satellite receiver – and other equipment.

With a semi-detached house the outlet plate is likely to be back-to-back with the one in the adjoining property, and not much farther from the neighbour's satellite receiver, games machine or computer. In blocks of flats, the TV set and associated equipment in a flat is likely to be spaced only 3m apart from similar equipment above and below.

## Interference to the Satellite IF

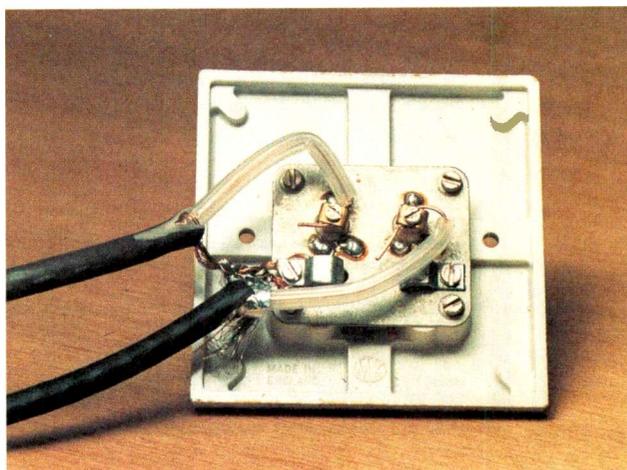
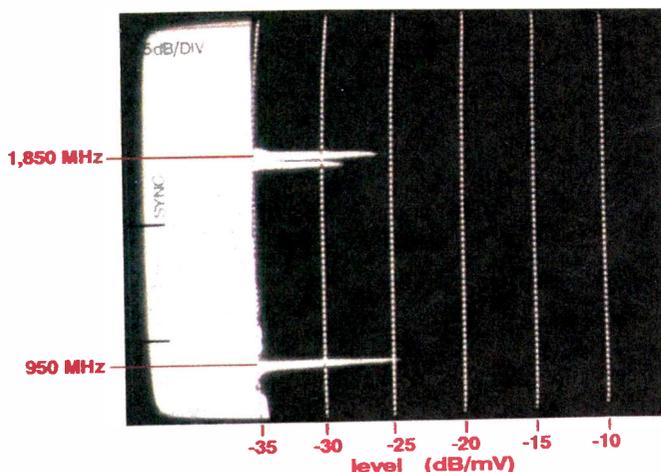
LNB output frequencies (the satellite first IF) coincide with various transmissions. If these signals find their way into the feed from the LNB to the satellite receiver they will cause interference. Cellphone masts have become a particular problem, with transmissions centred on 950MHz and 1,850MHz. Photo 6 illustrates this, and Table 1 lists the frequencies affected.

An LNB's output is at a very high level, with carriers as much as 35dB above the minimum receiver input. This provides good immunity from interference, but these levels are sometimes greatly attenuated by the time the signal reaches the outlet, flylead and receiver. This can happen if the satellite downlead is very long, or if an inferior type of cable is in use.

Satellite IF distribution systems are normally designed to deliver at each outlet a signal level that's only 12dB or so above the receiver's minimum input. Because of varying carrier levels, the signal can occasionally fall to a much lower level. In such a case there is vulnerability to interference that enters at the outlet plate and flylead.

**Table 1: Interference from cellphone transmissions.**

Cellphone transmission	Satellite frequency that could suffer interference		
	9.75GHz LO	10GHz LO	10.6GHz LO
950MHz	10.7GHz	10.95GHz	11.55GHz
1,850MHz	11.6GHz	11.85GHz	12.45GHz



**Photo 6:** A spectrum analyser display of cellphone transmissions in the satellite IF band. The signal levels shown here are low: they can be much higher in the vicinity of a cellphone mast.

**Photo 7:** How not to wire an outlet plate! The large amounts of unscreened inner conductor cause unwanted radiation and reception, impedance mismatching, severe through-loss and crosstalk.

It seems that nowadays virtually every high-rise building has a cellphone transmitter on the roof. Although cellphone transmissions are not high-powered, in my experience they can cause problems within the building itself and at sites up to a quarter of a mile away.

How can the outlet plate receive enough cellphone signal to cause interference? A quarter-wave dipole, perhaps the most efficient aerial of all, is only 38mm long at 1,850MHz. The length of unscreened inner conductor behind the outlet can be a significant fraction of this length.

**Crosstalk in Double Outlets**

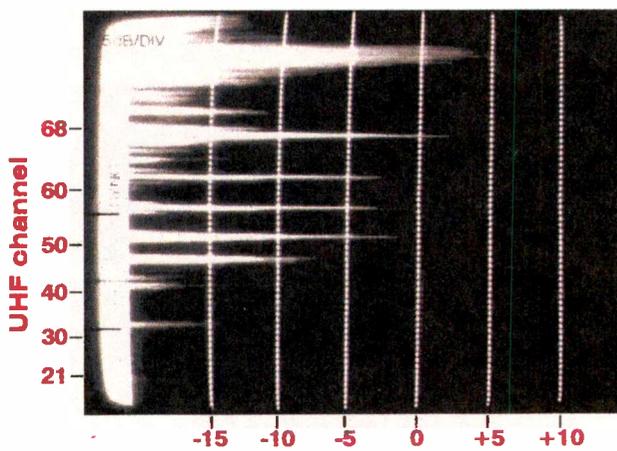
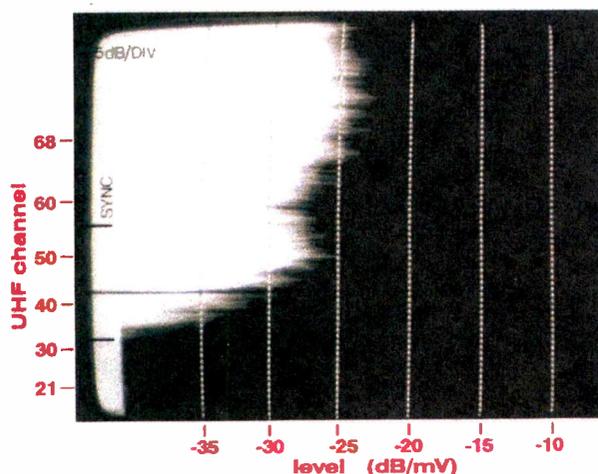
It's quite common for crosstalk to occur between the two circuits in a double outlet, even where a good-quality wallplate is used. The amount of crosstalk depends to some extent on the way the connections have been made at the back of the plate. If an unnecessary amount of inner conductor is left unscreened, the outlet can allow UHF signals to pass from one port to the other with as

little as 20dB attenuation.

Photo 7 shows a typical attempt by a site electrician, who to be fair can't be expected to know about the peculiarities of RF, to wire a double outlet. The plate itself is a good-quality one, and the manufacturer has positioned each saddle clamp and terminal screw close together to minimise the necessary amount of unscreened inner core. This was, alas, in vain. This particular example was the sole cause of severely degraded reception.

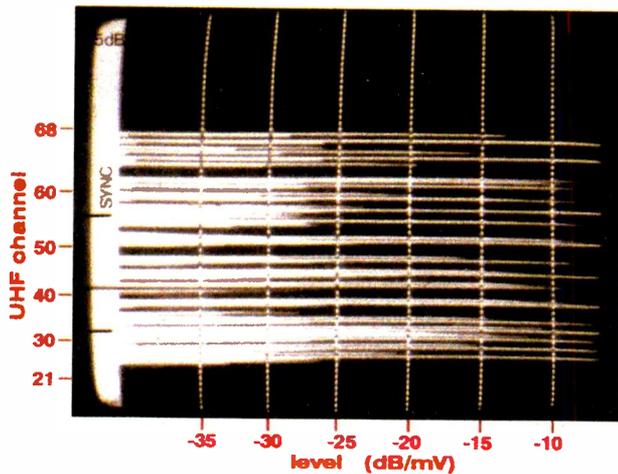
**Interference from Satellite IF**

A satellite IF feed and an unscreened double outlet form a very unhealthy combination. From this point of view an LNB is no more than a noise source followed by about 50dB of amplification. The noise output from most LNBs extends down well into the UHF TV band. If this noise gets into the UHF aerial feed, the signal-to-noise ratio will be reduced and the picture will become snowy, just as if the UHF signal is too weak. Cheap fly-

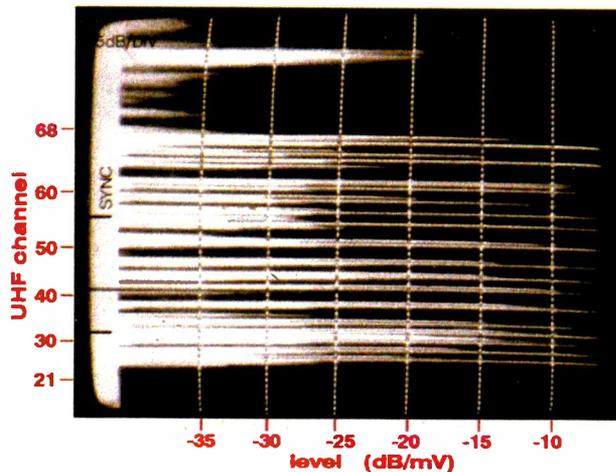


**Photo 8:** The UHF output of an LNB with a 9.75GHz local oscillator. If this noise finds its way into a UHF aerial feeder the picture will be snowy, as if the UHF signal is weak. In this example the satellite downlead loss was 10dB. Note that there is 20dB less input attenuation than in Photo 6.

**Photo 9:** The UHF output of an LNB with a 10.6GHz local oscillator. Even after 10dB downlead loss the satellite carriers can touch +5dB/mV. If a satellite carrier happens to coincide with an occupied UHF channel there is severe interference potential. Despite the differing transmission standards, a satellite signal can even produce an identifiable picture on a UHF TV set.



**Photo 10:** The output of a multi-channel UHF distribution system. In this and in Photo 11 the signal levels have been temporarily reduced by 6dB.



**Photo 11:** The UHF spectrum shown in Photo 10, but with interference from an LNB with a 10.6GHz local oscillator. The interference was introduced via a badly-wired double outlet, the result being crosstalk that measured -26dB. In addition to the obvious spikes above ch. 68, lesser signals and noise can be seen almost to the bottom of the band.

leads can be the culprit here as well as dodgy outlets.

An LNB with a local oscillator frequency of 9.75GHz isn't too bad in this respect, see Photo 8, but the older 10GHz LNBs down-convert the lower satellite channels to frequencies within the UHF group C/D spectrum. This has obvious interference-causing potential. In this respect the 10.6GHz local oscillator, intended for reception of the higher satellite channels, appears to be even worse. When the LNB's local oscillator frequency is switchable between 9.75GHz and 10.6GHz it's called a universal type. These LNBs are often used for reception from Hot Bird at 13°E.

I measured the UHF output of an 0.8dB (noise figure) universal LNB set to 10.6GHz and aligned, with a 1m dish, at 13°E. The results, see Photo 9, show that significant leakage of the LNB's signal into the UHF feed will cause severe reception problems. The satellite carriers leave the LNB at +10dB/mV or more. With allowance for a satellite download loss of 10dB, a double outlet crosstalk figure of -30dB could result in a signal-to-noise ratio of say 35dB. This will seriously degrade analogue UHF reception. Photos 10 and 11 show the effect of crosstalk as seen using a spectrum analyser. The result, on a TV screen, tends to be a strange mixture of snow and cross-modulation, see Photo 12. Even when

the UHF channel in use is affected by LNB noise only, with no satellite carrier present, the result, as you might expect, is a very noisy picture.

The point of all this is that when the feed from a dish passes through the same double-outlet plate as the signal from a UHF aerial, screening within the outlet is vital. There are on the market double outlets with one Belling and one F-type socket. Although these are expressly sold for dual satellite IF/UHF use, the two circuits are not screened from each other. Beware!

### SkyDigital

Reception from 28.2°E requires a universal LNB. At present all the transmissions are near the top of the band, with little or nothing lower down. When digital transmissions at the lower frequencies start, a 10.6GHz LNB will convert them to the UHF band. I think this will cause no end of trouble.

### Satellite IF Crosstalk

Crosstalk can occur between two satellite IF feeds when both LNBs are powered continuously. If both feeds pass through the same outlet plate, crosstalk is almost inevitable – because the length of unscreened inner conductor will be a significant fraction of a wavelength. The effects may be subtle. They are best avoided.

### In Conclusion

I hope that this article has succeeded in explaining some of the odd little peculiarities we all encounter from time to time. Sometimes there's only a minor fault: a little bit of patterning or a slightly grainy picture. It's tempting to shrug your shoulders and hope that the customer won't notice, especially if you have no idea what the cause might be. Unfortunately a minor fault can turn into a major one as soon as your back is turned.

How much better to get it right in the first place! Diagnosing the cause of this sort of thing is usually fairly simple, for example by disconnecting each possible source of interference in turn.

As the satellite and aerial installation business becomes ever more complicated, competent installers have a chance to distance themselves from the cowboys. The way to do this is to work to high standards. Don't ask yourself if the customer has noticed. Ask yourself if you've noticed.



**Photo 12:** A satellite D-MAC signal makes a nice mess of UHF ch. 47 reception. In this case the outlet plate crosstalk was -30dB. Matters were made worse by a UHF signal at -10dB/mV.

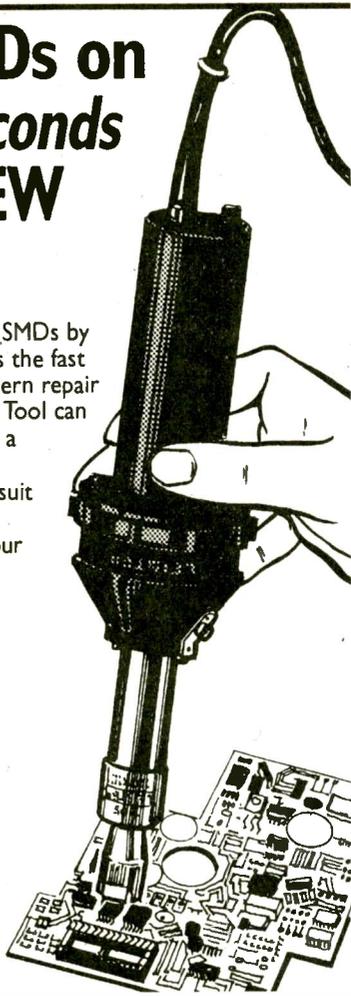
# Repair SMDs on PCBs *in seconds* with the NEW Hot Jet 'S'

Desoldering and soldering of SMDs by hot air and without contact is the fast and efficient way for the modern repair workshop. And now, Welwyn Tool can offer the complete package - a range of hot air tools, SMD Rework Stations, nozzles to suit all SMD requirements, free demonstrations and free colour instructional brochure ... all available from Distributors nation-wide.

For further information, please ask for Reference No. TMS

## WELWYN TOOL CO. LTD.

4 SOUTH MUNDELLS,  
WELWYN GARDEN CITY  
HERTS AL7 1EH.  
TEL: (01707) 331111.  
FAX: (01707) 372175.



PUT HOT AIR TO WORK FOR YOU

# IS YOUR RENTAL BUSINESS EXPANDING?

## Broughfame Ltd.

can help to expand your television/video rental business and increase your profitability.

Our rental Finance Plan offers you financial facilities from

**£1,500** upwards.

Block Discounting finance also available.

For further details ring or write to:

## Broughfame Ltd.

**115A St John's Hill,  
Sevenoaks, Kent TN13 3PE**

**Tel: (01732) 743400**

**Fax: (01732) 743335**

**E-mail: R@Broughfame.TelMe.com**

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 BFW BFX BFY BLY BLX BS BR BRX BRY BS  
BSS BSV BSW BSX BT BTA BTB BRW BU BUK BUT BUY  
BUW BUX BUY BUZ CA CD CX CXA DAC DG DM DS  
DTA DTC GL GM HA HCF HD HEF ICL ICM IRF J KA  
KIA L LA LB LC LD LF LM M M5M MA MAB MAX MB  
MC MDA J MJE MJF MM MN MPS MPSA MPSH MPSU  
MRF NJM NE OM OP PA PAL PIC PN RC S SAA SAB SAD  
SAJ SAS SDA SG SI SL SN SO STA STK STR STRD STRM  
STRS SVI T TA TAA TAG TBA TC TCA TDA TDB TEA TIC  
TIP TIPL TEA TL TLC TMP TMS TPU U UA UAA UC UDN  
ULN UM UPA UPC UPD VN X XR Z ZN ZTX + 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



Connect AMERICAN EXPRESS

## Cricklewood Electronics Ltd

40-42 CRICKLEWOOD BROADWAY LONDON NW2 3ET  
TEL 0181 452 0161 & 450 0995 FAX 0181 208 1441



Radcom  
Electronics  
UK LTD

# VIDEO PARTS TESTED & GUARANTEED SECOND HAND PARTS Overseas customers welcome Bulk Orders

All parts will be labelled with stock no and details of the equipment they have been removed from, (e.g. Ferguson FV14T lower drum stock no 9999) and a master list with the same details will be supplied with the consignment.

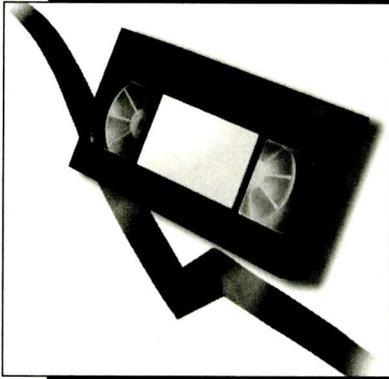
Unit 19

Clayton Court Castle Industrial Estate  
Invergordon IV18 0SB

Tel: 01349 854422 Fax: 01349 854400 (24 hr)

E-mail: radcom@radcom.clara.net

Web page www.radcom.clara.net



# VCR Clinic

Reports from  
**Philip Blundell, AMIIElec**  
**Eugene Trundle**  
**Ronnie Boag**  
**Roger F. White**  
**Bob Longhurst**  
**Gerald Smith**  
**John Coombes and**  
**Colin J. Guy**

## Philips VR838

The problem with this top-of-the-range machine was no tape movement in play or wind/rewind. When the tape was fully laced the supply spool wouldn't turn, though the brakes were seen to be off when a clear service cassette was tried.

An inspection under the deck soon revealed the cause of the problem: the kicker gear (item 129 in the exploded view in the manual) was wrongly timed. This gear is not present in basic models that use the Turbo deck. **P.B.**

## JVC HRJ225 and others

The deck used in this and other JVC models can jam in the fully-laced position. When this happens you will see that the pinch roller hasn't fully closed on the capstan shaft. The cause is a broken capstan lever assembly (item 50 in the exploded view in the manual), which is under tremendous stress from its spring. The replacement for this plastic part is made of cast metal. **E.T.**

## Akai VSG240 and others

Here's another common deck fault, which once again is not confined to this particular model. The symptoms are intermittent deck shut down, with ERR2 showing in the display panel. It usually happens when the machine changes mode: from stop to play or rewind, from rewind to stop, etc. The cause is

the mode switch, which is readily accessible on the underside of the deck after removing the deck's five securing screws. **E.T.**

## Akai VSG295

These machines can cut out intermittently in the LP record mode. The cure is to fit TR413 and TR414 (both DTC144TK), R520 and R521 (both 47k $\Omega$ ), C505 and C506 (both 10nF) and remove links JS401 and JS402. **R.B.**

## Sanyo VHR778

The fault with this machine was intermittent loss of sound when a Nicam broadcast was being recorded. The cause was dry-joints at oscillator X6701. **R.B.**

## Finlux VR3724

If the problem with one of these machines is intermittent no rewind or fast forward, replace the cam slide assembly – part no. 8681 4927. **R.B.**

## Ferguson 3V32

Some people think that these VCRs are better than new ones. The fault with this machine was failure to come out of standby. Q22 on the mecha board was short-circuit: as a result the voltage at the cathode of D29 was high, preventing the data pulses passing through. Once Q22 had been replaced and a service kit had been fitted the machine worked as well as many new ones. **R.F.W.**

## Hitachi VTM620E

The switching point varied in both the play and record modes. The cause of the trouble was C616 and C617. **R.F.W.**

## Sharp VCH81

There was no capstan rotation. Before ordering a new motor I examined the old one carefully and

found that the 12V supply was present at the connector but didn't reach the IC. A small electrolytic capacitor had become leaky, and the leakage had eaten through the copper print. **R.F.W.**

## Ferguson FV77

This machine was dead because the UC3842 chopper control chip IP01 had failed. As it's not a common failure, I looked for a reason and found that CP1 (220 $\mu$ F) was faulty. As a result the voltage at pin 7 of IP01 was low. **R.F.W.**

## Samsung SV80IK

This VCR was dead apart from four dashes on the clock display. It didn't respond to the standby switch or attempts to insert a cassette. If a cassette was inserted when the power was off, it would be ejected when the power was switched on again. The booster worked, but there was no test signal and no E-E operation.

My first thought was to clean the mode switch, but when I removed the deck I found that it doesn't have one. So I removed the PCB to check the power supply and noticed that one of the end sensors was unsoldered. After resoldering it I looked around for any other dry-joints then reassembled the machine. It now worked. Must have been one of my lucky days. **R.F.W.**

## GoldStar P131

"Dead" was the customer's complaint. As through-RF was fine I removed the power supply and concentrated on the secondary-side electrolytics. CP19 (1,000 $\mu$ F) proved to be useless when checked with a bridge. Once it had been replaced everything worked though the display was very dull. The cause turned out to be CP25 (100 $\mu$ F). **B.L.**

**Akai VS66**

The capstan motor was stalling. I held the spindle, with a dummy cassette inserted, and found that it quivered all the time. Not very technical this, but I deduced that there was a power supply fault. In fact the outputs from the power supply were all unstable, with ripple on them. The culprit was C15 (220 $\mu$ F). **B.L.**

**Panasonic NVL28**

The customer had somehow discovered that intermittent loss of video and sound while recording could be cured by tweaking the input selector switch. Needless to say this switch now had to be replaced. Once this had been done the original fault was apparent when the same PCB was flexed. The cause was dry-joints at the jumper ribbon-cable connections between the front sub-PCBs. What did concern me was that without the customer's hint I certainly wouldn't have started looking for the cause of the trouble in this section of the VCR! **B.L.**

**Thorn VR172L**

There was no display and no deck functions worked. But the modulator was obviously powered. The customer also mentioned that prior to the present situation recordings played back in monochrome. It was very helpful to find that the power module's output connector was marked with the supply voltages that should be present. The 6V output was low at 2V, but increased to 6V when disconnected from the main PCB. As the 6V regulator wasn't running hot, I decided to connect an external 6V supply to the machine. It then worked normally. A replacement KIA78006A regulator, obtained from Chas Hyde & Son, cured the trouble. **B.L.**

**Matsui VP9405**

This machine was dead with the mains fuse intact. I had an Orion D1096 circuit, which is almost identical. It didn't take long to discover that the 470k $\Omega$  start-up resistor R519 was open-circuit, and I was thankful there hadn't been a power supply blow up as there had with the Orion VCR. After a deck service everything was fine. **B.L.**

**Akai VSG745**

There was no E-E sound but playback was OK. Checks showed that there was no audio input to the sound processing PCB and no out-

put from the Nicam PCB. The sound would come and go when the Nicam PCB was tapped. Crystal X1 was so dry-jointed that it was hanging out of the PCB. Resoldering this item restored normal sound. **G.S.**

**Sharp VCM27**

There were heavy interference lines on E-E via the scart output and virtually no E-E picture or playback at RF. A new RF modulator restored normal pictures. **G.S.**

**Toshiba V404B**

The tape speed was incorrect and the back-tension lever was vibrating. The fault gave the impression that the capstan motor speed was varying, with wow on the sound. In fact the cause of the trouble was incorrect seating of the cam slider, giving incorrect operation of the tension-drive lever. When you get this problem, replace all these components, including the hook levers. **J.C.**

**Hitachi VTF450**

The complaint with this machine was no results. I soon found that the N5 (250mA) circuit protector QF901 was open-circuit. It protects the supplies to the mode switch (A5-4V), the EPROM (A5V) and the IC902 reset (B5V). **J.C.**

**Toshiba V705B**

A problem we've had with these machines is intermittent failure to accept a cassette – the fault can be very intermittent. The cause is a faulty cam switch (B432), part number 70031401. **J.C.**

**Sony SLV625U**

If the RVS arm assembly is creased or jammed because the grease has hardened around the spindle, the tape can loop and jam up on the guide poles, preventing tape ejection. To overcome this problem clean the spindle, lightly oil it and reset the height to restore normal operation.

Other causes of failure to eject the tape are a faulty mode switch or a faulty BA6238A loading motor drive chip (IC204). **J.C.**

**Panasonic NVSD400**

There were lines on the playback picture and sound variations. A check on the FM waveform showed that it seemed to be distorted. The cause of the trouble was arm unit P5 (part number VXL2306), which was bent. It should be replaced, but as a tempo-

rary measure it can be bent back to the correct position. **J.C.**

**Toshiba V212B**

The E-E picture was snowy. Reception via the aerial booster was also snowy. We found that the 12V supply to the booster was missing because the BCP53-16 14V regulator transistor TP91 was short-circuit emitter-to-collector. **J.C.**

**Samsung VIK326**

A faulty right-hand side plate is the usual cause of failure to accept a tape. The plastic mount which holds the cog that drives the lift mechanism in and out becomes cracked. It may break off completely. **J.C.**

**Ferguson FV61LV**

Although this machine was supposed to be dead there was a shuffle from the deck when I plugged it in. A quick check showed that RP86 (27 $\Omega$ ) was open-circuit. The replacement got very hot, and an audible whistling came from the power supply. Further checks showed that the supply line voltages were all high. Instead of 14V at TP86E there was 18V. The cause was TP01 (BC858) which was leaky. **C.J.G.**

**Panasonic NVSD40**

A tape was stuck in this machine and the display read H02, which means failure to retract the tape into the cassette. Inspection showed that this was the case, though the loading arms had retracted. At power up there was no movement from any of the motors, but I could wind the tape back into the cassette by turning the capstan with my fingers, so there was no jamming here.

To get to the electronics you have to remove the deck. The clever designer of these machines put a deck fixing screw under the tape carriage: it's inaccessible when there is a tape in the machine. The trick I use is to ease outwards the loading arms at each side of the cassette holder. It's then possible to lift the holder and remove the tape without breaking anything.

The cause of the fault turned out to be dry-joints at the BA6887 loading-motor driver chip IC1, which is right at the front of the PCB. Why the result was failure of the capstan motor to rotate I don't know, but it rotated once IC1 had been resoldered. **C.J.G.**

# VCR Soak Tester

**Fed up with intermittent-fault VCRs that bounce? Ian Rees provides the solution: an automated active soak test system**

**T**he number of times that a service engineer can check a VCR through its functions before releasing it after repair is limited. When a VCR with an intermittent fault came back to me for the third time, I decided that what was required was a means of automatic, active soak testing. The test equipment that was developed to meet this need is described in the following article. It has proved itself many times over in reducing the number of VCRs that might otherwise have been sent back to the customer with an intermittent fault condition still present.

## Design

I felt that the job could be done by using a PC to control a remote-control handset which in turn controlled a VCR's functions. A basic universal remote control unit from CPC was selected for the purpose. It's inexpensive, easy to program and can control a wide range of TV, VCR and satellite receiver brands with all the required functions. To use it to provide active soak testing I had to trace the tracks from its button pads back to the pins of its Zilog 1666 control chip (see Table 1). Only seven lines are needed for the range of six functions required. Several of the functions share control lines: this greatly simplified the interfacing.

The remote-control handset is connected to a control box by a short length of nine-way ribbon cable. This cable is hardwired to the IC pins at one end. At the other

end it's terminated by an IDC plug which is connected to the control box. It is best to power the handset from its own batteries: this enables the memory to be retained when the control box is switched off.

The first prototype used ten reed relays. I designed a special sound-controlled, tone-operated interface for my PC. This switched the reed test sequence from the 'line out' of a sound card, enabling a software program to control the relays directly. The problem was that this tied down my PC while a soak test was in progress, which could be all day for several days.

The second version, described here, uses a dedicated programmer arrangement and is a stand-alone device. I didn't feel it appropriate to use reed relays, and decided instead to use a couple of CD4066 quad bilateral switch ICs. They proved to be a bit troublesome at first in this application, but worked faultlessly once the bugs had been ironed out.

Although the original PC version could call up any combination of test sequences, I found that I tended to use the same sequence most of the time. So this was hardwired into the new unit.

## Circuit Description

Fig. 1 shows the circuit diagram of the finished unit. The output (pin 3) of a 555 timer chip (IC1) feeds clock pulses to pin 14 of a CD4017 decade counter/divider chip (IC2). This useful, inexpensive device has ten outputs, only one of which goes high and stays high until the next clock pulse arrives.

At switch-on C2 charges from the 12V supply, via R3, and resets the counter chip. Pin 3 of IC2 goes high first: the associated indicator LED1 then lights to show that it has reset. The voltage at pin 3 is fed back to pin 7 of the 555 chip via D1 and R6 to shorten its timing period to one second.

The next clock pulse steps IC2 on: pin 3 goes low and pin 2 goes high. The voltage at pin 2 lights LED2 and is applied to switching pin 6 of IC4 via D9 and C3. As a result, pins 8 and 9 of IC3 are shorted. These pins activate the remote control unit's 'power' function: this signal is sent to the VCR on test. The voltage at pin 2 of IC2 is also linked via D2 and R6 to IC1's one-second delay network.

When the next clock pulse arrives from IC1, pin 4 of IC2 goes high. LED 3 (record) lights, and C4 activates pin 12 of IC4. Pins 10 and 11 of IC4 are shorted and a record command is sent to the VCR via the remote-con-

**Table 1: Test sequence, timing periods and connections to the remote-control handset IC.**

Step	Function	Time	1666 pin connections
1	Reset	1sec	-
2	Power	1sec	9-4
3	Record	120secs	9-2
4	Stop	1sec	13-2
5	Rewind	30secs	12-2
6	Play	120secs	9-3
7	Fast forward	30secs	11-2
8	Stop	1sec	13-2
9	Rewind	30secs	12-2
10	Power	1sec	9-4

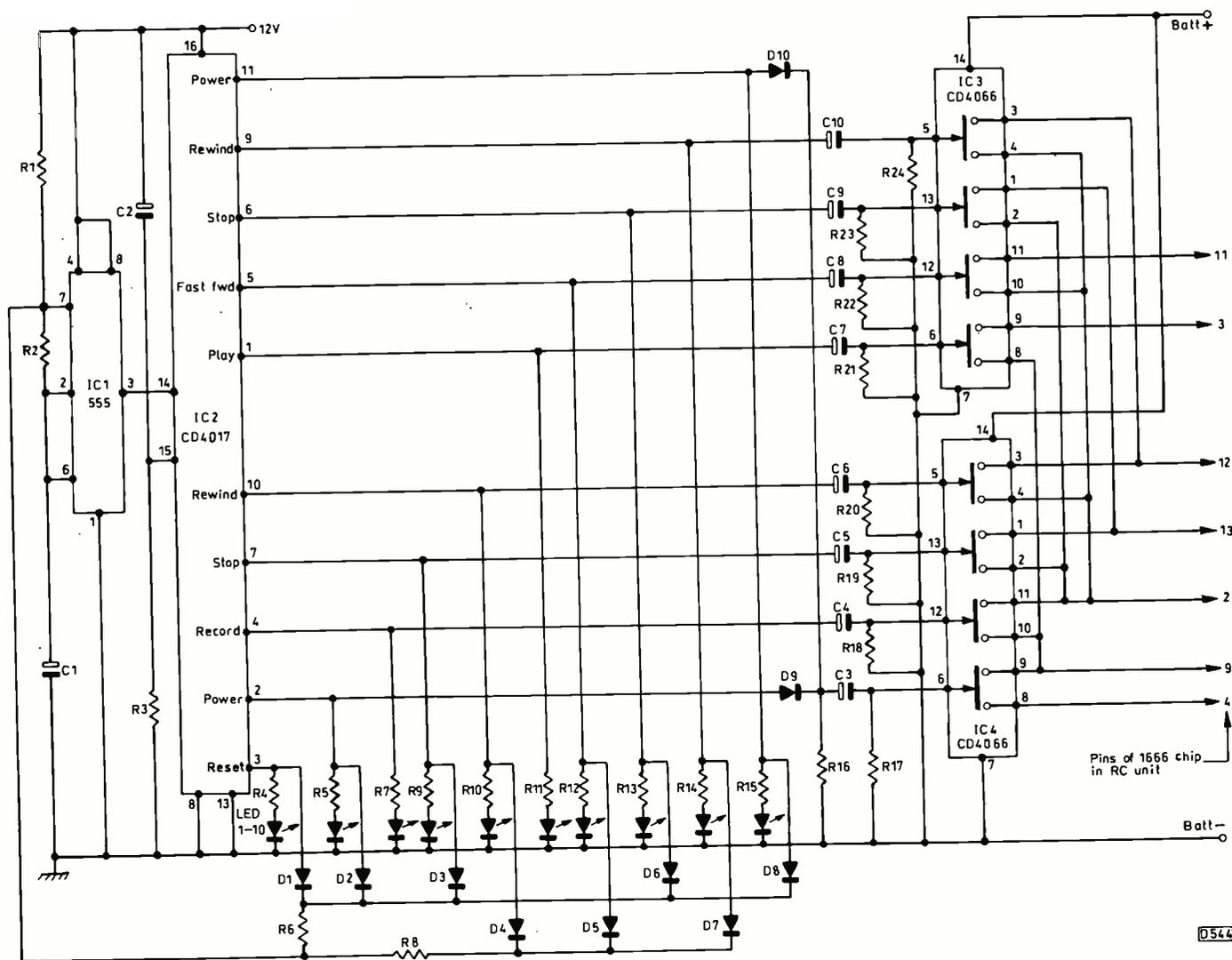


Fig. 1: Circuit diagram of the control unit, which drives the remote-control handset. CMOS switch version.

trol handset. With the record test there is no feedback to the timer chip IC1, so a full two minutes of recording time is allowed.

The next clock pulse from IC1 stops the VCR, and so on through the test program. Once the cycle has been completed it's repeated from the beginning.

The timing periods for the two rewinds and for fast forward (search) are set at thirty seconds by feedback via D4, D5 and D7 then R8 to IC1 (pin 7).

Note that all the commands to the remote-control handset are momentary. This is important to conserve battery power.

The sequence of commands and the timing periods programmed into the unit are listed in Table 1. The Zilog 1666 IC pins listed are those that have to be connected together to obtain particular functions.

The timing arrangement provides a complete test cycle every 5.6 minutes, i.e. nearly eleven full test cycles an hour.

**Construction**

No problems should be experienced in building this unit. Nothing is critical, all parts being cheap and easy to obtain from suppliers such as CPC, Maplin, RS etc.

Although the CPC handset may not be available outside the UK, or may become unobtainable or change, with care it would be very easy to repeat the process of tracing the button pads back to the control IC and modifying the connections accordingly.

I used an IDC connector for the ribbon cable at the

control box end. This was primarily because I was too short of cash to use more than one handset. So I plug and unplug the same one, using it between various test beds. Use of hardwiring at both ends of the ribbon would simplify construction.

**Parts list**

R1	1MΩ	C1	330μF, 40V
R2-3	1kΩ	C2-10	1μF, 60V
R4-5	680Ω	C11	470μF, 25V
R6	2.7kΩ	C12-13	0.1μF, 100V ceramic
R7	680Ω		
R8	56kΩ	D1-10	1N4148
R9-15	680Ω	D11-14	BY127 (1A)
R16	10kΩ	LED1	5mm green
R17-24	2.2kΩ	LED2-9	5mm red
All	0.25W, 5%		

IC1	555 timer
IC2	CD4017 decade counter/timer
IC3-4	CD4066 quad bilateral switch
IC5	7812 12V, 1A voltage regulator

F1	100mA fuse and holder
S1	DPST, 1A mains switch
T1	0-15V AC, 100mA mains transformer
CPC UR3 universal programmable remote control unit, order code HSUR3	

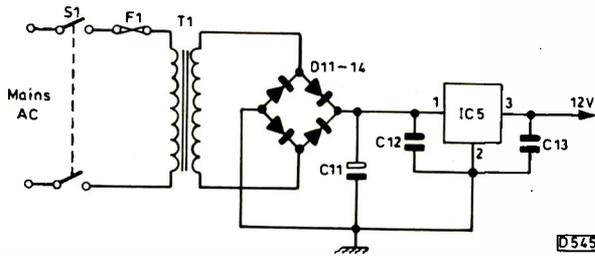


Fig. 2: The mains power supply circuit.

Fig. 3: Optional mechanical counter.

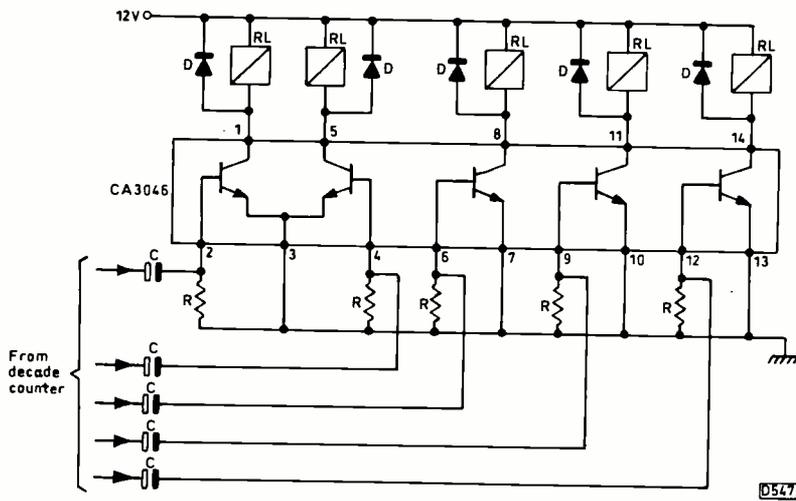
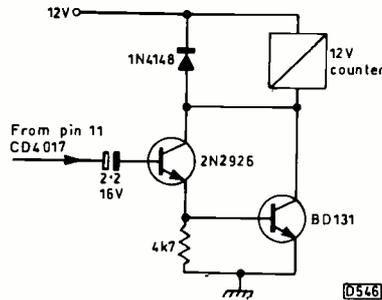


Fig. 4: Alternative reed relay circuit. Two CA3046 chips etc. are required. C = 22µF, 16V, R = 2.2kΩ, D = 1N4148, RL = 12V reed relay.

The length of the ribbon cable between the control box and the handset is about 12in. This is more than enough to set up and position the unit.

A slot was filed out at the bottom end of the remote-control handset to enable the ribbon cable to be brought into it. Splay out the leads and solder them directly to the IC pins as specified in Fig. 1. The ribbon cable was glued inside the plastic handset case using Bostic, a Tyewrap being used to anchor it in place. There's a small pillar that needs to be cut back to enable the top of the handset to be refitted without springing upwards on the ribbon cable.

The unit has undergone several metamorphoses since its inception, but still lives in its original sloped-top case. It has a stop/run switch and a reset button. As these are little used I have omitted them here.

The power supply (Fig. 2) is mounted in the control box on the same matrix board as the rest of the circuitry. The 12V stabiliser IC5 doesn't need a heatsink. The

two 0.1µF ceramic capacitors C12 and C13 must be mounted as close to the input and output pins 1 and 3 of IC5 as possible, to prevent instability.

Fig. 3 shows how a small electromechanical counter can be added to provide a tally of the number of soak-test cycles completed. I put the reading on the bill: it impresses the customer!

The step timings (Table 1) are approximate – there is no need for accuracy. I've used a higher working voltage capacitor in position C1 than is theoretically necessary: this was done deliberately, to keep the leakage low. The 1µF capacitors C3-10 must not leak, otherwise the remote control unit will operate continuously during the relevant step in the cycle.

The two steering diodes D9 and D10 enable one quad switch section to operate during two of IC2's outputs. This was done because otherwise I would have had to use another quad IC to complete step 10, leaving three unused IC switches. The reset position does nothing, because I found that I got spurious starts at switch on if I triggered the first step from here. This caused handset lock-up – with both the reed and quad-switch versions.

It's important that the supply for the two quad switch ICs comes from the batteries in the remote-control handset. The first mistake I made was to use the main power supply for this purpose. The quad IC outputs go low or unstable when the supply is removed, with the result that the handset either flashes continuously or locks up whenever the control unit is switched off. Being CMOS devices the quad ICs draw little current. They can be left connected to the remote-control unit's batteries with minimal current being drawn.

If you are unlucky and close more than one contact on the CPC unit and the result is a total lock-up of all functions, there's a simple solution. Disconnect the battery supply by removing one cell, then put it back again. This will restore operation. Phew!

### Relay Version

If you feel more at home with 12V reed relays, Fig. 4 shows the circuit used in the first prototype. The driver transistors are contained within a couple of CA3046 14-pin DIL npn transistor arrays. Two arrays provide ten driver transistors, so the component count is small. Note that pin 3 of the IC has two of the transistors connected to it.

### Use

In use, the VCR has to be in line-of-sight of the remote-control handset. This is obvious, but make sure that you don't put it where you can walk between the handset and the VCR on test and obscure the link.

The handset must be programmed for use with the VCR being tested while the control box is switched off. The functions can be confirmed by using the handset buttons to make sure that every step in the test cycle works.

The VCR has to be in standby at the start of the tests, and a fully rewound tape must be inserted. The control unit resets at switch-on: one second later, VCR power-up starts. Each step in the cycle is indicated by the LEDs, one of which will always be lit.

Ideally the VCR should be connected to a TV set and an aerial, so that you can observe the results of the record and playback tests. This is a good indication that all is well.

Resetting is just a matter of turning off the control unit for a few seconds then turning it back on again. The VCR will have to be put back in step with the first test before restarting.

## TRANSISTORS/LINEAR ICs

Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price		
BC107	8p	BD434	31p	BU126	65p	BUV48AF	325p	MJ4502	300p	4N35	50p	LINEAR ICs	AN6340	600p	BA335	55p	BA7004	200p	
BC108	8p	BD435	31p	BU128	125p	BUV48C	250p	MJ10012	300p			AN203	210p	AN6111	200p	BA338	80p	BA7007	200p
BC109	8p	BD436	31p	BU133	125p	BUV50	425p	MJ11015	250p			AN210	165p	AN6344	440p	BA340	75p	BA7021	180p
BC140	20p	BD438	36p	BU137	150p	BUV61	1000p	MJ11016	250p	RECTIFIER DIODES		AN211Q	170p	AN6345	400p	BA343	60p	BA7022	350p
BC142	20p	BD439	40p	BU180	100p	BUV70	200p	MJ11032	800p			AN217P	95p	AN6346	350p	BA401	175p	BA7025L	190p
BC143	20p	BD440	40p	BU180	100p	BUV93	175p	MJ15003	250p	BY127	8p	AN228	280p	AN6350	610p	BA402	60p	BA7107	475p
BC147	8p	BD441	40p	BU205	70p	BUW11A	220p	MJ15004	250p	BY133	8p	AN252	150p	AN6356	300p	BA511	145p	BA7212S	200p
BC149	8p	BD533	38p	BU206	100p	BUW11AF	220p	MJ15015	250p	BY139	35p	AN259	250p	AN6359	500p	BA514	160p	BA7252S	150p
BC159	8p	BD534	38p	BU207	150p	BUW12	125p	MJ15016	250p	BY184	32p	AN262	140p	AN6360	320p	BA518	150p	BA7604N	100p
BC172	10p	BD537	38p	BU208A	75p	BUW12A	150p	MJ15022	400p	BY206	11p	AN274	250p	AN6362	400p	BA521	100p	BA7751LS	150p
BC177	14p	BD538	40p	BU208B	200p	BUW13A	200p	MJ15023	400p	BY227	19p	AN278	400p	AN6363	375p	BA524	240p	BA7767AS	150p
BC178	14p	BD643	50p	BU208D	130p	BUW48	550p	MJ15025	700p	BY298	15p	AN301	330p	AN6367NK	400p	BA526	180p	BA8504	350p
BC182	7p	BD644	50p	BU209	90p	BUW49	550p	MJE340	30p	BY298	80p	AN302	650p	AN6368	275p	BA527	95p	BA8504	350p
BC182L	7p	BD645	50p	BU228	120p	BUW81A	150p	MJE350	30p	BY298-1200	150p	AN303	250p	AN6371	350p	BA532	100p	CA3140E	38p
BC183	7p	BD675	50p	BU312	90p	BUW84	75p	MJE3055T	65p	BY448	85p	AN304	360p	AN6372	480p	BA534	220p	CX1082A	50p
BC183L	7p	BD676	50p	BU325	55p	BUW85	85p	MJE3055T	65p	BY448	85p	AN304	360p	AN6373	600p	BA536	150p	CX1082A	50p
BC184	7p	BD677	38p	BU326A	75p	BUX10	30p	MJE3055T	65p	BYT11-1000	30p	AN305	250p	AN6374	480p	BA538	150p	CX133A	600p
BC184L	7p	BD678	40p	BU326B	75p	BUX11	30p	MJE3055T	65p	BYT11-1000	30p	AN306	150p	AN6375	480p	BA540	150p	CX133A	600p
BC188	7p	BD679	40p	BU326C	75p	BUX12	150p	MJE3055T	65p	S2055AF	175p	AN307	150p	AN6376	480p	BA541	150p	CX133A	600p
BC188L	7p	BD680	40p	BU326D	75p	BUX13	150p	MJE3055T	65p	S2530A	100p	AN308	150p	AN6377	480p	BA542	150p	CX133A	600p
BC189	7p	BD681	40p	BU326E	75p	BUX14	150p	MJE3055T	65p	S2530A	100p	AN309	150p	AN6378	480p	BA543	150p	CX133A	600p
BC189L	7p	BD682	40p	BU326F	75p	BUX15	150p	MJE3055T	65p	S2530A	100p	AN310	150p	AN6379	480p	BA544	150p	CX133A	600p
BC192	7p	BD683	40p	BU326G	75p	BUX16	150p	MJE3055T	65p	S2530A	100p	AN311	150p	AN6380	480p	BA545	150p	CX133A	600p
BC192L	7p	BD684	40p	BU326H	75p	BUX17	150p	MJE3055T	65p	S2530A	100p	AN312	150p	AN6381	480p	BA546	150p	CX133A	600p
BC193	7p	BD685	40p	BU326I	75p	BUX18	150p	MJE3055T	65p	S2530A	100p	AN313	150p	AN6382	480p	BA547	150p	CX133A	600p
BC193L	7p	BD686	40p	BU326J	75p	BUX19	150p	MJE3055T	65p	S2530A	100p	AN314	150p	AN6383	480p	BA548	150p	CX133A	600p
BC194	7p	BD687	40p	BU326K	75p	BUX20	150p	MJE3055T	65p	S2530A	100p	AN315	150p	AN6384	480p	BA549	150p	CX133A	600p
BC194L	7p	BD688	40p	BU326L	75p	BUX21	150p	MJE3055T	65p	S2530A	100p	AN316	150p	AN6385	480p	BA550	150p	CX133A	600p
BC195	7p	BD689	40p	BU326M	75p	BUX22	150p	MJE3055T	65p	S2530A	100p	AN317	150p	AN6386	480p	BA551	150p	CX133A	600p
BC195L	7p	BD690	40p	BU326N	75p	BUX23	150p	MJE3055T	65p	S2530A	100p	AN318	150p	AN6387	480p	BA552	150p	CX133A	600p
BC196	7p	BD691	40p	BU326O	75p	BUX24	150p	MJE3055T	65p	S2530A	100p	AN319	150p	AN6388	480p	BA553	150p	CX133A	600p
BC196L	7p	BD692	40p	BU326P	75p	BUX25	150p	MJE3055T	65p	S2530A	100p	AN320	150p	AN6389	480p	BA554	150p	CX133A	600p
BC197	7p	BD693	40p	BU326Q	75p	BUX26	150p	MJE3055T	65p	S2530A	100p	AN321	150p	AN6390	480p	BA555	150p	CX133A	600p
BC197L	7p	BD694	40p	BU326R	75p	BUX27	150p	MJE3055T	65p	S2530A	100p	AN322	150p	AN6391	480p	BA556	150p	CX133A	600p
BC198	7p	BD695	40p	BU326S	75p	BUX28	150p	MJE3055T	65p	S2530A	100p	AN323	150p	AN6392	480p	BA557	150p	CX133A	600p
BC198L	7p	BD696	40p	BU326T	75p	BUX29	150p	MJE3055T	65p	S2530A	100p	AN324	150p	AN6393	480p	BA558	150p	CX133A	600p
BC199	7p	BD697	40p	BU326U	75p	BUX30	150p	MJE3055T	65p	S2530A	100p	AN325	150p	AN6394	480p	BA559	150p	CX133A	600p
BC199L	7p	BD698	40p	BU326V	75p	BUX31	150p	MJE3055T	65p	S2530A	100p	AN326	150p	AN6395	480p	BA560	150p	CX133A	600p
BC200	7p	BD699	40p	BU326W	75p	BUX32	150p	MJE3055T	65p	S2530A	100p	AN327	150p	AN6396	480p	BA561	150p	CX133A	600p
BC200L	7p	BD700	40p	BU326X	75p	BUX33	150p	MJE3055T	65p	S2530A	100p	AN328	150p	AN6397	480p	BA562	150p	CX133A	600p
BC201	7p	BD701	40p	BU326Y	75p	BUX34	150p	MJE3055T	65p	S2530A	100p	AN329	150p	AN6398	480p	BA563	150p	CX133A	600p
BC201L	7p	BD702	40p	BU326Z	75p	BUX35	150p	MJE3055T	65p	S2530A	100p	AN330	150p	AN6399	480p	BA564	150p	CX133A	600p
BC202	7p	BD703	40p	BU327A	75p	BUX36	150p	MJE3055T	65p	S2530A	100p	AN331	150p	AN6400	480p	BA565	150p	CX133A	600p
BC202L	7p	BD704	40p	BU327B	75p	BUX37	150p	MJE3055T	65p	S2530A	100p	AN332	150p	AN6401	480p	BA566	150p	CX133A	600p
BC203	7p	BD705	40p	BU327C	75p	BUX38	150p	MJE3055T	65p	S2530A	100p	AN333	150p	AN6402	480p	BA567	150p	CX133A	600p
BC203L	7p	BD706	40p	BU327D	75p	BUX39	150p	MJE3055T	65p	S2530A	100p	AN334	150p	AN6403	480p	BA568	150p	CX133A	600p
BC204	7p	BD707	40p	BU327E	75p	BUX40	150p	MJE3055T	65p	S2530A	100p	AN335	150p	AN6404	480p	BA569	150p	CX133A	600p
BC204L	7p	BD708	40p	BU327F	75p	BUX41	150p	MJE3055T	65p	S2530A	100p	AN336	150p	AN6405	480p	BA570	150p	CX133A	600p
BC205	7p	BD709	40p	BU327G	75p	BUX42	150p	MJE3055T	65p	S2530A	100p	AN337	150p	AN6406	480p	BA571	150p	CX133A	600p
BC205L	7p	BD710	40p	BU327H	75p	BUX43	150p	MJE3055T	65p	S2530A	100p	AN338	150p	AN6407	480p	BA572	150p	CX133A	600p
BC206	7p	BD711	40p	BU327I	75p	BUX44	150p	MJE3055T	65p	S2530A	100p	AN339	150p	AN6408	480p	BA573	150p	CX133A	600p
BC206L	7p	BD712	40p	BU327J	75p	BUX45	150p	MJE3055T	65p	S2530A	100p	AN340	150p	AN6409	480p	BA574	150p	CX133A	600p
BC207	7p	BD713	40p	BU327K	75p	BUX46	150p	MJE3055T	65p	S2530A	100p	AN341	150p	AN6410	480p	BA575	150p	CX133A	600p
BC207L	7p	BD714	40p	BU327L	75p	BUX47	150p	MJE3055T	65p	S2530A	100p	AN342	150p	AN6411	480p	BA576	150p	CX133A	600p
BC208	7p	BD715	40p	BU327M	75p	BUX48	150p	MJE3055T	65p	S2530A	100p	AN343	150p	AN6412	480p	BA577	150p	CX133A	600p
BC208L	7p	BD716	40p	BU327N	75p	BUX49	150p	MJE3055T	65p	S2530A	100p	AN344	150p	AN6413	480p	BA578	150p	CX133A	600p
BC209	7p	BD717	40p	BU327O	75p	BUX50	150p	MJE3055T	65p	S2530A	100p	AN345	150p	AN6414	480p	BA579	150p	CX133A	600p
BC209L	7p	BD718	40p	BU327P	75p	BUX51	150p	MJE3055T	65p	S2530A	100p	AN346	150p	AN6415	480p	BA580	150p	CX133A	600p
BC210	7p	BD719	40p	BU327Q	75p	BUX52	150p	MJE3055T	65p	S2530A	100p	AN347	150p	AN6416	480p	BA581	150p	CX133A	600p
BC210L	7p	BD720	40p	BU327R	75p	BUX53	150p	MJE3055T	65p	S2530A	100p	AN348	150p	AN6417	480p	BA582	150p	CX133A	600p
BC211	7p	BD721	40p	BU327S	75p	BUX54	150p	MJE3055T	65p	S2530A	100p	AN349	150p	AN6418	480p	BA583	150p	CX133A	600p
BC211L	7p	BD722	40p	BU327T	75p	BUX55	150p	MJE3055T	65p	S2530A	100p	AN350	150p	AN6419	480p	BA584	150p	CX133A	600p
BC212	7p	BD723	40p	BU327U	75p	BUX56	150p	MJE3055T	65p	S2530A	100p	AN351	150p	AN6420	480p	BA585	150p	CX133A	600p
BC212L	7p	BD724	40p	BU327V	75p	BUX57	150p	MJE3055T	65p	S2530A	100p	AN352	150p	AN6421	480p	BA586	150p	CX133A	600p
BC213	7p	BD725	40p	BU327W															





# JAPANESE TRANSISTORS

Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price		
2SC1675	90p	2SC2261	700p	2SC2719	25p	2SC3263	280p	2SC3798	220p	2SD257	195p	2SD880	40p	2SD1327	150p	2SD1763A	60p	2SK312	750p
2SC1678	80p	2SC2267	80p	2SC2721	120p	2SC3264	390p	2SC3807	120p	2SD287	250p	2SD882	25p	2SD1328	60p	2SD1764	70p	2SK315	70p
2SC1683	100p	2SC2270	90p	2SC2724	15p	2SC3269	50p	2SC3808	70p	2SD291	250p	2SD889	35p	2SD1330	50p	2SD1765	70p	2SK320	120p
2SC1684	30p	2SC2271	25p	2SC2727	200p	2SC3270	50p	2SC3811	80p	2SD313	25p	2SD892A	75p	2SD1337	70p	2SD1770	110p	2SK323	130p
2SC1685	30p	2SC2274	15p	2SC2729	350p	2SC3271	75p	2SC3831	250p	2SD315	25p	2SD894	100p	2SD1348	65p	2SD1773	70p	2SK332	175p
2SC1729	900p	2SC2275	50p	2SC2750	300p	2SC3277	280p	2SC3832	135p	2SD325	30p	2SD895	35p	2SD1350	150p	2SD1776	100p	2SK333	120p
2SC1730	10p	2SC2278	70p	2SC2751	270p	2SC3279	30p	2SC3833	250p	2SD330	65p	2SD896	200p	2SD1376	60p	2SD1783	70p	2SK359	40p
2SC1735	70p	2SC2283	1800p	2SC2752	75p	2SC3280	200p	2SC3851	100p	2SD348	300p	2SD898B	225p	2SD1378	80p	2SD1785	160p	2SK363	50p
2SC1740	10p	2SC2290	70p	2SC2767	300p	2SC3281	200p	2SC3852	80p	2SD350	320p	2SD900	400p	2SD1379	100p	2SD1789	210p	2SK364	40p
2SC1741	35p	2SC2291	40p	2SC2769	400p	2SC3282	600p	2SC3853	220p	2SD357	40p	2SD905	450p	2SD1380	100p	2SD1791	120p	2SK367	40p
2SC1755	90p	2SC2298	35p	2SC2773	700p	2SC3293	85p	2SC3855	220p	2SD358	40p	2SD916	130p	2SD1382	60p	2SD1802	75p	2SK369	30p
2SC1756	35p	2SC2307	300p	2SC2774	500p	2SC3298	50p	2SC3857	500p	2SD359	50p	2SD917	300p	2SD1384	50p	2SD1806	75p	2SK373	40p
2SC1758	30p	2SC2308	10p	2SC2785	40p	2SC3299	120p	2SC3858	550p	2SD361	100p	2SD921	320p	2SD1390	350p	2SD1812	45p	2SK374	45p
2SC1760	70p	2SC2312	30p	2SC2786	20p	2SC3300	400p	2SC3866	275p	2SD362	100p	2SD923	360p	2SD1391	250p	2SD1815	50p	2SK376	50p
2SC1775	10p	2SC2314	70p	2SC2787	10p	2SC3303	100p	2SC3868	100p	2SD371	240p	2SD946	120p	2SD1392	85p	2SD1825	60p	2SK386	600p
2SC1781	20p	2SC2316	150p	2SC2791	500p	2SC3306	130p	2SC3870	200p	2SD380	650p	2SD947	100p	2SD1395	100p	2SD1827	120p	2SK389	115p
2SC1789	100p	2SC2320	10p	2SC2792	220p	2SC3307	600p	2SC3884	25p	2SD381	50p	2SD950	300p	2SD1396	120p	2SD1843	70p	2SK400	700p
2SC1809	40p	2SC2324	120p	2SC2793	700p	2SC3309	150p	2SC388A	210p	2SD382	75p	2SD951	200p	2SD1397	100p	2SD1846	350p	2SK405	450p
2SC1810	250p	2SC2328A	50p	2SC2808	40p	2SC3310	125p	2SC3884A	200p	2SD386	70p	2SD957A	520p	2SD1398	120p	2SD1847	275p	2SK414	550p
2SC1815	10p	2SC2310	25p	2SC2810	360p	2SC3316	280p	2SC3885	250p	2SD388	150p	2SD958	80p	2SD1399	300p	2SD1849	280p	2SK415	500p
2SC1819	70p	2SC2315	175p	2SC2812	40p	2SC3317	350p	2SC3885A	290p	2SD389	60p	2SD965	35p	2SD1400	280p	2SD1850	325p	2SK423	75p
2SC1826	60p	2SC2329	480p	2SC2814	75p	2SC3326	50p	2SC3886A	275p	2SD400	14p	2SD970	170p	2SD1402	120p	2SD1853	40p	2SK427	50p
2SC1827	60p	2SC2230	300p	2SC2824	75p	2SC3327	60p	2SC3890	150p	2SD401	50p	2SD972	40p	2SD1403	225p	2SD1856	40p	2SK430	200p
2SC1829	500p	2SC2331	50p	2SC2825	900p	2SC3328	50p	2SC3892A	250p	2SD402	120p	2SD973	70p	2SD1405	80p	2SD1857	75p	2SK431	40p
2SC1833	27p	2SC2333	200p	2SC2826	200p	2SC3330	20p	2SC3893	225p	2SD414	45p	2SD973A	60p	2SD1406	60p	2SD1858	40p	2SK432	250p
2SC1834	50p	2SC2334	80p	2SC2827	130p	2SC3331	25p	2SC3895	325p	2SD415	55p	2SD982	90p	2SD1407	60p	2SD1859	35p	2SK433	325p
2SC1841	12p	2SC2335	55p	2SC2832	300p	2SC3333	120p	2SC3896	400p	2SD424	350p	2SD985	120p	2SD1408	125p	2SD1864	85p	2SK436	180p
2SC1844	50p	2SC2336A	125p	2SC2834	280p	2SC3345	100p	2SC3897	400p	2SD426	150p	2SD986	120p	2SD1409	170p	2SD1877	175p	2SK437	350p
2SC1845	15p	2SC2344	150p	2SC2837	250p	2SC3346	130p	2SC3907	250p	2SD427	350p	2SD988	70p	2SD1411	85p	2SD1878	160p	2SK438	700p
2SC1846	35p	2SC2347	35p	2SC2839	40p	2SC3352	200p	2SC3927	250p	2SD438	35p	2SD1010	40p	2SD1412	75p	2SD1879	275p	2SK439	900p
2SC1847	45p	2SC2353	120p	2SC2853	70p	2SC3353	280p	2SC3940	40p	2SD467	15p	2SD1012	40p	2SD1413	60p	2SD1880	360p	2SK440	350p
2SC1855	85p	2SC2360	120p	2SC2873	60p	2SC3355	120p	2SC3944	75p	2SD478	15p	2SD1020	40p	2SD1415	190p	2SD1881	350p	2SK441	1100p
2SC1856	25p	2SC2361	150p	2SC2877	120p	2SC3356	120p	2SC3944	75p	2SD478	15p	2SD1021	120p	2SD1417	75p	2SD1884	300p	2SK442	30p
2SC1865	700p	2SC2362	50p	2SC2878	20p	2SC3358	50p	2SC3950	120p	2SD476	100p	2SD1022	250p	2SD1425	260p	2SD1886	300p	2SK443	50p
2SC1870	700p	2SC2365	280p	2SC2879	320p	2SC3376	300p	2SC3953	50p	2SD525	50p	2SD1024	850p	2SD1426	135p	2SD1887	225p	2SK452	250p
2SC1871	425p	2SC2369	100p	2SC2882	60p	2SC3377	50p	2SC3955	60p	2SD526	70p	2SD1027	850p	2SD1427	160p	2SD1894	300p	2SK453	225p
2SC1875	220p	2SC2371	25p	2SC2883	80p	2SC3378	120p	2SC3956	100p	2SD545	18p	2SD1030	75p	2SD1428	180p	2SD1895	225p	2SK454	30p
2SC1881	70p	2SC2373	210p	2SC2898	200p	2SC3379	1200p	2SC3972	250p	2SD549	120p	2SD1031	70p	2SD1430	280p	2SD1910	175p	2SK455	500p
2SC1890	15p	2SC2383	50p	2SC2909	50p	2SC3381	130p	2SC3973	210p	2SD551	300p	2SD1036	600p	2SD1431	200p	2SD1911	300p	2SK457	400p
2SC1895	500p	2SC2389	45p	2SC2959	60p	2SC3383	80p	2SC3975	210p	2SD554	225p	2SD1046	200p	2SD1432	400p	2SD1913	50p	2SK459	600p
2SC1904	125p	2SC2407	110p	2SC2910	25p	2SC3393	80p	2SC3981	180p	2SD555	500p	2SD1047	180p	2SD1433	300p	2SD1929	50p	2SK460	580p
2SC1906	15p	2SC2408	120p	2SC2911	80p	2SC3397	20p	2SC3986	600p	2SD556	225p	2SD1051	130p	2SD1438	60p	2SD1930	50p	2SK461	475p
2SC1907	20p	2SC2412K	50p	2SC2912	120p	2SC3399	50p	2SC3987	1250p	2SD558	200p	2SD1055	60p	2SD1439	165p	2SD1933	45p	2SK462	70p
2SC1909	250p	2SC2440	200p	2SC2921	650p	2SC3400	35p	2SC3988	80p	2SD560	50p	2SD1060	130p	2SD1441	220p	2SD1939	80p	2SK463	80p
2SC1913	90p	2SC2458	10p	2SC2922	480p	2SC3401	50p	2SC4006	10p	2SD571	20p	2SD1062	150p	2SD1442	80p	2SD1941	350p	2SK464	950p
2SC1914	30p	2SC2459	50p	2SC2923	75p	2SC3402	40p	2SC4020	150p	2SD575	530p	2SD1063	200p	2SD1445	200p	2SD1944	50p	2SK465	1150p
2SC1921	15p	2SC2466	55p	2SC2928	550p	2SC3405	130p	2SC4023	325p	2SD592	25p	2SD1064	250p	2SD1446	300p	2SD1958	80p	2SK466	100p
2SC1922	175p	2SC2486	275p	2SC2928	280p	2SC3409	400p	2SC4029	35p	2SD596	25p	2SD1065	160p	2SD1450	60p	2SD1959	210p	2SK467	300p
2SC1923	10p	2SC2492	50p	2SC2934	75p	2SC3416	90p	2SC4043	45p	2SD600	30p	2SD1069	150p	2SD1451	200p	2SD1978	50p	2SK468	100p
2SC1929	180p	2SC2470	65p	2SC2937	250p	2SC3417	90p	2SC4046	40p	2SD601	40p	2SD1073	350p	2SD1452	275p	2SD1984	60p	2SK469	500p
2SC1940	110p	2SC2481	120p	2SC2939	400p	2SC3419	120p	2SC4056	200p	2SD602	60p	2SD1088	150p	2SD1453	140p	2SD1991	50p	2SK470	550p
2SC1941	27p	2SC2482	20p	2SC2944	300p	2SC3420	80p	2SC4059	40p	2SD612	50p	2SD1094	375p	2SD1455	200p	2SD1994	200p	2SK471	425p
2SC1942	350p	2SC2483	120p	2SC2958	50p	2SC3421	45p	2SC4064	140p	2SD613	70p	2SD1110	225p	2SD1457	165p	2SD1996	45p	2SK472	475p
2SC1944	350p	2SC2484	185p	2SC2962	800p	2SC3422	75p	2SC4106	150p	2SD617	30p	2SD1111	20p	2SD1458	50p	2SD2006	75p	2SK473	400p
2SC1945	150p	2SC2485	400p	2SC2979	160p	2SC3423	65p	2SC4107	175p	2SD633	70p	2SD1113	225p	2SD1459	60p	2SD2010	250p	2SK474	300p
2SC1946	350p	2SC2491	200p	2SC2987	250p	2SC3425	85p	2SC4123	200p	2SD636	10p	2SD1128	200p	2SD1468	40p	2SD2011	60p	2SK475	500p
2SC1947	450p	2SC2498	50p	2SC2988	150p	2SC3446	150p	2SC4124	200p	2SD637	15p	2SD1133	85p	2SD1487	225p	2SD2012	50p	2SK476	500p
2SC1953	45p	2SC2500	25p	2SC2995	60p	2SC3447	130p	2SC4125	275p	2SD638	15p	2SD1135	75p	2SD1494	150p	2SD2018	65p	2SK477	200p
2SC1957	70p	2SC2502	140p	2SC2999	50p	2SC3456	200p	2SC4137	40p	2SD639	20p	2SD1138	40p	2SD1496	300p	2SD2033	80p	2SK478	800p
2SC1959	10p	2SC2503	600p	2SC3001	1400p	2SC3457	125p	2SC4138	200p	2SD640	350p	2SD1140	40p	2SD1497	230p	2SD2061	100p	2SK479	225p
2SC1962	175p	2SC2512	20p	2SC3019	320p	2SC3459	180p	2SC4157	400p	2SD655	18p	2SD1142	350p	2SD1497-02	350p	2SD2066	50p	2SK480	300p
2SC1967	1300p	2SC2517	120p	2SC3020	1450p	2SC346													

# REPLACEMENT VIDEO HEADS

MModel	Price	Model	Price	Model	Price	Model	Price
<b>AKAI</b>		VHSAN3	800p	HRD750, HRD830, HRD860	1900p	NVFS 100	4500p
VS105, 112, 115, 116, 120, 125, 126, 201, 202, 205, 220, 240, 244, 245, 247, 248, 250, 301, 303, 304, VSP8, VSP82, VSP82	850p	VHSAY3	2100p	HRD250, HRD257	1800p	NVFS1	4200p
VP7100, VS9300, VS9500	900p	VHSBH1, VHSCH1	850p	3V32, 8942, HR7655	1800p	<b>N.E.C.</b>	
VF7200, VS9700, VS9800	900p	VHSBP1	2600p	HRD180, 190, 230, 610, 3V59, FV12L, FV20B, 26, 30, 32, 33, VC141L	1600p	N9011, 9012, 9013E, 9014E, 9014G, 9015, 9016, 901A, 902A, 9033, N9034, 9040, 9053, 9054, 9055, 9056, 9063, 9065, 9066, 906, 9077	
VS1	900p	VHSD52	1600p	HRD370, HRD430, HRD470, 3V58, FV13H	1800p	N9095, DX1000, 1600, PX1200	850p
VS2	900p	VHSEH2, VHSDD2	1600p	HRD530, HRD700, HRD840, HRD870, HRD875, FV14T, FV57H	2300p	N911A, 914C, 915A, 916A, 917, 910, 9120	2400p
VS3	900p	VHSEF1, VHSF2	1400p	GRC1, GRC2, 3 V41	2800p	PVC600, 740, 744, 754, 763E, 764, FV2300, 2400, 760, 794, 770, 774	1650p
VS10	1350p	VHSGF2, VHSFG4, VHSF63, VHSFB3	1300p	BR9060, HRD330, 337, 440, 441, 637, 641, 660, 670, 720, 730, 740, 820	1600p	N830, N381, N830, N831, N832, N833, N834, N835, N836	550p
VS11	900p	VHSTJ1, VHSJ2, VHSJ3, VHSJ4	700p	HRC100, SR3300MS, FV44L	1600p	DX4000, N9610, NS7000	2400p
VS19	900p	VHSVH4, VHSWH1, VHSXH1, VHSYH2	700p	HRD960, HRD960, HRD980, FV46	4500p	N895	1800p
VS33, 35, 37, 38, 38EOG MKII, 53, 55, 65, 765, 766, 767, 768, 865, 867	1600p	VHSVJ2	700p	VZ395, BR5600, SRS368E	2600p	N9052, N9530, DX2000	3400p
VSF30, 33, 4, 400, 410, 420, 430, 440, 441, 450, 455, 480, 490, 497, VSG51, 54, 55, VXS450, VXS470	2250p	VHSVJ3	700p	FV22L	1400p	VCP1	1700p
VS512, VS515, VS516	2250p	<b>GRUNDIG</b>		FV42	2600p	PVC2300, 2400, 740, 744, 760, 764	1400p
VSA462, 465, 467, 467EOG2, VSF12, 15EK, 15EOH, 300, 301, 310, 280	2300p	VS410, 415, 435, 450, 456, 460, 500, 505, 510, 520, 521, 530, 540	1600p	VR182LV, VR202LV	1950p	6842	3500p
VSF220, 330, 340, 350, VSG30, 33, 34, 35	1000p	VS450, 450, 451, 5510, VS400, 440, 441, 500, 505, 510, 518, 600, 610, VS5180, VS5190, 700, 900, 901, 902, 9091, GV200, 201, 2092, SE2100, 5110	1400p	FV67HV, FV68TX, FV77	3800p	VR641, VR6540, VR6541, VR6640, VR6641, VR6642, VR6643, VR6644, VR6645, VR6646, VR6647, VR6648, VR6649, VR6650, VR6651, VR6652, VR6653, VR6654, VR6655, VR6656, VR6657, VR6658, VR6659, VR6660, VR6661, VR6662, VR6663, VR6664, VR6665, VR6666, VR6667, VR6668, VR6669, VR6670, VR6671, VR6672, VR6673, VR6674, VR6675, VR6676, VR6677, VR6678, VR6679, VR6680, VR6681, VR6682, VR6683, VR6684, VR6685, VR6686, VR6687, VR6688, VR6689, VR6690, VR6691, VR6692, VR6693, VR6694, VR6695, VR6696, VR6697, VR6698, VR6699, VR6700, VR6701, VR6702, VR6703, VR6704, VR6705, VR6706, VR6707, VR6708, VR6709, VR6710, VR6711, VR6712, VR6713, VR6714, VR6715, VR6716, VR6717, VR6718, VR6719, VR6720, VR6721, VR6722, VR6723, VR6724, VR6725, VR6726, VR6727, VR6728, VR6729, VR6730, VR6731, VR6732, VR6733, VR6734, VR6735, VR6736, VR6737, VR6738, VR6739, VR6740, VR6741, VR6742, VR6743, VR6744, VR6745, VR6746, VR6747, VR6748, VR6749, VR6750, VR6751, VR6752, VR6753, VR6754, VR6755, VR6756, VR6757, VR6758, VR6759, VR6760, VR6761, VR6762, VR6763, VR6764, VR6765, VR6766, VR6767, VR6768, VR6769, VR6770, VR6771, VR6772, VR6773, VR6774, VR6775, VR6776, VR6777, VR6778, VR6779, VR6780, VR6781, VR6782, VR6783, VR6784, VR6785, VR6786, VR6787, VR6788, VR6789, VR6790, VR6791, VR6792, VR6793, VR6794, VR6795, VR6796, VR6797, VR6798, VR6799, VR6800, VR6801, VR6802, VR6803, VR6804, VR6805, VR6806, VR6807, VR6808, VR6809, VR6810, VR6811, VR6812, VR6813, VR6814, VR6815, VR6816, VR6817, VR6818, VR6819, VR6820, VR6821, VR6822, VR6823, VR6824, VR6825, VR6826, VR6827, VR6828, VR6829, VR6830, VR6831, VR6832, VR6833, VR6834, VR6835, VR6836, VR6837, VR6838, VR6839, VR6840, VR6841, VR6842, VR6843, VR6844, VR6845, VR6846, VR6847, VR6848, VR6849, VR6850, VR6851, VR6852, VR6853, VR6854, VR6855, VR6856, VR6857, VR6858, VR6859, VR6860, VR6861, VR6862, VR6863, VR6864, VR6865, VR6866, VR6867, VR6868, VR6869, VR6870, VR6871, VR6872, VR6873, VR6874, VR6875, VR6876, VR6877, VR6878, VR6879, VR6880, VR6881, VR6882, VR6883, VR6884, VR6885, VR6886, VR6887, VR6888, VR6889, VR6890, VR6891, VR6892, VR6893, VR6894, VR6895, VR6896, VR6897, VR6898, VR6899, VR6900, VR6901, VR6902, VR6903, VR6904, VR6905, VR6906, VR6907, VR6908, VR6909, VR6910, VR6911, VR6912, VR6913, VR6914, VR6915, VR6916, VR6917, VR6918, VR6919, VR6920, VR6921, VR6922, VR6923, VR6924, VR6925, VR6926, VR6927, VR6928, VR6929, VR6930, VR6931, VR6932, VR6933, VR6934, VR6935, VR6936, VR6937, VR6938, VR6939, VR6940, VR6941, VR6942, VR6943, VR6944, VR6945, VR6946, VR6947, VR6948, VR6949, VR6950, VR6951, VR6952, VR6953, VR6954, VR6955, VR6956, VR6957, VR6958, VR6959, VR6960, VR6961, VR6962, VR6963, VR6964, VR6965, VR6966, VR6967, VR6968, VR6969, VR6970, VR6971, VR6972, VR6973, VR6974, VR6975, VR6976, VR6977, VR6978, VR6979, VR6980, VR6981, VR6982, VR6983, VR6984, VR6985, VR6986, VR6987, VR6988, VR6989, VR6990, VR6991, VR6992, VR6993, VR6994, VR6995, VR6996, VR6997, VR6998, VR6999, VR7000, VR7001, VR7002, VR7003, VR7004, VR7005, VR7006, VR7007, VR7008, VR7009, VR7010, VR7011, VR7012, VR7013, VR7014, VR7015, VR7016, VR7017, VR7018, VR7019, VR7020, VR7021, VR7022, VR7023, VR7024, VR7025, VR7026, VR7027, VR7028, VR7029, VR7030, VR7031, VR7032, VR7033, VR7034, VR7035, VR7036, VR7037, VR7038, VR7039, VR7040, VR7041, VR7042, VR7043, VR7044, VR7045, VR7046, VR7047, VR7048, VR7049, VR7050, VR7051, VR7052, VR7053, VR7054, VR7055, VR7056, VR7057, VR7058, VR7059, VR7060, VR7061, VR7062, VR7063, VR7064, VR7065, VR7066, VR7067, VR7068, VR7069, VR7070, VR7071, VR7072, VR7073, VR7074, VR7075, VR7076, VR7077, VR7078, VR7079, VR7080, VR7081, VR7082, VR7083, VR7084, VR7085, VR7086, VR7087, VR7088, VR7089, VR7090, VR7091, VR7092, VR7093, VR7094, VR7095, VR7096, VR7097, VR7098, VR7099, VR7100, VR7101, VR7102, VR7103, VR7104, VR7105, VR7106, VR7107, VR7108, VR7109, VR7110, VR7111, VR7112, VR7113, VR7114, VR7115, VR7116, VR7117, VR7118, VR7119, VR7120, VR7121, VR7122, VR7123, VR7124, VR7125, VR7126, VR7127, VR7128, VR7129, VR7130, VR7131, VR7132, VR7133, VR7134, VR7135, VR7136, VR7137, VR7138, VR7139, VR7140, VR7141, VR7142, VR7143, VR7144, VR7145, VR7146, VR7147, VR7148, VR7149, VR7150, VR7151, VR7152, VR7153, VR7154, VR7155, VR7156, VR7157, VR7158, VR7159, VR7160, VR7161, VR7162, VR7163, VR7164, VR7165, VR7166, VR7167, VR7168, VR7169, VR7170, VR7171, VR7172, VR7173, VR7174, VR7175, VR7176, VR7177, VR7178, VR7179, VR7180, VR7181, VR7182, VR7183, VR7184, VR7185, VR7186, VR7187, VR7188, VR7189, VR7190, VR7191, VR7192, VR7193, VR7194, VR7195, VR7196, VR7197, VR7198, VR7199, VR7200, VR7201, VR7202, VR7203, VR7204, VR7205, VR7206, VR7207, VR7208, VR7209, VR7210, VR7211, VR7212, VR7213, VR7214, VR7215, VR7216, VR7217, VR7218, VR7219, VR7220, VR7221, VR7222, VR7223, VR7224, VR7225, VR7226, VR7227, VR7228, VR7229, VR7230, VR7231, VR7232, VR7233, VR7234, VR7235, VR7236, VR7237, VR7238, VR7239, VR7240, VR7241, VR7242, VR7243, VR7244, VR7245, VR7246, VR7247, VR7248, VR7249, VR7250, VR7251, VR7252, VR7253, VR7254, VR7255, VR7256, VR7257, VR7258, VR7259, VR7260, VR7261, VR7262, VR7263, VR7264, VR7265, VR7266, VR7267, VR7268, VR7269, VR7270, VR7271, VR7272, VR7273, VR7274, VR7275, VR7276, VR7277, VR7278, VR7279, VR7280, VR7281, VR7282, VR7283, VR7284, VR7285, VR7286, VR7287, VR7288, VR7289, VR7290, VR7291, VR7292, VR7293, VR7294, VR7295, VR7296, VR7297, VR7298, VR7299, VR7300, VR7301, VR7302, VR7303, VR7304, VR7305, VR7306, VR7307, VR7308, VR7309, VR7310, VR7311, VR7312, VR7313, VR7314, VR7315, VR7316, VR7317, VR7318, VR7319, VR7320, VR7321, VR7322, VR7323, VR7324, VR7325, VR7326, VR7327, VR7328, VR7329, VR7330, VR7331, VR7332, VR7333, VR7334, VR7335, VR7336, VR7337, VR7338, VR7339, VR7340, VR7341, VR7342, VR7343, VR7344, VR7345, VR7346, VR7347, VR7348, VR7349, VR7350, VR7351, VR7352, VR7353, VR7354, VR7355, VR7356, VR7357, VR7358, VR7359, VR7360, VR7361, VR7362, VR7363, VR7364, VR7365, VR7366, VR7367, VR7368, VR7369, VR7370, VR7371, VR7372, VR7373, VR7374, VR7375, VR7376, VR7377, VR7378, VR7379, VR7380, VR7381, VR7382, VR7383, VR7384, VR7385, VR7386, VR7387, VR7388, VR7389, VR7390, VR7391, VR7392, VR7393, VR7394, VR7395, VR7396, VR7397, VR7398, VR7399, VR7400, VR7401, VR7402, VR7403, VR7404, VR7405, VR7406, VR7407, VR7408, VR7409, VR7410, VR7411, VR7412, VR7413, VR7414, VR7415, VR7416, VR7417, VR7418, VR7419, VR7420, VR7421, VR7422, VR7423, VR7424, VR7425, VR7426, VR7427, VR7428, VR7429, VR7430, VR7431, VR7432, VR7433, VR7434, VR7435, VR7436, VR7437, VR7438, VR7439, VR7440, VR7441, VR7442, VR7443, VR7444, VR7445, VR7446, VR7447, VR7448, VR7449, VR7450, VR7451, VR7452, VR7453, VR7454, VR7455, VR7456, VR7457, VR7458, VR7459, VR7460, VR7461, VR7462, VR7463, VR7464, VR7465, VR7466, VR7467, VR7468, VR7469, VR7470, VR7471, VR7472, VR7473, VR7474, VR7475, VR7476, VR7477, VR7478, VR7479, VR7480, VR7481, VR7482, VR7483, VR7484, VR7485, VR7486, VR7487, VR7488, VR7489, VR7490, VR7491, VR7492, VR7493, VR7494, VR7495, VR7496, VR7497, VR7498, VR7499, VR7500, VR7501, VR7502, VR7503, VR7504, VR7505, VR7506, VR7507, VR7508, VR7509, VR7510, VR7511, VR7512, VR7513, VR7514, VR7515, VR7516, VR7517, VR7518, VR7519, VR7520, VR7521, VR7522, VR7523, VR7524, VR7525, VR7526, VR7527, VR7528, VR7529, VR7530, VR7531, VR7532, VR7533, VR7534, VR7535, VR7536, VR7537, VR7538, VR7539, VR7540, VR7541, VR7542, VR7543, VR7544, VR7545, VR7546, VR7547, VR7548, VR7549, VR7550, VR7551, VR7552, VR7553, VR7554, VR7555, VR7556, VR7557, VR7558, VR7559, VR7560, VR7561, VR7562, VR7563, VR7564, VR7565, VR7566, VR7567, VR7568, VR7569, VR7570, VR7571, VR7572, VR7573, VR7574, VR7575, VR7576, VR7577, VR7578, VR7579, VR7580, VR7581, VR7582, VR7583, VR7584, VR7585, VR7586, VR7587, VR7588, VR7589, VR7590, VR7591, VR7592, VR7593, VR7594, VR7595, VR7596, VR7597, VR7598, VR7599, VR7600, VR7601, VR7602, VR7603, VR7604, VR7605, VR7606, VR7607, VR7608, VR7609, VR7610, VR7611, VR7612, VR7613, VR7614, VR7615, VR7616, VR7617, VR7618, VR7619, VR7620, VR7621, VR7622, VR7623, VR7624, VR7625, VR7626, VR7627, VR7628, VR7629, VR7630, VR7631, VR7632, VR7633, VR7634, VR7635, VR7636, VR7637, VR7638, VR7639, VR7640, VR7641, VR7642, VR7643, VR7644, VR7645, VR7646, VR7647, VR7648, VR7649, VR7650, VR7651, VR7652, VR7653, VR7654, VR7655, VR7656, VR7657, VR7658, VR7659, VR7660, VR7661, VR7662, VR7663, VR7664, VR7665, VR7666, VR7667, VR7668, VR7669, VR7670, VR7671, VR7672, VR7673, VR7674, VR7675, VR7676, VR7677, VR7678, VR7679, VR7680, VR7681, VR7682, VR7683, VR7684, VR7685, VR7686, VR7687, VR7688, VR7689, VR7690, VR7691, VR7692, VR7693, VR7694, VR7695, VR7696, VR7697, VR7698, VR7699, VR7700, VR7701, VR7702, VR7703, VR7704, VR7705, VR7706, VR7707, VR7708, VR7709, VR7710, VR7711, VR7712, VR7713, VR7714, VR7715, VR7716, VR7717, VR7718, VR7719, VR7720, VR7721, VR7722, VR7723, VR7724, VR7725, VR7726, VR7727, VR7728, VR7729, VR7730, VR7731, VR7732, VR7733, VR7734, VR7735, VR7736, VR7737, VR7738, VR7739, VR7740, VR7741, VR7742, VR7743, VR7744, VR7745, VR7746, VR7747, VR7748, VR7749, VR7750, VR7751, VR7752, VR7753, VR7754, VR7755, VR7756, VR7757, VR7758, VR7759, VR7760, VR7761, VR7762, VR7763, VR7764, VR7765, VR7766, VR7767, VR7768, VR7769, VR7770, VR7771, VR7772, VR7773, VR7774, VR7775, VR7776, VR7777, VR7778, VR7779, VR7780, VR7781, VR7782, VR7783, VR7784, VR7785, VR7786, VR7787, VR7788, VR7789, VR7790, VR7791, VR7792, VR7793, VR7794, VR7795, VR7796, VR7797, VR7798, VR7799, VR7800, VR7801, VR7802, VR7803, VR7804, VR7805, VR7806, VR7807, VR7808, VR7809, VR7810, VR7811, VR7812, VR7813, VR7814, VR7815, VR7816, VR7817, VR7818, VR7819, VR7820, VR7821, VR7822, VR7823, VR7824, VR7825, VR7826, VR7827, VR7828, VR7829, VR7830, VR7831, VR7832, VR7833, VR7834, VR7835, VR7836, VR7837, VR7838, VR7839, VR7840, VR7841, VR7842, VR7843, VR7844, VR7845, VR7846, VR7847, VR7848, VR7849, VR7850, VR7851, VR7852, VR7853, VR7854, VR7855, VR7856, VR7857, VR7858, VR7859, VR7860, VR7861, VR7862, VR7863, VR7864, VR7865, VR7866, VR7867, VR7868, VR7869, VR7870, VR7871, VR7872, VR7873, VR7874, VR7875, VR7876, VR7877, VR7878, VR7879, VR7880, VR7881, VR7882, VR7883, VR7884, VR7885, VR7886, VR7887, VR7888, VR7889, VR7890, VR7891, VR7892, VR7893, VR7894, VR7895, VR7896, VR7897, VR7898, VR7899, VR7900, VR7901, VR7902, VR7903, VR7904, VR7905, VR7906, VR7907, VR7908, VR7909, VR7910, VR7911, VR7912, VR7913, VR7914, VR7915, VR7916, VR7917, VR7918, VR7919, VR7920, VR7921, VR7922, VR7923, VR7924, VR7925, VR7926, VR7927, VR7928, VR7929, VR7930, VR7931, VR7932, VR7933, VR7934, VR7935, VR7936, VR7937, VR7938, VR7939, VR7940, VR7941, VR7942, VR7943, VR7944, VR7945, VR7946, VR7947, VR7948, VR7949, VR7950, VR7951, VR7952, VR7953, VR7954, VR7955, VR7956, VR7957, VR7958, VR7959, VR7960, VR7961, VR7962, VR7963, VR7964, VR7965, VR7966, VR7967, VR7968, VR7969, VR7970, VR7971, VR7972, VR7973, VR7974, VR7975, VR7976, VR7977, VR7978, VR7979, VR7980, VR7981, VR7982, VR7983, VR7984, VR7985, VR7986, VR7987, VR7988, VR7989, VR7990, VR7991, VR7992, VR7993, VR7994, VR7995, VR7996, VR7997, VR7998, VR7999, VR8000, VR8001, VR8002, VR8003, VR8004, VR8005, VR8006, VR8007, VR8008, VR8009, VR8010, VR8011, VR8012, VR8013, VR8014, VR8015, VR8016, VR8017, VR8018, VR8019, VR8020, VR8021, VR8022, VR8023, VR8024, VR8025, VR8026, VR8027, VR8028, VR8029, VR8030, VR8031, VR8032, VR8033, VR8034, VR8035, VR8036, VR8037, VR8038, VR8039, VR8040, VR8041, VR8042, VR8043, VR8044, VR8045, VR8046, VR8047, VR8048, VR8049, VR8050, VR8051, VR8052, VR8053, VR8054, VR8055, VR8056, VR8057, VR8058, VR8059, VR8060, VR8061, VR8062, VR8063, VR8064, VR8065, VR8066, VR8067, VR8068, VR8069, VR8070, VR8071, VR8072, VR8073, VR8074, VR8075, VR8076, VR8077, VR8078, VR8079, VR8080, VR8081, VR8082, VR8083, VR8084, VR8085, VR8086, VR8087, VR8088, VR8089, VR8090, VR8091, VR8092, VR8093, VR8094, VR8095, VR8096, VR8097, VR8098, VR8099, VR8100, VR8101, VR8102, VR8103, VR8104, VR8105, VR8106, VR8107, VR8108, VR8109, VR8110, VR8111, VR8112, VR8113, VR8114, VR8115, VR8116, VR8117, VR8118, VR8119, VR8120, VR8121, VR8122, VR8123, VR8124, VR8125, VR8126, VR8127, VR8128, VR8129, VR8130, VR8131, VR8132, VR8133, VR8134, VR8135, VR8136, VR8137, VR8138, VR8139, VR8140, VR8141, VR8142, VR8143, VR8144, VR8145, VR8146, VR8147, VR8148, VR8149, VR8150, VR8151, VR8152, VR8153, VR8154, VR8155, VR8156, VR8157, VR8158, VR8159, VR8160, VR8161, VR8162, VR8163, VR8164, VR8165, VR8166, VR8167, VR8168, VR8169, VR8170, VR8171, VR8172, VR8173, VR8174, VR8175, VR8176, VR8177, VR8178, VR8179, VR8180, VR8181, VR8182, VR8183, VR8184, VR8185, VR8186, VR8187, VR8188, VR8189, VR8190, VR8191, VR8192, VR8193, VR8194, VR8195, VR8196, VR8197, VR8198, VR8199, VR8200, VR8201, VR8202, VR8203, VR8204, VR8205, VR8206, VR8207, VR8208, VR8209, VR8210, VR8211, VR8212, VR8213, VR8214, VR8215, VR8216, VR8217, VR8218, VR8219, VR8220, VR8221, VR8222, VR8223, VR8224, VR8225, VR8226, VR8227, VR8228, VR8229, VR8230, VR8231, VR8232, VR8233, VR8234, VR8235, VR8236, VR8237, VR8238, VR8239, VR8240, VR8241, VR8242, VR8243, VR8244, VR8245, VR8246, VR8247, VR8248, VR8249, VR8250, VR8251, VR8252, VR8253, VR	







## MODE SWITCH

NV2000, 2010, 7000, 7200, 7800 (VS50048)	
NV230, 260, 430, 810, 870, 2300, 4300 (VSS0110)	<b>£3.50</b>
NV830 (VSS0091)	<b>£2.25</b>
NV300, 333, 340, 366, 688, 777, 778 (VSS0060)	<b>£2.10</b>
NVG21, 25, NVH65, NVD80 (VSS0175A)	<b>£3.75</b>
	<b>£2.00</b>

## AUDIO CONTROL HEADS

**AMSTRAD ORIGINAL NO: 150751**  
 Used on: AMSTRAD TVR1, 2, 3, VCR4600, 4600MKII, 4700, FUNAI VS2, VCR4600, 4800, 5200, 5600, 6600, VIP3000, 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 90mAh  
 Order Code: BB01  
 Part Nos: 138 - 10229, 2.4v 100mAh  
 Order Code: BB02

Price: 70p

Price: 135p

### FERGUSON

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

Price: 90p

Price: 150p

## SATELLITE PSU REPAIR KITS

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	1100p

MAKE & MODEL	CODE	PRICE
PACE MSS200/300 APPOLL	SATPSU9	900p
PACE MSS500/1000	SATPSU10	1230p
FERGUSON SRD4	SATPSU11	650p
ECHOSTAR SR5500	SATPSU12	1600p
ECHOSTAR 6500/7700/8700	SATPSU13	2750p
AMSTRAD SRD600	SATPSU14	2600p
MIMTEC (Surenson)	SATPSU15	700p
AMSTRAD SRD700, SR950, SRX100, 301, 501, 502, 1002, 2001, SRD2000 SAT250	SATPSU16	1250p

### SATELLITE TUNERS

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

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

### SWITCH MODE TRANSFORMERS

PACE 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: 100p

### 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: 130p

USED ON:  
 KV1400, KV1440, KV2040, KV2060  
 (POWER SWITCH 26mm)  
 Order Code: SW12 Price: 110p

### SONY

USED ON:  
 KV2020  
 (POWER SWITCH 21mm +Remote)  
 Order Code: SW6 Price: 130p

### 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
3A	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	FUSE47	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.**

Video Recorders Edition 5 1997  
 Over 300 pages packed with more than 5500 faults for different brands  
**Price £15.00 - No VAT.** Order Code: BOOK01

### TELEVISION Edition 7

This new A5 size guide lists more than 9600 faults and to approx. 474 pages in size.  
 Price: 1650p only - no VAT (+ £2 Postage)  
 Order Code: BOOK02

### Satellite Repair Manual Edition 5

346 pages of receiver faults plus notes and general information such as many useful button sequences for resetting parental lock codes, resetting installation choice to factory defaults.  
**Price £16.00 - No VAT plus Postage £1**  
 Order Code: BOOK03

### SEMICONDUCTOR COMPARISONS 1999

With over 650 pages listing more than 34,200 Semiconductors with suitable alternatives complete with descriptions and base information.  
**Price: 1900p only - No VAT (+ £2 Postage).**  
 Order Code: BOOK04

### SEMICONDUCTOR COMPARISONS 1999

The new 1998 Jaeger Semiconductor comparison with 1100 pages packed with information on over 95,000 semiconductors in much greater detail plus marketing data on SMD devices and a separate generic table of all the type designations.  
**Price: £47.00 only - No VAT (+ £5 Postage).**  
 Order Code: BOOK06

## SERVICE AIDS

DESCRIPTION	VOLUME	CODE	PRICE
VIDEO HEAD CLEANER	75ML	SP01	145p
SWITCH CLEANER	176ML	SP02	155p
SILICONE GREASE	200ML	SP03	180p
FREEZE IT	170ML	SP04	295p
FREEZE IT	400ML	SP16	580p
FOAM CLEANER	400ML	SP05	180p
ANTI-STATIC	200ML	SP06	180p
AEROKLEANE	200ML	SP07	200p
AERO DUSTER	200ML	SP08	340p
AERO DUSTER	400ML	SP17	580p
PLASTIC SEAL	200ML	SP09	250p
GLASS CLEANER	200ML	SP10	160p
COLDKLENE	200ML	SP13	220p
EXCEL POLISH 80	200ML	SP18	160p
ADHESIVE 120	500ML	SP19	250p
LABEL REMOVER 130	200ML	SP20	260p
REFURB 140	400ML	SP21	260p
TUBE SILICON GREASE	50 GRAMMES	SP11	225p
TUBE SILICON SEALANT WHITE	75ML	SP22	250p
TUBE SILICON SEALANT CLEAR	75ML	SP23	250p
TUBE HEAT SINK COMPOUND	25 GRAMMES	SP12	150p
DRIVE CLEANER	200ML	SP24	150p
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
<b>ANTEX SOLDERING IRONS</b>		
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
<b>SOLDERING STAND &amp; SPONGES</b>		
SOLDERING STAND (MADE BY ANTEX)	S108	350p
SPARE SPONGE	S109	55p
<b>SOLDER</b>		
18 SWG 500 GRAMMES	S110	500p
20 SWG 500 GRAMMES	S111	650p
22 SWG 500 GRAMMES	S112	700p
<b>DESOLDERING AIDS</b>		
SDLDER MOP STANDARD GAUGE 1.2MM X 1.5M	S107	100p
SOLDER MOP 1.2MM X 10M	S113	420p
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	1050p	4515 01 19	LOT169	1500p	TLF 14520 F	LOT40	1500p	094-01020/0,7	LOTS9	1400p	1-439-303-31	LOT94	1300p
AKAI			2424593	LOT79	1600p	4515 01 24	LOT137	1600p	TLF 14521 F	LOT39	1850p	094-01021/0,6	LOTS9	1400p	1-439-303-32	LOT94	1300p
45150344	LOT56	1650p	2432101	LOT169	1500p	4515 01 46	LOT136	1600p	TLF 14567 F	LOT39	1850p	094-01027/0,8	LOT186	1825p	1-439-311-00	LOT95	1550p
101-214017-03	LOT278	1300p	2432461	LOT80	1800p	4515 03 01	LOT169	1500p	TLF 14568 F	LOT40	1500p	094-01038/0,7	LOT245	1900p	1-439-311-11	LOT95	1550p
101-220005-03A	LOT72	1600p	2432611	LOT80	1800p	4515 03 02	LOT180	1500p	TLF 14569 F	LOT41	1700p	094-01052/0,8	LOT186	1825p	1-439-311-13	LOT95	1550p
D 050/37	LOT27	1450p	2432611	LOT80	1800p	4515 03 04	LOT169	1500p	TLF 14584 F	LOT42	1700p	094-01057/1,1	LOT295	1450p	1-439-311-31	LOT95	1550p
D 053/37	LOT207	1550p	2432611	LOT169	1500p	4515 03 05	LOT180	1500p	TLF 14586 F	LOT256	2000p	610.018.6620	LOT189	1850p	1-439-311-32	LOT95	1550p
D 056/37	LOT156	1850p	2432681	LOT169	1500p	4515 03 06	LOT168	1500p	TLF 15606 F	LOT278	1500p	610.018.6637	LOT215	1800p	1-439-331-22	LOT96	1550p
D 059/37	LOT200	1400p	2432681	LOT169	1500p	4515 03 08	LOT178	1500p	TLF 70012 F	LOT78	1500p				1-439-331-41	LOT98	1550p
D 069/37	LOT156	1850p	2432681	LOT169	1500p	4515 03 09	LOT178	1500p	TLF 70012 F	LOT78	1500p				1-439-332-00	LOT99	1600p
FCM 2015 AL	LOT78	1500p	2433011	LOT171	1600p	4515 03 10	LOT168	1500p	TLF 70012 F	LOT78	1500p				1-439-332-11	LOT99	1600p
			2433012	LOT171	1600p	4515 03 13	LOT196	1550p	TLF 70018 F	LOT78	1500p				1-439-332-21	LOT99	1600p
FERGUSON			2433012	LOT171	1600p	4515 03 14	LOT174	1400p	TLF 70018 F	LOT78	1500p				1-439-332-41	LOT100	1500p
00 D-3-508-001	LOT38	1250p	2433014	LOT168	1500p	4515 03 15	LOT22	1250p	TLF 70162	LOT78	1500p				1-439-332-42	LOT101	1450p
00 D-3-508-002	LOT38	1250p	2433212	LOT172	1350p	4515 03 18	LOT192	1250p	TLF 70162	LOT78	1500p				1-439-332-52	LOT100	1500p
00 D-3-508-003	LOT38	1250p	2433291	LOT246	1600p	4515 03 19	LOT30	1250p	TLF 70162	LOT78	1500p				1-439-333-00	LOT270	1550p
00 D-3-515-001 PL1	LOT276	1400p	2433301	LOT188	1900p	4515 03 20	LOT190	1850p	TLF 70162	LOT78	1500p				1-439-333-11	LOT270	1550p
00 D-4-208-001	LOT79	1600p	2433442	LOT191	1800p	4515 03 22	LOT196	1550p	TLF 70162	LOT78	1500p				1-439-333-12	LOT270	1550p
00 D-4-208-002	LOT79	1600p	2433451	LOT81	1350p	4515 03 24	LOT194	1550p	TLF 70162	LOT78	1500p				1-439-363-11	LOT268	1400p
00 D-4-235-002	LOT240	1250p	2433452	LOT82	1250p	4515 03 25	LOT22	1250p	TLF 70162	LOT78	1500p				1-439-363-21	LOT311	1450p
00 D-4-235-002 HTI	LOT81	1350p	2433453	LOT82	1250p	4515 03 26	LOT198	1550p	TLF 70162	LOT78	1500p				1-439-387-11	LOT311	1450p
00 D-4-235-00201G	LOT81	1350p	2433454	LOT82	1250p	4515 03 28	LOT27	1450p	TLF 70162	LOT78	1500p				1-439-387-21	LOT311	1450p
00 D-4-260-004 HTI	LOT38	1250p	2433455	LOT234	1600p	4515 03 29	LOT193	1550p	TLF 70162	LOT78	1500p				1-439-387-21	LOT311	1450p
00 H-0-701-2400	LOT182	1450p	2433521	LOT85	1600p	4515 03 30	LOT179	1350p	TLF 70162	LOT78	1500p				1-439-416-11	LOT255	1600p
06 D-3-083-001	LOT82	1250p	2433581	LOT22	1250p	4515 03 31	LOT193	1550p	TLF 70162	LOT78	1500p				1-439-416-21	LOT255	1600p
06 D-3-083-002	LOT82	1250p	2433721	LOT81	1300p	4515 03 32	LOT193	1550p	TLF 70162	LOT78	1500p				1-439-416-23	LOT255	1600p
06 D-3-084-001	LOT23	1400p	2433751	LOT01	1300p	4515 03 34	LOT193	1550p	TLF 70162	LOT78	1500p				1-439-416-24	LOT255	1600p
06 D-3-087-001	LOT84	1450p	2433752	LOT01	1300p	4515 03 35	LOT27	1450p	TLF 70162	LOT78	1500p				1-439-416-51	LOT271	1550p
06 D-3-088-001	LOT204	1600p	2433891	LOT250	1350p	4515 03 38	LOT200	1400p	TLF 70162	LOT78	1500p				1541255A	LOT275	1550p
06 D-3-093-001	LOT87	1600p	2433892	LOT84	1450p	4515 03 40	LOT196	1550p	TLF 70162	LOT78	1500p						
06 D-3-095-002	LOT87	1600p	2433893	LOT23	1400p	4515 03 41	LOT196	1550p	TLF 70162	LOT78	1500p						
06 D-3-095-002	LOT87	1600p	2433893	LOT23	1400p	4515 03 43	LOT196	1550p	TLF 70162	LOT78	1500p						
06 D-333-512.001	LOT204	1600p	2434002	LOT33	1000p	4515 03 46	LOT201	1550p	TLF 70162	LOT78	1500p						
FETX 100 90 DEG	LOT04	1500p	2434141	LOT33	1000p	4515 03 50	LOT27	1450p	TLF 70162	LOT78	1500p						
FETX 90 WHITE	LOT06	1650p	2434141	LOT33	1000p	4515 03 51	LOT27	1450p	TLF 70162	LOT78	1500p						
FETX 100 100 DEG	LOT34	1500p	2434274	LOT44	1050p	4515 03 75	LOT56	1850p	TLF 70162	LOT78	1500p						
			2434274	LOT44	1050p	4516 16 01	LOT22	1250p	TLF 70162	LOT78	1500p						
GRUNDIG			2434453	LOT86	1600p												
29201.008.01	LOT153	1750p	2434453	LOT86	1600p												
29201.014.01	LOT140	1500p	2434455	LOT234	1600p	731003	LOT51	1550p									
29201.015.01	LOT149	1400p	2434593	LOT44	1050p	276-16399	LOT49	1500p									
29201.017.01	LOT06	1250p	2435062	LOT296	1400p	334 B 07803	LOT50	1450p									
29201.018.01	LOT163	1300p	2435121	LOT87	1000p	334 B 078030	LOT74	1600p									
29201.018.02	LOT61	1700p	2435131	LOT251	1450p	334 B 08104	LOT295	1600p									
29201.019.01	LOT62	1250p	2435141	LOT88	1300p	334 B 08108	LOT51	1550p									
29201.019.02	LOT62	1250p	2435301	LOT88	1450p	334 P 18506	LOT75	1500p									
29201.022.01	LOT63	1700p	2435671	LOT89	1600p	334 P 18507	LOT70	1500p									
29201.022.02	LOT166	1600p	2436201	LOT109	1200p	5908-05008A-AA	LOT49	1500p									
29201.022.03	LOT165	1350p	2436202	LOT109	1200p	D 10837	LOT273	1700p									
29201.022.04	LOT165	1350p	2432101-2	LOT79	1600p	DCF1577	LOT272	1300p									
29201.022.04A	LOT165	1350p	2433451H	LOT81	1350p	DCF2077A	LOT279	1550p									
29201.024.01	LOT65	1500p	2433453H	LOT82	1250p	KFS 60226B	LOT78	1500p									
29201.024.04	LOT164	1400p	2433891H	LOT23	1400p	MSH-1FBW08											
			2433892G	LOT84	1450p												
HINARI			I.T.T.														
154 138 K	LOT24	1500p															
51 13914 1	LOT24	1500p															
51 14184 1	LOT24	1500p															
CF 44 A	LOT24	1500p															
HMS1-1411834-1	LOT24	1500p															

\*\*\*\*\*  
**NIKKAI BABY 10 REGULATOR**  
 ORDER CODE : BABY 10 PRICE: £10.00  
 \*\*\*\*\*

**Universal Pre-Programmed  
 Brand Replacement Remote Controls**

- Brand for Brand Replacement
- Codeless setup
- Teletext and Fastext
- Pre-programmed for the latest models
- Replaces broken and lost remotes
- CE Approved

BRAND	CODE	BRAND	CODE
Panasonic	RCUNI01	Nokia	RCUNI06
Sony	RCUNI02	Samsung	RCUNI07
Philips	RCUNI03	Toshiba	RCUNI08
Hitachi	RCUNI04	Ferguson	RCUNI09
Mitsubishi	RCUNI05	Grundig	RCUNI10

**Normal Price: £8.50 + VAT Special Offer: £7.50 + VAT**

**NEW ARRIVAL!!!!**

**UNIVERSAL REPLACEMENT SATELLITE REMOTE CONTROL**  
 This unique remote control covers 11 brands including  
 Pace MSS series, Nokia, Echostar...

**Order Code: RCUN117 Price: £7.50 + VAT**

**SPECIAL OFFERS!!**

**CD PICK UPS**

	WAS	NOW
KSS 152A	<del>£16.00</del>	£13.00
KSS 210A	<del>£18.00</del>	£13.00
KSS 210B	<del>£20.00</del>	£15.00
KSS 240A	<del>£25.00</del>	£20.00
KSS 213B	<del>£19.00</del>	£15.00
KSS 213C	<del>£19.00</del>	£15.00
OPTIMA 6S	<del>£20.00</del>	£16.00
OPTIMA 5	<del>£30.00</del>	£16.00
RCTRH 8151	<del>£44.00</del>	£20.00
RCTRH 8112	<del>£57.00</del>	£20.00

**GRANDATA LIMITED**  
**K.P. HOUSE, UNIT 15, POP IN COMMERCIAL CENTRE, SOUTHWAY,**  
**WEMBLEY, MIDDLESEX, ENGLAND. HA9 0HB**  
 Telephone: 0181 900 2329 Fax: 0181 903 6126 E-Mail: grandata.ltd@btinternet.com  
**OPEN Monday to Friday 09:00 - 17:30 Saturday 09:00 - 14:00**



K.P. House, Unit 15,  
Pop In Commercial Centre,  
Southway, Wembley,  
Middlesex HA9 0HB  
tel: 0181 900 2329  
fax: 0181 903 6126

# Grandata Ltd

distributor of electronic components

Website: <http://www.grandata.co.uk>  
E-Mail: [grandata.ltd@btinternet.com](mailto:grandata.ltd@btinternet.com)

Business Hours: **Mon-Fri** 09.00 - 17.30  
**Sat** 09.00 - 14.00



Price  
£9.75

### CM2300

Handy Digital Multimeter

- 3.5 Digit LCD (1999 Count)
- Diode Test
- Low battery Indication
- Overload Protection
- Single Rotary Switch Operation



Price  
£14.50

### CM2400T

Digital Multimeter with  
Temperature Measurement

- 3.5 Digit LCD (1999 Count)
- Diode Test
- Low battery Indication
- Overload Protection
- Single Rotary Switch Operation



Price  
£39.50

### CM3230

Digital Capacitance Meter with  
Shockproof Holster

- 3.5 Digit LCD (1999 Count)
- 9 Selectable ranges (200pF to 20 uF)
- High Accuracy (0.5%)
- External Knob for Zero Adjustment
- Overload Indication
- Safety Designed Test Probe



Price  
£11.50

### CM2900

Super Slim Pocket  
Digital Multimeter

- Low battery Indication
- Overload Protection
- Audible Continuity



Price  
£40.50

### CM2700

Auto Ranging Digital Multimeter with  
Bargraph display and Holster

- 3.75 Digit LCD (3999 Count)
- 33 Segment High speed bargraph display
- Auto Polarity Operation
- Auto Power Off with Warning beep
- Low Power Consumption
- High Safety Standard
- Audible Continuity and Diode Test



Price  
£29.00

### CM3900A

High Performance Digital Multimeter with  
Shockproof Holster

- 3.5 Digit LCD (1999 Count)
- Large LCD display 18mm height
- Engineering unit Annunciations
- Low Battery Indication and Auto Power Off
- Overload Protection
- Audible Continuity and Diode test



Price  
£41.00

### CM3920

High Performance Digital Multimeter with  
Temperature Measurement and Shockproof  
Holster

- 3.5 Digit LCD (1999 Count)
- -50 to 1000°C Temperature Measurement
- Large LCD Display 18mm height
- Overload Indication
- Low Battery Indication and Auto Power off

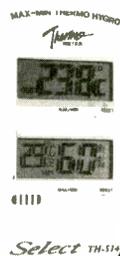


Price  
£16.50

### ADM513

Auto-Ranging Digital Multimeter with  
Thumb Control for one hand operation

- 3.75 Digit LCD (3999 Count)
- Auto Ranging on all functions
- Side Attachable test leads
- Low Power Consumption
- Auto Power Off
- Audible Continuity and Diode Test

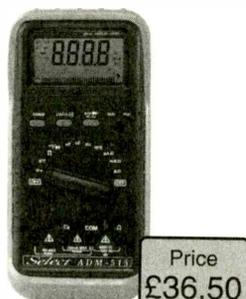


Price  
£16.50

### TH514

Digital Thermometer and Hygrometer for  
Indoor and Outdoor

- Measuring and displaying indoor/outdoor temperature and indoor relative humidity
- Built in Memory to record Max/Min Values
- A slide switch to select Centigrade or Fahrenheit



Price  
£36.50

### ADM515

High Accuracy Autoranging Digital Multimeter  
with Bar graph and shockproof Holster

- 3.75 Digit LCD (3999 Count)
- Auto Ranging
- Full Range Protection
- Data hold
- Auto Power Off
- Audible Continuity, Transistor and diode test



Price  
£27.50

### ADM516

Auto Ranging Digital Multimeter

- 3.75 Digit LCD (3999 Count)
- Auto Ranging with Manual Override
- Auto Polarity Operation
- Data Hold, Auto Power Off
- Low Power Consumption
- Touch Button Controls
- Full Overload Protection
- Audible Continuity



Price  
£11.75

### DM520

Pocket Sized Digital Multimeter with  
Thumb Control for one hand operation

- 3.5 Digit LCD (1999 Count)
- Low cost ideal for DIY users
- Side Attachable Test Leads
- Overload Protection
- Audible Continuity and Diode test



K.P. House, Unit 15,  
Pop In Commercial Centre,  
Southway, Wembley,  
Middlesex HA9 0HB  
tel: 0181 900 2329  
fax: 0181 903 6126

Website: <http://www.grandata.co.uk>  
E-Mail: [grandata.ltd@btinternet.com](mailto:grandata.ltd@btinternet.com)

Business Hours: Mon-Fri 09.00 - 17.30  
Sat 09.00 - 14.00

# Grandata Ltd

distributor of electronic components



Price  
£45.00

### DM550

Professional Digital Multimeter

- 3.5 Digit LCD (1999 Count)
- Strong Protective Cover (useable as stand)
- Data Hold
- Backlit LCD
- Auto Power Off
- Full Range Protection
- Input Warning
- Temperature and Capacitance Measurement
- High Safety Design



Price  
£36.50

### DM551

Professional Digital Multimeter for Accurate Measurement

- 3.5 Digit LCD (1999 Count)
- Rubber Holster
- Clip On Test Lamp
- Backlit LCD
- Auto Power Off
- Full Ranges Protection
- High reliability
- Capacitance Measurement



Price  
£4.50

### AM517

Pocket Analogue Multimeter

- Mirrored Scale reduces errors
- 13 Versatile Ranges
- 2k  $\Omega/V$  DC/AC Sensitivity
- Recessed Input Terminals for safe use
- Fuse and diode Protection



Price  
£9.75

### AM518

General Purpose Analogue Multimeter

- 20 Versatile Ranges for general purpose testing
- Large Mirrored Scale of 80mm length
- Audible Continuity Test
- DCA 10A measurement
- 20k $\Omega/V$  DC 9k $\Omega$



Price  
£9.75

### AM519

General Purpose Analogue Multimeter

- Zero Centre (Null) Meter
- 24 Versatile Ranges with battery check
- Continuity check (LED indicator)
- Series Capacitor Output to detect AC signal
- 20k $\Omega/V$  DC 9k $\Omega/V$  AC Sensitivity
- Fuse and diode Protection



Price  
£52.00

### CLM553

Digital Clamp Multimeter

- 3.5 Digit LCD (1999 Count)
- Rubber Holster
- Clip On Test Lead Lamp
- Backlit LCD
- Auto Power Off
- Full Ranges Protection
- High reliability
- Capacitance Measurement



Price  
£48.00

### CLM552

Auto-Ranging Digital Multimeter with Plug In Current Transducer

- 3.75 Digit LCD (3999 Count)
- 65 segments bar graph
- AC/DC voltage
- Resistance measurement
- Plug-in Clamp for AC current measurement
- Datahold for easy reading
- Audible continuity
- Auto Power Off



Price  
£16.50

### CL554

Current Transducer

- Clamp size 30mm Max
- ACA 0-50A,  $\pm 3\%$  50-300 A  $\pm 2\%$
- Dimensions 80 x 156 x 35mm
- High Safety Design



Price  
£10.00

### UTV54

Universal Voltage Tester

- Rated Voltage Range: 12-400 VAC  
12-500 VDC
- Type of display: 12-50-120-220-400 VAC LED
- Type of display: 12-50-150-300-500 VDC LED
- Polarity Display: Visual + -
- Test and Approved GS/TUV/CE



Price  
£12.00

### MPS547

Metal, Power and Stud Detector

- Electronically locates cables, gas and water pipes
- Traces hidden ceiling joists and wall studding
- Helps prevent accidents when drilling
- Senses presence of mains power without touching live wire
- Incorporates Audio Signal and indicator light
- CE Approved

**Please note  
that postage on all Meters  
is charged at £1**

**All the prices quoted  
in this leaflet  
are subject to VAT**

# 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:** LOPT for the Matsui Model 2080, part no. 3220012. D. Mehta, 133 Booth Road, Colindale, London NW9 5JU. 0181 200 0987.

**Wanted:** Amstrad/Fidelity VMC100 camcorder spares or scrap camera. Particularly require lens and front video section. S. Wardill, 1 Wentworth Road, Southend-on-Sea, Essex SS2 5LF. 01702 600 834.

**Wanted:** Set of radio valves, UCH42, UF41, UL41 and UY41. M.M. Rigg, Four Ways, 139 Broad Lane, Rochdale OL16 4PP. 01706 640 409.

**Wanted:** Information on the Escom computer system with Intel 80486 processor. Also on upgrading from 486 to a Pentium overdrive. Greg Strange, phone/fax 0151 327 5971.

**Wanted:** Circuit diagram for the Hitachi HV62K CCTV camera. D.J. Rockcliffe, 3 Hewell Lane, Barnt Green, Nr Birmingham B45 8NZ. 0121 445 5360.

**Wanted:** Circuit diagram (photocopy OK) for PCB type 145N(N) used in the Sharp TV Model 3705. P.T. McKeever, 4 Castleview Park, Derry, N. Ireland BT48 8DL. 01504 353 613.

**Wanted:** Circuit diagram or layout for plug-in transistor Y amplifier unit 1Y2 for the Dynamco D7100 scope. Jim Littler, 363 Atherton Road, Hindley Green, Wigan, Lancs WN2 3XD.

**Wanted:** STK183BC colour output chip for the Amstrad PC14 HRCD R computer monitor, or does anyone know of a replacement? Richard S. Barnard, 105 Portland Road, Worthing, W. Sussex BN11 1QA.

**Wanted:** LOPT for the Plustron 5in. TV/radio/cassette Model TVRC5C. It has 11 pins and is marked TMF-205L UKCT. Or does anyone know how to fixed shorted turns? Graham Seward, 2 Orchard Close, Severn Stoke, Worcester WR8 9JJ. 01905 371 504. E-mail grahamsew@tesco.net

**Wanted:** MN15151GBC chip (IC701) or complete panel for the Goodmans C series Model 2050R. Please phone Peter on 01642 650 027.

**Wanted:** 16MB memory module for the Mitac 4028G series notebook computer. Phone John Rider on 01384 825 512.

**Wanted:** 0-12Ω safety resistor circuit ref. R1101 for the Panasonic NV370 VCR. Chris Lusardi, 154 Western Road,

Tingley WF3 1QA. 0113 253 0432.

**Wanted:** Chopper transformer for the Nikkai Model TLG1409. Numbers on the transformer are 5903 06002A-AA-L SE. Also require CB radio and radio scanner. M. Payne, 66 Nevinson Avenue, South Shields, Tyne and Wear NE34 8NP. 0191 537 2062.

**Wanted:** Cabinet front for the Akai VS485EK VCR and a working or repairable main chassis panel for the Grundig TVR5504 (CUC3500), plug-in boards not needed. T.J. Steel, 185 Charter Road, Chippenham, Wilts SN15 2RF. 01249 464 427.

**Wanted:** Heads, in reasonable condition, for the Philips VCR Model VR2020. Steve Rowe, 20 Woodside Close, Knaphill, Woking, Surrey GU21 2DD. 01483 480 027.

**Wanted:** Power supply for the Sharp VC2300H VCR plus circuit diagram or manual. Gerald Dethick, 35 Bideford Road, Offerton, Stockport, Cheshire SK2 5AX. 0161 480 7537.

**Wanted:** Service manual or circuit diagram for the Sharp VLC780H camcorder - good photocopy OK. G. Thomas, 31 The Parade, Merthyr Tudful CF47 0ET. 01685 722 575.

**Wanted:** Philips Matchline 36ML8906/05B power board with LOPT and power amplifiers. Vince Stanley. Phone 01954 253 649, fax 01954 253 601 or e-mail vince.stanley@pigroup.co.uk

**Wanted:** Repair data for the Amstrad type 83-4933-9-001 and type 9975414801 14in. SVGA monitors and also the Mega PC base unit. David Benyon, Marshland View, St. Annes Hill, Bude, Cornwall EX23 0LT. 01288 353 373.

**Wanted:** Betamax tape rewinder; SL1432 IC; GoldStar 12401 and Tashiko VVE992 VCRs, working or not. Ron Bruce, 11 New Zealand Way, Rainham, Essex RM13 8JP. 01708 558 792.

**Wanted:** Manual for the Taylor 45D valve tester. G. Edwards, 17 Watson-Watt Gardens, Mundesley, Norfolk NR11 8DR.

**Wanted:** Technicolor portable VCR/monitor. Condition immaterial as long as the power supply and monitor sections are complete. Also any information on, or a source of spares for, or a scrap Varitronic Express labelling

machine. Mine doesn't print the characters correctly. Andie Wilkes, 01926 404 935 (day), 0121 605 0720 (evening) or e-mail andie@wilkes123.freemove.co.uk  
**For sale:** Video Jackfield, musa, two-row with 20 musa per row with test points. Brand new boxed. Also BNC patchpanel 2U-19in. rackmount, two rows of 16 double-sided BNCs. Brand new never used. Phone Fran Ott on 01359 240 745.

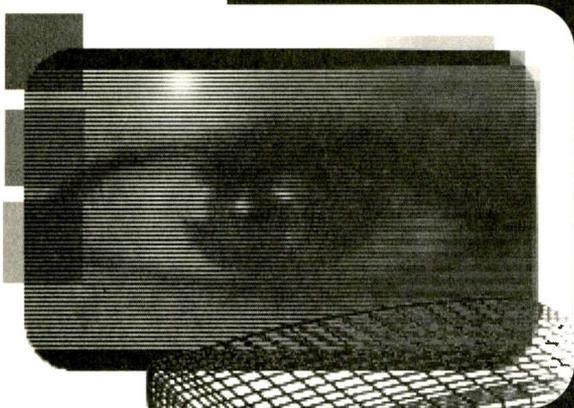
**Wanted/for sale:** Require 10 x 7in. 3-5Ω speaker, Truvox radio jack circa 1953 and a teletext board for the Grundig CUC220 chassis. Have for sale Sony TA100 15W PC amplifier £30, six-volume set of *Radio and Television Servicing* pre-1956-1962 £30, two Canon NP50 and one NP5500 copiers plus some chemicals for breaking £80 - very heavy, buyer collects. W. Milne, 20 Graham Road, Wimbledon, London SW19 3SR. 0181 543 9542.

**Contact:** Would like to keep in touch with service technicians in the UK and Ireland for exchange of advice and ideas about our job. Write to Stefano Tonelli, Via Antica Luni 2, 54011 AULLA (MS), Italy or e-mail vidserv@tin.it

**Wanted/for sale:** Require valves, parts, manuals, knobs etc., in fact anything to do with 405-line TV and valve radio sets, also old test gear (especially 405-line pattern generator), anything considered. Can supply photocopies of many early *Trader* service sheets at £1 each. Steve Taylor, 11 Charnborough Road, Coalville LE67 4SF. 01530 832 695 or 07977 805 308.

**Wanted:** Service manuals for the Technics SLP7 CD player, Sanyo VTC5000 VCR, Panasonic AG6800 VCR, Akai DT200 timer unit, Trio KX710 cassette deck and Hitachi D5500M cassette deck. Terry Martini, 122B Cannon Street Road, London E1 2LH. Phone 0171 702 8774, fax 0171 702 8216 or e-mail terryym@callnetuk.com

**For sale:** Manuals for the Ferguson FV10, FV11, FV13, FV21, FV26, FV30, 3V24, 3V44 and 3V59 VCRs at £3 each plus postage. Also Avo 9 Mk 4 meter in excellent condition with EverReady case (needs new leads), £50 plus carriage. Phone David Forfar on 01695 735 132 for further details and list of other manuals.



# TV

## Fault Finding

Reports from  
**Philip Blundell, AMIIElec**  
**David Smith**  
**Bob Longhurst**  
**Chris Watton**  
**Paul Hardy**  
**Michael Dranfield**  
**Tony Matthews and**  
**Derek, Telecare**

### **Toshiba 3357DB (C5SS chassis)**

Another dealer had replaced the STRS6709 chopper chip Q801 because it had gone short-circuit between pins 1, 2 and 3. The replacement failed next day. When Q801 has failed, D809 (MTZJ5-6B, part no. 23316672) must always be checked. If it's short-circuit Q801 will fail when the set is brought out of standby. **P.B.**

### **Hitachi CPT1454**

"Just snow" it said on the job card. Voltage checks around the tuner unit (helpful to have the pin functions printed on the PCB) showed that the 12V supply was missing. When I traced back along the track I found a crack in the copper, by the AGC control. The track was broken at one end of R222. A small wire link restored normal operation. **P.B.**

### **Philips 29PT9113/05 (MD2.22 AA chassis)**

This set was dead – well almost. At switch on the front LED went green for 15 seconds then turned steady red. There was no EHT or sound of any kind during this time. It's unusual for the LED to be a constant red during a fault condition: in most situations it flashes red. The trusty dealer service tool couldn't

pick up any error codes, so I was on my own with this fault!

The standby microcontroller chip (the chassis has two chips of this type) appeared to be OK, as the front LED and the remote-control receiver sections were working. But the main microcontroller chip, which wakes up the set and sends error codes to the infra-red transmitting LED, wasn't working.

Checks around this IC showed that the clock oscillator (1200) was running, the reset pulse was OK, and the +5S standby, +5V2 and +8S supplies were present and correct. Even the Main-Is-Alive signal, which indicates that the main microcontroller chip is operational, was as per the manual. The I<sup>2</sup>C bus was active during the 15 seconds when the front LED was green.

Could there be a software fault – either a faulty ROM or EAROM? Fortunately I was able to borrow a working text/control PCB from a neighbouring dealer (thanks Kevin!). This enabled me to prove that microprocessor 7200 was faulty.

Philips operates a repair service for this PCB, at a fixed price. Remember to keep the original EAROM chip (or copy it) to save having to set up the option codes, picture geometry, grey scale and tuning afterwards! **P.B.**

### **Samsung CI5944 (SCT12B chassis)**

The TDA8350 field/EW output chip in this chassis seems to fail quite often. Samsung has issued a modification sheet, which is rather too involved to explain here. The value of one component has to be changed and five others added. Ask me in 18 months if it does the trick!

If you replace the chip and the scanning is restored but there are flyback lines at the top of the screen, check R307 (10Ω) which

tends to go high in value. Its part no. is 2008-000179. **P.B.**

### **Grundig G1000 Chassis**

If the set is dead but the standby LED is glowing, check whether the efficiency diode D304 (BY133) is short-circuit and R314 (6.8kΩ, 4W) in the feed to the line driver stage is open-circuit. **P.B.**

### **GoldStar CI20C22F (PC42 chassis)**

There was no sound or vision, just a blank raster with the on-screen display showing when the remote control unit was used. A check on the supply lines seemed to be a good idea, especially as there are several 78 series three-terminal regulators on the signals board. IC831 (7812) had 16V at its input but only 9V instead of 12V at its output. A replacement restored normal operation. **P.B.**

### **Panasonic TX29AD1DP**

Tripping with field collapse was the complaint with one of these sets. There are two switch-mode power supplies and a conventional transformer supply. Look no farther than R7000 (180kΩ) and R7005 (150kΩ) which are connected in series and provide a start-up supply for the STR chip. They are on the side panel, where the audio output stage lives. R7000 had in this case gone high in value. As a result the power supply couldn't get going.

A word of advice. There are two identical plugs near the top of the panel. If they are wrongly connected you will get the same results. Better to mark them than be led a merry dance! **D.S.**

### **Osaki CI5013T**

This set was stuck in standby. Safety resistor R826 (1Ω, 0.5W) was open-circuit and the line output transistor was short-circuit – which

was not surprising as R826 had 250V at one side! The cause of the excessive voltage was C852 (470 $\mu$ F, 16V) in the power supply. It had gone low in value. Once it had been replaced and the HT had been set at 125V the receiver produced a super picture. Odd that the 160V capacitors were intact and hadn't blown their tops! **D.S.**

### Crown CTZ9009R

The width varied, with severe EW bowing. After all the main components had been checked and proved to be OK I removed the scan coils and found severe burn marks in one spot. Fortunately I had a spare yoke, which restored normal scanning. **D.S.**

### Mitsubishi CT15M2X

There was just a squealing noise when this set was switched on. The cause turned out to be the 2SD1877 line output transistor Q552, which was short-circuit. After checking for possible causes I fitted a replacement and switched on. The set then worked perfectly but, still suspicious, I kept a wary eye on it. After about ten minutes my suspicions were confirmed when the HT rose. Fortunately there was no further damage. The cause of this power supply fault was the STR54041 chip IC901. **B.L.**

### Ssangyong CTV0014

There was sound but no picture, because of field collapse. The surge limiter R122 (3.3 $\Omega$ ) in the supply to the field output chip was open-circuit, and a resistance check showed that there was a dead short across the supply. C108 (1,000 $\mu$ F, 25V) rather than the IC had gone short-circuit. I used a 35V replacement, unhappy at the thought of a 25V electrolytic decoupling a 25V supply. The HT was correct at 120V. A two-day soak test proved that the set was now OK. **B.L.**

### Ferguson ICC8 Chassis

I was told that this set went dead intermittently. It failed to do so during five days on test. So I carried out a tap test, followed by a flex-and-twist test. It was still OK. Blanket resoldering of all likely causes of the trouble was then undertaken. It failed during the first evening the customer had it back!

After another five days of fruitless testing a frustrated thump on the side of the cabinet did the trick: off it went. A quick attack inside revealed great sensitivity around the plastic power supply cage. The

cause of the fault turned out to be dry-joints on the chopper transistor's metal heatsink plate – its soldered lugs are used to complete the chassis line. Had it been a Sony set I would have looked for dodgy lugs first! **B.L.**

### Tatung A Chassis

There was no remote-control operation. The handset was OK, but an oscilloscope check showed that there was no output from the stand-up IR receiver unit. Its 5V supply was present, and the external circuitry was OK. A new receiver unit from Wizard Distributors, order code TAT117, solved the problem. **B.L.**

### Goodmans 2185T

There was a green picture. The usual suspects were all OK, so further testing was required. This brought me to R618 which was open-circuit. According to the circuit diagram it should have been 470k $\Omega$ , but 330k $\Omega$  was fitted. It was covered with the dreaded dried glue.

Another fault was apparent, field cramping. The cause of this turned out to be C333 (4.7 $\mu$ F). **B.L.**

### Ferguson TX99 Chassis

Although the power supply was working the set appeared to be dead. Checks showed that the 18.5V supply was missing. The usual cause of this is the 1A circuit protector ICP1 going open-circuit, but in this case there was an open-circuit at pin 7 of the chopper transformer. When the transformer was removed most of the leadouts were found to be very poorly soldered. Remaking them restored normal operation. **C.W.**

### Roadstar TVM70034

These 6in. monochrome sets are popular with lorry drivers. One problem you get is loss of tuning or tuner drift. The usual cause is C107 (0.01 $\mu$ F), a disc capacitor that tends to become leaky. **C.W.**

### Daewoo T514 (CP365 chassis)

Intermittent loss of the signal is a complaint you can get with these sets. If a button is pressed, you find that the on-screen displays are there. But only switching off and on will restore the signal. Then, after a while, the fault returns. The cause is poor connections to the chopper transformer. Don't be surprised if no amount of thrashing will instigate the fault. **C.W.**

### Matsui 20T1

No sound is a quite common fault with this set. The cause is usually safety resistor R550 (4.7 $\Omega$ ) which goes open-circuit. It's mounted next to the speaker plug. **C.W.**

### Sony K VX2532 (AE1B chassis)

If the picture is cramped at the bottom and stretched at the top, check the field scan coupling capacitor C531 (680 $\mu$ F, 25V). It's quite a common fault with these sets. This one had a rather unusual fault, incorrect purity and convergence because the scan coils were incorrectly positioned. **C.W.**

### Hitachi C2166TN

For an apparently dead set with a dim standby LED, check the connections to IC902. **C.W.**

### Tatung 140 Series Chassis

It took over a year to establish the cause of an extremely intermittent fault, low gain, with one of these sets. Fortunately the customer was quite understanding. On initial test the fault put in a brief appearance then refused to make another. Some suspect joints were remade. On subsequent visits the tuner was replaced, as the best guess as to the cause, then the SAW filter and the IF chip. During one visit the fault remained long enough for voltage checks to be carried out. I found that the base-emitter junction of Q101 (BF959), which drives the SAW filter, was going open-circuit. A BF141 proved to be a suitable replacement, and the set has not been back for many months now. **P.H.**

### Philips G90AE Chassis

The customer's complaints were that the picture was ragged, the display went dim and teletext was poor. The first two faults were cured by replacement of C2640 (680 $\mu$ F) and C2580 (470 $\mu$ F), the reservoir capacitors for the 22V and 12V supplies respectively. The teletext fault was a bit more obscure: it looked rather like poor purity. Resoldering the joints where the teletext panel is joined to the main PCB didn't fix it. The cure was to resolder a lot of the long links on the main PCB near the teletext panel. **P.H.**

### Sony KVM2140U (BE2A chassis)

We've had a number of these sets in which the Aquadag earth lead retaining clip has broken away

from the cabinet. The only way to repair this is to use a couple of tie wraps and anchor the lead to the tube mount. In most cases there is no other damage. With one set there was no picture after reattaching the lead. The customer had complained that it was dead. In fact there was field collapse because R819 (0.47 $\Omega$ , 0.25W safety) had failed. **P.H.**

### Sharp CV2131 (8PSR chassis)

This set had intermittently failed to work and was now dead. Quite a number of poor joints were attended to, but the real culprit was C723. It's a 3.3 $\mu$ F non-polarised electrolytic capacitor in the power supply. I didn't have one in stock, but two 6.8 $\mu$ F electrolytics connected back-to-back restored normal operation. **P.H.**

### Philips G90AE Chassis

We've seen a number of these sets that have displayed F4 or F7. Usually the signals are missing, the LED changes colour from green to orange and there is no response to the remote control unit. These error codes point to the EEPROM or the teletext chip. In each case however the microcontroller chip has been faulty.

The error codes seem to occur only when the chip is quite warm. Freezer spray and a hairdryer are useful diagnostic aids to prove whether it's faulty. I usually warm the chip until I can just touch it with the back of a finger for a few seconds. If the fault is present at this temperature, a power reset usually makes no difference. If you then cool the chip slightly with freezer, a power reset will normally restore correct operation. **P.H.**

### Ferguson ICC5 Chassis

At switch on the EHT blipped up but the set otherwise remained dead. The cause was traced to a dried out electrolytic capacitor, CP26 (470 $\mu$ F), on the primary side of the chopper power supply. It's the reservoir capacitor for the 7.5V supply. **M.Dr.**

### NEI E28GITFXN (E5 chassis)

This set would trip out at switch on. The supply to the line output stage was disconnected and a bulb was used as a dummy load. This proved that the cause of the fault was in the power supply. Cold checks revealed that D652, which provides the supply for pin 6 of the

TDA4605-2 chopper control chip, had a high forward resistance. Once it had been resoldered it seemed to be OK and the set worked. So the set was put on soak test.

A couple of hours later the set was again dead. This time the power supply was OK but there was no supply to the line driver stage. Another diode, D705, was found to be dropping more than 0.7V. A replacement restored normal operation then, ten minutes later, there was field collapse. The boost diode D301 in the field output stage was faulty.

It was by now clear that there was a batch of bad 1N4003 diodes in the set. I removed another one, from a different part of the circuit, placed it across my ohmmeter probes and pulled at the leadout wires. The forward resistance varied as different stress was applied to the wires. As the offending diodes were all silver in colour they were very easy to spot. It was apparent that unless they were all replaced the set would be coming back time and time again. I decided to replace the lot with 1N4007s. After that the set worked perfectly for days.

Intermittent problems with **Samsung SI3240/3269 VCRs** are caused by the same thing, high forward-resistance diodes. Again it's best to replace the lot – in this case there are only about six. **M.Dr.**

### Bush 2052T/A

For no sound check Q616 (2SC1815). It's in the ident feed to the microcontroller chip IC601. When it fails IC601 mutes the sound because it thinks there's no incoming signal. **M.Dr.**

### JVC CVT21EK

This set would switch on then drop back to standby as the relay removed the HT supply. Suspecting field collapse, I shorted the relay's contacts. The set then came on with a blank raster and no on-screen displays.

Checks around the microcontroller chip IC601 showed that the voltage at the reset pin (2) was low. This pin is connected to chassis via Q602, whose base is labelled "X ray". It's part of a trip circuit that operates in the event of a fault, forcing the reset pin low to switch the set back to standby. When I traced the path from the base of Q602 I came to Q805, which monitors the line output stage's HT current as it flows via R808. This 0.68 $\Omega$ , 1W safety resistor was the

cause of the trouble: it had increased in value to 1.2 $\Omega$ . **M.Dr.**

### Toshiba 175T9B/215T8B

For field linearity problems check the electrolytic feedback capacitor C317 (4.7 $\mu$ F, 50V). **M.Dr.**

### Ferguson ICC9 Chassis

"Intermittent picture and sound" it said on the job card. As tapping the rear of the PCB seemed to provoke the fault I spent some time resoldering suspect joints. This failed to cure the fault. I then decided to scope the line drive waveform and found that it disappeared when the fault was present. It was not being produced by the STV2160 chip IV01. Voltage checks around this chip showed that the supply at pin 13 dropped sharply in the fault condition. The cause was traced to DV01 (1N4001), which was intermittent. **T.M.**

### Matsui 20T1 (Grundig G1000 chassis)

Off-air reception was OK but the picture was unstable when a pre-recorded tape was being viewed. The customer was using a scart lead, and the video option had been selected. A replacement microcontroller chip cured the fault. **T.M.**

### Energy-saving Lamps

The customer complained about random channel changing, going into the text mode and sometimes switching off. None of these things happened in the workshop. The customer then told me that the trouble occurred in the evening, when the lights were on. Energy-saving fluorescent lamps had recently been installed in the centre light, and were eventually found to be the cause of the trouble: they were putting out a lot of infra-red radiation which was interfering with the remote control circuitry. **T.M.**

### Ferguson ICC8 Chassis

One of these sets would trip out immediately after starting up. Checks in the line output stage showed that the BY397 13V supply rectifier DL13 was short-circuit. Make sure that you use a fast diode in this position – I use a <50 $\mu$ sec device. **D.T.**

### Osaki P140

There was no tuning or on-screen tuning indication because the microcontroller chip had become corrupted. Resetting cures the fault: select channel 38 then press 'store' and 'control up'. **D.T.**

**Simply the very best way  
to find Electronic Parts**

**NEW 600 PAGE  
FREE USER FRIENDLY  
TRADE CATALOGUE**



Comprehensive technical information with pictures to help in product identification is included. All products are clearly and logically presented, to make the items easy to find. We offer the most competitive prices in the industry without sacrificing the quality of our products.

'Our aim is your next order' is not a gimmick.

We have a highly trained and caring staff and perfect systems to try and make every contact with A.R.D. Electronics a pleasurable and problem free experience.

**PACE APPOINTS  
A.R.D.**

A.R.D. Electronics are delighted to announce their appointment as an official distributor of Pace spare parts. Pace are at the cutting edge of digital technology and this move links two of the most dynamic companies in the industry. We feel that the timing of this is perfect following on from BSKyB's decision to supply Digital Satellite Decoders free of charge.

A.R.D. has access to the FULL range of parts held by Pace and we will endeavour to be the best distributor in the industry. If you would like a FREE Pace catalogue please contact our sales office, open an account and order part number 500-00007.

**A.R.D.  
ELECTRONICS**

'Our aim is your next order'

- Huge range of computer products
- Same day despatch
- 28,000 sq. ft. Warehouse
- Local Trade Counter
- Low, Low Prices
- All high Quality Products

**Exclusive to A.R.D.**

**The New A.R.D.  
Long Life Alkaline  
AA Battery**



A high performance battery from one of the worlds leading battery manufacturers.

- 5yr Shelf Life
- Gives up to 6 times the life of ordinary zinc carbon type batteries
- Mercury and Cadmium free
- Suitable for low and high drain, continuous and intermittent use.
- Supplied bulk packed in a 40 unit display box

Batteries due in last week July

**Now Available from stock**  
Order Code 130-00405  
**Pack of 40 ONLY £4.99**

**SUPER PRODUCT RANGE**

Aerials & Accessories  
Audio Accessories  
Audio Spares  
Batteries & Accessories  
Books  
Cable & Accessories  
Capacitors  
Car Products  
Clocks & Timers  
Computer Components

& Accessories  
EHT Components  
Electrical Accessories  
Filters/Surge Protectors  
Fuses & Holders  
Intercommunication Equipment  
Lamps & Lighting  
Loudspeakers &

Accessories  
Optoelectronics  
Power Supplies & Adaptors  
Relays  
Remote Control Handsets  
Remote Control Konig Cross  
Reference Chart  
Resistors, Positors & Trimmers

Satellite Spares & Accessories  
Security Products  
Semiconductors  
Service Aids  
Soldering Equipment  
Stands & Brackets  
Stationery & Office Equipment  
Storage Systems  
Switches

Telephones, Fax Machines & Accessories  
Telephones - Cellular  
Accessories  
Test Equipment  
Tools  
Transformers  
Video Accessories  
Video Heads  
Video Spares

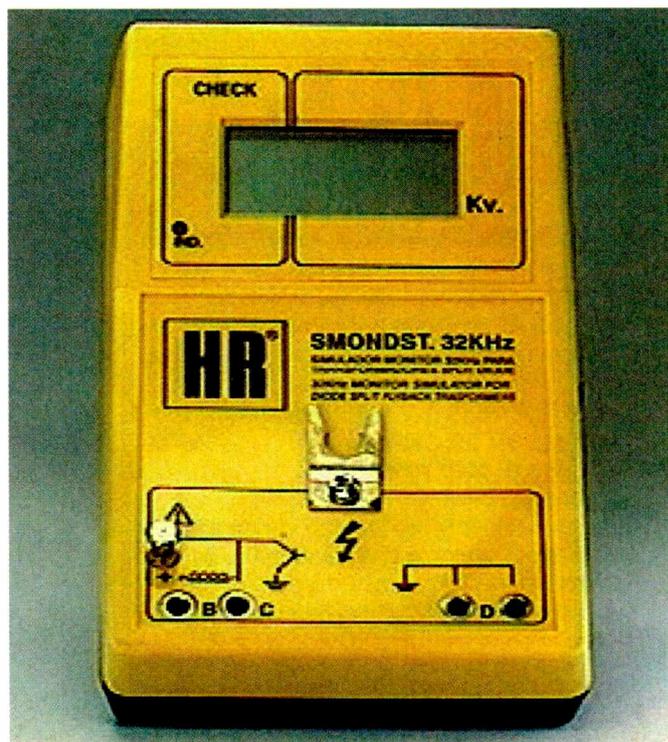
An easy way to order your copy of this essential Trade Catalogue is to visit our Trade web site on [www.ard-plc.co.uk](http://www.ard-plc.co.uk) and complete a registration form or simply phone or fax A.R.D. Electronics, Now! for a registration form. You will enjoy a £250 credit limit from day one.



A.R.D. Electronics Plc, Shorten Brook Way,  
Altham Business Park, Altham, Accrington, Lancashire. BB5 5YL  
Telephone: 01282 683000 Fax: 01282 683010  
E.mail: [sales@ard-plc.co.uk](mailto:sales@ard-plc.co.uk) Welcome to our Trade web site [www.ard-plc.co.uk](http://www.ard-plc.co.uk)

## Test Report

Alan Willcox checks out a unit that's been specifically designed to test 32kHz diode-split LOPTs used in monitors



# The HR monitor LOPT tester

**M**y first impression of HR's tester type SMONDST.32kHz, for monitor line output transformers, was "here's a box with nothing in it"! The unit weighs a mere 6.5oz. It has a standard 4-digit LCD panel to present its findings: there's also a small red LED that provides a 'faulty' indication.

### Description

On closer inspection I found that the circuitry inside is quite sophisticated. There are two fibreglass PCBs, and the construction is of good quality. The LCD and the LED, along with the bulk of the circuitry, are on the smaller PCB. There are six surface-mounted ICs on this board, four of which drive the LCD directly. The board is held by sealed nuts and is mounted at a good angle for viewing when the tester is on the bench. Both boards are double-sided, but I was not inclined to remove them for closer examination. In the absence of a circuit diagram, I can't provide an explanation of how the circuitry on the smaller PCB interprets the test results it receives from the larger one.

The test terminals and the test signal generator are on this larger PCB. The LOPT driver IC is a plug-in device and is crystal controlled. An attenuator network, from the EHT (final anode) test point, is kept well clear of the other circuitry.

There has been no scrimping over the quality of the test leads, and the miniature crocodile clips are of superb quality.

There's no battery-power option and no on/off switch. These omissions are sensible. The mains adaptor runs quite hot, and for long life it's best switched off at source when not in use. Power consumption was found

to be just 17mA at 15V AC. The heat generated in the mains adaptor is the result of the losses you get with a small transformer. Rectification is carried out in the meter itself. With such a low current consumption, this section should be very reliable.

### Use

When the tester is first powered, with no connections made to a transformer under test, it appears to indicate that 200.0kV is present at the EHT test point. In fact the first digit is a fault code number that indicates the way in which the transformer has failed – if in fact it has. For economic reasons this indication cannot be separated from the rest of the display – to do so would require a dedicated display device. Markings on the case distinguish between the fault code and the EHT reading. This is an acceptable compromise. When the transformer being tested is OK, the fault code digit is not present and the LED is off.

Tests normally involve four connections: to the HT supply pin for the transformer's primary winding, to the output transistor's collector, to chassis and to the EHT cap. When a test is made in situ, the only requirement is that the connection between the primary winding and the line output transistor's collector circuit is desoldered. A test point is provided to enable the flyback pulses to be displayed on an oscilloscope.

One of the tester's strongest points is that it provides an indication of the EHT that would be generated in the line output stage. In my opinion this is the most meaningful assessment of whether all is well. In effect it tests not only the primary and secondary windings but also the split-diode EHT sections, and is thus an indication of

the condition of the transformer as a whole.

Tests with a few transformers known to be faulty produced fault code readings of 3 or 4 and little by way of an EHT value. These codes may seem to be rather academic – the section of the transformer that has failed is, after all, usually of little interest. But once you have some experience in using the meter the codes could be helpful in a marginal case.

When tests were made on working monitors the fault code disappeared and the LED remained out.

### The Test Signal

The signal used to drive the primary winding of the transformer being tested is 12V DC with a rather unusual waveform superimposed on it. This is mainly a squarewave, with a period of precisely 35µsec (about 28kHz) in the case of the tester I had for evaluation. But it's a squarewave with a difference. Its amplitude is only 400mV, with rise and fall times so fast that I couldn't measure them. Where it differs however is that a spike with an 0.02µsec period is present at the trailing edge. The presence of this pulse may be the reason why the tester simulates the operation of the line output stage so well. It doesn't work in the way that many other LOPT testers do, by ringing the line output transformer.

### LOPT Testing

With a good transformer the observed flyback pulse was clean. In this respect normal operating conditions are simulated. With a faulty transformer the pulses were about a third later on in the cycle. The fault code indicator analyses the pulses either by amplitude or repetition – without them there is no indication. This is a clever circuit indeed.

The meter is very sensitive to inductive reactance. When I tested a LOPT in a working TV set I obtained a faulty indication. When I introduced a shorted turn the tester showed the transformer to be good. The tester is thus suitable for checking only monitor LOPTs.

The flyback pulse amplitude and the magnitude of the resulting EHT voltage is about ten per cent of the normal operating level. Some types of transformer failure, such as breaking down (arcing) at high voltages, occur only under normal working conditions. My estimate of the occurrence of this type of failure would be about twenty per cent.

There is no claim to 100 per cent success in testing. As always, much depends on the experience of the user. I can provide a tip here. If the tester gives a faulty indication and you are not quite sure, introduce a shorted turn around the limb of the transformer (this is not always possible of course) while observing the tester. If there is a significant change in the reading, you can be fairly sure that the transformer is OK. But bear in mind the proviso about breakdown under the high-voltage conditions in normal use.

Under the test conditions the actual EHT at the tube's final anode is about 2kV. This takes a few seconds to discharge after power has been removed. At this level, semiconductor devices connected to the transformer's secondary windings will turn on. The only supply of concern is that to the field output stage. When I introduced a short across this supply, insufficient energy was diverted to affect the readings.

The package contains a complete reference guide to all HR transformers with a template which, when aligned with the relevant HR number, gives the transformer's pin numbers and the connection points for the tester. Also given is the EHT value to be expected. The required position of the high/low resolution switch, the

only one on the tester, is shown. This switch doesn't alter the test signal: it adjusts the scale of the EHT indicator so that the reading corresponds with the information given. A lot of work has gone into the construction of these tables.

### Verdict

The English translation in the multilingual instruction manual is poor, which is irritating and confusing. I feel that for the cost of the meter specific instructions for the country of sale, checked by an engineer who speaks the relevant language, would be justified. For example at one point the instructions read "The instrument should be checked outside the monitor . . ." I could go on about this!

A similar instrument, type STVDST.01, is required for testing TV receiver LOPTs. It's a pity that the two testers, which use the same technology, couldn't have been incorporated in a single unit. A serious omission is a cross-reference guide to HR type numbers and monitor model numbers. This exists in book form, and if provided with the tester would be a great help. A CD is also in preparation.

These criticisms apart, the tester itself works very well and does all that is claimed of it.

The tester is available from SEME Ltd., Hudson Road, Melton Mowbray, Leics LE13 1BS. Sales hotline 01664 484 000, fax 01664 563 976. The order code is EQU488 and the current price £73.45 plus VAT.

## BACK ISSUES

We have available a limited stock of the following back issues of *Television*:

- |             |  |
|-------------|--|
| <b>1995</b> | January, April, May, June, July, August, September, November and December    |
| <b>1996</b> | January to December inclusive  |
| <b>1997</b> | January to December inclusive  |
| <b>1998</b> | January, February, March, April, May, June, September, November and December |
| <b>1999</b> | January, February, March, April, May, June and July                          |

**Copies are available at £3.00 each including postage. Send orders to:**

Reed Business Information Ltd.,  
Television Back Issues,  
Room L302, Quadrant House,  
The Quadrant, Sutton, Surrey  
SM2 5AS.

**Make cheques/postal orders payable to Reed Business Information Ltd.**



## Reports from David C. Woodnott

### Sony CCD-TR760E

The camera/VTR power switch was extremely stiff. As with other similar models, this switch also operates the internal lens cover mechanism. These parts can often be dismantled then cleaned and lubricated, using a suitable plastic lubricant, before reassembly. With some models they are available as replacements; with other models a complete front case has to be obtained, which makes an expensive repair out of what must seem to the customer to be a rather minor problem.

With this particular unit the dismantling and cleaning procedure worked and all was then well. I did however warn the customer that any further similar trouble would be more expensive to rectify.

### Nikon VN9000

This Sony clone (similar to the CCD-V88) produced a green camera picture. I found that the problem was intermittent, and that the unit would revert to a no-picture condition. Playback was acceptable, but required some 'tidying up'. The camera picture symptom varied between a greenish shade and complete loss of picture into a mass of lines. The sync and burst signals remained constant at all times.

I decided to check the camera head PCBs for signs of leaked electrolyte – widespread capacitor failure on the video and syscon boards is becoming common with these units. Any severe problems here could mean the end of the camcorder, as not being worth repair. In

# Camcorner

this case however both these boards were OK. So on to the camera section.

I removed and inspected all the boards. Board VC32P (process and SSG) was found to be in trouble. Several capacitors had leaked, and some minor print repair was required. After washing, drying and repairing the PCB, and fitting new capacitors, I reassembled the unit for testing – minus, at this stage, the many screening cans/screws etc. that make these camcorders a joy to work on!

At power up the green picture had disappeared. But only the lines were present, as previously! I next investigated the SSG section, and found that the VSUB driver transistor Q629 was faulty. Once this item had been replaced a correctly coloured E-E picture appeared on the monitor's screen.

The VSUB voltage was then reset as laid down in the manual. Having restored the camera head to health, I gave the deck a service and reassembled the units. With a camcorder of this age and known propensity to capacitor failure, I always warn the customer about the risks involved in undertaking a repair.

### Sony CCD-FX500E

The note attached to this unit said it was dead. It certainly was – there was no power up in either the camera or the playback mode.

When the cam/VTR switch fails it usually does so for one or other mode, rarely for both. I released the switch from the case to check it, then saw the cause of the problem. The cam/VTR button had fractured internally: it appeared to move correctly from side to side, but didn't operate the switch. A new button assembly was all that was required.

### Sony CCD-TR780E

When I checked this dead camcorder I found that PS501 had failed. As the usual checks for short-circuits etc. failed to reveal anything amiss, I fitted a replacement and put the unit on soak test. It worked for several days without giving any trouble.

PS501 supplies an unregulated input to IC502 on the servo/syscon PCB VS125. This IC is labelled "reg. battery detect" and, amongst other things, provides separate 5V and 3-7V supplies for the mode control master chip IC503. It was difficult to see how PS501 could have failed without any tell-tale signs in this area, but there weren't any. The unit continued to work during several more days of soak testing, and was then returned to the customer.

A few months later the unit reappeared with exactly the same symptom. PS501 had again failed, and as before no reason for its failure could be found. As electrolytic capacitors are always suspect, though they are usually OK in such a new unit, I replaced C503 and C506 which decouple the two supply lines. They looked and tested OK in all respects – value and ESR. Six months later the unit has not returned, and we know it has been well used.

### Samsung VPK70

This camcorder arrived with a note to say that there was a tracking fault and that it had been checked, unsuccessfully, elsewhere. Their looseness made it fairly obvious that the tape guides had been adjusted in an attempt to achieve stable pictures. During playback the tracking was 'almost OK', with occasional vertical picture jumping, especially after rewind search. Careful realignment of the tape path with a Sony test tape failed to improve matters, and I couldn't see any obvious damage to the deck, guides etc. Everything seemed to be all right, but the machine wouldn't set up properly.

As a last resort I checked the deck against another one that was in the workshop. This almost immediately revealed what was wrong: a slant pole was missing on the take-up guide coaster! This deck has two slant poles on the take-up coaster, and one had sheared off. The break was not detectable unless you knew that the pole should be there. A replacement assembly cured the problem.

Some experimentation led to acceptable reception of the first RSL station in the UK under very unfavourable conditions. It also revealed a curious polarisation condition. Keith Cummins describes his attempts to receive TV12

# Polarisation Puzzle

**T**his short article describes my efforts to receive transmissions from TV12, the Isle of Wight RSL-TV station. When I started off I didn't realise that I was embarking on what would end up as DX-TV reception – at a distance of 4.5 miles!

Having discovered that TV12's transmissions are on ch. 54, I first tried tuning in via my existing group A aerial. There was not the slightest hint of a signal. I next hung a set-top loop aerial out of the window. This produced a faint impression of a signal. Bearing in mind that the Rowridge transmitter is just 4.5 miles away, and that when I walk a few hundred yards I can see the mast, I was surprised at the lack of signal. The next step was to add a preamplifier with a gain of 12dB. This enabled me to receive something, but the signal was so poor that even large captions were illegible.

## Polarisation Peculiarities

At this point I squashed the loop aerial and discovered that the received signal was vertically polarised. I didn't realise that the transmissions are actually horizontally polarised until later, when I read about them in Roger Bunney's DX-TV column. To cut a long story short I ended up discussing the matter with Roger, who assured me that the transmissions are horizontally polarised. So what was happening at my reception site?

I obtained a group C/D aerial with a gain of 14dB and proved beyond doubt that the polarisation as received was vertical. The signal was still very noisy, but at least I could now read the captions. Roger Bunney had suggested that because transmission to the south of Rowridge, where I live, is restricted to prevent interference to French transmitters, reflection from

the support mast could affect the polarisation.

Since the signal strength was so low, I now knew that a good masthead preamplifier would be essential to achieve anything that approached reasonable reception. David Martin of Aerial Techniques recommended the Triax TA34, which has a gain of 34dB and a noise figure of 1.8dB. When one had been installed it was possible to read the smallest captions. Definition was good, but noise was still noticeable – along with co-channel interference from Ch. 4 Mendip. The Mendip transmissions are horizontally polarised, but are still received at a consistently perceptible level via the vertically-polarised aerial.

## Theories

Subsequently, at an IIE meeting, I met two members who are broadcast engineers and discussed the polarisation puzzle with them. Although not involved with the TV12 equipment, they were able to confirm that the transmission ERP is 1kW, obtained by feeding 200W into a directional aerial array with a 7dB power gain. Their theory suggested that since the power was very low spurious transmission artefacts at the rear of the aerial were of no consequence – unlike the situation where hundreds of kW are involved.

I later received a phone call from one of these engineers to say that he had checked the polarisation in a due easterly direction. It was horizontal. But the vertical component was only 3dB down, compared with the normal broadcast specification of better than -15dB. My site is a further 30° round the back of the mast. I guess that, since I receive no horizontally polarised signal component, the ratio of the hori-

zontal to the vertical component of the signal changes with direction until, where I am, the horizontal component has disappeared. Furthermore the gain of the aerial may well be negative in my direction. For example a 10dB power loss would imply an ERP of 20W. This may not be far adrift, judging by the difficulties I have encountered.

Another theory put forward involved ground reflection, which can apparently cause a polarisation twist. But reflection of this type would in all probability degrade the definition, and this isn't happening. Reflection from surrounding objects can, I think, be ruled out because maximum signal is obtained by aiming the aerial directly at the transmitting mast. Also the received polarisation is absolutely vertical, not skewed: this supports the "don't care, it's the back of the aerial" theory.

To sum up, I appear to be receiving an undefined rear-lobe transmission that has somehow become vertically polarised.

## In Conclusion

As more RSL stations come on air, the problems I have described here may become more widespread. The moral is: don't trust the specified polarisation in difficult reception conditions that involve directional transmitting aerials and low power.

Several people subsequently told me that reception is impossible in my situation, but persistence has yielded results which, though not brilliant, are watchable. The irony is that if I'd been aware from the start that the transmissions are horizontally polarised I might not have experimented in the way that led to my discovery of the polarisation puzzle.



# DX and Satellite Reception

**Terrestrial DX and satellite TV reception. News from abroad and about satellite developments. The PLT problem. New aerial designs. Roger Bunney reports**

**T**he 1999 Sporadic E season is now with us. It started rather late, and to date has been more of a fizzler than a bang. For many DX enthusiasts the prime channels E2 and R1 have been lost because of strong local 49MHz interference from baby alarms etc. For my own sightings I've had to rely more on the higher channels: the number of openings, their intensity and duration left much to be desired. A similar story of infrequent SpE propagation is revealed by logs from Peter Schubert (Rainham) and Cyril Willis (Norfolk). Reception has generally been from the south, i.e. signals from Spain, Italy, etc. Here's a collated SpE log for the month:

10/5/99	Unidentified ch. E3 signal.
14/5/99	RTP (Portugal) E3.
16/5/99	Canal+ L2; TVE (Spain) E2, 3, 4; RAI (Italy) IA; TVA (Italy) IA; LTV (Lithuania) R2; unidentified logos in ch. R2.
17/5/99	TVA IA; RAI IA; unidentified ch. R1 signal.

*Fox News with a Balkans' package westbound from Europe.*



19/5/99	TVE E3; RAI IA, B; SVT1 (Sweden) E2; YLE (Finland) E3; unidentified signals in chs. R1 and R2.
20/5/99	TVE E2-4; RTP E3.
21/5/99	RAI IA.
22/5/99	TVE E2; unidentified signals in chs. R1 and R2.
23/5/99	RAI IA, B; TVA IA; unidentified ch. R1 signal.
24/5/99	RAI IA, B; TVA IA; RTP E3; TVE E2-4; MTV (Hungary) R1; unidentified signals in chs. R1 and E4.
25/5/99	TVE E3.
26/5/99	TVA IA, RAI IA, B; Video (Italy) E2.
28/5/99	RAI IA. Unidentified signals in chs. R1, R2 and E4.
29/5/99	TVE E3; RTP E2-4; system M signal in ch. E2 (see below).
30/5/99	TVE E2-4; RTP E3.

There was a tropospheric lift in early May, with mainly UHF signals from France and the Benelux countries received in the south/south east. By May 4th things were back to normal.

George Gaskin (Gibraltar) had more widespread reception from the 10th, with SpE signals in Band I from Belgium, Sweden, Switzerland and the Czech Republic. On the 27th a tall cruise liner had to dock in a manner that broke the microwave link between the GBC-TV studio and the 30ft ch. E6 TV tower. Result: loss of TV reception until the ship sailed off twelve hours later.

A mystery system M (US standard) ch. E2 signal from the SE has

put in an appearance from time to time in recent years. Cyril Willis saw the weak signal on May 29th from 1200 BST. Video was clearly audible using a scanner. Cyril wonders whether it comes from a US base in Germany or Turkey.

Nice to hear again from Ian Roberts, who is now in Randpark Ridge, South Africa – some 20km NW of Johannesburg. He too suffers from interference in chs. E2/R1 from baby minders, cordless phones and other devices that produce strong carriers. But he still monitors ch. E2 via TEP (transequatorial skip), using a scanner, and comments on the large number of transmitters that still use this channel. He feels that the present solar cycle might not be too good – little has been monitored above 56MHz.

Robert Copeman in Melbourne, Australia reports on the transition to digital TV there. Single station per channel operation is to be used, running at much higher powers than in the UK. End-December 2005 is the proposed analogue switch-off date. Chs. 6, 8, 10, 11 and 12 will be used for digital TV in Melbourne. This suggests that Band I will be reallocated to other uses.

## Satellite Sightings

There have been fewer news feeds from the Balkans in recent weeks. Much of the output has again been via Eutelsat II F3 at 36°E, in digital form, though W2 at 16°E has also been used – at frequencies up to 12.550GHz, with horizontal polarisation and the familiar 5,632 SR and 3/4 FEC. Intelsat 705 (18°W) is also worth checking. It has traditionally been used for Italian OB links: feeds below 11GHz have been seen, with vertical polarisation, SR 6,399 and

FEC 3/4. Roy Carmen (Dorking) even saw "DSNG7 UKI-433 Montenegro" via Telecom 2D at 5°W. The signal was at 11.493GHz with vertical polarisation, SR 27,500 and FEC 3/4. These are unusual SR values for SNG working. Eutelsat II F2 at 10°E has carried occasional traffic for CNN. It shows that news feeds can pop up anywhere.

Fortunately there's more than war reporting via the Clarke belt. The famed Indianapolis 500 motor race was to be seen on May 30th at 1800 BST via New Skies/K at 21.5°W. An analogue feed at 11.529GHz H was used for the ABC network: the same programming less opt-out network stings was carried in digital form (SR 5,632, FEC 3/4) at 11.550GHz H, one of BTI's leases. Interesting that the digital commentary and pictures were delayed by about two seconds in comparison with the analogue programming.

The 30th was a sporty day, with Gillingham v. Manchester City full time during the evening via Eutelsat II F3 at 36°E. The link was provided by OB/SNG UKI-95 SIS-17 in clear analogue form at 11.634GHz H.

Football enthusiasts had a ball on the 26th, with Manchester United v. Bayern Munchen as a clear PAL ITV feed via Intelsat 705 (18°W) at 11.664GHz H. The Spanish uplinker Retevisión E-19 fed live BBC Breakfast TV footage back to the UK on the 25th and 26th via Eutelsat at 36°E. This was digital material at 11.580GHz H (SR 5,632, FEC 3/4).

The Round Italy Cycle Race '99 was carried by Intelsat 705 on the 26th at 11.136GHz V. It was remarkable, with camera shots from a helicopter and motor cycles with hardly any video dropouts as the cyclists sped round mountain roads and steep slopes. Telecom 2C at 3°E also carried analogue coverage of the race.

It was unusual to see an analogue news feed (clear PAL) for Sky London via New Skies/K (21.5°) at 1545 BST on the 31st. The London News Network (LNN) signal used the 11.531GHz H transponder. Another curious sighting via the same satellite late that evening consisted of a test pattern with "Alice Productions Bruxelles" and a phone number. This digital signal (SR 5,632, FEC 3/4) was at 11.525GHz H and lasted till 2300 BST.

Dean Rogers (London SE2) uses a Humax FTA receiver quite effectively despite its lack of auto SR/FEC locking. His interest is mostly in sports however, which usually means an SR or 5,632, 6,111 or 7,028 and FEC always 3/4. May 9th was a good

day for him, with the Motor Cycle Grand Prix, Spain as an analogue signal at 10°E and the FIA World Rally Championships from France as a digital signal via 2C (3°E). The latter feed, at 12.507GHz (SR 5,632, FEC 3/4), was for both Canal Plus and Eurosport. Dean has a problem with the RTL digital package via Hot Bird at 13°E (11.054GHz H, SR 27,500, FEC 5/6). The Humax gives the signal level as 90 per cent, data up to 100 per cent, yet the picture suffers from freeze frames and lockup. No other broadcast package via Hot Bird does this. Can anyone offer an answer?

### Terrestrial News

**DTT:** The close down of analogue TV in Italy has been brought forward: the latest proposal is end 2006. Here are further proposals: UK 2012-15; France 2010-15; Sweden 2008-12; Ireland 2009-15; the Netherlands 2010; Spain 2012; Germany 2010.

DTT is to be launched in France during autumn 2001/spring 2002. Test transmissions should start after 2000, once a transmitter allocation plan has been agreed. RAI (Italy) is currently testing UHF DTT, with coverage expected to extend from 30 to 60 per cent of the population by 2003.

The US DTT standard differs from that adopted in the UK, with much higher powers. Aerial company Andrews has just installed its Trasar digital transmitting aerial system atop the 1,454ft Sears Tower in Chicago for WFLD-TV (ch. 31). The 30ft long aerial is mounted on an 80ft mast on the roof of the building. The FCC gave the four main networks till May 1st for them to have DTT on-air in parallel with analogue services.

TVB and Asia Television have started DTT tests in Hong Kong.

London area Band III DAB (Digital Audio Broadcasting) franchises have been advertised. To date bids have come from CE Digital, Switch Digital and MXR London. CE Digital was awarded the Birmingham area franchise and plans to start in early summer 2000.

**France:** The daytime educational La Cinquieme and evening ARTE cultural channels are to be merged to provide a fifth national service.

**Malaysia:** Broadcasting is to be privatised. The government has asked for proposals – no privatisation date has been decided.

**RSL-TV:** The ITC has issued a list of broadcasters that have recently been given an RSL-TV licence, see Table 1. TV12 (Isle of Wight) ch. E54 is already on air, with relays



planned. Lanarkshire Television ch. E67H is about to go on air. MATV (Leicester) was launched on May 27th with programming aimed at the Asian community.

### Satellite News

Rupert Murdoch has at long last managed to buy into Italian pay-TV, by taking a 35 per cent stake in the Stream digital service. It's to be relaunched with new programming and exclusive access to major football team TV rights. Stream has been

*An early-morning digital feed from KFOR-TV provided dramatic footage of the tornados that swept Texas and the Midwest in late April.*

## Aerial Techniques

### UNIVERSAL DIGITAL VIDEO FORMAT CONVERTER

■ 4M bits field memory

INPUT	OUTPUT
NTSC 3.58	NTSC 3.58
NTSC 4.43	NTSC 4.43
PAL	PAL
PAL M	PAL M
PAL N	PAL N
SECAM	



**Input TV systems** N3, N4, PAL, PAL M, PAL N, SECAM

**Output TV systems** N3, N4, PAL, PAL M, PAL N

**Connection terminals** Video Input: 1 RCA jack  
Video Output: 1 RCA jack

**Sampling frequency** Y : 13.5MHz  
R-Y : 6.75MHz  
B-Y : 6.75MHz

**Digital Code Bit** Y : 8 Bits  
R-Y : 8 Bits  
B-Y : 8 Bits

**Line conversion** 525 → 625 lines

**Field conversion** 60 → 50 fields

**Power supply** DC 15 volt 450mA

**Dimensions** 145 (W) x 95 (D) x 34 (H)mm

**Weight** 1.0Kgs

**Accessory** 1 set of video cable, AC adaptor

**THOMSON PAL/SECAM/NTSC video recorder**  
Multi-system (with infra-red remote control)

**NEW PRODUCT**

Multi-system compatibility. Covers VHF, UHF and cable channels. Records, receives and plays back: PAL System 1 (for UK); PAL System B/G (for Europe); SECAM System L (for France); SECAM B/G (for Middle East); SECAM System D/K (Eastern Bloc); NTSC 3.58 (via Scart).

- Tuner reception: PAL 1, B/G, D/K, SECAM B/G, L, L'
- NICAM hi-fi stereo
- 99-channel memory
- Hyperband tuner
- 4 head dual azimuth
- Auto long play
- NTSC via Scart
- Videoplus ■ 8 event - 1-year
- Satellite control
- 2 Eurocart sockets
- 3 phono video/audit L/R
- Autoprogramming ■ Jog shuttle

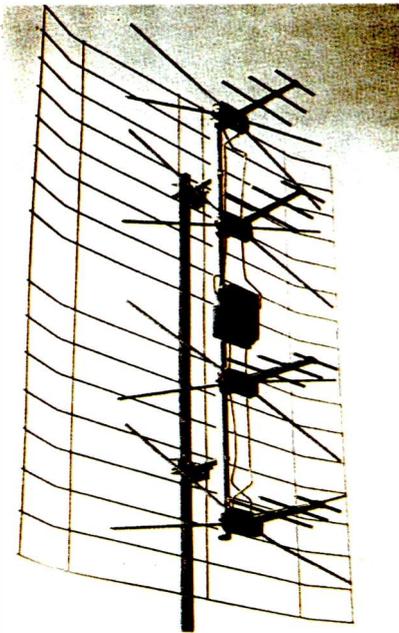
**NEW 1999 CATALOGUE**  
Available by return of post for only £1.50 or ring with your credit card (fully refundable on first purchase over £20).

**£399.00**

**£399.00**

**11 Kent Road, Parkstone, Poole, Dorset BH12 2EH**  
**Tel: (01202) 738232 Fax: (01202) 716951 E-mail: atech@dircon.co.uk**

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



**A stacked bowtie/panel array from the Lithuanian firm Intrada. This model covers Band III and the UHF channels. Note the small UHF director chain at the front of each bowtie dipole.**

making heavy losses: it is in competition with Telepiu, which is controlled by Canal Plus.

A new TV channel, Bulgarian SAT-TV, has appeared as a digital signal (SR 27,500, FEC 3/4) via Hot Bird at 13°E. It's present between about 1400-0200 local time. Check at 11.095GHz H.

The Chinese government has changed its mind and decided to ban domestic reception of satellite TV.

There was concern about possible mass

defection of viewers from the dull national Chinese network programming.

Alcatel/Loral Europe\*Star 1 will provide enthusiasts with added interest when it's launched next summer. It will be in orbit at 45°E, providing broadcast and general communications services between SE Asia and Europe – and points in between down to South Africa. The all Ku-band satellite will be joined by the similar Europe\*Star 2 in summer 2002.

The Indian government has delayed legislation on digital pay-TV. There is debate over licence fees to 'allow' channels to 'land' in India. The latest Indian satellite, INSAT-2E, is now in orbit at 83°E. It carries 17 C-band transponders plus several meteorological and experimental payloads. AsiaSat-3S is now in orbit at 105.5°E, providing broadcast and general communications services for Asia, Australasia and the Middle East. It has 28 C-band and 16 Ku-band transponders.

Concern has been expressed over the lack of any Ku-band operation at 47°W. The Columbian TDRS-6 satellite at this position has only C-band transponders. There have been calls for reallocation of the licence.

There are rumours that PanAmSat might adopt an FEC rate of 7/8 for its digital services. This is worrying cable operators. The equivalent of an analogue signal at threshold with an optimum signal-noise ratio of 46dB is a digital signal that just locks without pixelation. In C band a 3m dish provides good quality with the FEC at 1/2. If this is changed to 7/8 the received signal is 4dB below threshold, calling for a 5.2m dish to restore the previous quality. Bad news at the reception site but good news for the satellite operator, since more signals can be compressed into a given bandwidth. For a technical discussion on this subject refer to *SatFACTS* April 1999, pages 6-8, The BER Confusion by Bob Cooper.

### PLT Interference

In a previous column I mentioned PLT (Power Line Telecommunication), which uses the mains supply for data communication over wide areas and is being pushed by power concerns such as NOR.WEB, Nortel etc. The June issue of the RSB's magazine *Radcom* carries an update on the subject by Dave Lauder (EMC, page 78). Things don't look good for radio amateurs and weak-signal enthusiasts who operate at HF and up to the low VHF spectrum.

A graph of field strength/frequency proposed by the power industry illustrates what we could expect at a distance of about 10m from the cables. The graph includes indication of noise levels within 'rural' and 'quiet rural' environments, along with other indications of man-made interference. Typically, at 30MHz the proposed PLT system would create potential background noise (interference) levels of 16dB above the 'rural' and 30dB above the 'quiet rural' levels. PLT noise would be slightly less at the low end of Band I, but most of us are in residential areas where the background noise is already high. It would thus mean a further addition to the RF pollution.

### New Aerials

Each year I visit the Cable and Satellite Show, now called Cable and Satellite Mediacast. Although the event has moved towards the internet, computer access and so on there are still items of interest to the enthusiast. Advanced Satellite International of London NW10 for example had

many unusual smaller components, such as a range of C-band feeds and the rare PTFE shaped polarising slabs for use with a horn to provide left- or right-hand circular polarisation. More importantly, several companies displayed terrestrial TV aerials. These included Televies, Triax and two companies I'd not come across before, CB Vicky of Italy and Intrada of Kaunas, Lithuania.

In addition to the usual multiple X-director Yagi arrays for UHF use, CB Vicky had a log-periodic aerial with Band III and UHF sections mounted in-line on a common split boom. The highest-gain version, with 24 elements, provided a gain of 7.5dBd over chs. E5-12 and 9dBd over chs. 21-69. Its length is 1.61m.

Several bowtie/panel UHF arrays were on display at the Intrada stand. They had something extra to offer. For example a twin-bay panel array had a mass of X-type directors ahead of each dipole, lifting the gain across the UHF band from a low of 14dBd at 470MHz to a peak of 16dBd at 850MHz then falling slightly to 15.8dBd at 870MHz.

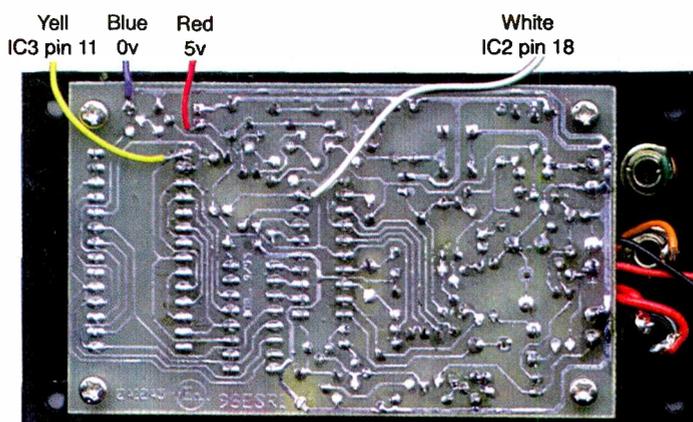
Of greater interest to me was the ZAT range of export bowtie/panel aerials. Three of these, Models ZAT18, ZAT22 and ZAT24, cover Band III (chs. R6-12, i.e. 175-230MHz) and UHF (chs. 21-69), with gains as high as 6.5-9dB in Band III and 11-15dB at UHF. The UHF gain is increased above the usual 11-13dB by including a small half-wave director chain in front of each of the four full-wave dipoles. Models ZAT23 and ZAT25 differ in covering Band I (chs. 2-4), the VHF-FM band, Band III and UHF. The gain claimed for the ZAT25 is a remarkable 4.5-6dB in Band I, 6.5dB in Band II, 6.5-9dB in Band III and 11-15dB at UHF. In view of the fact that the width of the ZAT25's reflector screen is 820mm, well below a half wave in Band I, and that the only Band I element in the stack of four dipoles is a single extended bowtie with central inductive loading, I feel that the quoted VHF performance figures are probably rather optimistic. If any trade/aerial rigger has experience of these aerials I'd be interested to hear about the results obtained in practice.

It was good to find new aerial designs in a market that's seen minimal change in recent years. The use of high-performance wideband aerials with a flat response will undoubtedly increase as reception of the digital multiplexes becomes more widespread. Perhaps we'll find Lithuanian aerials adorning our rooftops!

**Table 1: Recently-approved RSL-TV stations.**

Station	Channel/power	Transmitter
Ch. 6 Aberdeen	E48H/50kW	Durris
Ch. 6 Dundee	E49V/0.5kW	Tay Bridge
Ch. 6 Edinburgh	E52H/3.2kW	Craigkelly
Ch. 6 Glasgow	E59H/10kW	Black Hill
Ch. 6 Perth	E47H/1kW	Perth
Ch. 6 Stirling	E56H/0.2kW	Chartershall
City TV, Bristol	E66H/0.5kW	Ilchester Crescent
Manchester Student TV	E39H/0.5kW	Salford University
Midland Broadcasting Corporation (Leicester)	E68H/4kW	Ratcliffe College
The Oxford Channel	E47H/10kW	Oxford
TVC9 Derry	E21V/0.5kW	Sheriff's Mountain

# Beeper for the Genie



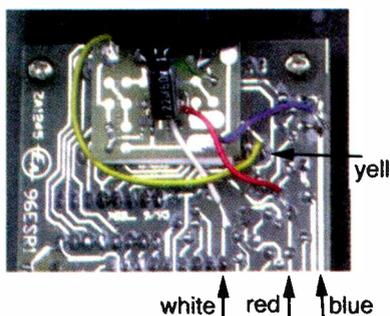
**The addition of an audible test-result indication speeds PCB checks when using the Genie ESR meter. Martin Pickering, B.Eng. has devised this modification to provide beeps**

The Genie ESR meter (an electrolytic capacitor tester) was designed by Bob Parker. Details were originally published in the magazine *Electronics Australia*: a test report appeared in the January 1999 issue of *Television*. There have been no modifications to the Genie since it was originally introduced, which is a testament to its excellent design.

If you compare it with more expensive units such as the Capacitor Wizard however, one notable feature is missing: there's no audible tone to indicate the range of measurement. This omission is easy to remedy. The simple, low-cost addition described in this article gives very acceptable results.

## Circuit Details

Fig. 1 shows the modification circuit details. Two general-purpose npn transistors (e.g. BC548) are used to detect the on state of the Genie's range LEDs. As the LEDs are multiplexed, the voltages fed to them are continuously switched on and off. Because of this the transistors (Q1/2) are connected in a rather unusual way.



Heading photograph: connections to the Genie PCB. Photograph above: the SatCure beeper subpanel connected to a Genie PCB.

Pin 11 of IC3 in the Genie sends 5V pulses to both decimal LEDs. Transistor Q2 is on when either of these LEDs is lit (ESR between zero and 9.9Ω). The piezoelectric beeper P1 then receives current via Q2 and R3, whose value is chosen to set the beep volume.

If the least-significant LED is activated (ESR 0.99Ω or lower), Q1 is pulsed on by pin 18 of IC2. R3 is then bypassed, increasing the beep volume.

If neither LED is lit (ESR 10Ω or higher) there is no sound from the beeper.

The value of C1 (22μF) was chosen to smooth the volt-

age applied to the beeper without causing a significant delay before sound is produced.

## Effect

The effect of this modification is that the Genie beeps loudly for ESR values of 0-0.99Ω, softly for ESR values of 1-9.9Ω and remains silent for ESR values of 10Ω and above. This audible indication aids 'eyes-free' operation, enabling you to check several electrolytic capacitors quickly without removing your attention from the probes.

Although the beep threshold is fixed, it has proved to be just as useful as the variable-threshold, fixed-volume beep provided by the Capacitor Wizard.

## Genie Kit Problems

There have been a few component problems with some Genie kits. In particular the gain of the BC238 transistors has sometimes been so low that either the meter has refused to turn on, spurious faults have occurred, or the LED display has been dim.

Even when this fault has been rectified the display can be difficult to see in bright sunlight. The solution is to fit a pair of Ultra-bright LED displays.

## Availability

Genie ESR meters can be obtained from SatCure in either kit form (£61.63 inclusive), ready-built (£73.38) or upgraded as described above (£82.19). The latter is known as the Genie-Plus version. An Ultra-bright LED display pair and the piezoelectric beeper (just the beeper or a modification kit of parts) are also available from SatCure.

SatCure can be reached on 01270 753 311. The address is PO Box 12, Sandbach, Cheshire CW11 1XA. You can visit the SatCure web site at

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

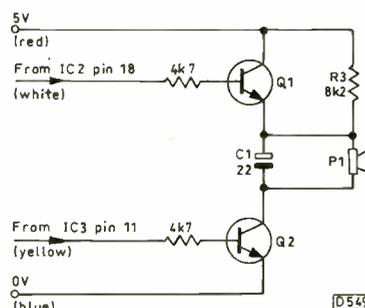


Fig. 1: Beeper circuit for the Genie ESR meter.



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, Television, Room L302, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

# Letters

any dead spots is a virtually unsolvable problem.

There are areas where no signals at all can be received, because interaction between adjacent transmitters causes cancellation. This creates what ONdigital calls a "white hole". There are complete towns sitting in these zero-signal white holes: Basingstoke, Hampshire was quoted as an example. ONdigital technicians are working on the problem, but it seems that the use of many fill-in transmitters offers the only long-term solution.

There are none of these problems with SkyDigital. The picture doesn't break up, freeze or pixilate at all. ONdigital should maybe think about installing a satellite at 28.2°E and forget about terrestrial transmitters, which are thirsty in terms of energy that has to be generated by burning fossil fuel.

*Peter C. Murchison,  
Salisbury, Wilts.*

## Free STBs

There are likely to be unanticipated problems with the free set-top boxes being offered by ONdigital and SkyDigital. ONdigital is offering a free STB to all subscribers. This is not a gift however: it's a free rental, which means that if the box goes wrong ONdigital will exchange it free of charge. We've seen offers like this in the past. They are not 'set in stone' and may change at any time in the future. This is where I see problems.

Normally when a new product is launched and repairs are subsequently needed the service industry can cope: experience is gained, and the product's shortcomings are noted. Over a period of time we acquire any specialised test equipment required and stock up on service data and spare parts. In the present case however it will not be viable to do this until the offers have stopped and we feel confident that they will not start again.

What will happen with the ONdigital/Bush 21in. analogue/dig-

ital TV sets? Will they be distributed on a free exchange basis, or will customers have only the standard one-year guarantee that applies with an analogue TV set? If the latter is the case, customers would be ill advised to pay for something that may be 'beyond economic repair' because a free STB with unlimited replacement is available.

The final problem we have here is that although our local branch of Currys is supplying free ONdigital boxes to those who sign up there will be no reception in this area until October. In answer to the question "will standing orders start in October?" the reply was "no they start immediately, because you could use the box in an area where reception is possible". This seems a certain way for ONdigital to encourage greater sales of SkyDigital subscriptions.

My advice is to think it through before you get too involved, whether you are a potential viewer or, like me, a service centre.

*John Hopkins,  
The TV Workshop, Felixstowe.*

## Channel 5: the Aftermath

When transmission details for Channel 5 were announced in the early Nineties many of us in this trade were appalled that the four-channel transmission plan which had served us so well was to be seriously compromised. The four-channel system had been well thought out and carefully engineered. At the vast majority of locations, it provided good reception of four TV services using one small aerial. That has now changed. It wouldn't be so bad if the only problem was poor Channel 5 reception. What annoys me is that the presence of Channel 5 often spoils reception of the other channels. This might seem surprising, but it often happens.

Before Channel 5 came along, almost every TV transmitter site in the country radiated four signals that could be received using an aerial designed for one group of

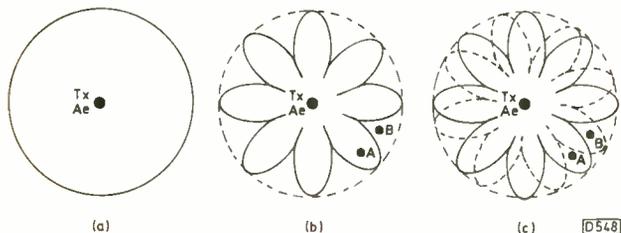
## DTT Reception

There have been several letters on the subject of variable digital terrestrial TV reception. The following information should be of interest.

An ONdigital representative gave a short talk at a recent local RETRA branch meeting here. Although he was not technical, he did touch on the transmission problems with a digital signal.

Analogue signals are usually transmitted omnidirectionally from the aerial, as shown in Fig. 1(a). The distribution of a digital signal is not the same: it can be likened to the petals of a flower, as shown in Fig. 1(b). If the receiving site is at A, within one of the lobes, reception is fine. If it's at B, the same distance from the transmitter, there is zero signal and thus no reception. Fig. 1(b) shows the distribution for just one multiplex: the lobes for the other multiplexes do not coincide with this or any other one. Fig. 1(c) illustrates this. At A both signals would be received, but at B only one signal would be received. For simplicity the diagram shows just two multiplexes. Thus getting full coverage from a transmitter without

**Fig 1: Transmitting aerial polar responses. (a) Omnidirectional analogue; (b) omnidirectional digital, one multiplex; (c) omnidirectional digital, two multiplexes.**



channels. A 'grouped' aerial has a relatively narrow bandwidth, and thus good gain and directivity. Despite attempts at obfuscation by those who sell wideband aerials, the relationship between gain/directivity and bandwidth is set by the laws of nature and thus can't be altered. A wideband aerial will always have inferior performance to a grouped 'equivalent'. After all, that's why the four-channel plan was devised – to have all four signals from each transmitter on fairly closely-spaced channels.

The pressure is now on installers to supply wideband aerials, against their better judgement, for the sake of Channel 5 reception. In fringe areas, or where ghosting is a problem, the likely result is unnecessarily poor reception of the other channels.

To take the Crosspool transmitter at Sheffield as an example, the channels used are 21, 24, 27, 31 and, would you believe it, 67! Four in group A and one, Channel 5 of course, near the top end for group C/D – and on permanent half power at that. I was incredulous when this channel allocation was announced, and still am. Can anyone explain why ch. 34 couldn't have been used?

Even the better-quality, properly-designed wideband aerials don't perform nearly as well as their grouped equivalent. Wideband arrays based on the traditional Yagi configuration are available from the larger manufacturers, who often quote performance figures next to those for their grouped versions. These tell their own story. Log-periodic aerials are again becoming fashionable, all these years after Antiference had a brief fling with them in the Seventies. These aerials are genuinely wideband, and have good directional characteristics, but the gain is very poor. The stacked bow-tie, or 'fireguard', has its adherents, but I'm not one of them. I've always found that their directional characteristics leave something to be desired, especially with horizontally-polarised signals.

Local riggers who always use the cheapest possible 'contract' aerials are not suddenly going to start using good-quality wideband aerials. They are going to use the cheapest possible wideband arrays. The reaction of one manufacturer to the Crosspool channel allocation has been to produce what is possibly the worst UHF aerial I have ever encountered. It's a contract 18-element array with the folded

dipole correct for group A and the director chain about right for group C/D. To make matters worse, the flat plate reflector is not long enough to function below channel 25. There's no attempt at impedance matching or efficient signal transfer from the director chain to the dipole. The grouped aerials from this firm aren't exactly brilliant, but they perform much better than this wideband effort which is, well, staggeringly bad. One that I played about with before replacing it had no useful directional abilities whatsoever for ch. 21 reception. The ch. 67 gain was about 3dB, rather than the 13dB of a half-decent grouped aerial. The sad thing is that these aerials are selling like hotcakes, because for a lot of riggers in Sheffield they 'solve' the Channel 5 problem.

Another problem arises with choice of transmitter. This is best explained by considering an example. The coverage areas of the Emley Moor and Belmont transmitters have a very large overlap. Before Channel 5 came along, we would use whichever transmitter provided the best reception. But at many locations we now have a dilemma. The Channel 5 transmissions from Belmont are so low-powered that in most parts of my area we can't use them. In places where we would automatically have used Belmont we now have to consider Emley Moor – for the sake of Channel 5. A ridiculous situation frequently arises: we have to provide indifferent Emley Moor signals despite the presence of four good signals from Belmont. This must be a common problem, and I'd be interested to hear the views of aerial installers in other parts of the country. The low-powered relays and the south coast main stations don't carry Channel 5, so this situation must frequently arise.

We've paid a high price for Channel 5. A nonsense has been made of the four-channel transmission plan, and this has resulted in a general reduction in the quality of TV reception. What are the benefits of Channel 5? Has there been a wealth of brilliant, innovative programming? Has viewing choice increased in any real sense? I don't need to answer these questions, do I? Whatever the reasons for starting Channel 5, the interests of ordinary viewers were not given much consideration.

We now have digital terrestrial and digital satellite TV. Both these developments were in the pipeline

when Channel 5 started. They show what an anachronism the terrestrial analogue Channel 5 transmissions are. In years to come it will seem incredible that a brand new analogue network was set up, at such cost, at the dawn of the digital era. *Bill Wright, Wright's Aerials, Rotherham, S. Yorkshire.*

### Multimeter Batteries

Many older analogue multimeters use a small BLR154 15V battery to provide power on the higher-resistance ranges. These are still readily available from most wholesalers, but their cost (currently about £5) has increased so much recently that I was prompted to look for an economical alternative. The GPI, GP23A or Duracell MN21 car-alarm transmitter battery has proved to be ideal. It has a similar capacity to the original, and can be bought for well under £1 if you shop around.

Its obvious shortcoming is the lower terminal voltage of just 12V. In practice however this seems to be of little consequence. All the meters I've come across have been able to achieve full-scale deflection with the zero-adjustment control not too far from its normal setting. Accuracy is not affected.

The size also differs: 28mm long by 10mm wide compared to the original battery's 35mm by 14mm. As far as I know there is no dedicated holder, but one designed for a 1.5V N cell fits rather well – very little adjustment is required. Alternatively, if modifying the meter sounds too much like hard work, careful bending of the battery holder terminals and a suitably-positioned lump of BluTac will often suffice.

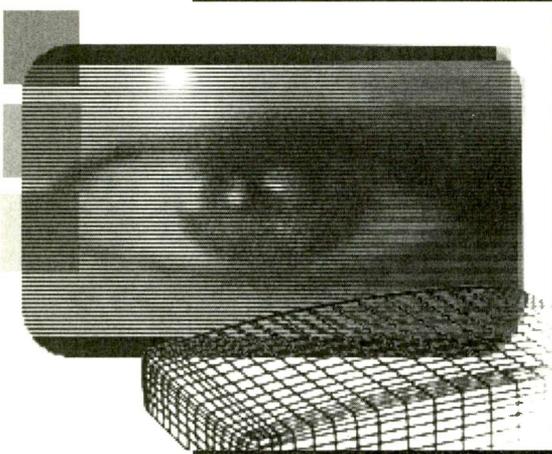
*Nicholas Arnold,  
Rye, East Sussex.*

### Chip Availability

In the April Monitors section Ian Field mentioned that the TC4010BP chip is now difficult to obtain. It may be helpful to readers to know that the CD4010CN is still available from Farnell Electronic Components under order code 384 549. It should be OK. Farnell's sales number is 0113 263 6311, fax 0113 263 3411. Technical support is available on 0113 279 9123, fax 0113 279 4279.

I have found the company to be very helpful. It doesn't require a minimum order, and credit cards are welcome.

*Ian Johnson,  
St. Albans, Herts.*



**Reports from**  
**Ian Field**  
**Roger Burchett**  
**Russ Phillips and**  
**Gerry Mumford**

### **Taxan MV789LR**

Several of these monitors arrived as a batch with the instruction "get as many as possible going". At least half had a duff line output transformer. The remainder had a cracked main board or other fault. These monitors have a good specification and are worth repair if a LOPT can be obtained at a reasonable cost. If the root cause of its failure is not corrected however you can destroy the replacement LOPT.

The first and most important thing to check is that the value of R820 is correct (150k $\Omega$ , 1%) and that it is of the right type. You can find it by following the tracks from the 4N35 optocoupler I802 to the TL431 adjustable zener I803 and the set-HT control. One end goes to chassis via R824 (910 $\Omega$ ). Follow the other track to R819 (12k $\Omega$ ) with R820 alongside. Both rectifiers on the secondary side of the power supply should be checked.

If R820 is an ordinary 5% resistor, replace it anyway. Use a good-quality 1% resistor (four colour bands for the value code plus brown for 1%) rated at 0.5W or more. A 2% resistor can be used provided it is of high quality/stability and has been checked for accuracy.

Q808 (2SK526) always dies when R820 fails. It's a chopper-type device used for EW control. The input to it is about 210V, while the smoothing electrolytics on its output side are rated at 200V. So it's obvious that this FET should reduce the HT fed to the LOPT. It won't when it goes short-circuit!

# Monitors

The 2SK526 has a drain-source voltage rating of 250V and a drain current rating of 10A. The drain-source resistance rating when on is 0.4 $\Omega$  (0.6 $\Omega$  maximum).

The 2SC4747 line output transistor Q403 rarely fails. But I found one that broke down at working voltage though it tested OK when cold. This gave the impression that the LOPT was faulty! Its failure hadn't damaged Q808, but this item should always be checked. I.F.

### **Fujitsu/ICL Value Plus 17"/KDS KD1700V**

This monitor came in with a blackened mains fuse. The auxiliary chopper power supply MOSFET was obviously not the original one, as at some time past its predecessor had vented soot on the side of an adjacent snubber resistor. There was evidence that dampness had been a problem, and I assume that someone had repaired the auxiliary power supply only to have the main power supply blow up next time power was applied. The main power supply chopper MOSFET Q801 had blown apart, removing most of the casing and the type number. Gate protection zener diode ZD801 (Z12C) had blown open-circuit, and R811 (22 $\Omega$ ) had vapourised. In view of all this, IC801 (SG3824M) was added to the list of items to replace.

The rebuilt power supply struggled for a few seconds, then blew up as before. This suggested that something else was wrong in the monitor and that the power supply current sensing was faulty as well. R805, part of the RC network connected to pin 3 (current sensing) of the 3824 chip, read almost exactly 24k $\Omega$ . But the third band looked more red than orange, indicating that it should have read 2.4k $\Omega$ .

Once the power supply had been restored to working order I carried out some checks in the line output stage. Q414 (MJW16212) was short-circuit, so was the EHT PWM control transistor Q416 (2SK2341).

As it was not possible to identify

Q801 from its remains, several types were tried until one that ran at a reasonable temperature was found. Eventually a 2SK727 was left in circuit and given a full five-day continuous soak test to make sure that it was up to the task. ZD801 was upgraded to 18V, as normally used in power supplies that employ a 2SK727. I.F.

### **Gateway 2000 CS1024 N12**

Several of these monitors were brought in because they were dead. It's my opinion that this chassis is dangerous and is on the whole best avoided! The main weakness seems to be the resistors that sample the HT output from the chopper power supply for regulation purposes. Since an over-voltage condition had persisted for some time before the power supplies blew up completely, most of these monitors were write-offs. The output from the power supply continues to rise until almost every power stage is damaged. I regularly leave monitors on overnight to soak test: I won't do so with any that use this chassis!

The worst case of overheating was due to a different cause however and was repairable – despite the fact that the pedestal had fused to the cabinet cover so badly that the two couldn't be separated! One lead of L101 (scan coupling or EW decoupling coil) had been dry-jointed to the large rectangular copper pad that forms the junction between C116 and C117 (both 0.33 $\mu$ F). There's an aperture in the PCB between these two capacitors: the amount of carbonised PCB that had to be removed left a new, larger aperture next to it.

With all the other monitors R325 and/or R335 (33.2k $\Omega$ , 1%, 3W) was either high-resistance or open-circuit, several of the electrolytics on the secondary side of the power supply had vented, and most of the rectifiers had broken in two!

The TDA1170N frame timebase chip IC201 is probably the first power device to suffer, but because

its supply rectifier breaks in two the power supply continues to run amok until something else stops it. It's probably a matter of luck whether the chopper MOSFET fails before something gets well alight! **I.F.**

**Elonex MN009/1**

The complaint with this colour SVGA monitor was that it powered down after a while. I found that the cause was dry-joints at the 7808CT regulator chip IC7108, which is mounted on the rear metal bracket next to the VGA cable entry.

There are numerous versions of this chassis, many of which have separate PWM regulators for the scan and EHT. Most of these have a MOSFET approximately where the regulator is in this one: the dry-joints cause considerably more damage! **I.F.**

**Dell Ultrascan P1428E**

The ticket said "line on screen" but the symptoms looked nothing like this. The picture was collapsing in all directions, with the sides bowing in and up to 100 per cent loss of contrast. In fact the power supply regulation was erratic.

Inspection revealed that C631 (100µF, 200V) was slightly bulged. To be on the safe side the HT sensing resistors R627 (1.5kΩ) and R628 (100kΩ) were checked: they were OK. The small electrolytics in the power supply were then checked: C622 (10µF, 50V), C618 (100µF, 35V) and C651 (10µF, 50V) seemed to have some effect on the symptom when frozen. The problem was solved by replacing all these suspect capacitors. The cost is less than the time taken to check out each one individually.

This fault stirred memories of a similar case, where the symptom had been failure to start: the small electrolytics on the primary side of many 3842-based power supplies are suspect. **I.F.**

**JD144**

Another anonymous JD144! This one bore the Model name 29J44J and the model numbers JD144J and FCC ID:AMPJD144J. It was dead. The cabinet design was the same as the last one seen, but the chassis was quite different! The cause of the fault was the same however: the Nicholas 140M271 degaussing posistor had failed. Don't bother shaking it to see if it rattles - break it open and inspect the thermistor pellets.

The plastic pushbutton assembly used in some of these models seems

to be poorly moulded. If it's not too bad, a quick squirt with Electrolube DFL200D PTFE spray will cure the problem. Smoother action can be obtained by unclipping the pushbutton and applying Finish Line Teflon-fortified bicycle grease to the sliding surfaces. **I.F.**

**Anbonn AM14S**

This monochrome monitor had been taking an increasingly long time to start up. C100 (68µF, 25V) in the start-up supply to the chopper control chip had fallen in value. **R.B.**

**Taxan EV410LR**

Every one of these monitors I've come across has been fitted with a Samsung M34KUK35X13-K tube. All have suffered from low emission within eighteen months. Only one responded to tube rejuvenation. From my experiences of CTX monitors with Samsung tubes, the extra life probably won't be very long. **R.B.**

**Peacock PM14P48LR**

The usual cause when one of these comes in dead is that the 27kΩ start-up resistor R603 has gone high in value or open-circuit. There are two series-connected resistors of the same value in the start-up circuit, the other one being R604. A word of warning: with this fault the mains bridge rectifier's reservoir capacitor will be fully charged. **R.B.**

**Viglen 14S**

There was no EHT because of loss of line output transistor drive. The cause of the trouble was eventually traced to a dry-joint at R877 (0.22Ω fusible) in the 9V supply. Although the joint looked sound, the resistor measured open-circuit when checked in circuit. When I removed the resistor to replace it I discovered that one leg had not been soldered. Once the resistor had been correctly soldered in place the monitor worked perfectly. **R.P.**

**AOC CM33S**

If the HT voltage (85V) is set too high the picture width will be excessive with lack of height. For correct operation the HT should be set at no more than 90V. **R.P.**

**KME 26S10A32HX/H**

Two of these monitors were brought in from a local mechanical engineering plant. They are industrial units that are used in the operator panel displays of large machinery. The first unit was dead, though the power supply appeared to be OK.

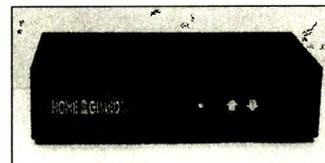
There was no HT supply at the line output stage however, because power choke L3 was open-circuit. In fact one leg had corroded off. Fortunately the choke is open-wound and has few turns, so repair was easy.

The second monitor powered up but arced badly. On inspection, sparks could be seen jumping across the burnt ends of R47 (27kΩ, 3W) on the tube base PCB. The neighbouring MPSA93 transistor VT11 was short-circuit. These two components were replaced, but at power up the unit again arced, this time from the line output transformer (1242.0148). VT11 had once more died. After replacing these items we finally had a display. **G.M.**

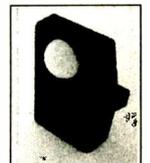
**XGA CK3148L**

There was no blue in this monitor's display. A check on the CRT base panel showed that R531 (47Ω, 0.125W) had burnt up. As a result, R553 (1kΩ, 5W fusible) had increased in value. Once these two resistors had been replaced there was a correctly coloured display. **G.M.**

**LOW COST CCTV SYSTEMS**



SL300 VIDEO CONTROL MODULE



PIR CAMERA

**DEALERS/SALES AGENTS REQUIRED**  
**INSTALLERS REQUIRED**  
**NATIONWIDE**

**EXCLUSIVE AREAS AVAILABLE**  
**SUBSTANTIAL GROWTH INDUSTRY**

Record Prowlers/Burglars/Visitors on a Low Cost Domestic Video Recorder. System automatically activates when a person approaches a property, detects and records each visit, adding date and time to the recording picture, hence uses the minimum of video tape. Unit automatically switches your video on and off, the unit "learns" your remote control commands during "setup", 1 to 4 Cameras may be used (depends upon installation). British designed and manufactured, full 12 months return to base warranty. YEAR 2000 OK

**System Components**

**Video Control Module**  
B/W Cameras with built-in PIR  
Colour Camera: uses any N/C Contact  
Uses your own Video Recorder (works with 99% of Video Recorders on the market). We can offer a suitable recorder if required, prices upon request.

System expandable up to 4 Cameras.

Easy DIY Installation.

Colour Camera Record triggered by: Door Switches/Window Switches/Pressure Mats/Panic Switches/Remote PIR's.

Computer Interface available soon!

Can be used by the Police as evidence.

Call/Fax for More Details

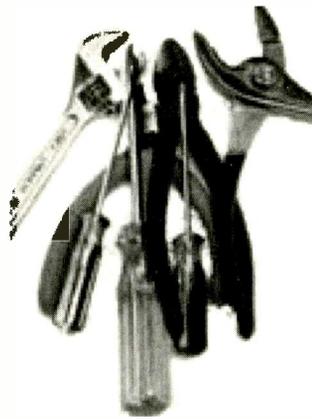
**WESTFIELD SECURITY PRODUCTS**

Unit 2, Station Yard, Station Road, Hungerford, Berkshire RG17 0DY

Tel: (01488) 686590 Fax: (01488) 685430

E-mail: sales@westfield.co.uk

Contacts: Bernie Crowther/Steve Chappell



# John Edwards' Casebook

## Mitsubishi CT21M2TX (Euro 14 chassis)

When this set was switched on the standby LED glowed red. Then, when the standby button on the remote control unit was operated, the set came to life and the LED turned green. But the screen remained blank and there was no sound. This situation continued as I changed channels, except for the display of an occasional burst of snow. The EEPROM chip IC702 is not all that reliable so, after checking that the 5V supply was present at pin 8 and that there was data activity at pins 5 and 6, I fitted a replacement. But I couldn't figure out how to tune and store channels using the remote control unit. The only relevant button was the preset one: all the others were normal customer preference ones.

I phoned the customer to ask for the user's booklet. This never goes down well – it suggests that I don't know what I'm up to. The lady of the house said she hadn't seen it for years, but would ask her husband to phone when he got back from work to tell me how to work the set. That was too much. I told her not to bother, it wouldn't take me long to figure it out.

Well, I did figure it out – eventually. So if you want to know, this is it. Select the channel you want to tune in, then press the preset button (I got that straight away!). You will see the tuning display appear, coloured blue. The next step is to change its colour to yellow by pressing the channel down button. Then press the volume + or – button to start the search tuning. When it has stopped on a channel, press volume + until the channel you selected is displayed. Press the preset button to store it, then repeat for all the other channels you require. I don't know if my method is the same as that in the user's booklet, but it works.

I was not all that surprised when the husband phoned me that evening. Apparently his wife had suggested he got in touch. I was happy to tell him that the set was now OK. "Yeah, I guessed she'd got it wrong" he said, "after all, one tele's the same as any other."

I decided not to get involved in a discussion about the thousands of models and the numerous circuit arrangements and different control systems in use. I agreed with him and arranged a delivery time.

## GoldStar GSEQ121

This centre-mount machine erased the previous sound track but wouldn't record over it. The E-E and recorded pictures were fine. I decided to carry out checks at the pins of the BA7790LS audio playback/record chip IC401. The 9V supply was present at pin 7, and audio from the IF strip was present at pin 18. But there was no output to the record head at pin 21. So either the chip

was faulty or it wasn't being told to record.

Pin 24 is used for record/playback switching. There should be 5V here in the record mode and 1V in playback. In fact 0.5V was present here whichever mode was selected. Thinking that the chip might be faulty, I disconnected pin 24. The voltage on the print leading to it remained at 0.5V. So the chip was permanently switched to playback.

The control voltage comes from pin 31 of a surface-mounted microcontroller chip. I decided to check the continuity between the two pins with my multimeter's buzzer facility: there was no response with one prod at the audio chip and the other at the microcontroller chip, but when the 'audio' prod was placed on the track about 2mm from pin 31 of the micro a buzz was heard. Although I couldn't see it, there was an open-circuit just short of this pin. I solved the problem by carefully soldering one end of a single strand of wire directly to the micro's pin and the other end to a good area of track, with a small piece of insulation tape beneath. After that there was continuity between the two pins and correct record/playback operation.

## Compaq 491 (171FS)

This 17in. monitor was dead. There was HT at the drain of the chopper FET Q920, but no supply at pin 7 of the UC3842 chopper control chip. R902 (30kΩ) was open-circuit.

## Matsui 1496R/T and 2096R/T

Here's a bit of information that could well be useful. The following situation can arise with these sets: the customer has entered a 'pass' code number and has forgotten it, or has accidentally entered a random code number. In either event the set will remain in the pass mode and won't allow access to some or all channels. The instruction book doesn't mention this.

To remove the pass code: (1) take the PCB out of the remote control unit and connect a tact switch between pins 4 and 17 of IC1; (2) switch on the set via the remote control unit and select the channel or channels that have a pass code number; (3) press the tact switch and hold it down for about a second. The 'pass channel' will clear and the picture will return.

To remove the pass mode permanently, press the tact switch again. The message "pass clear" will appear on the screen and the set will be back to normal operation. Return the remote control unit to its original condition and write out your invoice! My thanks to Dave at Charles Hyde for this one. I had a customer two days after he'd told me!

## Answer to Test Case 440

- see page 681 -

Aren't these intermittent faults horrible? Especially when they result in component destruction, when they lie dormant for a long time then strike in an instant, and when they rear their evil heads after a new repair that's just been paid for. All three of these factors were present in this case - and at the end of it all there wasn't an extra bean by way of payment.

Considering the many possibilities, Television Ted felt that the most likely causes were: a flashover or other failure within the line output transformer; the same situation with some other component in the line output stage, such as the tuning capacitor C559; a sudden rise in the HT voltage because of a power supply fault; or a marked change in Q552's drive waveform (the driver transformer T551 faulty?) or its load conditions (maybe a rectifier or scan coil fault). He carefully chose the points to be monitored, using a couple of old dual-beam oscilloscopes for the purpose with a continuous watch and recording provided by means of a camera/recorder jig.

When the fault next occurred, the tape was rewound and the waveforms at the crucial moment were studied. The 112V supply had suddenly shot up, and with it the flyback voltage in the line output stage. The cause of the trouble was the STR54041 chopper chip IC901. It had perhaps lost its internal feedback, reference voltage or whatever.

### NEXT MONTH IN TELEVISION

#### Digital TV receivers: the front end

Time to get to grips with the channel decoder section of a digital TV STB/IDTV receiver, whether for terrestrial off-air, satellite or cable reception. K.F. Ibrahim starts a new series that gives detailed insight.

#### Servicing the Aiwa HVFX1500 VCR

John Coombes provides servicing guidance on the deck and the electronics used in this model.

#### Test report: the Global Remote Eye

The Global Remote Eye can be used to insert control signals into a wired link between a Sky digibox and a TV set, giving two-way remote control operation.

#### The Super Audio CD format

George Cole explains the techniques used in this recent audio disc format, which was launched last May.

#### Servicing commercial microwaves

Here's another possibility to add to the range of equipment you repair and service. There are a few differences with the types of microwave ovens used in catering, as Derek Townsend explains.

**PLUS ALL THE REGULAR FEATURES**

## TELEVISION INDEX/DIRECTORY AND FAULTS DISCS PLUS HARD COPY INDEXES & REPRINTS SERVICE INDEX DISC

Version 7 of the computerised Index to TELEVISION magazine covers Volumes 38 to 48 (1988-1998). It has thousands of references to TV, VCR, CD, satellite and monitor 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 quick and easy to use, and runs on any PC with Microsoft Windows or MS-DOS. Price is £35 (supplied on a 3.5" HD disc). Those with previous versions can obtain an upgraded version for £15. Please quote the serial number of the original disc. See the CD-ROM offer below.

### FAULT REPORT DISCS

Each disc contains the full text for television VCR, monitor, 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:

Vol 38 (Nov 1987 - Oct 1988); Vol 39 (Nov 1988 - Oct 1989);  
Vol 40 (Nov 1989 - Oct 1990); Vol 41 (Nov 1990 - Oct 1991);  
Vol 42 (Nov 1991 - Oct 1992); Vol 43 (Nov 1992 - Oct 1993);  
Vol 44 (Nov 1993 - Oct 1994); Vol 45 (Nov 1994 - Oct 1995);  
Vol 46 (Nov 1995 - Oct 1996); Vol 47 (Nov 1996 - Oct 1997);  
Vol 48 (Nov 1997 - Oct 1998).

Price £15 each (supplied on 3.5" HD discs).

### FAULT FINDING GUIDE DISCS

These discs are packed with the text of vital fault finding information from TELEVISION - fault finding articles on particular TV chassis, VCRs and camcorders, Test Cases, What a Life! and Service Briefs. There are now two volumes, 1 and 2. They are accessed via the Index disc. Price £15 each (supplied on 3.5" HD discs).

### NEW - COMPLETE PACKAGE ON CD-ROM

The Index and all the Fault Report and Fault Finding Guide discs are available on one CD-ROM at a price of £195 (this represents a saving of £35). An Index to Electronics World (worth £20) is also included. Customers who have all the previous Fault Report discs can upgrade to CD-ROM for £45. Please quote the serial number of your Index disc.

### REPRINTS & HARD COPY INDEXES

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 48 at £3.50 each.

All the above prices include UK postage and VAT where applicable. Add an extra £1 postage for non-UK EC orders, or £5 for non-EC overseas orders. Cheques should be made payable to SoftCopy Ltd. Access, Visa or MasterCard Credit Cards are accepted. Allow 28 days for delivery (UK).

**SoftCopy Limited,**  
**1 Vineries Close, Cheltenham, GL53 0NU, UK.**  
**Telephone 01242 241 455.**  
**Fax 01242 241 468.**  
**e-mail: sales@softcopy.co.uk**  
**Web site: http://www.softcopy.co.uk**

Published on the third Wednesday of each month by Reed Business Information Ltd., Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. **Filmsetting** by JJ Typographics Limited, Unit 4, Baron Court, Chandlers Way, Temple Farm Industrial Estate, Southend-on-Sea, Essex SS2 5SE. **Printed** in England by Polestar (Colchester) Ltd., Newcomen Way, Severalls Industrial Park, Colchester, Essex CO4 4TG. **Distributed** by 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 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.

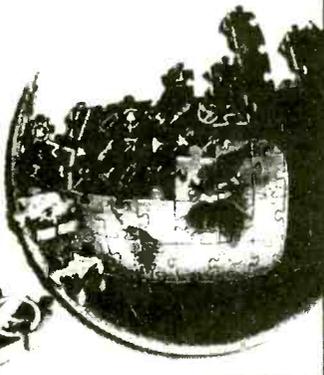
# WILTSGROVE LTD

28/29 River Street, Digbeth, Birmingham B5 5SA

Tel : 0121 772 2733

Fax : 0121 766 6100

**WILTSGROVE LTD**  
Electronic Components Catalogue



1999/2000

**OUT NOW!**  
the  
**1999/2000**  
**ELECTRONIC COMPONENTS**  
**CATALOGUE**

**"FOR ALL YOUR REPAIRS**  
**BUY OUR SPARES!"**

**GRADED STOCK**

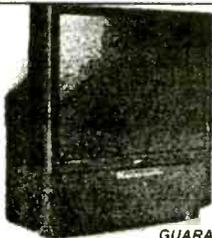
MONO CTVS :	DESCRIPTION	PRICE
C1411R	34cmV, 14", Remote control	£59.99
C1411T	34cmV, 14", Remote, Fastext	£69.99
C1420VT	TV/VCR combined unit, Text, Videoplus	£145.00
C1714T	41cmV, FST, Fastext, Scart	£115.00
C2114T	51cmV, FST, Fastext, Front AV, R/C	£110.00
C2514T	59cmV, FST, Front AV, R/C, Fastext	£149.00
NICAM CTVS :		
C2156/66TN	51cmV, NICAM, Easytune system	£135.00
C2856TN	66cmV, NICAM, Picture noise reduction	£199.00
DOLBY PRO-LOGIC CTVS :		
C2548TNS	59cmV, DPL with 3DS, Stand, Matrix tube	£219.00
C2848TNS	66cmV, DPL with 3DS, Stand, Matrix tube	£239.00
C2976TN	68cmV, DPL with surround speakers	£299.00
C24W1TN	56cmV, Widescreen, 3DS	£249.00
C28WD2N	66cmV, Widescreen, DPL	£299.00
C32WD2TN	76cmV, Widescreen, DPL, with Cabinet	£485.00
C32W40TN	76cmV, Widescreen, DPL	£549.00
MONO VCRS :		
VTM530	DA4 Heads, Videoplus, PDC, Autoclean	£65.00
VTM610/30	2 Head, LP/SP, Videoplus, PDC	£69.00
VTMX730	DA4 Heads, LP/SP, Videoplus, PDC	£79.00
NICAM VCRS :		
VTF641	DA4-Head, LP/SP, Videoplus, PDC, NTSC Plybk	£99.00
VTF645	DA4-Head, Satellite cntrl, Videoplus, PDC	£99.00
VTF650	NICAM stereo, PDC, Videoplus, LP/SP	£99.00
VTFX760/65/770	DA4-Head, Satellite cntrl & More...	£115.00

## BARGAINS GALORE THIS MONTH

**Alba/Bush**

Colour Televisions Graded Stock Boxed as New!

	Untested	Tested
14" Remote Control	£34.99	£44.99
14" Remote, Teletext	£39.99	£52.99
20" Remote Control	£39.99	£49.99
20" Remote, Teletext	£44.99	£54.99
20" NICAM, Remote, Teletext	£54.99	£69.99
21" Remote, Teletext	£49.99	£59.99
21" NICAM, Remote, Teletext	£54.99	£74.99
28" NICAM, Remote, Teletext	£109.99	£129.99



### SONY 41" Projection Screen 103cm Rear Projection TV

41" CRT rear projection Anti-reflective coating, Digital comb filter, High contrast screen Scratch proof screen, Centre speaker input, IQ menu & operation to allow you to use the set's speaker as the centre speaker of a Dolby Pro Logic system. Auto convergence. Multi standard, NTSC Video input. NICAM/ZVEI stereo. Fastext with 400 page memory. Sleep timer. Parental lock. Auto tuning. 3 scart sockets. Front AV input incl. S video.

GRADED STOCK  
AS GOOD AS NEW

GUARANTEED WORKING STOCK

**£849.99**

### OLIVETTI JP883 INKJET PRINTER

- High quality Refillable printheads.
- Black & colour capability.
- 1200 dpi resolution capability.
- Windows Plug 'n Play.



only **£79.99** 12 Months On-site Warranty BRAND NEW

### THE ASTRAL COLLECTION

Choose from either a Walnut or Pine finish for that unique look.

- Features:
- Pulse or Tone signalling.
  - 31 digit storage of last number dialed.
  - Hearing Aid compatibility.
  - Illuminated keypad.



**NOW ONLY £7.49**  
These Phones are BRAND NEW & come packed in gift box with 12 months Guarantee.

### AMSTRAD MC2800 Micro system (GRADED)



Wall mounting unit with 3 detachable speaker grilles. Remote controlled. Output 2x5 Watts RMS (20Watts MPO). Programmable CD, FM/MW Radio. Auto stop cassette. Pre-set GEO. Alarm function.

**£34.95**

### 14" Text CTV



- 14" PICTURE TUBE
- 40 PROGRAMMES
- REMOTE CONTROL
- DIGITAL ON SCREEN DISPLAY
- 240V MAINS OPERATED
- SLEEP TIMER
- UHF/VHF TUNNING
- AUTOMATIC CHANNEL STORAGE
- AUTO RESET FOR PICTURE
- SCART CONNECTOR
- STANDBY MODE
- TELETEXT
- AUTOMATIC TIMED SWITCHING OFF

NEW with 12 Months Guarantee **£74.99**

### EX-RENTAL BARGAINS

(WORKING STOCK READY TO USE)

Basic CTVs - £12, R/C CTVs - £15

T/TEXT CTVs - £20, TX100 Range - £29.99

EX-RENTAL VCR's from **£20.00**

### \*\*\*\*\*NEWS FLASH\*\*\*\*\*

BRANDED WHITE GOODS IN STOCK NOW!

WASHING MACHINES FRIDGE FREEZERS DRYERS

MICROWAVE OVENS OVEN/HOBS

ALL PRICES SUBJECT TO AVAILABILITY, VAT & CARRIAGE

**FREEFAX ORDERLINE : 0500 55 05 05**





Wholesale Distributors & Export Agents  
of Domestic Electronics & Appliances

**Current Stock**

- 10" ac/de
- 14" r/c
- 14" text
- 20" r/e
- 20" text
- 21" text
- 21" nicam
- 25" text
- 25" nicam
- 25" dpl
- 28" nicam
- 28" dpl
- 28" wide
- 33" nicam
- 33" dpl
- 33" wide
- 37" nicam
- 46" rp
- 52" rp
- 55" rp
- full ver range**

**Possibly the Largest and Oldest  
Establishment in the UK**

**New Contracts secured from  
this month**

**MITSUBISHI  
TV's/VCR's from £65**

**DIRECT LOADS  
UNTESTED RETURNS**

- F14" r/c from £30
- 2 sp VCR from £30
- Portable CD from £16
- Small domestic from £3
- Radio cassette from £3.50
- Large domestic from £6.50
- BT phones from £18
- Dect phones from £35
- N/W kettles and toasters £1

All prices based on availability + VAT

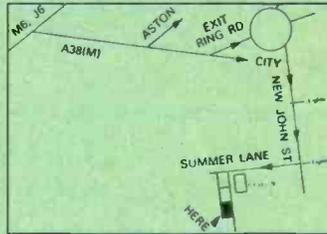
**FERGUSON**

**REAR PROJECTOR TV'S**

- RP46 £1,200
- RP52 £1,450

**THIS MONTH ONLY**

- 14" R/C Portables from...£50
- 14" Portable Text from...£60
- VCR's from.....£50
- Dect Phones.....£45
- Anologue BT Phones from  
.....£20



**MANY MORE OFFERS AVAILABLE**

**Current Stock**

- Radio/ Cassettes
- Car Audio
- CD Port
- Hi-Fi
- Phones
- Faxes
- Kettles
- Irons
- Mixers/ Blenders
- Microwaves
- Vacs
- Printers
- Speakers
- BT Phones
- Fridge/ Freezers
- Cookers
- Hobs
- Direct  
Loads

**NATION-WIDE NEXT DAY DELIVERY SERVICE - VISITORS BY APPOINTMENT**

**Phone 0121-359 7020**

**Fax 0121-359 6344**

**PHOENIX HOUSE, 190 BRIDGE ST. WEST,  
BIRMINGHAM B19 2YT**



**WANTED**

**SURPLUS STOCK REQUIRED**

*Anything considered*

TV, VIDEO, HI-FI, MICROWAVE,  
SMALL HOUSEHOLD ELECTRICAL ITEMS  
eg: Kettles, Toasters, Irons, Hoovers, Garden Equipment.

**SALES**

**Sanyo 100,000s Stock clearance**  
eg Microwaves, CD, radio cassettes, personal CDs and  
videos

Thompson TVs and videos available

*Ring for prices*

**SUPERSOUND LEEDS LTD**

**21 Upper Accommodation Road, Richmond Hill, Leeds LS9 8NF**

**Tel: 0113 248 0512 Fax: 0113 249 6990**

# DARTEL ELECTRONICS

8 Heather Park Drive, Alperton  
Wembley, Middlesex HA0 1SL

Tel: 0181-795-1735 Fax: 0181-795-1736

**High quality graded  
stock from  
manufacturers**

Camcorders, VCR's,  
Televisions, Hi-Fi's,  
Car Stereos, Microwaves etc

**All popular brands boxed  
with warranty**

*Tel/Fax for details  
Visit by appointment*

# TUBES

TV/Monitor

**NEW**

**Graded**

**Ex-Equipment**

**Re-gun**

**De-Scratching Service**  
*Prices on application*



**Ring Irene**



**EXPRESS TV**

**The Mill, Mill Lane**

**RUGELEY, STAFFS WS15 2JW**

**TEL: 01889 577600**

**FAX: 01889 575600**

## W. TREE TRADE WAREHOUSE

UNIT 9A/9B CARRMERE ROAD  
LEECHMERE INDUSTRIAL ESTATE  
SUNDERLAND SR2 NTE  
TELEPHONE: 0191 521 1500

**LARGE SELECTION OF HIFI  
TECHNICS • KENWOOD • PIONEER • AIWA**

### B Grade TV's - Boxed - Working

14" R/C.....	from £55	25" Fastext .....	£165
14" Televideo Combinations.....	£125	28" Nicam.....	£159
20" Televideo Combinations.....	£189	28" Wide Screen.....	£300
20" R/C Television.....	£79	32" Wide Screen.....	£550
20" Fastext .....	£89		

### Special Offer on B Grade Videos

L/P Video - £52 Videoplus - £60 Nicam - £79

### B Grade Camcorders

Working, boxed with instructions  
**£129**

### Ex-Rental Bargains (Working)

**21" FST from £35 - 25" FST from £45**  
or buy as they come - £25 each

## W. TREE TRADE WAREHOUSE

UNIT 1, SUNSHINE MILLS, WORTLEY ROAD,  
LEEDS LS12 3HT  
TELEPHONE: 0113 2638804



**ELECTRONICS**

WHOLESALE DISTRIBUTORS  
OF DOMESTIC  
ELECTRONIC APPLIANCES

Unit 15 Marks Hall Margaret Roding Dunmow Essex CM6 1QT  
Telephone: 01245 231684 Facsimile: 01245 231862

### NEW B GRADE STOCK AT BELOW TRADE PRICE

Large **WIDE SCREEN** 16 x 9 Format Televisions from £450

Large **REAR PROJECTION** Televisions 52" from £1,500

*We also carry a Large selection of  
televisions and videos all at below trade price.*

36cm portables .....	from £70
51cm televisions nicam .....	from £150
59cm televisions nicam .....	from £200
68cm televisions nicam .....	from £250
78cm televisions nicam .....	from £500
95cm televisions nicam .....	from £800
videos 2 head mono .....	from £70
videos 4 head nicam .....	from £110
videos 6 head hi-fi nicam .....	from £130
36cm combined TV and video .....	from £170
dvd players.....	£160

### LARGE QUANTITY DISCOUNTS AVAILABLE

25cm televisions with DC 12/24 volt suitable for  
caravans - mobile homes - cars - kitchen use from £120

- ALL PRODUCTS ARE FULLY GUARANTEED -

### YOU WILL NOT GET A BETTER DEAL ANYWHERE

We stock a great many other items in the TV and Video  
range so if you don't see what you are looking for,  
give us a call, *we will save you pounds.*

*Visitors by appointment only*



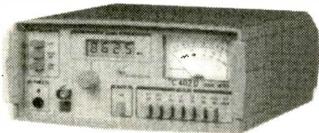
**Largest selection  
of  
MAJOR MANUFACTURERS  
NEW "B"  
GRADE PRODUCTS  
T.V. VIDEO AUDIO  
MICROWAVE OVENS**

**Contact Fred Bean**

BSMART (CRAWLEY) LTD.  
10/11 LLOYDS COURT, MANOR ROYAL,  
CRAWLEY, SUSSEX RH10 2QX  
Tel (01293) 618000  
Fax (01293) 400133

<b>TVs</b>	<b>VALUE FROM VISION TEC ON BRANDED ELECTRICAL</b> ALL UNDER MANUFACTURERS GUARANTEE SONY • TOSHIBA VOLTAIR • PANASONIC KENWOOD • BUSH AIWA • ALBA • ROWENTA PIONEER • VENTURA	
<b>VIDEOS</b>		
<b>CAMCORDERS</b>		
<b>HI-FIs</b>		
<b>DIGITAL CAMERAS</b>		
<b>VACUUM CLEANERS</b>		
<b>MICROWAVES</b>	<b>★ Before you buy please call us first ★</b>	
BT CORDLESS AND DIGITAL DECKPHONES	EXTENSION LEADS	<b>KEENESEST PRICES AROUND</b>
KETTLES, CORDLESS AND CORDED IN ALL COLOURS	LAVA LAMPS	
RADIO CASSETTES	HEADPHONES	<b>VISION TEC</b> Electronics & Domestic Appliances 184 GREAT HAMPTON ROW HOCKLEY BIRMINGHAM B19 3JP <b>0121-236 4335</b> FAX: 0121-235 1744
CAR STEREOS	PORTABLE TVs	
CLOCK RADIOS	CD RADIO CASSETTES	
PORTABLE RADIO	BRANDED IRONS AND TOASTERS	
DOOR BELLS		
HAIR DRYERS		

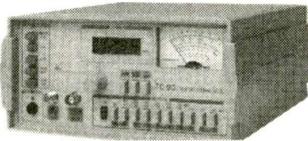
*Sole UK  
Agents for* **SADELTA**



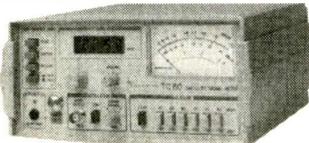
**TC-402D**  
Due to its weight and size, the TC-402D is the ideal instrument for the installation of FM and Terrestrial TV antenna, as well as CATV systems.

- 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

**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**

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 3981

The prepaid rate for semi display setting is £15.00 per single column centimetre (minimum 4 cm). Classified advertisements £2.00 per word (minimum 20 words), box number £22.00 extra. All prices plus 17% VAT. All cheques, postal orders etc., to be made payable to Reed Business Information. Advertisements, together with remittance, should be sent to Television Classified, 12th Floor, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS

## Latest Servicing Data

WHY WASTE TIME LOOKING FOR ELUSIVE FAULTS !!!  
INDISPENSABLE TITLES FOR SERIOUS ENGINEERS.

### Just released: Model / Chassis / Equivalents book.

The long awaited 3rd Edition of the Equivalents guides now available, 7,500 ENTRIES covering TV Models to chassis and TV, Video, Camcorder, Satellite & Monitor Equivalents. comprehensive A4 book.  
ISBN 1 898394 29 6 3rd Edition Equivalents £6.95

### New release: Edition 22 Fault Index books.

Now Available Edition 22 of the Television Magazine Index Covers over 14,000 Television, Video, Satellite, Camcorder & Monitor faults, Large easy to read A4 format The latest addition to a highly acclaimed & recommended series. In daily use in workshops around the world !!  
ISBN 1 898394 27 X Edition 22: Complete set £14.75

### Brand New: Fault indexes on disk - Version 1.8

Latest faults together with all data from all previous versions, Covering a MASSIVE 21,500 !! Television, Video, Camcorder, Satellite, CD & Monitor faults listed in 19 years of Television.

Version 1.8: Indexes on Disk (price held) £17.50

Low cost updates are available for all Book & Disk fault indexes.

### Kwik Tips Fault Database on Disk - Version 1.1

A valuable service resource for workshops large or small. Kwik Tips Version 1.1 is our LARGEST FAULTS & REMEDIES database EVER, Compiled from over 20,000 !! Entries & covering 1,435 Chassis & Models. This concisely Edited TV & Video repair database will easily pay for itself with just one repair.

Kwik Tips on disk Version 1.1 £27.95

All programs require a PC or compatible & are supplied with a user manual

**E.C.S.**  
Technical Publishing (Est 1985)

316, Upton Road,  
Noctorum, Wirral,  
Merseyside. CH43 9RW  
Tel / Fax 0151 522 0053

Please add £1.75 P & P to total (Europe £2.75, r.o.w please enquire).

### NEW FAX BACK SERVICE NOW AVAILABLE

TEL/FAX A.T.V. on 0114 285 4254

SAT/CTV Circuits £5.00  
VCR Circuits £7.00  
CTV Manuals £10.50  
VCR Manuals £14.50

(P/P add £2.50 to each order)

419 LANGSETT ROAD,  
SHEFFIELD S6 2LL

### 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

### Fryerns

Service Information **FES** Circuit Diagrams

TV's, VCR's  
SATELLITE  
AUDIO & HI-FI  
Most Models Covered

Prices are from £4.00 + £2.50 P/P  
1 item - total £6.50 inc  
2 items - total £10.50 inc  
3 items - total £14.50 inc  
4 items - total £18.50 inc

Payment by credit card or Postal  
Order for next day delivery.

Cheques to clear.

Tel/Fax 01206 211570

2 The Lodge  
Easthorpe Green  
Marks Tey, Colchester  
CO6 1HA



## SERVICE MANUALS

Thousands of models available

For most U.K. European, Far East & USA makes

### Service manual prices

B/W TV - £6.00 CTV/VCP - £10.00  
VCR - £14.00 Camcorder - £16.00

Service sheets/circuits also available for some models.  
+ data for satellite, audio and microwave.

All the above items include circuit diagrams.

Please telephone to check availability.

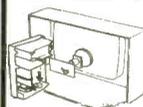
Payment by Cheque/PO only please.

Add £2.00 P/P etc. to order total. Do not add any VAT.

### D-TEC

PO BOX 1171, FERNDOWN, DORSET BH22 9YG  
Tel: 01202 870656

## Service Manuals



Available for most equipment.

From Valve Wireless to Video Recorders  
and everything else in between.

Televisions, Computer Monitor, Test Equipment,  
Satellite, all Audio, Amateur Radio etc etc.

If you need a Service Manual give us a call.

Originals or Photostats as available.

Our entire index of Manuals is now being put on our  
web site for instant access.

Alternatively complete the coupon below for our Floppy Disc  
catalogue of Manuals and Technical Books available.

### MAURITRON TECHNICAL SERVICES

8 Cherry Tree Road, Chinnor, Oxon OX9 4QY

Tel: 01844-351694. Fax: 01844-352554.

Email: enquiries@mauritron.co.uk

Web site at: <http://www.mauritron.co.uk/mauritron/>

Please forward your Catalogue of Technical Books and Service  
Manuals Index on PC Disc for which I enclose 4 x 1st class stamps.

Name \_\_\_\_\_

Address \_\_\_\_\_

Postcode \_\_\_\_\_

Telephone \_\_\_\_\_

CLASSIFIED TEL: 0181 652 8339

**SERVICE MANUAL LIBRARY** pay only £5 loan fee for any Service Manual or keep it for £10. Lifetime membership £99 – FREE Data Reference Manual showing the 1000's of manuals available with models cross referenced to correct manufacturer's chassis (£9.95 on its own). We take other manuals so members can get new manuals for only the cost of postage.

Phone 01357 440280 (fax 440384) for full details or write to:  
**Technical Information Services, Midlinbank Farm, Ryelands, Strathaven, Lanarks ML10 6RD.** World's largest stock of Service Manuals (TV VCR Combs, Test Eqpt, Audio, CD, Satellite, Dom Eq) Complete Repair Data (Not the few faults offered everywhere else) & Technical Literature. Any items asked – free quote.

**Special offer until end of June 1999**  
 Any 20 full service manuals from stock (1 at a time or in any quantity you wish) only £240 including 1st class post. Includes those priced at £50/£60!!! Includes FREE Data Reference Manual and Practical TV & VCR Repair Manuals worth £33.90 alone.

100's of offers and prices FREE on request. Buy any 2 Buy, Sell & Repair (TV's or VCR or CD) @ £12.95 each – get 3rd FREE.  
 European Scrambling Systems (Hackers Black Bible) £35.  
 Practical Radio Repairs for £2 (post free with any other order).  
 Any of the famous McCourt or Tunbridge CTV Repair Manuals for only £5 each – all 9 for £25 till end June 1999 or when cleared.  
 Thorn – 6 training manuals for £9, PAL system £10.  
 The 9 manuals for common CTV's – 1001, 1401, 1403, 1405, 2001, 2003, 2005 plus Text sets covering Beon, Bush, Crown, Murphy, Philips, Taiwan Ind & multiples only £49 (Circs £39)  
 ACCESS, DELTA, EUROCARD, MASTERCARD, VISA  
 £2.50 postage any non-free order.  
 e-mail s\_manuals@hotmail.com

# TRANSFORMERS

## 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  
 Mon-Fri 9 am to 12.30 pm & 1.30-4.30 pm  
 Approx. 1 mile from New Bridge.

# FOR SALE

**AS NEW 'A' GRADED PRODUCT IN ORIGINAL PKG & BOX WITH INST BOOK LEADING BRANDS ONLY. FULLY GUARANTEED ALL SOLD AT APPROX HALF USUAL RETAIL.**

MICROWAVE OVENS ..... £39  
 14" PORTABLE CTV ..... £69  
 14" COMBI CT VCR ..... £135  
 28" LARGE SCREEN .... from £295  
 CDR PLAYERS ..... £173

**KG PURCHASING LTD · BRADFORD**  
 Tel 01274 660196/665670 Fax 665246

**IMPORTERS OF GRADED BROWN AND WHITE GOODS**

**WORKING AND UNWORKING**

INTERESTED THEN PLEASE  
 FAX 00962 64756902 or  
 E-MAIL samam@go.corn.jo  
 JORDON

## WANTED

## PROPERTY

**BILLINGTON EXPORT LIMITED** Billingshurst, West Sussex RH14 9EZ

**VALVES WANTED FOR CASH**  
 (KT88, PX25, DA100, EL37, ECC83)  
 AVO Valve Tester VCM163  
 Valves must be Mullard/GEC/West European to achieve top prices  
 Ask for our free Wanted List.  
**WE SUPPLY VALVES, C.R.T., VIDICONS ETC**  
 Tel: (01403) 784 961  
 Fax: (01403) 783 519  
 Email: billingtonexportltd@btinternet.com  
 Important - visitors please phone for an appointment

**POPULAR BIRMINGHAM BUSINESS**

18 manufacturer's accounts held,  
 200 service jobs monthly plus sales,  
 rentals and maintenance  
**Accommodation available**

**Offers around 50k all in**

email jrickyard@yahoo.co.uk  
 or box no B6506 Television Magazine,  
 Quadrant House, The Quadrant,  
 Sutton, Surrey SM2 5AS

**Are you urgently looking for:**  
**TECHNICIANS**  
**BENCH ENGINEERS**  
**FIELD SERVICE ENGINEERS, etc.**

Then why not let Television Magazine help you find the right person that you are looking for.

**Call Pat Bunce on**  
**0181 652 8339**  
**0181 652 8931 (Fax)**

## REPAIRS

**accént**

**TECHNIC**

**CAMCORDER REPAIRS**

Collection and delivery any-where in the UK.  
 All makes, fast service.  
 Phone free for details.  
 Fax: 01905 796385  
 (0800) 281009

**SALE** 

Large quantity of 14" PAL multi-standard CTV's.  
 100 programmes  
 Remote Control, On Screen Display UHF/VHF  
 Hyperband Tuner  
 Sleep Timer, Clock Timer on/off  
 Personal Preference, Auto Shut off  
 Auto Noise mute  
 Auto voltage 100-270V, AV in/out.

**£74.99 each + VAT**  
**Globetronics - Walsall**  
**Tel: 01922 746583**  
**Fax: 01922 616932**

## SPARES & COMPONENTS

## LINEAGE

**RCS VARIABLE VOLTAGE D.C. BENCH POWER SUPPLY**

**£45 INC VAT - POST & INS £4**  
 Up to 20 volts DC at 1 amp continuous, 1.5 amp peak  
 Fully variable from 1 to 20 volts.  
 Twin voltage and current meters for easy read out.  
 240 Volt AC input. Fully smoothed.

**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.

**AVO MULTIMETER** Model 8, £45.00. 500 volt megers £30.00. Prices plus VAT and p. & p. Send SAE for lists of surplus instruments and scopes etc. A. C. Electronics, 17 Apleton Grove, Leeds LS9 9EN. Tel: 0113 249 6048.

**PRIVATE RETAILER** has excellent part exchange colour televisions and videos to clear. Tel 01494 814317.



# CATALOGUE/CD ROM UPDATE

Contact Pat Bunce on 0181-652 8339

**M.C.E.S.**  
"Making the difference"  
Since 1978

PRECISION  
ELECTRONIC  
ENGINEERS

Specialists in the service and recalibration to original manufacturers specification of all types of:

Tuner units  
Combined tuner and IF units  
RF boosters and modulators  
Video upper drums  
LNBS

Ring or email now for latest prices

Telephone 0161 746 8037  
Fax 0161 746 8136  
Email sales@mc.es.co.uk

15 Lostock Road, Dabylhulme,  
Manchester M41 0ES  
www.mc.es.co.uk

WILLOW VALE  
ELECTRONICS LIMITED  
General Catalogue  
1998/99

"The Better Choice"  
Willow Vale Database

The 1998/1999 edition 600 page general catalogue (order code 50103D) AND issue 6 of our acclaimed CD ROM is now available FREE OF CHARGE to bona fide members of the trade.

Send your request to:-

The Trade Sales Order Desk  
Willow Vale Electronics Ltd  
11 Arkwright Road  
Reading Berks RG2 0LU  
or fax our sales office on  
0118-986 7188

STOP PRESS:- The new Willow Vale Electronics Trade Index covering the range of vacuum cleaner bags, drive belts and filters (order code 50331) for all premium brands sold in the UK free to trade customers Order as above.

TELEVISION  
SERVICING VIDEO SATELLITE DEVELOPMENT  
JUNE 1999 £2.70

CD player repairs

How PC memories work  
Servicing the Panasonic Euro-2 chassis  
A time-run switching circuit  
Servicing Daewoo V50/V60 VCRs

Full reports TVs, VCRs, PC Monitors and Satellite

The production of company catalogues/CD ROMs represents a high investment cost for any company to ensure that you get a fair return on your investment. It is therefore essential that your catalogue/CD ROM is seen by electronic service engineers and technicians working with the TV/VCR and satellite and computer equipment.

To find out more or to reserve your space in this section Please contact

Pat Bunce Tel 0208 652 8339  
Fax 0208 652 3981

WILTSGROVE LTD  
Electronic Components Catalogue  
1999/2000

The **Ultimate Solution** to all Your Spares needs!  
**WILTSGROVE**  
1999/2000 catalogue

covering Spares for more than **300,000** models. Our range includes:

- Semiconductors
- Tools
- CCTV systems
- Service Aids
- Satellite spares
- Test Equipment
- Remote Controls
- Microwave spares
- L.O.P.T.S
- Computer accessories
- Video Heads
- Audio/Video leads
- Audio/Video Belts
- Vacuum Cleaner bags
- Idlers/Clutches
- Mains accessories
- CD lasers Pickups
- Batteries/Chargers
- Cables
- & Much More....
- Aerial accessories

Quantity Discounts available  
**BOOK YOUR COPY NOW!**

Telephone, Fax, Post or E-mail Us At :  
28/29 River Street, Digbeth, Birmingham B5 5SA  
England (U.K.)

Tel : 0121 772 2733 Fax : 0121 766 6100  
E-mail : Sales@Wiltsgrove.co.uk

MILLENNIUM  
CATALOGUE  
OUT  
SOON  
CPC

Good people to deal with!

CPC plc, Component House  
Faraday Drive, Fulwood, Preston PR2 9PP  
Sales Phone: (01772) 654455  
Fax: (01772) 654466

**CPC**  
Millennium Edition

- Over **2,200** Colour Pages
- Featuring more than **12,000** **NEW** Products
- Keen Prices
- **FREE** to Account Holders

VISA  
MasterCard

making things work...  
**No.1** for  
**SERVICE SPARES**  
for our customers

**SALI**  
Some Active Link Interfaces

- Over 8 million parts on CD
- Active ordering system
- Latest prices & stock availability
- Pictures & detail text
- Stock/White Goods spares & accessories

**SOLO**  
Some On Line Ordering

- Over 8 million products accessible
- Instant ordering
- Check catalogue prices & stock
- Pictures & detail text
- Stock/White Goods spares & accessories

**Spares Catalogue**  
Monthly Flyer

- Detailed Spares Catalogue
- Popular manufacturers parts
- Comprehensive range of Tools, Test Equipment, Leads, Connectors, Service Aids, Video Parts, TV Parts

**Seme Offers...**

Access to <sup>3</sup>/<sub>4</sub> million products.  
Latest prices. Stock availability.  
Pictures. Information. Cross Reference.

Release date imminent

- **CD-ROM Issue 4**
- **Internet Catalogue**

For details  
Phone Seme Sales on  
**01664 484000**

Seme Ltd, Hudson Road,  
Melton Mowbray. LE13 1BS **Seme**

**DO YOU HAVE A NEW CATALOGUE OR CD ROM COMING OUT?  
WOULD YOU LIKE EVERYBODY WITHIN THE INDUSTRY TO KNOW  
ABOUT IT?  
IF THE ANSWER TO THE ABOVE IS YES THEN THE NEW UPDATE  
SECTION IS FOR YOU**

To find out more contact:  
**PAT BUNCE**  
**Tel: 0208 652 8339 Fax: 0208 652 3981**

# Special Offer Sale - 20 Remote Controls £20.00 (mixed all well known brands)

FERGUSON ICC 7 HAND SET	£3.00
<b>FERGUSON VIDEO</b>	
FV90 LV HAND SET	£3.00
FV80 LV HAND SET	£3.00
FERGUSON BATTERY CONVERTER TA606	£15.00
24V DC/240V AC	£15.00
BENCH 1 AMP FLUORESCENT WITH MAGNIFIER	P/P £5.00 ea £50.00
BENCH POWER SUPPLY VARIABLE 0-30V 3A. 1VIN METERS	P/P £5.00 ea £50.00
BRIDGE RECTIFIERS 10 FOR	£1.00
BURGLAR ALARM KIT full description	£7.00
CAMCORDER UNIVERSAL BATTERY 9.6V - 1400MA FOR JVC-PANASONIC-PHILIPS	£5.00
CAMCORDER-RIPOD SHOULDER POD CAPACITORS:-	£3.00
11N2KV, 2N2ZKV, 4N24KV EACH	15p
5N6ZKV, 6N2ZKV, 9N1ZKV EACH	15p
35V-22UF, 50V 4 7UF, 50V-100UF EACH	25p
AA BATTERIES 1.5 VOLT	
STC ALKALINE	10p
DESOLDER PUMP	£2.00
DIGITAL CAPACITANCE METER CMC200 200PF-20MF	£28.00
FILTERS - 455 & 480	EACH 10p
GAS SOLDER IRON-PORTASOL HOBBY	£10.00
INFRA RED DETECTOR WIDE/SHORT ANGLE WITH RELAY	£5.00
INFRA RED RECEIVER-MATSUMI MINIATURE	£1.00
MILLI VOLT METER-ELECTRONIC-LEADER LMV-181A 40V AC IN-IMV F/S	£5 P&P
IMV-300V CALIBRATED - COST £225.00 £5 P&P	
COLOUR TV BATTERY CONVERTER IN 24VDC TO 240V OUT	£15.00
MODULATOR-TUNABLE SATELLITE-TV	£1.00
PANEL-1K2-FM2211 STEREO	£5.00
PANEL-CV80-POWER	£5.00
POSITOR 18 2 PIN	20p
POSITOR-2322 662 98012	50p
POSITOR-3 PIN POS.PT1451 BLACK TYPE POWER SUPPLY - 12V DC & 24V DC-REGULATED	£2.00
POWER SUPPLY-REGULATED 3-12V 500MA	£5.00
PSU AC 12V 500MA	£1.50
PSU AC 9V 1A	£1.50
QUARTZ HALOGEN - 500W 24W FOR OUTDOOR LAMPS	£1.00
R.S. SAFE BLOC	£5.00
RELIAS-SUB MINIATURE SATELLITE TUNER UNIT - 2427611	£3.00
... BASE BAND/VIDEO OUT	
SCART TO 4 PHONO LEADS 1.5M	£3.00
SCART TO 6 PHONO LEADS	£3.00
SCART TO 'D' PLUG	£1.00
SCART TO SCART LEADS - ALL PINS CONNECTED - 1.5 METRES	£2.00
SOUND 5.5MHZ MP3 1000T	£1.00
SOUND 6.0MHZ MP3 1040	£1.00
TRANSFORMER-RS ENCAPSULATED MAINS 0-120V-0-120V P1-0-9V-0-9V SEC	£1.00
TRIPLER KT3K30	£4.00
TRIPLER - UNIVERSAL	£5.00
<b>AMSTRAD</b>	
HEAD AND DRUM - 6000	£12.00
HEAD AND DRUM - NICAM	£12.00
PANEL CLOCK DISPLAY - 8900	£5.00
PLASTIC FRONT WITH FLAP - 8900	£3.00
POWER SUPPLY VS1000-VS1100	£5.00
POWER SUPPLY LONG OR SHORT CHASSIS 1991/1992 MODELS	£3.00
POWER SUPPLY - SWITCH MODE - DOUBLE DECKER	£5.00
20 OFF MIXED NOKIA IIT	
SALORA FINLEX SERVICE MANUAL	£10.00
	POST 4.00
MAINS ADAPTOR 12V AT 500 MA	£1.00
NEGATIVE CENTRE	£1.00
NEGATIVE CENTRE	£1.00
POSITOR EQV 98009 - SALE PRICE	25p
<b>FERGUSON</b>	
ADAPTOR - VPT - TEXT - VA354	£2.00
AC MAINS & BATTERY-VA365 P/P £3.00 ea	
CAMCORDER BATTERY 6V-1400MA-VA366	£5.00
CAMCORDER BATTERY HIGH CAPACITY 9.6V 1800MA-VA310	£3.00
CAMCORDER BATTERY CHARGER 9.6 VOLTS VAZ65	EACH £6.00
CAMCORDER CAR ADAPTOR CHARGER - AND BATTERY-VA308	£5.00

CAMCORDER LENS 2 OFF - TELE CONVERSION LENS x1.4 & x0.7	£1.00
CARDIOID CAMERA MICROPHONE-VA SUPER 218 TEL ESCOPIC BOOM & STAND	£5.00
CHASSIS TX80-NEW-NO TUNER P/P £5.00 ea	£15.00
CHOKO-MAINS INPUT-TX9-TX10	£4.00
CHROME BOARD-ICCS	
IC3-U464TKF OR I111498 DECK AND CAPSTAN MOTOR - FV61LV, FV62LV, FV67LV, FV68LV EACH	£30.00
FV70LV, FV71LV, FV72LV, FV74LVX EACH	£30.00
FV77HV	£30.00
IV31R	£12.00
HEAD AND DRUM	
MODULATOR-SATELLITE-T1040 SRD3/4	£2.00
PANEL-10 MIXED FROM TX9 TO ICCS	£20.00
PANEL-DECODER-ICCS	£5.00
PANEL-FRONT-TX100	£4.00
PANEL-IF TX9, TX10	£4.00
PANEL-REMOTE AND POWER SUPPLY FV31R DISPLAY P/P £2.00 ea	£5.00
PANEL-REMOTE-TX9, TX10 EACH	£5.00
PANEL-REMOTE-TX10-54001	£5.00
PANEL-REMOTE-TX10 WITH BATTERY AND 4 ICS - 1544-033C	£7.00
PANEL-REMOTE TX90 - 139001 IC3 M293B1 AND MS1000	£10.00
PANEL-REMOTE TX100 IC M293B1-SAA5012	£5.00
PANEL-REMOTE TX100 WITH STAND BY BATTERY AND ICS	£5.00
PANEL-T1228B TEXT FOR TX89, TX98, TX99, TX100	£6.00
PANEL-TX90 THORN FRONT - 8 BUTTONS 01M4-515-002	£5.00
PANEL-TUBE BASE-ICCS	£5.00
PANEL-TUBE-BASE-TX89, TX98, TX99	£5.00
PANEL-TUNING 1509G-TX9, TX10	£5.00
POWER SUPPLY 12V-3A FOR VIDEOSTAR CAMERA P/P	£4.00
PUSH BUTTON UNIT-TX85, TX86 - 8 BUTTONS	£5.00
RECEIVER - INFRA-RED - IC5L486-TX100	50p
TRANSFORMERS-SWITCH MODE:- TX85, TX86, TX89 EACH	£4.00
TX100	£5.00
473190-001, 40153000 EACH	£5.00
ICCS 3112-338 326842	£5.00

<b>HITACHI</b>	
DECODER-TELETEXT PC323A5 - ISSUE 4	£15.00
HEAD AND DRUM - 620E	£12.00
MAINS SWITCH WITH STAND-BY	£50p
MODULATOR No 5587881	£5.00
OSCILLOSCOPE 20MHZ DOUBLE BEAM - V212	£188.00
PANEL-TELETEXT G8P - ISSUE 6	£10.00
PANEL-TELETEXT PC315-11 - ISSUE 7	£15.00
PANEL TEXT VT753E	£20.00
POWER SUPPLY TV SWITCH MODE - STR 4211 ISSUE 10	£8.00
POWER SUPPLY VIDEO SWITCH MODE - VTM312ELM	£10.00
THICK FILM-IM9204A	£3.50

<b>HOSIDEN</b>	
TUBE BASE - MIXED 10 for AA Batteries made by STC Group of Companies 10p each	£1.00

<b>ITT</b>	
IF MODULES:-	
5827-01-51, 5827-03-51	EACH £3.00
5828-04-10, 5829-02-58	EACH £3.00
5929-03-41	EACH £3.00
TELETEXT CONVERSION KIT CORE 2 907 IIT TEXT PANEL	£3.00

<b>1996/7 MATSUI</b>	
VIDEO DECK COMPLETE P/P £5.00 ea	£16.00

<b>MATSUI - ORION</b>	
DECKS WITH HEADS	
D1096 VXA110 VP 9401	£16.00
HEAD-VSR1500 - ORION D2096	£5.00
PANEL-MAIN-VSR 1500 P/P £5.00 ea	£3.00
POWER SUPPLY-VSR 1500	£5.00
POWER SUPPLY & REG - TYPE STK 5343-VPS01	£8.00
POWER SUPPLY-SWITCH MODE-1500	£3.50

<b>PHILIPS</b>	
DECODER-TEXT-K40-KT3 IF PANEL FOR CP90-CP110	£6.00
	£3.00

<b>TEXAS</b>	
NICAM BOARDS MK II	£3.00

<b>BIG SALE HITACHI</b>	
VIDEO MAIN BOARDS	
VTM 720E	
VTM 740E	
VTM 752E	
VTM 820E	
VT F 150E	EACH £5.00
VT-M 220E	EACH £5.00
VT-M 230E	EACH £5.00
VT-F 250E	EACH £5.00
VT-M 340E	EACH £5.00
VT-F 450E	EACH £5.00

<b>L.O.P.T.</b>	
36061, 36162, 36362, 36383, 36481	
36482, 36761, 36831, 36832, 36922	
36943, 36962	
2432211, 2432351, 2432491, 2432851	
2432871, 2432981, 2432984, 2433751	
2433952, 2434002, 2434141, 2434393	
2434451, 2434492, 2434494,	
2435016, 2435062	
2435064, 2435085, 2435121	
2435372, 2435710, 2436773	
2436792, 2436795, 2436797, 3216001	
2436066, 2436063	
3220029, 3714016, 47003481	
AT207678, AT207688, AT2078/25	
AT307781	
DSTN1243/472593-0	
DST85B235/47328700 & /40153200	
DST88N234/40086AD, & /47805200L	
DST88N234/47320041, & /47317590	
DST186N243/473058-00	
TFB3035D, TFB3069D, TFB4023AD	
TFB4039AD, TFB4066AD	
<b>FERGUSON</b>	
TX9	
TX10	
TX85, TX86	
TX89, TX98, TX99	
Y260781	
FSTY26482	
LOFT RED SPOT	
LOFT WHITE SPOT & YELLOW SPOT	

<b>PANASONIC</b>	
TC2203, TLF 1456B	
TLF1457B, TLF701/6	
<b>TOSHIBA</b>	
TFB 3035D, TFB 4023AD, TFB 4032BD	
TFB 4038AD, TFB 4110AD	
TFB 3089D, TFB 4088AD	

<b>VIDEO DECKS</b>	
A1WA 1500	
MATSUI VXA 1100	
MATSUI 1500	
ORION D1094	
ORION D1096	
ORION D2096 ETC	EACH £20.00
CAPSTAN MOTOR FOR ABOVE DECKS	£15.00
AND HAND SETS	£3.00
4 HEAD DECK FOR 1500	£20.00
20 HIGH VOLTAGE CAPS 1500V - 2000V MIXED	£1.00
VIDEO PATTERN GENERATOR MODEL TV535 240V	£5.00
MAINS SMALL	£5.00
PAI TV ADAPTOR - RGB IN UPH OUT	£5.00
MOTOR 12V	10p

<b>HANDESETS</b>	
<b>AMSTRAD</b>	
4600	£3.00
4700	£5.00
6000	£15.00
6800	£4.00
UNIVERSAL	£3.00
<b>DECCA</b>	
NICAM LCD	£4.00
<b>FERGUSON</b>	
HSB	£1.50
FV41R/V3V59	£10.00
FV41R/FV42 - FV51-52	
ICCS	£7.00
IK2000, IK7000	EACH £4.00
SKD2, SRD3, SRD4	EACH £1.00
T7801	£2.00
TV/SATELLITE WITH FST	£3.00
<b>HITACHI</b>	
CF12158 (NO REPLACEMENT)	£5.00
VIDEO RM933E VIDEO PLUS	£30.00
<b>MATSUI</b>	
1500	£3.00
VSR 1500	£4.00
VX3000	£3.00
3000ORION - TV AND VIDEO	£2.00
RC - PACE 900, FERGUSON, SONY, GRUNDIG	£5.00
<b>MITSUBISHI</b>	
RM35 - VIDEO	£5.00

<b>NOKIA</b>	
RC202	£4.00
VP9401	
D1096	
VXA1100	
AND VIDEO PLUS	
<b>ORION</b>	
TV AND VIDEO	£2.00
VIDEO WITH LCD - 1992/93 MODELS	£5.00
<b>PANASONIC</b>	
EUR51142	£10.00
TC1632, TC1642, TC2232	EACH £8.00
TX2034, TX2044, TX2200, TX2234	EACH £8.00
TX2244, TX2300, TX2636, TX3300	EACH £8.00
RC201 - TV - REPLACES TNZ1411/2	
<b>PERDIO</b>	
PV 1188	£3.00
<b>PHILIPS</b>	
NEW TYPE UNIVERSAL RC4001	£8.00 (3 in 1)
<b>SANSUNG</b>	
HANDESETS, TV & VIDEO - 12 TYPES EACH	£3.00
<b>SANYO</b>	
UNIVERSAL VIDEO	£3.00
<b>SIEMENS</b>	
TV/VIDEO - 1994 MODEL	£5.00
<b>THORN</b>	
9600, 9600, TX9, TX10, TX1000	
TEXT AND NON-TEXT	EACH £10.00
CPT1408T, CPT2176, CPT2178	EACH £5.00
CPT2376, CPT2478	EACH £5.00
TEXT REPLACES PHILIPS KT3, K30, K4 ETC U/V	£8.00
PHILIPS 3 IN 1 HAND SET	£8.00
FERGUSON WITH TEXT IKB CHASSIS	P/P £5.00 £10.00
TX86 CHASSIS	P/P £4.00 £10.00
ORION AND MATSUI CARRIAGE 1500 TYPE D1096 ETC	£6.00
SANYO LOFT	P/P £2.00 4 FOR £5.00
240V ADAPTOR 9V AC 1A	£1.00

<b>COMPLETE REPAIR KIT, CLUTCH AND PINCH ROLLER, IDLER, D2906</b>	£7.00
---	-------

<b>TUNERS</b>	
IF TERC8-022A TBUZA-002A-ALPS	£3.00
SATELLITE: SXT2302180968	£3.00
SATELLITE: WITH BASE BAND MIN SXT2302234	£4.00
SMALL UNFVHF	£3.50
VHF/UHF - TEKFA 112A	£4.00
4944	
U321, U341, U342, U343	
U344, U411, U412, U944	£2 EACH
U743, 7744	

<b>AMSTRAD</b>	
UE33-BO1	£3.00
MR7 7E33	
MATSUI ORION VIDEO TUNER IF	£5.00
<b>FERGUSON</b>	
BE105 RE	£5.00
MT1201-A100	£5.00
UHF - ICES	£5.00
VHF - ICES	£5.00
TX85, TX86, TX89, TX90	EACH £4.00
TX98, T99, TX100	EACH £4.00

<b>ORION</b>	
1500 - UE33 BO9	£4.00
<b>PANASONIC</b>	
SMALL UHF/VHF	£3.00
<b>FERGUSON</b>	
DOUBLE SIDE NICAM	£10
ICCS NICAM SINGLE BOARD ICES	£10
<b>SHARP</b>	
TUNER AND IF 1R1087 PA1 UK	£3.00
<b>TATUNG</b>	
UNIVERSAL 205 OR EQUIVALENT WITH AERIAL SOCKET	£3.00

<b>MOTORS</b>	
HITACHI	
CAPSTAN 150E	£3.00
<b>MATSUI</b>	
CAPSTAN DC NO. M56730 ASP	£15.00
2 TYPES 1995 TO 1997 MODELS MATSUI VIDEO DECKS WITH CAPSTAN MOTOR AND HEAD	P/P £5.00 £20.00
<b>MITSUMI</b>	
MOD MKFP-UF32	£5.00
MOD TMDUG3-103A	£5.00
<b>MITSUBISHI</b>	
CAPSTAN-HSE41-IC M51782ASP	£2.00

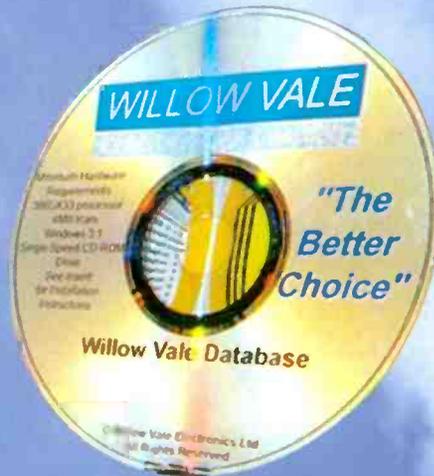
7805	20p	2SD1432	£1.00	BU204	60p	BUT11AF	50p	BYW2950	15p	HD61404251	50p	No accounts		No Credit Cards
7806	20p	2SD1453	£1.00	BU205	75p	BUT12A	50p	BYW95	10p	HD6140815	£1.00			
7809	20p	2SD1576	£1.00	BU206	£1.00	BUT13	£1.00	BYW95C	10p	HE4528HP	15p			
7812	20p	2SD1577	£2.00	BU207	£1.00	BUT14AF	£1.00	BYW562A 100V	80p	HEF4029BP	20p			

WILLOW VALE DELIVERS

# A World of Spares

[www.willow-vale.co.uk](http://www.willow-vale.co.uk)

**QUALITY REPAIRS  
NEED GENUINE  
MANUFACTURERS  
SPARES!**



*Now available  
on CD ROM  
(issue 6) simply  
order parts by  
E-mail, phone, fax  
or C.O.P.S. on:  
sales@willow-vale.co.uk.  
Phone: 0118 987 6444  
Fax: 0118 986 7188  
C.O.P.S. 0118 931 1969*

*Willow Vale can supply  
genuine spares for the  
following manufacturers:*

- Sharp
- Philips
- Pace
- JVC
- Matsui
- Grundig
- Ferguson
- Tatung
- Nokia
- Saisho
- Goldstar (LG Electronics)
- Panasonic
- Sony
- Toshiba
- Thomson
- Mitsubishi
- Akai
- Aiwa
- Pioneer
- Samsung
- Hitachi
- Amstrad
- Alba
- Bush
- Goodmans
- Whirlpool

**SERVICE PROFESSIONALS CHOOSE  
TO BUY FROM**

**WILLOW VALE**  
ELECTRONICS LIMITED

**'The Better Choice'**

**11 Arkwright Road, Reading, Berkshire RG2 0LU.**

*C.O.P.S. computer  
ordering parts system  
via our viewdata<sup>®</sup> based  
order/enquiry system.*