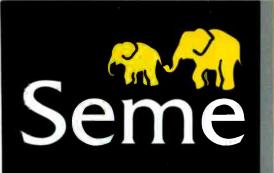


Fault reports TVs, VCRs, PC Monitors and Satellite



making things work...

NO.1 for SERVICE SPARES

for our customers



Ordering



BEKO

CROWN

DAEWOO

₹ FERGUSON

GoldStar



marantz

≜ MATSUI





Panasonic



Pioneer

saisho

SHARP

THOMSON

THORN

TOSHIBA

Active Link CD Catalogue
Search & Ordering

- Over ¾ million parts on CD
- Active ordering system
- Latest prices & stock availability
- Pictures & detail text
- Brown/White Goods spares & accessories

Internet Active Catalogue
Search & Ordering

- Over ¾ million products accessible
- InterActive ordering
- Check catalogue prices & stock
- Pictures & detail text
- Brown/White Goods spares & accessories

Spares Catalogue
Monthly Flyer



- Popular manufacturers parts
- Comprehensive range of:-Tools, Test Equipment, Leads, Connectors, Service Aids, Video Parts, TV Parts



Seme







Direct Sales Line: 01664 484000



01664 563976



Viewdata: 0345 585488 or 0345 585444

CONTENTS

April 1999

Vol. 49, No. 6

Ten Years of Sky 375 TV Fault Finding 398 **Editor** John A. Reddihough **Toshiba Service Briefs** 378 What a Life! Fault know-how on TVs and VCRs from Toshiba A varied collection of TV problems – and problem Tessa Winford Technical. customers. Donald Bullock's servicing commentary.

Letters

382

Teletopics Success of SkyDigital, predictions from Toshiba on TV/video developments including 3D-TV, DVD update, DTT installations and other news.

Satellite Workshop Jack Armstrong's column on satellite receiver servicing.

Test Case 436 383 Monitors 384

Hints and tips on dealing with computer monitor faults.

Camcorner 386 Fault reports and repair tips on camcorders.

PC Operation and Repair In this first instalment of a new series K.F. Ibrahim describes the hardware used in a PC, what the various



items do and how they are related to the software.

Service Casebook John Edwards on various TV servicing problems.

Setting up as an ASC To become a manufacturer's Authorised Service Centre will bring in plenty of work but requires a lot of

thought, effort and probably some investment. Cliff Martin outlines what's involved.

Corrections

VCR Clinic

John Coombes provides a fault-finding guide for this

Servicing the Hitachi 46TN Series

Digital picture quality, a problem with the Salora M

chassis, stepper motors and a VCR-based security

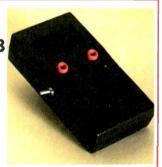
series of sets which date from 1995.

Help Wanted

Design of an ESR Meter

In this second instalment Alan Willcox deals with construction and setting up, upgrades and use, and provides additional background information.

Short Locator 428 Adrian Spriddell presents an electronics short locator unit that's particularly useful for tracing faults on data bus lines.



439

423

424

Satellite Notebook

Solutions to problems with satellite TV equipment and installations.

DX and Satellite Reception Terrestrial DX and satellite TV reception. News from

abroad and from the satellite belt. A multi-standard receiver from Comet. And some aerial history. Roger Bunney reports.

Next Month in Television

Production Editor

Consultant Editor Martin Eccles

Publisher Mick Elliott

Advertisement Sales Manager Grant Allaway 0181-652 3032

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.

April issue on sale March 17th.

Next issue, dated May, on sale April 21st.

Satellite & digital SERVICES. ECHOSTAREA

AUTHORISED SERVICE CENTRE!!

We repair all warranty and non warranty Echostar Satellite receivers as well as non warranty Pace, Grundia, JVC, Nokia, Philips, BT and Amstrad Satellite receivers, and also all D2MAC Decoders. We are manufacturer trained in most cases.

IF YOU CAN'T FIX IT, WE PROBABLY CAN! Our Charges: - TRADE ONLY PRICES!

| | Normal IRD Fault | s£ | 25.00 |
|---|------------------|----|---------------|
| | MSS 500/1000 | £ | 35.00 |
| | D2MAC Assorted | £ | 25.00/£ 45.00 |
| | Echostar PSU | | |
| ı | | | |

We also modify Filmnets, CTU's, Pace PRD's, MSS 500/1000's - Call for details.

We can supply most Echostar, Pace, Amstrad and Nokia spares - again call for details.

IF YOU NEED HELP OR JUST GOOD HONEST ADVICE CALL US - S.D.S.

Send us 3 receivers and we will send them back free, send us 5 or more and we will collect them as well normally £7 and £14.

S.D.S. - UNIT 4-5 CADDSDOWN IND PARK, **BIDEFORD, DEVON, EX39 3DX** Tel: 01237 425999 / Fax: 01237 470333

M.C.E.S.

Specialists in the Service and Recalibration to original manufacturers specification of:-All types of:-

TUNER UNITS TO 20 GHZ BOOSTERS & RF MODULATORS COMBINED TUNER AND IF UNITS

Supply of Upper Drum Assy's for all video recorders including time lapse, marine and aviation requirements, either as new or remanufactured using your original drum and new grade A chip sets.

We are able to service, recalibrate and confirm manufacturers specifications for all low noise

New LNB's can also be supplied to order.

New price list now available.

15 Lostock Road, Davyhulme Manchester M41 0ES Telephone: 0161 746 8037 Fax: 0161 746 8136







MARAPET ELECTRONIC COMPONENTS Tel: (01452) 53 22 53 Fax: (01452) 549514

QUALITY SPARES for the CONSUMER ELECTRONICS SERVICING TRADE THIS IS JUST A VERY SMALL SAMPLE OF OUR STOCK. We can supply spares for a vasi range of Makes & Models. Please contact us with your requirements, we'll be pleased to offer a 'PRICE & AVAILABILITY'. Many General Components, Tools and Home Computer Spares also available. Telephone or write for a Selected Spares Guide

GENUINE VIDEO PARTS

| MONITOR FLYBACK TRANSFORMERS | | | | | |
|--|--------|--|--|--|--|
| PHILIPS Charlie Deck Rack Slider Kit £8.49 | | | | | |
| HITACHI VTF350E Remote Control | £39.95 | | | | |
| GOLDSTAR D17 Deck. P.Roller Assy | £9 99 | | | | |
| ERGUSON 3V58/59/65 Tension Band | £1.09 | | | | |
| MSTRAD TVR3 Service Manual & Harnes: | | | | | |
| Special Prices – only while current stocks i | remain | | | | |

| MONITOR FLYBACK TRANSFORM | | | | |
|---|--------|--|--|--|
| This is just a sample of the types we can s | upply | | | |
| CORN/DIGITAL/IBM etc | P.O.A. | | | |
| T2090/08 (ESCOM) | £19.95 | | | |
| OLDSTAR/DELL 154-166A | £27.91 | | | |
| HILIPS CM8833 Mk 1 (popular uSlot type) | £20.95 | | | |
| HILIPS CM11342 (CM8833 Mk 2) | £22.45 | | | |
| | | | | |

| ** | Other Computer Spares available ** | |
|----|------------------------------------|--|
| | Keyboards, Leads, etc. | |

| REMOTE CONTROLS | ; | | | |
|--|----------------|--|--|--|
| GEC V4001H/V4005 - Genuine | £11.03 | | | |
| ITT IFB-13-14-15 - Replacement | £16 45 | | | |
| Many other Genuine and alternative types a | vailable P.O.A | | | |
| TV FLYBACK TRANSFORMERS | | | | |

FERGUSON TX90 90 (RED SPOT) FERGUSON TX90 99 (RED SPOT) £16.50 HITACHI (DMD6011 (2435141) £16.99 PHILIPS AT2140 (108-31000) by HR £13.99 We can supply many other LOPT×S, for ALBA & BEKO through to TOSHIBA & ZANUSSI. Please supply model no, and Iuli information from original part. SELECTED VIDEO HEADS

| SELECTED VIDEO READS | | | | |
|--|--------|--|--|--|
| AMSTRAD TVR1/VCR4500/5200 | £13.99 | | | |
| FISHER FV HP420/615/720/721/722 | £15.99 | | | |
| HITACHI VT11/33 & some others | £12.89 | | | |
| NEC N9013 & some others "WSL" | £8.49 | | | |
| SHARP VC381 to VC388 | £10.99 | | | |
| These are quality heads - Phone for models not shown | | | | |

| SPECIALS (Valid to end of April 1999 or W.S.L.) | | IC's for | PHILIPS |
|---|------------------|------------------------|----------------|
| PC AT type Replacement PSU (200W) COMBINATION CRIMP TOOL - crimps, cuts & strips | £12.99 £2.39 | | W069 £13.15 |
| TV Faults Guide latest issue 7 | £16.95 | MAB8441P1 MAB8461P1 | |
| FERGUSON TX100 51cm (Yellow Spot) LOPTX | £12.95 | NSM5480 | **Check** |
| PHILIPS VR422/437/447/6845 VIDEO HEAD (DM4 Deck) SATELLITE REPAIR MANUAL Latest Issue 5 | £69.99 £16.95 | TDA1006 TDA3730 | £2.59 £7.99 |
| ANTIFERENCE Omni-directional FM Aerial | £10.75 | XC89507P | £17.96 |
| Many other Special Prices available this month on a large numbe | rof | | stock only* |
| stock lines - Please Phone or Send S.A.E. for a listing | | Other typ | oes P.O.A. |

Our range of Video Spares is now much expanded – we can supply parts for over 150 makes. Try us also for a wide range of: Remote Controls, TV On-Off Switches, Posistors, Resistors, Capacitors, Fuses, Connectors, Cables, Tools, Domestic Electrical Accessories and much much more...

EQUIPMENT MANUALS

Large range of Manufacturers Service & User Information available Original manuals supplied if possible. We only show a few examples here

| AIWA NSX-800 | £9.56 | AMSTRAD PC4386X | £16.29 | AMSTRAD PC5286 | £18.31 |
|--------------------|--------|-----------------|--------|--------------------|--------|
| BINATONE 01/9771 | £8.25 | HITACHI CPT2658 | £9.42 | PIONEER XCP-410M/T | £14.53 |
| PANASONIC KXP-1123 | £12 41 | PHILIPS CST427 | £5.99 | PHILIPS CM11342 | £10.83 |
| PHILIPS CM8524 | £7.42 | SHARP WQ-T360E | £7.99 | TOSHIBA ST-U2 | £7.49 |

When ordering, please add £2.50 P & P and then add 17.5% VAT. (N.B. VAT is due on P & P — Equipment Manuals are zero payments by Card accepted, however a nominal surcharge may apply — please enquire. Overseas orders welcome — minin £3.00, but please check to avoid delays. 'Validity Dates' required for card orders, also the Issue No. for SWITCH. All despatched as quickly as possible, subject to clearance of payment. All items subject to availability — Prices can change with

Very sorry, we are unable to accept callers – Please order by PHONE or POST. We accept: VISA, ACCESS, MASTERCARD, DELTA, SWITCH, SOLO, EUROCARD M.E.C. 1 HORNBEAM MEWS, GLOUCESTER GL2 OUE

Remote Controls

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

Ten Years of Sky

t seems almost unbelievable that Sky Television has now been in operation for just over ten years: the actual launch date was February 5th, 1989. I have to confess to being amongst those who thought it would never come off, and that Rupert Murdoch was out of his mind. People had four perfectly adequate TV channels which they received either at UHF or via cable. Who would want to rush out and buy a dish to receive four more channels from a new, upstart broadcaster? It just didn't seem to be on. But I, and many others, were wrong and Rupert Murdoch has proved to be spectacularly right. Mind you he did take a gamble, more than one in fact, and was aware of it.

He seems to have been very worried about whether the Astra satellite would make it into orbit, and whether it would work successfully if it did. And would his new broadcasting technology work? He needn't have been too worried on either of these counts, though delays could have jeopardised the project. After all there was nothing new about satellites, and satellite TV broadcasting had been proved as far back as 1975/6, with the ATS-6 satellite that provided an experimental TV service to the Indian sub-continent. That satellite. working at UHF, started the ball rolling. Though directed at Asia, from 35°E, there was sufficient off-beam signal to provide reception of sorts even in the UK.

The established broadcasters in Europe and elsewhere had been slow to take advantage of the possibilities presented by satellite transmission, though orbital and frequency allocations had been agreed at the World Administration Radio Conference

(WARC) in 1977: the 11·7-12·5GHz band was to be used for DBS (Direct Broadcast by Satellite) services in Europe. Rupert Murdoch wanted to extend his media interests to TV, but there were no terrestrial channels that he could use in the UK and he didn't, of course, have a satellite allocation. Nevertheless certain opportunities were open to him.

The WARC had allocated orbital positions to countries large and small. It was unlikely that indigenous broadcasters in smaller countries would make full use of their allocations. Luxembourg in particular represented an opportunity. It had allocations, which were in the right spot for broadcasting to Western Europe. In fact the Luxembourg government had decided to become involved with satellite broadcasting as early as 1982. By 1985 the Luxembourg-based Societe Europeenne des Satellites (Astra) had decided on a suitable satellite (the RCA 4000 type) and had signed contracts for delivery and launch. Hence Astra 1A, which would be located at

What about frequencies? Well, there was the fixed satellite service (FSS) band, just below the DBS band at 10·95-11·7GHz, which was intended for fixed communications services such as the delivery of signals to cable distribution systems – and was likely to be underused. Rupert Murdoch seized the opportunity, and in June 1988 signed ten-year contracts for four Astra channels in the FSS band. It's remarkable that he got his act together in time for the February 1989 launch. The rest, as they say, is history.

But how was Murdoch to compete suc-

cessfully with the established broadcasters? With his media experience, Rupert knew what was required. Basically, sports and movies, and plenty of 'em. He set about wheeling and dealing, and built up the programming he required.

He was helped in his efforts by certain technological factors. The cable companies were happy to distribute his channels, and improvements in LNB technology made reception with small dishes possible. Everything was going his way, and once it had become established as part of the broadcasting scene Sky grew and grew. It now has over seven million subscribers, 6.5m in the UK and 576,000 in Ireland. The split between DBS and cable reception of Sky is about 50:50. Sky has proved to be highly profitable, making over £300m in 1997. There has been a sharp decline recently, because of the cost of launching digital TV services. But this seems to have been well handled - the digital subscriptions are rolling in. Once again Rupert Murdoch has revealed a flair for getting it right.

By clever marketing Sky has got the public used to the idea of paying for TV. This can be extended further, with pay-perview operation. Now we have the digital revolution adding to Sky's prospects: lots of channels and people willing to pay for premium and special-interest programming. To this can be added interactive TV, with more scope for profitability.

The next step for Sky is to extend its operations across Europe. This will require more wheeling and dealing. It is already underway, as our news pages (Teletopics) report. There seems to be no stopping Sky, and many viewers will be thankful for this.

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 439.

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 422.

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



housands 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.

BUT11A@ PP each BUT11AF @289 each BU508A @ (19) each Fully wired scart lead (19)

a slight inconvenience....

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

£3.75 each £12.95 Thorn TX100 Green spot LOPTX

..and now ask for a full price list

PSU repair - refurb kits/

Look for the PHOENIX stamp of approval GENUINE

Om 200,000 Wall

KIT1 26.95 Pace - PRD800,PRD900,PSR800,PSR900 Fergus

ST700, Toshiba TU-SD200, SAT99

SAT6600 Finlux SR5700, Thompson SRS4

KIT6 £6.95 Pace D100,120 KIT9 £9.45 Pace MSS200,300,Apollo

KIT12 £16.45 Echostar SR5500(early PSU with adjuster) KIT15£7.36 Mimtec (Sorenson PSU type only)

KIT 17 £8.95 BT SVS300

KIT 20 25.95 Maspro ST 5 Grundig 150,250,280,300 Matsui Rd600 Minerva

KIT22 £9.95 Philips STU909

NEW EDITION No. 5

"you could say that what Martin "you could say that what Martin Picketing 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 receives. 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. Ordinally, entitled "Satellife" Originally entitled "Satellite Repair Manual*, this book has become established as a bible for satellite TV repair.

But the subject doesn't stand still. New models, new faults there is atways something to add. So here we have the fifth edition, which has been completely updated and now 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 i seti il hi riton sequences for resettina parental lock codes, resettina installation choices to factory defaults and other less well known operations, practical information on LNBs with hypical current drains, a list of manufacturers and suppliers addresses, other useful information and a beginners section.

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

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

SRD5,SRD16,Grundig STR1, Maspro SRE250S/1,350S/1, Philips STU802/05M, Manhattan 850,950 Goodmans KIT2 £6.95 Pace · SS900,9200,9210,MRD920, Ferguson SRV1, Grundig GIRD2000,3000, Philips STU801, Network 900,9200, Bush IRD150, Nokia SAT1500, Maspro SRE250S,350S,450S,Alba

KIT3 £6.95 Amstrad · SR510,520,540,SRDR45,SRD550 **£6.95** Amstrad SRD 500

£6.95 Churchill D2MAC decoder KIT7

KIT10 £13.11 Pace MSS500,1000 KIT13 £29.71 Echostar SR6500,7700,8700

KIT16 £5.95 Amstrad SRD700,SR950,SRX100,301,501,1002,2001,SRD2000,SAT250

KIT 18 £10.52 Amstrad SRD2000

KIT23 £7.95 Nokia SAT1700 (mainly surface mount)

KITS #6.95 Amstrad SRX320.340 etc (export models)

25.95 Pace MSS100

KIT11 £5.95 Ferguson SRD4 KIT14 £23.95 Amstrad SRD600

KIT 19 £6.95 Bush IRD155

KIT21 £6.95 Amstrad SRD650 KIT25 £16.95 Maspro ST-8

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

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.

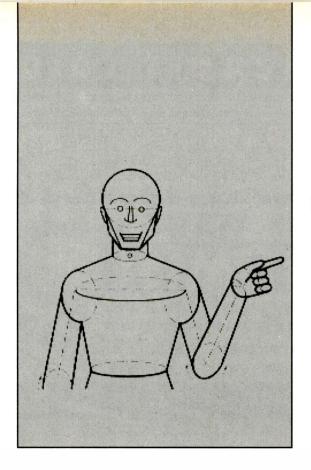
I can't locate a Sony mode switch for I can't locate a Hitachi pinch wheel for I can't locate a Hitachi pinch wheel for I can't locate a remote control for a Finlux I can't locate a line of at trans for ter for I can't locate an O I can't locate

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

HASSIE COLLECTOR

| MARCIN ADD 2502276 ASS 289034 ASS BCS460 Co.14 BFRIGA Co.8 BFRIGA Co.8 ASS ASS Co.14 BFRIGA Co.8 ASS ASS Co.14 ASS | Economic supply | y TV & Video | parts vere | eru Fast |
|--|--|--|--|--|
| 2SA950 0.18 2SD15555 2.55 BC182L 0.14 BD433 0.29 BUT11AF 1.18 KSR1004 0.21 STK4192II 15.63 TDA2050 4.56 IICP10BU 0.72 2SA956 0.18 2SD1556 5.11 BC184L 0.06 BD434 0.31 BUT12A 1.17 LA4282 5.11 STK5332 2.82 TDA2541 1.12 TIP110 0.35 2SA966 0.69 2SD1650 2.48 BC212 0.12 BD435 0.38 BUT12AF 1.87 LA4705 6.41 STK5342 4.07 TDA257A 3.45 TIP111 0.57 2SA954 0.39 2SD151 0.34 BC237 0.19 BD436 0.52 BUT16AF 1.87 LA4705 6.41 STK5342 4.07 TDA257A 3.45 TIP111 0.57 2SA954 0.38 2SD1761 0.34 BC237 0.12 BD437 0.52 BUT16AF 1.87 LA4705 6.41 STK5342 4.07 TDA257A 3.45 TIP111 0.57 2SA954 0.38 2SD1161 0.34 BC237 0.12 BD437 0.52 BUT16AF 1.19 LA7116 1.70 STK6481 8.12 TDA2576A 3.20 TIP112H 0.77 2SD1854 0.35 2SD1815 0.44 BC237 0.19 BD438 0.38 BUT12AF 1.19 LA7116 1.70 STK6481 8.12 TDA2576A 4.91 TIP120 0.40 2SD1870 0.35 2SD1815 0.65 BC237B 0.19 BD438 0.38 BUT16AF 1.19 LA7116 1.70 STK6481 8.12 TDA2576A 4.91 TIP120 0.40 2SD1870 0.35 2SD1815 0.65 BC237B 0.19 BD438 0.38 BUT16AF 1.19 LA7116 1.70 STK6481 8.12 TDA2576A 4.91 TIP120 0.40 2SD1870 0.35 2SD1873 0.51 DDA2576A 4.91 TIP120 0.40 2SD1870 0.55 DDA2576A 4.91 TIP120 0.57 | 1N4002 | 0.35 BC548B 0.06 BFR90 3.40 BC548C 0.14 BFR90A 0.69 BC550C 0.09 BR100 0.60 BC556A 0.14 BFR90A 0.69 BC556B 0.14 BRX49 0.69 BC556B 0.14 BRX49 0.52 BC557A 0.15 BT139600 0.35 BC557B 0.18 BT139600 1.63 BC558B 0.18 BT1408400S 1.76 BC558C 0.09 BT115500R 1.63 BC558B 0.18 BTA08400S 2.31 BC635 0.23 BU208A 2.79 BC636 0.14 BU208D 2.31 BC635 0.23 BU208A 2.79 BC636 0.14 BU208D K 1.66 BC637 0.14 BU208D K 12.55 BC639 0.21 BU2508AF K 12.55 BC639 0.21 BU250AF K 11.11 BC846B 0.16 BU2525AF 0.09 BC847C 0.23 BU326A 0.11 BC848 0.35 BU406 0.11 BC848B 0.35 BU406 0.11 BC848B 0.35 BU406 0.11 BC848B 0.35 BU406 0.61 BC856C 0.41 BU500 0.69 BC86C 0.41 BU500 0.69 BC86B 0.21 BU506DF 2.14 BC65B 0.21 BU506DF 2.14 BC65B 0.21 BU506DF 2.14 BC65B 0.21 BU508AF 1.18 BC65BC 0.45 BU508AF 1.19 BC858B 0.21 BU508AF 1.19 BC858B 0.21 BU508AF 1.19 BC858B 0.21 BU508AF 1.17 BC858 0.19 BU508AF 1.18 BC658C 0.19 BU508AF 1.19 BC858B 0.21 BU508AF 0.69 BC856B 0.21 BU508AF 0.60 BC856B 0.24 BU508AF 0.17 BC875 0.45 BU508AF 0.52 BD131 0.26 BU806 0.21 BU508A 0.22 BU508D 0.24 BU508AF | 0.59 BYV96D 0.36 MJE3055T 0.4 0.68 BYV96E 0.53 MJE340 0.4 0.92 BYW56 0.31 MJF18004 2.0 0.18 BYW76 0.31 MJF18004 2.0 0.18 BYW76 0.31 MJF18006 6.2 0.43 BYW95C 0.24 MJF18204 6.0 0.35 BYW96E 0.50 MMF50 1.7 1.29 BYX10 0.30 MPSA06 0.3 1.12 BYX55600 0.23 MPSA42 0.1 1.17 BZV10 1.37 MPSA56 0.2 1.16 CD4013 0.45 MFSA92 0.1 1.46 CD4011 0.24 MFSA92 0.1 1.46 CD4017 0.47 NE555D 0.2 1.58 CD4056 0.30 P600A 0.3 3.34 CD4069 0.18 P600J 0.2 3.11 CD4094 0.69 P6KE130A 2.5 1.36 CD4066 0.30 P600A 0.3 3.11 CD4094 0.69 P6KE130A 2.5 1.36 CNX62A 1.29 P6KE180A 4.6 0.69 CNX82A 2.16 R2KL 0.7 0.86 CNX83A 2.55 R2M 0.8 1.41 CNY17F 0.98 R4050 3.0 0.86 CNX83A 2.55 R2M 0.8 1.41 CNY17F 0.98 R4050 3.0 1.80 CNY575B 0.52 RG2 0.231 DZVREM 16.95 RGP10G 0.2 2.31 DZVREM 16.95 RGP10G 0.2 1.29 DCREG 13.95 RGP15G 0.3 1.32 DTA114ES 0.31 RGP15J 0.1 1.37 DTC124ES 0.37 RGP30M 0.3 1.38 FR605 1.90 S2000AF 2.5 1.88 FR605 1.90 S2000AF 2.5 1.88 FR605 1.90 S2000AF 3.5 1.88 FR605 1.90 S2055AF 2.2 2.99 HA13151 18.24 SGSIF344 10.7 2.14 IMRE251 14.32 SL1431 2.8 8 3.47 KA22066 2.40 STK4141II 9.4 0.655 KBU602 2.18 STK4142II 9.4 | 15 TA7698AP 4.29 TDA4601D 1.46 15 TA8205AH 4.50 TDA4605 3.39 15 TA8207 2.74 TDA4605 3.39 15 TA8207 2.74 TDA4605 3.39 17 TA8210H 4.79 TDA4605 1.97 17 TA8215H 4.96 TDA4935 10.08 17 TA8216H 8.01 TDA4950 1.76 185 TA8221 9.82 TDA7052 1.70 182 TA8251H 24.66 TDA7263 13.45 183 TA8251H 24.66 TDA7394 6.44 19 TA8427K 4.00 TDA8138 3.59 10 TA8427K 4.00 TDA8138 3.59 10 TA8427K 4.00 TDA8140 4.62 10 TA8427K 4.00 TDA8140 4.62 10 TA8427K 1.34 TDA8170 4.70 10 TA8427K 1.34 TDA8180 4.87 10 TDA1013B 2.57 TDA8180 4.87 10 TDA1013B 2.57 TDA8180 4.87 10 TDA1016 1.37 TDA8218 4.62 10 TDA1044 1.43 TDA8350 2.53 10 TDA1050 2.54 TDA8391 7.69 10 TDA1170 1.85 TDA9503 2.13 10 TDA1085C 2.74 TDA8391 7.69 10 TDA1170 1.85 TDA9503 2.13 10 TDA1519A 4.87 TEA2029CV 3.54 10 TDA1519A 4.87 TEA2029CV 3.54 10 TDA1519A 4.87 TEA2029CV 3.54 10 TDA15570 4.23 TEA2164 3.40 10 TDA15570 4. |
| BF970 BF981 0.43 BYV95B 0.21 MJE13005 0.86 TA7280P 2.74 TDA4600/2/3 2.82 UPC57AJ 0.30 TA7281P 3.20 TDA4601 1.46 ZTK33B 0.28 MJE18004 0.86 TA7281P 3.20 TDA4601 1.46 ZTK33B 0.28 ZTK3650 0.51 IF YOU DONT SEE IT LISTED ASK FOR QUOTE. GIVE MAKE, MODEL, LOCATION. REMEMBER TO ADD £1.00 POST & HANDLING U.K. MAINLAND ONLY. EXPORT AT COST. ADD 17.5% VAT TO TOTAL | 2SA940 0.82 2SD1555 2.65 BC182 2SA950 0.18 2SD1555 2.65 BC182 2SA956 0.99 2SD1650 2.48 BC212 2SA966 0.99 2SD1651 2.38 BC212 2SA966 0.99 2SD1651 2.38 BC212 2SA964 0.38 2SD1761 0.94 BC237 2SB1010 0.35 2SD1815 0.86 BC237 2SB143 0.77 2SD1858 0.43 BC238 2SB143 0.77 2SD1858 0.43 BC238 2SB1660 0.43 2SD1878 2.63 BC239 2SB669 0.43 2SD1878 2.63 BC239 2SB669 0.43 2SD1878 2.63 BC239 2SB688 1.61 2SD1884 3.35 BC307 2SD1877 0.99 2SD1887 3.56 BC307 2SB774 0.99 2SD1887 3.56 BC307 2SB774 0.99 2SD1887 3.56 BC307 2SB793 1.71 2SD1899 2.14 BC308 2SB793 1.71 2SD1899 2.14 BC308 2SB793 0.35 2SD2012 0.86 BC3098 2SC1383 0.32 2SD400 0.34 BC307 2SC1345 0.15 2SD400F 1.20 BC308 2SC1740S 0.84 2SD467 0.57 BC337 2SC1815 0.17 2SD669A 0.79 BC338 2SC2230 0.55 2SN1507 5.56 BC546A 2SC2230 0.55 2SN1507 5.56 BC546A 2SC2230 0.55 | 0.14 BD33 0.29 BUT11A 0.06 BD434 0.31 BUT12A 0.12 BD435 0.38 BUT12AF 0.12 BD435 0.38 BUT12AF 0.12 BD436 0.52 BUT18AF 0.12 BD437 0.52 BUT16AF 0.12 BD437 0.52 BUT16AF 0.11 BD839 0.57 BUW12A 0.01 BD901 0.52 BUX84 0.04 BD911 0.52 BUX84 0.09 BD912 0.63 BUZ77B 0.09 BD912 0.63 BUZ77B 0.015 BF199 0.18 BUZ90A 0.015 BF199 0.18 BUZ90A 0.09 BP240 0.11 BUZ90AF 0.09 BF240 0.11 BUZ90AF 0.10 BF245A 0.19 BY127 0.10 BF258 0.04 BY133 0.14 BF324 0.18 BY184 0.14 BF324 0.18 BY184 0.14 BF324 0.19 BY1227 0.16 BF421 0.24 BY228 0.18 BF423 0.19 BY227 0.18 BF423 0.19 BY227 0.19 BF459 0.43 BY299 0.11 BF459 0.35 BY299 0.11 BF759 0.38 BY033D 0.11 BF759 0.38 BY033D 0.11 BF759 0.38 BY033D 0.69 BF970 0.43 BY295C | 0.95 KIA6210AH 6.15 STK4152II 10.9 1.18 KSR1004 0.21 STK4192II 15.6 1.17 LA4282 5.11 STK5332 2.8 1.87 LA4705 6.41 STK5332 2.8 1.87 LA4705 6.41 STK5332 2.8 1.37 LA6324 3.25 STK5372H 6.8 1.37 LA6324 3.25 STK5372H 6.8 1.19 LA7116 1.70 STK5481 8.1 1.54 LA7830 1.88 STK7253 10.5 2.99 LA7832 2.40 STK730-060 11.6 1.03 LA7833 5.98 STK73410II 6.8 1.03 LA7835 3.51 STK7340II 6.8 1.03 LA7835 3.51 STK7340II 6.8 1.03 LA7837 8.53 STK7340II 6.8 1.03 LA7837 8.53 STK73907 10.4 2.7 LA7837 8.53 STK73907 10.4 2.7 LA7837 8.53 STK73907 10.7 3.30 LED3G 0.10 STR51006 3.9 3.40 LC7132 4.70 STR11006 7.3 3.30 LED3G 0.10 STR51006 3.9 0.14 LN1203N 3.25 STR510103 4.4 0.08 LM317T 1.29 STR50103A 5.5 0.33 LM324N 1.48 STR51020 6.0 0.33 LM324N 1.48 STR5142M 13.2 0.13 LM339N 0.50 STR54041 13.2 0.13 LM389N 0.50 STR54041 5.1 0.15 M293B1 21.34 STR6020 6.0 0.16 M51182L 1.88 STR61001 10.8 0.16 M5182L 1.88 STR61000 8.0 0.35 MC13002P 7.69 STV5730ST 4.0 0.12 MC1310P 0.85 STV9379 11.1 0.16 MC34063API 2.65 T6071V 2.9 0.12 MC1310P 0.85 STV9379 11.1 0.16 MC34063API 2.65 T6071V 2.9 0.12 MC1310P 0.85 STV9379 11.1 0.16 MC34063API 2.65 T6071V 2.9 0.12 MC1310P 0.85 STV9379 11.1 0.16 MCR100-8 0.45 T9064V 1.8 2.55 MJ15003 2.23 T9064V 1.8 2.55 MJ15003 2.23 T9064V 1.9 0.26 MJE18004 2.05 TA7281P 3.2 | 95 TDA2030V 0.00 TIC246D 1.54 31 TDA2050 4.56 TICP106D 0.72 82 TDA2551 3.45 TIP110 0.35 97 TDA2577A 3.45 TIP111 0.57 184 TDA2578A 3.20 TIP112H 0.77 122 TDA2579A 4.91 TIP12O 0.40 151 TDA2581Q 2.57 TIP2955 0.89 151 TDA2581A 1.91 TIP29E 0.77 162 TDA2581A 1.91 TIP29E 0.77 17 TDA2653A 4.70 TIP31A 0.41 48 TDA3301B 9.12 TIP42A 0.35 37 TDA3505 2.40 TIP42C 0.52 38 TDA3560 6.13 TIP1791A 2.48 56 TDA3561A 3.85 TIP1791A 2.48 56 TDA3565 2.74 TL082 1.04 52 |



ToshibaService Briefs

More know-how from Toshiba, based on Technical Bulletins AH73 and AH74

TV Sets

2173DB (C7S chassis)

Field scan collapse – to 0.75in.: C323, which is connected to pin 2 of Q501, had developed a 300kΩ leak. It's an 0.68μF plastic film capacitor rated at 50V.

2505DB and 2805DB (C90D chassis)

Field scan cramped at the bottom of the screen and stretched at the top: C372, which is connected to pin 15 of the EW chip Q371, had reduced capacitance. The correct value is 2.2µF, rating 50V.

2550TB (C4E-R chassis)

Two-inch bands of patterning at the top and bottom of the screen, present only when the set is cold (at first switch on): Line-frequency pulses are being picked up at the base of the DPC amplifier transistor QD03. Cure is to add an $0.001\mu F$ decoupling capacitor across RD13 on the print side of the PCB. Ensure that it cannot short to other areas of the board.

Service manual note: Power supply transformer T803, type TPW3368AR, is not listed in the manual. Its part no. is 23217352.

2563DB and 2863DB (C6SR chassis)

Pulsating picture with low HT: Occurs when transistor Q828 in the voltage control circuit is leaky. It's type 2SC1815-Y, part no. A6317440.

2877DB (C7SS chassis)

White dashes on the picture, sloping down to the right in lines. The fault is video-content dependent and not present on chroma: The TA9090AN digital comb filter chip QZ01 is faulty. Its part no. is B0410688.

28MW7DB and 32MW7DB (C7SS chassis)

High level of background hiss (white noise) from the rear speakers: An improved Dolby Digital module,

part no. TSN01467, is available to cure this condition.

The kit includes microcontroller chip QA01 which, when fitted, will also remedy the slow channel change reported in Bulletin AH70 (see *Television* August 1998 page 694).

Kit TSN01467 supersedes kits TCP01421 and TCP01422.

3787DB (C855 chassis)

Very intermittent crackling from all speakers when the set is first switched on from cold. Sounds like static discharge. Flicking through the surround menu options will sometimes trigger the fault: The cause is noise pickup within the Dolby Digital unit U101A (identified by U1 written on the label on it). The cure is to replace the unit with the improved version which has U2 written on it and is available under part no. 23781658 (original) or 23782114 (new).

Alternatively, if a fast repair turnround is required the original module can be modified as follows. Unsolder the four earth terminals and very carefully unplug the connector from the IMA module H002. Remove the module from the panel, then remove both metal screening cans from the module. Replace the four 100Ω chip resistors RD03/04/05/06 with 33Ω chip resistors. Fig. 1 shows the position of these resistors.

40PW8DB (C8SS chassis)

Severe convergence errors: Occurs when Digicon module U103 is dislodged from its socket. Refit.

Service manual notes: The correct part no. for the line output transformer T461Z is 23236552, not as shown in the manual. The wide aspect conversion (WAC) block was omitted from the chassis block diagram in the manual. It's connected between the RGB/YUV SW block and the chroma/video/deflection block (Q501).

48PJ6DB/DG and 55PJ6DB/DG (C5SS chassis)

Note that circuit diagram 2/5, Power Supply 1, in the service manual shows resistors R843 and R842 in the

optocoupler circuit reversed. They are correct on the PCB.

Repair Kits

When repair kit 40PW8DBKIT, 56PW8DBKIT, 40PW8DGKIT or 56PW8DGKIT is obtained you will find that it includes a detailed instruction sheet. This should be carefully read before undertaking the repair.

VCRs

V218B, V228B and V428B

Intermittent failure to start up from mains off: Cause is TW020 not receiving the correct start-up voltage via RP004/05/06/07/08/10/11/24. It's RP024 (47k Ω) that usually goes high in value.

High pitched noise from the power supply, appears to come from transformer LP050: Replace the 2,200pF capacitor CP041, part no. 24285222.

AC mains input socket on PCB: There has been a report of dry-jointed/cracked solder connections at this socket, with some arcing. Repair was carried out by resoldering. Toshiba has not come across this fault and would like to investigate a machine where it has occurred. If you can help, phone Toshiba Technical on 01276 62222.

Service manual corrections: TW095 on the secondary side of the power supply is shown as an npn instead of

CO34

CO34

CO34

CO34

CO35

Fig. 1: Modification to the original Dolby Digital unit in Model 3787DB to cure intermittent audio crackles from all speakers when the set is switched on from cold. Replace the arrowed surface-mounted resistors, using 33Ω instead of 100Ω resistors.

a pnp device in the circuit diagram. Its emitter is connected to RP095. Delete the link shown between the 20V supply (from DP061/CP061) and the PG (power good) control line.

V218B, V228B, V428B, V728B and V858B

Intermittent loss of record colour: Can occur when CV061 (0·047µF) is leaky. It's connected to pin 54 (record AFC detection) of the video processor chip IV001. The part no. is 70041704.

V726B

Stuck in standby but responds to remote control: The 2SC2236-Y 12V regulator transistor TW003 on the main PCB is open-circuit. Part no. is A6325549.

V856B and V857B

Intermittent loss of record colour: Can occur when CV030 (0·047µF) is leaky. It's connected to pin 29 (record AFC detection) of the video processor chip IV001. The part no. is 70041704.

VideoPlus Programming

S4C has now been allocated VideoPlus Guide channel 11. This means that when installing a VideoPlus VCR you will either have to tune S4C in at programme position 11 or set the VideoPlus Guide channel number 11 to select programme position 4 (if S4C is tuned in at this position).

Make sure you get your copy of Television

It can be difficult finding a copy of *Television* at local newsagents. The number of magazines being published keeps on increasing, which means that newsagents have less shelf space for the display of particular titles. Specialist magazines in particular get crowded out.

There's a solution to the problem. Most newsagents provide "shop-save" and/or homedelivery services. There's no charge for a shop save. You simply ask your newsagent to order a copy for you: it will be kept on one side each month ready for you to collect. Home-delivered copies are ordered in the same way, but often incur a delivery charge.

A newsagent can order any magazine for you, whether or not the shop normally stocks it.

If you buy your copies of *Television* from a newsagent and want to make sure you get every issue, just ask at the counter.

TELETOPICS

SkyDigital Success

By the end of January BSkyB had signed up some 350,000 subscribers to its digital satellite TV services. Just over a third were new subscribers to BSkyB, the others converting from Sky's analogue services. SkyDigital has has achieved better results than digital satellite broadcasters elsewhere. In the USA, DirectTV signed up 200,000 subscribers during the same period, from a very much larger population base. In France CanalSatellite claimed some 100,000 subscribers at the end of January. SkyDigital exceeded its target of 200,000 subscribers by the end of 1998 by 75,000, and has set itself a new target of a million subscribers by October 1999.

BSkyB plans to revamp the electronic programme guide currently used for its near video-on-demand service. A pay-per-view film service from the digital broadcasting company is to be added to SkyDigital this spring, when the Open interactive service is also due to start. Argos, Dixons and Somerfield are the latest firms to sign up with Open – they will be offering products when the full service starts next autumn. In addition to home shopping, Open will be providing information, games, banking and e-mail.

Rupert Murdoch's aim is to make

BSkyB part of a Europe-wide pay-TV network. An attempt to buy Telecom Italia's pay-TV subsidiary Stream broke down in early February. More recently, BSkyB has been holding talks with Canal Plus over a possible merger. Canal Plus is now active in Spain, Italy and elsewhere as well as France. There seem, understandably, to be differences between the two over who should run a combined operation. There is also the major point that a merger would almost certainly initiate a full-scale anti-trust investigation by the European Commission. which vets all substantial mergers that affect the single EU market.



Labgear has launched the TriStar Compact set-top UHF TV aerial in response to calls for a smaller version of the well-established TriStar. The new aerial is based on the same log-periodic design, providing good gain across the entire UHF TV band. For further details call Labgear on 01223 366 521.

Predictions

Haruo Nakatsuka of Toshiba came up with some intriguing predictions for the future of TV and video during his keynote speech at the latest International Solid State Circuit Conference (ISSCC), which was held at San Francisco in late February.

A substantial increase in games capability, in which for example you could take part in a 'real' car race, was his first prediction. This would call for a CPU with a five billion floating-point operations/sec (GFlops/sec) capability and a 700 GFlops/sec graphics processor.

For 3D-TV the scene would be filmed from several angles simultaneously, which would enable the TV set to

construct a geometric model of the scene and use real-time ray-tracing to play it back from an arbitrary direction. "A viewer could enjoy a football goal scene from any angle" Nakatsuka said. This would require about 100GFlops, or 10GFlops if done off-line.

Video filtering becomes possible with 900GFlops/sec processing. The TV set could for example use facial recognition to follow the viewer's favourite footballer around a match, always selecting the camera that provides the best view of the player.

Nakatsuka thinks that processing power for real-time ray-tracing will be available by 2005 and for video filtering by 2008.

DTT Installations

The Digital TV Group has published a book entitled *Installing Digital Terrestrial Television – Domestic Systems*. It's very clearly presented, with lots of colour, and provides sound guidance. Copies are available at £10 each from The Digital Television Group Limited, Liss Mill, Liss, Hampshire GU33 7BD. Telephone no. is 01730 893 144, fax 01730 895 460, e-mail

mcook@dtg.org.uk

also web www.dtg.org.uk

Antiference has introduced the RX range of aerials for DTT reception. Features include twin dipoles for optimum signal transfer to the cable across the bandwidth, and a reflector with tuned bars to improve protection against ghost signals. For further details contact Antiference, Eastern Avenue, Lichfield, Staffs WS13 7SB. Phone 01543 267 160, fax 01543 267 104.

DVD Update

According to the DVD Committee well over 50,000 DVD players have been sold in the UK and sales are steadily growing. Over 35,000 region two discs were sold during the pre-Christmas period. Sales in the USA have been very encouraging, and in the UK it appears that the DVD is gaining acceptance amongst video users.

Nimbus manufacturing recently produced the first DVD-9 (dual-layer, single-sided) disc in the UK.

Panasonic has launched a DVD-ROM drive, Model SR8583, that's compatible with DVD-RAM discs. It has a x5 speed mode for DVD-ROM discs and a x32 mode for CD-ROMs. The machine is also compatible with DVD-R, DVD-5, DVD-9, DVD-10, CD-R and CD-RW discs.

Onkyo's new DVD player, Model DVS501, includes 20bit/96kHz audio playback.

Sony has launched several DVD-Video players. Model DVPS7700 plays DVD-Video, Video CD and audio CD discs and is compatible with Dolby Digital and MPEG-2 audio. It has a digital output socket for DTS digital surround-sound. Models DVPS725 and DVPS525 have a built-in Dolby Digital and MPEG-2 decoder and a digital output for DTS.

Philips, Sony and Pioneer have formed a joint licensing programme for DVD technology.

.......



CPC has added Rayvac's unique rechargeable alkaline batteries and chargers to its range. These 1.5V batteries can be recharged up to a hundred times and can be used to replace Ni-Cad and Ni-MH equivalents. They can be stored for up to five years fully charged. For further details check with CPC on 01772 654 455, fax 01772 654 466.

Video News

Sony has announced the first camcorders that use its new Digital-8 technology, enabling users to record digital sound and pictures on Hi-8 tape (see Teletopics, March page 308). There are four models, DCR-TR7000, DCR-TRV110, DCR-TRV310 and DCR-TRV510. With the exception of the first model they all have a built-in LCD screen and an IEEE 1394 digital output socket for connection to a PC or other digital device. Model DCR-TRV510 has a digital still camera function with a built-in 2MB flash memory that enables up to 33 still images to be stored. It also has an RS232 connecting cable and software for image manipulation on a PC. Other features include an electronic image stabilser, x80 digital zoom, x20 optical zoom, eight picture effects and six digital effects. The Digital-8 system has an optional LaserLink IR connection to enable a camcorder to be linked to a TV set or VCR without the need for cables.

Panasonic has introduced three new VHS-C camcorders, Models NV-VX24B, NV-VX44B and NV-VX54B. All incorporate a 2.5in. colour LCD screen. Model NV-VX54B has a X300 digital zoom. There is also a MiniDV camcorder,

Model NV-DS33B, which is claimed to be the world's smallest conventional-style digital video camera. It uses a newly-developed super compact mechanism with a three-stage middrive cylinder that provides an extremely short tape path with optimum tape protection. Another feature is the Progressive Shot System, which is claimed to enhance the resolution of standard-recorded still pictures by 1.5 times, making them better suited to printing or feeding into a PC.

JVC says it expects over 42,000 MiniDV camcorders to be sold in the UK this year compared with 27,000 last year.

Business News

LG Electronics has ceased production of TV sets at its Washington, Durham plant because of excess capacity in the European market.

Japanese manufacturers continue to announce record losses, the result of an over-valued Yen and poor trading conditions in domestic, Asian and other markets. NEC made its largest loss ever, £770m, for the year to March and is to make 15,000 employees redundant; Matsushita has reduced its earnings forecast after a poor third quarter result with pre-tax profits down 49 per cent; Toshiba has suffered its first loss (\$167m) at parent company level since 1951 (the last loss at group level was in 1976); and Hitachi has warned that consolidated net losses for fiscal 1998 will be \$3.3bn, sharply higher than its previous estimate – the dividend is to be halved.

Round-robin Help

Martin Pickering of SatCure now supplies a weekly update of servicing faults/cures by e-mail *only*. The recipient list is restricted to trade repairers, who are expected to contribute new information to this self-help group as well as occasionally asking for help themselves. Fault contributions considered to be of general interest may be published in – and paid for by – *Television*.

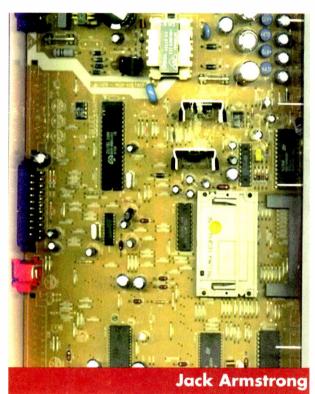
Trade repairers of TV sets, VCRs, monitors or satellite receivers should contact SatCure by e-mail at satcure@netcentral.co.uk

Please mention TV/VCR/monitor Round Robin and provide a brief description of your servicing background, qualifications and current business. Initial subscription is free, but a small annual fee may be requested once the Round Robin is established. Members' details will remain confidential, and you will not be inundated with messages or adverts as a result of joining the group.



A range of three new fully-programmable DC power supplies from Grundig has been introduced by Vann Draper Electronics Ltd. There are three models, PN400, PN300 and PN200. The PN400 provides two 0-40V at 0-4A outputs and a 0-6V 0-5A output. It's fully programmable or controllable via RS232C and IEEE.488.2 ports. The PN300 provides two 0-30V at 0-2-3A outputs and a 0-5V output at 0-2A: other details are basically as Model PN400. Model PN200 provides two 0-20V at 0-0-5A outputs: control is via an RS232C port or a remote control unit. For further details check with Vann Draper on 01162 771 400, fax 01162 773 945.

Satellite WORKSHOP



The phone rang. My 'caller display' box showed that the call was from a town about twenty miles away – outside my normal area. So I answered it in a relatively good mood.

"Jack Armstrong, good morning."

My ears were assaulted by the sound of a child screaming. Then a

voice asked "is that Jack Armstrong?"

"Yes, that's why I said 'Jack Armstrong, good morning'."

"Eh? You want to change your attitude, mate, if you want my business. Anyway, I need some advice before you come."

I replaced the handset gently. Funny how people assume that I'm so desperate for business I'll accept verbal abuse, give free advice and do a free call out.

Pace Apollo 120

Alf is a CB radio enthusiast. He spends his nights on top of Carlton Bank, broadcasting to the whole of North Yorkshire. That pobably explains why he's always tired. The Pace Apollo receiver he brought in also looked tired.

"No pictures" he yawned as he handed the receiver to me.

"Hmmm. Get any sound?"
"Sorry, gimme a nine on that.
You're a bit ten-one."

"I said do you hear any sound from it?"

"Ah, sound. Think so, but the modge is a bit low you know."

When I tested the receiver the power supply started up but its 14V output was low. My oscilloscope showed that there was massive ripple on the line. A quick in-circuit check with my Genie meter then revealed that C73's ESR was far too high. So I replaced C73 (1,000µF, 25V). Everything was now OK, and no other fault could be found.

Alf was impressed by the speed of the repair, but less impressed with the cost.

"Bloomin' 'eck. The 'Rig Doctor' charges only a fiver for a complete tune up! Oh well, here's your cash. Ten-ten good bud."

Nokia SAT780

Nokia receivers are either very scarce or very reliable, as I seldom get one in for repair. As a result, I'm not too familiar with them. This SAT780 provided the LNB with only a 17V supply, that is it wouldn't change the polarisation by dropping the supply to 13V. Fortunately the cause was simple to

trace: there was a dry-joint at the LM317T variable-voltage regulator.

Helping Hands

More and more I find myself working past midnight just to earn a crust. I frequently find my eyelids drooping, and once woke myself up by nodding off into a switch-mode power supply! Now I have the answer. I bought myself one of those 'helping-hands' contraptions. You know, the one with a magnifying glass and two crocodile clips on articulated arms – see photo.

It's so useful. I fit each clip carefully to an eyelid and peer through the magnifying glass, with my chin resting on a cup of strong coffee. It's painful but it keeps me awake! Just kidding.

Pace Prima, Apollo and all MSS models

I've had lots of no-decoding problems with later Pace receivers that use PTV111, PTV110, PTV115 etc. ICs. Even after swapping every IC and capacitor on the decoder board I've had some that refused to work. Pace have informed me that there are two different types of PTV115 IC in use. The details are as follows.

There's a CMOS version of the PTV115, with a C or with bright white marking. When this is used, fit links J301 and J302 so that clock pulses reach pin 18.

The other version is an NMOS type made by Siemens, with dark yellow marking. With this type fit links J300 and J303 so that the clock pulses arrive at pin 19.

Grundig GRD300

You could hear the power supply fire up, but the vacuum fluorescent display didn't light. There was no LNB voltage and, of course, no picture or audio – just snow and hiss. Occasionally, when the tuner module was warmed with a hairdryer, the screen displayed some sort of mistuned picture.

I have to confess that this receiver sat on the bench for several days – and that I had sleepless nights because of it. The owner was a personal friend – isn't that always

the case with tricky repairs? I didn't want to let her down.

I eventually discovered that the cause of the fault was cracked tracks near the tuner's solder lug. I should have known really, because with other Grundig receivers the same fault gives rise to the stuck in standby symptom.

Pace MSS501IP

Don't you just hate it when a customer tells you the repair is urgent then adds that he doesn't want to pay very much? In this situation I usually offer a service exchange unit. As I didn't have an MSS501IP lying around however that option was out. So I adopted option two.

"Go away."
"Pardon?"

"I said go away. I'm not going to waste my time on someone who brings me a £400 receiver but doesn't want to pay more than £25 for a good repair.

He suddenly became more reasonable and slapped a fifty pound note on the counter.

"Horizontal channels go off when it's hot" he said, "if it costs more than that let me know. Discount for cash, mind!" He hopped into his Discovery and roared off, leaving his business card on the counter. A solicitor – oops!

Anyway I didn't need to trace the cause of the fault, because fitting the relevant reliability kit of ultra-low ESR capacitors, Relkit 10, cured it. For details of the kit phone 01270 753 311.

Memory Loss

I sometimes get "loss of memory" or "loses its position" complaints with motorised receivers. There is usually nothing wrong with the receiver or positioner, the cause of the problem being interference produced by the installation itself. Interference has two main effects with a motorised system. If the positioner finds that there are too many pulses, it won't reach the true satellite position. The other problem is that noise from the motor produces interference on the TV picture. Neighbours' TV and radio equipment may also be affected.

The main cause of interference is the use of unscreened caravan or telephone cable. The remedy is to use proper cable. The motor wires should have a screen. Pulse and Jack Armstrong is willing to try to sort out readers' satellite TV receiver problems via e-mail. You can reach him via the Internet at:

jack@netcentral.co.uk

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

polariser wires should be screened separately. All screening braids should be connected to earth at the receiver/positioner only. They should not be connected to the dish. The dish assembly must have a separate earth connection – preferably to a long copper rod hammered into adjacent soil. This will help to remove the static charge that otherwise builds up on the dish – it's carried by dust particles, and is particularly bad on dry, windy days. In some parts of Europe earthing the dish is a safety requirement.

Test Case 436

Because of the high cost of house calls, collection and delivery, most chargeable TV repairs are nowadays brought to our workshop. But some people simply don't have the means of doing this. So it was that Mr Davis had us call to look at his TV set – at a reduced rate, mind you, because he's a pensioner.

The set in question, a Panasonic TC2175, is itself rather ancient. It was completely dead and Doc Colin, our electromechanical paramedic, found that the mains fuse inside it (F801, 3·15A) had blown. A replacement fuse restored normal operation, and no other fault could be found – even though Colin banged and tapped the PCBs and switched the set on and off at the mains plug several times. So off he went, having charged Mr Davis for the call-out and a fuse. This wasn't the end of the story of course!

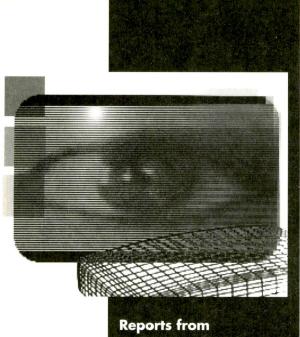
Three days later Mr D was back on the phone to say that his set had once again failed. On his follow-up call Colin replaced the fuse and also the filter capacitors across the 230V AC input to the set. He told his customer to keep an eye on the set. Mr D promised to do that, and was back on the phone a couple of days later: the set had failed yet again! This time Colin, by now somewhat disgruntled, decided to take the set back to the workshop.

Now Television Ted, our top man for all television matters, was off on holiday. So the set fell into the clutches of TechnoCrat, a good man but, by his own admission, maybe not quite as good as Ted at diagnosing faults of this sort. What, mused TC, could cause the fuse to blow at intervals,

with never any sign of other damage and with the set always returning to good working order once a new fuse had been fitted? He looked at the fuse that had just failed. While it had not shattered, and its glass envelope was intact, it was completely black inside. This showed that the overload had not been a slight one: there had been no gradual increase in temperature until the melting point of the wire inside the fuse had been reached. He knew too that the mains filter capacitors were not responsible – they had already been replaced.

After studying the circuit diagram, TechnoCrat decided to replace the mains bridge rectifier (D801). He could see no signs of distress in the associated surge-limiter resistor R802 and the reservoir capacitor C807. He also decided to resolder all the connections to the chopper transformer T801, the LOPT and the line driver transformer. He then took the set to the soak-test bench and got on with other things. The set worked for the rest of the day and the whole of the following day. In fact it wasn't until day three that the next failure occurred: there was, at the moment of first switch on in the morning, a brief splutter followed by a pop as the fuse blew.

All that TC could now think of doing was to start a trialand-error replacement of suspect components in turn. So, as a start, he replaced the chopper chip IC801 and the snubbernetwork diode D810. This didn't do the trick either, because the mains fuse blew again at switch on later that day. What was the cause of the trouble? For the solution, turn to page 439.



Gerry Mumford Alan Bonhomme Chris Hawkins Russ Phillips and Ian Field

Apple Multiple-scan 15 M2978 (GoldStar chassis)

If there is no line hold or the side edges of the display are bulging and rippling, rather like asymmetrical EW bowing, check the output from the 7812PI 12V regulator IC951. You often find that the output is slightly low. This disrupts the operation of the VCO in the horizontal deflection generator section of the TDA9102C chip IC701, because the VCO uses the regulated 12V supply as a reference. Replace IC951 if it's output is less than 11-9V. G.M.

Digital PCX13V-SA

There was very little frame scan, only about 0.5cm at the centre of the screen. A measurable short-circuit was present at the frame output, the cause being C317 (10nF Mylar) which is connected in parallel with the frame scan coils. **G.M.**

Hyundai HL5864

This monitor powered up, but there was no display as the line output stage was not running. The arrangement here is a bit unusual: the line drive is applied to the emitter of the output transistor, via a small driver transistor, while its base is held at a constant voltage by a biasing network. The drive was missing, which led me to the TDA9102C chip U301. Because of a short-circuit at pin 19 (voltage reference) the line oscillator section wasn't running. The cause of the trouble was C402 (100nF, 25V). G.M.

Monitors

IPC VDVGA15

This monitor was dead with a blown mains fuse. The primary side of the power supply had blown up, killing the 2SK1507 chopper FET Q501, its feed resistor R527 (0·22 Ω , 2W fusible), gate resistor R528 (47 Ω , 2W) and the UC3842 chopper control chip U502. In addition a flashover had occurred at D509 (1N4148), melting the leg off its neighbouring capacitor C519 (10nF, 100V) which also had to be replaced. **G.M.**

Smile CA6415DL

This monitor was dead with no power anywhere, not even at the mains fuse - I thought for a moment that my meter was playing up! I started to disconnect the line output transformer pin by pin however. When every pin had been disconnected, power returned but R143 caught alight. This led me to Q122 and Q103. When I replaced these items (I had to guess the value of R143) Q103 quickly became very hot. I then checked further and found that the DTV64 damper diode D103 was open-circuit. Once this had been replaced there was normal operation. Q103 is type TIP122A while Q122 is a Darlington set-up with two transistors, a 2SD669A and a complementary 2SB669A. My thanks to Don of Smile who provided the correct value for R143: 22Ω, 1W. **A.B.**

AOC 7HLRT Spectrum Series

This monitor was brought in by a customer of Russian origin. He complained that the display jumped from side to side and up and down, and said repair was urgent. So I told him to come back in an hour's time.

When I took the back off and connected the monitor to my PC I could see what he was on about, though the cause took some while to trace. C448 (330nF, 63V), which is connected to pin 2 of the line output transformer, was dry-jointed. I had just managed to resolder the

joint when the monitor's owner returned, carrying two glasses and a bottle of Vodka.

Fortunately no other customers came in and, thinking that all was well, I left the monitor running while we enjoyed the Vodka. Then, suddenly, the display disappeared. To cut a long story short, I had to wait till morning for my head to clear sufficiently and discover that C453, C436 and C832 had failed. They are all 4·7nF capacitors rated at 2kV. Once they had been replaced there was a bright, rock-steady raster – which is more than I can say for the owner. C.H.

KFC/Smile CA1716DL

This monitor produced a mauve-coloured display, which means no green. I found that Q414 (2SC3953) on the CRT's base panel was dead short base-to-emitter. If you get the same problem with red or blue, check Q415 or Q410.

Note that the video processor chip U401 is type MN1203. It can be replaced with an LM1203N if necessary. C.H.

Targa Low-radiation MPRII

This monitor is made by a Taiwanese company called Shamrock. It's display was twitching from left to right. I took a guess and decided to check the separate, vertically-mounted geometry control PCB, which is a maze of double-sided circuitry. There were numerous doubtful soldered joints here, particularly at connector BB03. It took about two hours to deal with them. Fortunately the monitor then produced a stable raster. C.H.

Tatung TM4523

If the colours are incorrect, check for dry-joints around transistors TR201 and TR202 in the red output stage, TR203 and TR204 in the green output stage and TR205 and TR206 in the blue output stage. One of these transistors in each

stage is a 2SC3953 the other a PH2369. If these stages are OK, check the U2203B video processor chip – an LM1203B can be used as a replacement if necessary.

If the display is dim or missing, check the blue disc capacitor C229 (10nF, 2kV) which tends to develop leakage.

If there's only a horizontal line when the monitor is hot, the TDA8172 chip IC402 is the likely cause. C.H.

Dell D1528LS

This monitor would lose its display after four hours. In the fault condition the green power LED went orange and there was no line drive. The cause of the trouble was Q806 (2SA931), which had an intermittent fault. Note that a 2SA931 *must* be used in this position. 'Equivalents' don't work, even though they may have the same or a superior specification.

This monitor can be run with the line output transistor removed. In this condition the power LED will be orange instead of green, the line output transistor's collector voltage will rise from 75V to 84V and the 75V supply to the CRT base panel will rise to 103V. R.P.

Essex PV564M

This monitor was dead with the reservoir capacitor for the 15V supply to the UC3842 chopper control chip short-circuit. Its value is 68µF. R.P.

IBM 6322-R22

You sometimes find that the picture is bright with no contrast, i.e. very washy with no punch, becase of a fault in the XC86211B microcontroller chip Z500. To check, disconnect pin 22. If the picture then comes up, the IC has failed. **R.P.**

Samsung CQA4147L

The job card said "picture went small – smokes 30 a day". D618 was in two pieces and C626 (100μF, 100V) had an expanded top. Both are in the HT supply. The 2SC5149 line output transistor Q403 was short-circuit base-to-emitter, FET Q408 (IRF9610) was short-circuit drain-to-source while D406 (RU4DS, mounted on a heatsink) was short-circuit. Replacements restored normal operation. **R.P.**

AST TE1464G

This monitor was dead with a blown mains fuse. It has a discretecomponent chopper power supply, and in this situation a little patience is required to check all the diodes, transistors and resistors. Miss one and a rebuilt power supply will go bang at switch on!

0901 (2SC3680) was short-circuit. Q905 (BC638 - I used a BD238), Q904 (2SC945) and Q902 (2SB857) had also been damaged. O904 (BC637) was the only undamaged transistor on the primary side of the circuit. D904 (1N4148 suitable) and ZD903 (5V1B2) were both short-circuit, as were all connections to the transistor section of the optocoupler. A second check through the power supply revealed that D912 was short-circuit. I mislaid the faulty diode before recording its type number, but I had made a note of its specification: an RGP15D should do.

In most cases visual inspection will show whether any resistors are in need of replacement — none in this case. Once the components listed above had been replaced, the monitor worked when powered.

I.F.

IBM 6314-002

When this monitor was switched on the power LED flashed at a rate that increased to a dim flicker then went out altogether. In addition the power supply made distressed noises. The cause of these symptoms turned out to be dry-joints at the scan-coil plug.

Several of these monitors had come in at the same time. The complaint with the rest of them was "inability to store user settings". The procedure is to press the mode button while holding down the save button: all seven LEDs should flash three times simultaneously, then you release the mode button. While setting up these monitors I occasionally had the LEDs flash like a crossing signal – alternating in two groups! Assuming that this was an error indication, I repeated the entry sequence. On each occasion that this happened the seven LEDs flashed three times simultaneously on the second attempt and the changes were successfully saved. I.F.

Dell 1528LS

There was no rustle up at switch on and the power indicator was yellow. The latter means that there's loss of line drive or the 25V supply. I checked back to the power supply and found that Q806 (2SA965) was not being driven by Q804 (2SC945). When bias was temporarily applied to Q804, the

monitor started up and ran. To cut a long story short, the cause of the instant shut down at start up was C826 (1,000µF, 16V) in the 6.3V supply.

A word of warning about 1803 (TC4010BP) which drives Q804. Most suppliers list this 4000-series CMOS chip as obsolete and may offer a 4050 as a "pin-for-pin" replacement. This is not correct! Pin 16 is not used with the 4050. In the Dell 1528LS pin 16 is connected to the 5V rail via what appears to be a start-up capacitor, C845 (1µF, 50V). I feel that the use of a 4050 in this position is likely to compromise the correct operation of the safety shut-down circuit.

These monitors are more recent than any data books that list the 4010 as obsolete, so someone must still make the device. Try to find the correct type if replacement is required. **I.F.**

Dell Vi1428E

The chopper transformer's primary winding had shorted turns, effectively reducing its step-down ratio. Because of this the MCR100-6 overvoltage thyristor Q102 was coming into operation, removing the supply at pin 7 of the UC3842 chopper control chip IC101. I had the same fault recently with an identical monitor that another customer decided to donate to the graveyard, so it could be a common failure.

To check this quickly, disconnect the drain of the 2SK1118 chopper FET Q101 and use a 60W bulb to complete the circuit to the transformer's primary winding. With a faulty primary winding there will be 320V across the bulb.

Note that IC102 (4N35) has nothing to do with regulation, which is based on sampling the voltage produced by the winding that supplies the chopper control chip – IC102 couples line sync pulses to the chopper circuit. This makes it safe to disconnect all the rectifiers on the secondary side of the circuit to make sure that the short is in the transformer and not on the PCB.

The above test is meaningful only if Q102 is disabled – do this by shorting across C110 (10μ F, 50V).

If there's a more common fault that destroys the 2SK1118 FET, you can use an MTP6N60 as a replacement provided the silicone rubber heatsink insulator is free from defects. There is a fully-insulated version of the 6N60, but it's extremely rare. **I.F.**



Reports from
David C. Woodnott
and
Adrian Spriddell

Sony CCD-TR780E

This newish camcorder arrived with a tape stuck in its mechanism (Sony A type). The mechanism was completely jammed, and even the trusty mode box couldn't evict the tape. General dismantling, bit by bit, eventually enabled me to extract the tape. I then removed the LS chassis to gain access to the deck section.

Some of the teeth of cam gear B (L) were missing, a condition that's not uncommon. I replaced the gear, along with arm assembly FF which was bent and arm assembly GL which was similarly afflicted. I also replaced the mode encoder switch, as it can be the cause of mechanical failure of this type. Once the unit had been reassembled and checked all was found to be well. A service completed the repair. D.C.W.

Sony CCD-FX200E

No camera picture was the complaint with one of these popular camcorders. Playback and all the mechanical functions proved to be OK. The first item I checked was the camera/VTR switch: being of the type used in some previous models (F series), it was suspect – you often find that it works intermittently. This one proved to be OK however.

I then checked the record/pause (trigger) switch. On examination the cause of the fault was obvious: the switch actuating lever had broken off, leaving the switch permanently in the pause position. When

Camcorner

it was pushed into the record position the camera picture appeared with all functions operative. The reason for the damage was that the record/pause button assembly, which is fitted to the grip case, had been forced and had lost its end stops. As a result there had been excessive movement of the record/pause button and the switch actuator had sheared off. A new button assembly and switch cured the problem.

Since I carried out the original repair another similar model has arrived with the same fault. The unit will work if the switch only is replaced, but it's is highly likely that this will be damaged at some stage – and you will be expected to repair it free-of-charge under guarantee! **D.C.W.**

Sharp VLE37H

This Viewcam produced good play-back pictures but no E-E pictures. Internal inspection of the camera section revealed that the iris assembly was stuck because of leakage of oil on to the iris vanes. As separate lens parts are not available for this model, a complete lens unit had to be obtained. When it arrived I removed the iris assembly and fitted it to the existing lens unit.

This is the most satisfactory way of carrying out the repair, as it avoids the setting up (autofocus tracking etc.) that would be required if a complete new lens unit was fitted. I then checked the unit at various light levels, using a calibrated light source, and found that it operated satisfactorily. A service completed the repair. **D.C.W.**

Sony CCD-FX300E

The complaint with this camcorder, which came from the local technical college, was that it produced "strange pictures". Playback of previously recorded tapes was OK, but the E-E pictures were optically distorted – the picture was 'oval', with multicoloured abberations at the right-hand side. There was no zoom or autofocus operation.

I removed and dismantled the lens unit for inspection. It was evi-

dent that the unit had been subject to an impact, as the internal sections were detached from their locations. Fortunately no actual damage had occurred, and when the unit had been reassembled correctly it worked perfectly. It seems that the impact had merely displaced the internal moving sections, a most unexpected event! **D.C.W.**

Panasonic NVMS90

The cause of field collapse in the electronic viewfinder was traced to the 3.9Ω surface-mounted resistor that couples the AN2514S timebase chip to the field scan coils – it was open-circuit. You will find it next to the scan coil plug, connected to one end of the height potentiometer. **A.S.**

Sony CCD-TR55E

This well-used unit came with a report that it had seized up after a trip to the beach. Sand was the likely cause of the problem. But not masses of it: just one grain was enough! The offending grain had lodged in one of the gear teeth of the capstan motor's rotor. It was sufficient to jam the motor, with the result that the unit was in the caution mode.

After removing the motor and cleaning its gear I removed the LS chassis from the deck to check for any other foreign matter that could cause problems. All was well, but I decided to replace the conversion gear, drive belt and midway pulley. They often become noisy in operation – the result is knocking noises or a general mechanical unpleasantness. It's much better to replace these items on spec rather than have to dismantle the unit again after reassembly. **D.C.W.**

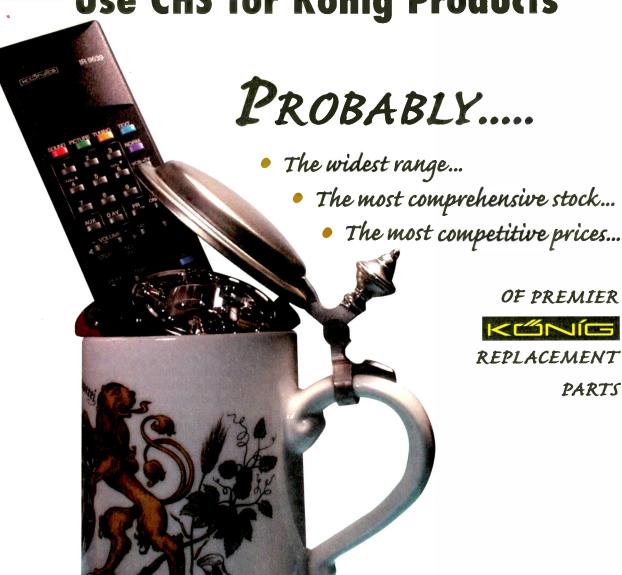
Sony CCD-TR330E

The note that came with this machine said it was dead. I found that CP002 on the power supply PCB was open-circuit. As no cause could be found, despite carrying out all the usual tests, I fitted a replacement. The machine then worked normally, and a soak test proved that it was OK. D.C.W.





Use CHS for König Products



For a Fast, Efficient & Competitive Service

Call us on **01759 303068** for immediate action

Sales Desk:

01759 303068

All other enquiries:

01759 304457

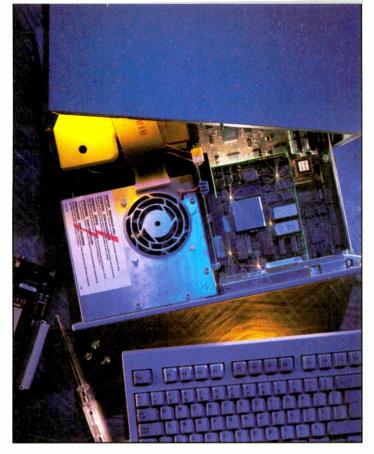
Fax:

01759 303620

Internet:

www.charleshyde.co.uk

Charles Hyde & Son Ltd Prospect House, Barmby Road, Pocklington, York Y042 2DP



Why not add PCs to the range of equipment you service? It's a logical step after TV sets and monitors. You need to know how a PC's hardware and software operate, then how to go about testing. In this first part of a new series K.F. Ibrahim describes basic PC hardware



Operation & Repair

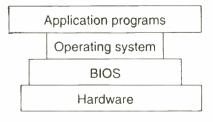
he operation of a computer depends on hardware, i.e. physical units and circuitry, and software, i.e. coded instructions and programs. Fig. 1 shows the software/hardware 'hierarchy'. At the 'highest' level there are software application programs that provide word processing, spreadsheets or computer games for example.

Such programs will work only within the computer environment for which they are designed. This environment is the operating system, the next level down, which is also a collection of programs/routines. These routines are called up by the application program as necessary.

There are a number of operating systems, the most common being MS-DOS (Microsoft Disc Operating System) and Windows 95. Others include OS/2 and Unix. Note that Windows 3.1 is an application program, not an operating system: Windows 95 is an operating system that incorporates DOS.

A personal computer (PC) is a general-purpose system designed to accommodate different operating systems. The link between the hardware and an operating system is a set of software routines known as BIOS, i.e. Basic Input and Output System. The BIOS enables the software to take control of the hardware at a very basic, fundamental level. Its program routines are permanently stored in a ROM or a PROM memory chip. Because of their permanent nature, BIOS routines are referred to as firmware.

Fig. 1: PC software/hardware hierarchy.



Where a graphical user interface (GUI) is used, for example the Windows' icon system, a further level of software is introduced between the application programs and the operating system in the PC hierarchy.

PC Hardware

A PC's hardware consists of four essential components: a power supply, disk drives (for hard and floppy disks), a motherboard, and expansion (option) cards (PCBs) that fit into expansion slots on the motherboard. We'll consider each of these in turn. Fig. 2 shows a typical layout.

The Power Supply

The power supply is a self-contained, sealed unit in which all the high-voltage circuitry is incorporated. A metal container is provided to prevent high-frequency interference affecting the digital circuitry, where it could cause havoc. The power supply is cooled by an electric fan, which also helps to cool the motherboard and other devices and cards. In addition, the flow of air prevents dust from settling on the ICs and other electronic components. The noise that you hear when a computer is turned on is produced by the cooling fan.

A PC requires a number of stabilised DC voltages to supply the motherboard and the other devices and expansion cards. These are typically as follows:

| Voltage | Colour | Current | Power |
|---------|--------|---------|-------|
| +5V | red | 20A | 100W |
| -5V | white | 0·5A | 2·5W |
| +12V | yellow | 8A | 96W |
| -12V | blue | 0·5A | 6W |

The +5V supply powers all the TTL circuitry while the +12V supply is used to drive the disk drive motors and

K.F. Ibrahim is a

North West

Senior Lecturer at the College of

London. This series

of articles is based on Mr Ibrahim's

book PC Operation

and Repair which

was published in

April last year by AWL under the

Longman imprint.

CD-ROMs. Some applications, for example a serial port, require bipolar (positive and negative) supplies, hence the -5V and -12V rails. All voltages have to be regulated to within ± 5 per cent. This means a maximum of 5.25V and a minimum of 4.75V for the +5V supply, and a maximum of 12.6V and a minimum of 11.4V for the +12V supply. When no loads are connected, the outputs fall to zero.

A switch-mode (chopper) power supply is more efficient than a linear (series regulator) type, generating less heat and requiring less space. These advantages more than compensate for the added complexity. For this reason switch-mode power supplies are universally used in PCs.

Some CMOS and NMOS processors require a 3.3V or 3.45V supply. This is obtained from the +5V line via a subassembly. ATX motherboards require this supply directly, so the power supply has to provide an additional 3.3/3.45V output.

A power supply's power rating is the total power it can deliver in watts. It can be calculated by multiplying each output voltage by the individual current rating and adding the results together. Most modern PCs require a power supply rated at 220-280W. Computers that have multiple disk drives and/or numerous optional extras require a more powerful supply that can meet this extra loading. The mains fuse rating is usually 2A or 3A.

Protection

A PC's power supply incorporates protection arrangements to minimise damage that could be caused by a permanent or intermittent fault. Excess-current protection is mandatory. It shuts the power supply down if the current drawn exceeds a safe level. An excessive current demand will arise if there is a short-circuit on the motherboard or in any other device or subsystem, or alternatively if extra loading has resulted in the supply's power rating being exceeded. The shut down continues until the power switch is recycled (switched off and on again).

A good-quality power supply should protect the computer in the event of a short-duration, say 50-100msec, dip in the mains voltage. It should also provide automatic restart following such a dip, which is known as a brown out. There is normally a delay of a few seconds in the restart, to give peripheral devices and subsystems time to reset before everything starts up again.

A thermal cut-out should be included to shut down the power supply in the event of excessive heat. There is again usually a restart delay. The power supply will also shut down if the cooling fan fails to rotate, either because the fan is faulty or because its 12V supply has failed.

Finally, the power supply will shut down when none of its outputs are connected to a load.

The Power Good Signal

A power good (PG) signal is generated by the power supply when all its internal tests have been passed and stabilised outputs have been established. This normally takes 0·1-0·5secs after switching on the power.

The PG signal is used to generate a power-up reset signal to start up the microprocessor chip (CPU), see Fig. 3. In this arrangement Cl charges via R1 when the PG signal goes high. Once Cl has been fully charged, pin l1 of the 82284 timer/clock generator chip goes high and its clock generator starts up. After a short delay, pin l2 (reset) goes high, taking the reset pin of the microporcessor chip high to start up the system.

The circuit shown in Fig. 3 includes a push-button for

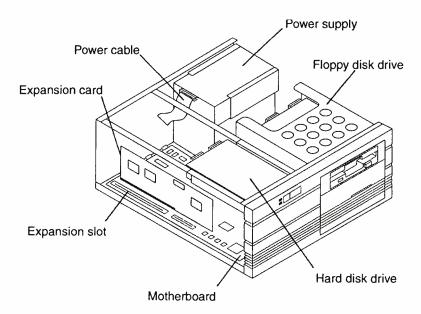


Fig. 2: Typical PC layout.

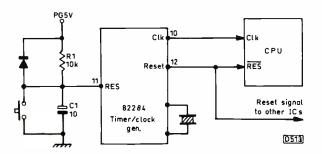


Fig. 3: PC reset via the timer/clock generator chip.

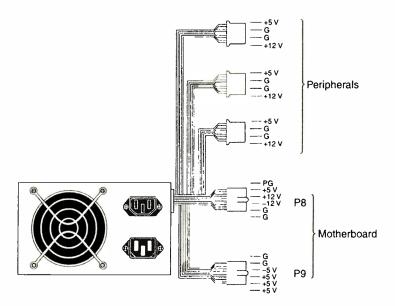


Fig. 4: Power supply connectors.

manual reset of the microprocessor. As an alternative, reset can be instigated by connecting the power good line to chassis via a $1k\Omega$ resistor.

Connectors

There are two types of connector for the outputs from a PC power supply box: two six-way connectors for the motherboard and either three or four five-way connec-

Fig. 5: Mother-

board power

connectors.

Table 1: Function and colour-coding of motherboard power connector leads.

| | Pin | Colour | Function |
|---|-------------|-------------------------|---------------------------|
| | 1 2 3 | orange red yellow | Power good +5V +12V |
| | 4 | blue | –12V |
| ! | 5 | black | 0V |
| | 6 | black | 0V |
| | 7 | black | 0V |
| | 8 | black | 0V |
| | 9 | white | -5V |
| | 10 | red | +5V |
| | 11 | red | +5V |
| | 12 | red | +5V |

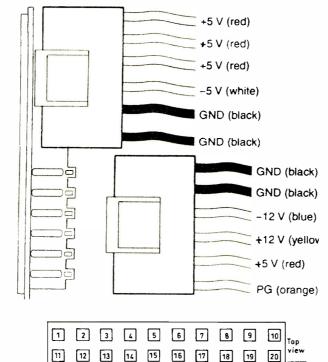


Fig. 6: The ATX motherboard power supply connector. Pins 1 and 2 orange 3-33V; pin 3 black ground; pin 4 red 5V; pin 5 black ground; pin 6 red 5V; pin 7 black ground; pin 8 grey power good 5V; pin 9 purple 5V; pin 10 yellow 12V; pin 11 orange 3·33V; pin 12 blue -12V; pins 13-17 black ground; pin 18 white -5V; pins 19 and 20 red 5V.

Table 2: Intel microprocessor generations.

| Type | Launch date | Bits | Speed |
|----------------|--------------|----------|-----------------------|
| 8086 8088 | 1978 1979 | 16 8 | 8MHz 5MHz |
| 80286 | 1982 | 16 | 8-12MHz |
| 80386 80486 | 1985 1989 | 32 32 | 16-25MHz 25-100MHz |
| Pentium | 1993 | 32/64 | 60-200MHz |
| P II (MMX) | 1997 | 32/64 | 300MHz + |

tors to supply disk and CD-ROM drives, see Fig. 4.

The two motherboard connectors, shown as P8 and P9 in Fig. 4, are plugged into the motherboard with the black (0V) leads adjacent to each other, see Fig. 5. The functions of the connector leads are listed in Table 1.

An ATX motherboard has ten-pin connectors, with a total of twenty leads, to cater for the extra 3.3/3.4V supplies. See Fig. 6.

Disk Drives

Disk drives are mass data storage devices. PCs generally employ two types of disc drive, for floppy (plastic) and hard (metal) disks. Both types of disk are coated with a very thin layer of electromagnetic material. Data is stored on concentric tracks that have been appropriately formatted.

The disk drives are connected to the motherboard either directly or via an adaptor card, using multi-line, flat ribbon cables. A 24-way cable is used for floppy disk drive connection. For hard disk drive connection either a 40-way IDE (Integrated Drive Electronics) or a 50-way SCSI (Small Computer System Interface) type cable is used. Pin 1 of the ribbon cable is identified by a red or blue stripe.

Motherboards

Different types of motherboard can be identified by the processor, the size and type of system and cache memories, the type and number of expansion slots, and any other functions provided by on-board ICs, e.g. onboard disk drive and video display controllers. Fig. 7 shows a typical Pentium motherboard layout.

The microprocessor chip (CPU – Central Processor Unit) determines the motherboard's processing power. Table 2 lists various Intel microprocessor chips in order of release.

A coprocessor chip, also known as a maths or numeric processor unit (NPU), may be included on the motherboard. Examples are the 80287 and 80387. Alternatively the coprocessor may be incorporated in the main microprocessor as with the 80486 and Pentium chips. The coprocessor is a programmable logic device that's designed to handle what are known as floating-point mathematical operations. Software that can take advantage of the coprocessor enables substantial improvements in the performance of the system to be achieved.

Support Chips

A number of what are called support chips (the 'chip set') are required for computer operation. Examples are the clock generator, interrupt and DMA (Direct Memory Access) controllers.

The computer system's operating memory banks are incorporated on the motherboard: modern PCs use SIMM (Single In-line Memory Module) or DIMM (Dual In-line Memory Module) slots for the purpose. There are four SIMM slots and two DIMM slots in the board layout shown in Fig. 7. Two cache fast-memory chips are also shown - there may be IC sockets or module slots for the cache memory (the cache memory technique will be explained in Part 3). The size of cache is determined by the type of motherboard.

The computer system relies on a number of configuration information and software routines which are stored in ROM or RAM devices. These are as follows.

The BIOS (Basic Input and Output System) routines are stored in a DIL ROM or EPROM package such as a 27PC512-15. Flash BIOS memory may be used instead. The BIOS chip usually has a paper sticker that

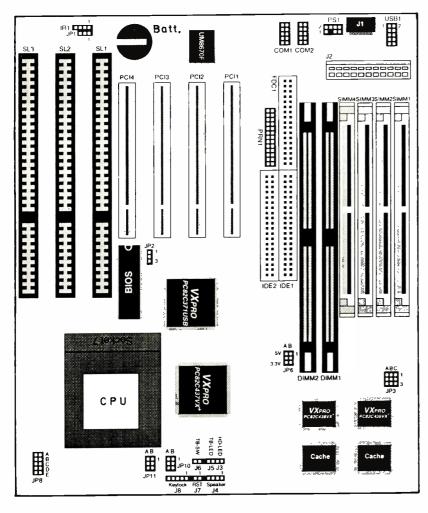
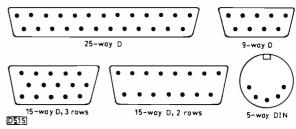


Fig. 7: A typical Pentium motherboard layout. SL1, 2 and 3 are ISA connectors; J2 is the power connector; PRN1 is the LPT1 connector; COM1 and 2 are serial ports.

| Table 3: I | Expansion slot | types. | |
|-------------|------------------|------------------|---|
| Туре | Data (bits) | Speed | Comment |
| ISA VESA | 8 or 16 32/64 | 8-33MHz 33MHz | Extensively used Used mainly for fast video graphics: cannot be used for 64-bit systems |
| PCI | 32/64 | 33MHz | Processor independent: may come to predominate |

| Table 4: Common connector types. | | | | | | | | | | | |
|----------------------------------|---|--|--|--|--|--|--|--|--|--|--|
| Туре | Application | | | | | | | | | | |
| 25-way D | Male type: series (RS232), COM1, COM2, COM3, COM4 Female type: parallel (Centronics), LPT1, LPT2, LPT3 | | | | | | | | | | |
| 9-way D | Male type: (a) serial (RS232), COM1, COM2, COM3, COM4 (b) mouse Female type: video (CGA, EGA) | | | | | | | | | | |
| 15-way D (3 rows) | VGA or SVGA video, network. Female type only | | | | | | | | | | |
| 15-way D (2 rows) | Games port. Female type only | | | | | | | | | | |
| DIN 5/6-w | ay Keyboard connector | | | | | | | | | | |
| BNC | Network connection | | | | | | | | | | |



provides the name of the manufacturer, the date and version.

The keyboard controller (KBC), also known as the keyboard BIOS, converts serial codes from the keyboard into ASCII (American Standard Code for Information Interchange) codes that can be understood by the computer system. Examples are the 8042 and 8742.

The CMOS set-up chip, for example the MC146818 or Dallas 1287 or 1387, is a small battery-backed RAM that stores the set-up and configuration information required for the BIOS routine when the computing system is initialised following power up or a reset. It also contains time and date information. The battery is usually soldered to the motherboard. It ensures that the CMOS set-up chip retains its data even when the PC is switched off. If the battery has to be replaced, the data stored in the CMOS set-up chip will be lost and must be reentered. Jumper connections can be used to delete the CMOS set-up chip's contents without disconnecting the battery: this may be necessary where, for example, a password stored in the chip has been mislaid.

A timing/clock generator chip, e.g. an 82284, and crystals are required. To ensure accuracy and stability, the system clock is based on a crystal-controlled oscillator. A second clock signal, using a separate 14-318MHz crystal, is available on the motherboard for the ISA expansion bus.

Connectors

Expansion slots/buses provide access to the motherboard via double-sided edge connectors. More than one type of expansion slot may be included on the motherboard. There are three main types: ISA (Industry Standard Architecture), PCI (Peripheral Component Interface) and VESA (Video Electronic Standards Association). Table 3 shows a com-

Fig. 8: Common connectors. See Table 4.

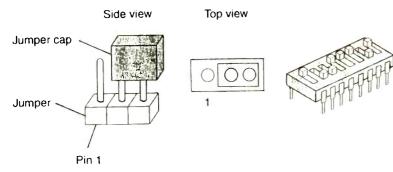


Fig. 9: Jumpers and DIP switches for motherboard configuration.

parison between these three types. In Fig. 7 there are three ISA slots and four PCI slots. Options such as a modem or sound are provided by inserting a card into one of the available slots. One essential is the video card, which is connected to the PC monitor via a 15-way (three rows) female-type port.

A standard AT-style five-pin (six-pin for IBM) connector is provided for the keyboard cable, usually at the rear of the motherboard.

The majority of motherboards have a standard 12-pin power supply connector. With ATX motherboards a 20-pin connector provides the extra 3.3/3.45V supplies.

Table 4 and Fig. 8 show the most common types of ports available at the back of a PC.

Jumpers and DIP Switches

A number of jumpers and DIP (Dual In-line Package) switches – see Fig. 9 – are provided to configure the motherboard for the system's specific arrangements and requirements. When a motherboard is upgraded or changed, the configuration jumpers and DIP switches must be set in accordance with the details in the manufacturer's handbook. Configuration arrangements are typically for mono-colour display, CPU power requirements and speed, and cache memory size.

Modern Motherboards

More modern motherboards incorporate a number of functions that were in the past provided via expansion cards. They include built-in IDE (hard disk) and floppy disk interfaces, two serial ports, an enhanced parallel port and a mouse interface.

The two IDE connectors are known as primary and secondary. Each can accommodate two hard-disk drives or two CD-ROM drives or a combination of both. One is known as the master, the other the slave.

The serial and parallel connectors are linked to corresponding ports at the back of the PC. The serial ports are referred to as COM1 and COM2, and may be of the nine-way or 25-way female variety. The parallel port, known as LPT1, is of the 25-way male type.

In part 2 next month we will take a detailed look at the booting-up process – what happens when a PC is switched on – and consider basic system configuring and customising.

Earn More Money

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



Special offer £50

Buy 2, save

Offer ends 31st March 1999

Teletest PC: Like a pocket sized computer!

Teletest 2: RF, Video, S-Video & audio outputs.

- High quality test pattern generators
- Powered from a 9V battery
- ♦ 60 day "no-quibble" money back guarantee
- 2 years parts & labour warranty

Freecall: 0500 009070



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

Teletest Ltd: 29 Beaulieu Rd, FREEPOST, Bournemouth, BH4 8BF, UK



John Edwards' Casebook



Panasonic TX21S1T (Z5 chassis)

This set produced sound but no picture. I marked the position of the tube's first anode supply control then turned it up, expecting to see field collapse. But what I saw was a blank raster with flyback lines. After returning the A1 control to its original setting I decided to check the line-frequency feedback pulses at pin 38 of the TDA8361 chip IC601, which contains the IF strip, the colour decoder, the timebase generators and one or two other items.

Bingo! Although some sort of pulse waveform was present, there were certainly no line-frequency pulses. So I traced back and came to the collector of the BC847B surface-mounted transistor Q504. There was a 1.5V peak-to-peak line-rate squarewave at its base, but a messy, inconclusive waveform at its collector.

I was about to switch the set off and check the transistor when a perfect picture suddenly appeared on the screen. This is never a good omen. The fault can clear and refuse to come back – until the set has been returned to the customer. This time I was lucky however. A slight prod on the body of the transistor with the end of a pencil made the picture appear or blank out. The soldering at the legs of the transistor looked OK, but when fresh solder had been applied there were line pulses at pin 38 of the TDA8361 chip and the picture remained no matter how much prodding was applied to the transistor.

Grundig 8787

This ageing portable was dead. I removed the back and noticed that safety resistors RU05 and RU15 had sprung open. Also obvious was the open-circuit fuse VU09. As I didn't have the circuit diagram, I decided to resolder the sprung resistors, renew the fuse and slowly apply power via my variac. Expecting the worst, I was delighted when the set sprang to life with a nice picture and sound.

After a couple of hours there was still no sign of distress. So I replaced the resistors and ran the set for another day. It behaved impecably. I'll never know what caused the resistors to spring and the fuse to blow. Perhaps just age.

Hitachi CPT2598 (G8Q chassis)

"Won't switch on" the customer said. Before I had the back off I suspected thermistor TH902 in the start-up circuit, so it was no surprise to find that there was no voltage at pin 7 of the UC3844 chopper control chip IC901 and discolouring of the PCB where the thermistor lived. I soon had a replacement fitted, then switched on. There was still no supply to the chip however, as the 27V zener diode ZD901 was short-circuit. When this had been replaced the

power supply worked, producing an HT output of 145V, but the set remained lifeless.

A scope check at the base of the line output transistor showed that the line drive was missing. The TDA2579 timebase generator chip IC701 had only 4V instead of 12V at its supply pin 10. This was remedied by replacing C933 (2,200 μ F, 25V), the reservoir capacitor in the feed to the 12V regulator. To get reliable operation I also had to replace the reservoir capacitors in the 8V and 10V supplies, C932 (470 μ F, 16V) and C934 (220 μ F, 16V) respectively.

Sony KVM2130U (BE1 chassis)

This set was stuck in standby with the BU506DF line output transistor short-circuit. But a replacement failed to restore line output stage operation. PS802 in the HT feed to the transformer was open-circuit, and there was no line drive.

I replaced PS802 then found that the soldering at the pins of the TDA2579A timebase generator chip IC551 looked dull and crumbly. So I renewed the solder. This time the set burst into life when it was switched on, and rigorous tapping in a search for more dry-joints had no effect. A nice one for a change!

Toshiba 216T9B

The field scanning was stretched at the top, with no scan below the centre line of the screen. The cause of the trouble was the field ramp capacitor C303 ($2\cdot2\mu F$), which is connected to pin 31 of the TA8659A colour decoder/time-base generator chip IC501.

Sony KVX2532 (AE1B chassis)

The owner of this set rang up as I was turning the lock on the workshop door at the end of the day. Our conversation wasn't helped by the fact that he was almost totally deaf. Considering the sort of day I'd had however, the chance of earning a few bob appealed. Fifteen minutes later I was ringing his door bell.

I was shown the set, whose picture had severe foldover at the bottom of the screen and stretching at the top. This was almost certainly caused by capacitor trouble, the suspects being the field scan coupling capacitor C531 (680 μ F, 25V) and the flyback boost capacitor C532 (100 μ F, 50V). I had to write a note to tell him I'd be back in the morning with the parts required.

Next day the repair went without hitch. Once the two capacitors had been replaced the field scanning was correct.

TELEVISION April 1999 393

If you want to take your business a stage further, why not consider becoming a manufacturer's ASC? This should guarantee you plenty of work and a secure future, but calls for a lot of effort and, probably, investment. Cliff Martin explains what running an ASC involves



Setting up as an **Authorised Service Centre**

he aim of this article is to provide guidance on setting up a workshop as an authorised service centre (ASC) or, as Grundig prefers to call it, a regional service centre (RSC). It can't be done without considerable knowledge of the brown goods servicing trade today, either from the management or engineer's point of view. In fact it would be a definite advantage to have both types of experience. A manager who has been an engineer is likely to be more in tune with what is viable and what isn't, and is less likely to be misled by engineers who are doing the job inadequately. In other words it's necessary to be streetwise.

Setting up from scratch as an ASC is not easy. You will be seeking work directly from manufacturers or referrals from them. Now look at it from their point of view. They will expect any business up for consideration as an ASC to have a good track record in the trade, something that a fledgling company will take some

time to acquire. Most ASCs have been around for a long time.

Place of Work

Anyone who thinks they can set up as an ASC in a garden shed or a garage can think again, no matter how good they are. Security is very important, also accessibility - especially if a lot of contact with the public is envisaged. Carriers will be used to deliver products to you for repair, and adequate space will be needed to cater for them.

A light industrial unit is ideal. These are normally in an area that automatically takes into account the points mentioned above. Security is vital: once word gets around that large quantities of TV sets and VCRs are being held, the local burglary brigade will be only too happy to relieve you of them. A decent alarm system is essential, and doors and windows must be protected so that they are difficult to force. A professional thief will always find

any weaknesses. Break-ins are always a distressing experience, but at least you know afterwards of any security weaknesses. But it's best to beat them at their own game and get it right first time. The local police will be happy to inspect your arrangements and advise on appropriate improvements.

Another factor is whether or not there is another ASC in the locality. Manufacturers are not keen to have more than one within a specific radius

Requirements

If a manufacturer is interested in appointing your company as an ASC you will almost certainly be paid a visit. The area TLO is usually given this task, and is often accompanied by senior management. They will be looking for a neat, tidy workshop with a proper reception area. Always bear in mind that your reputation will reflect on them as well. First impressions

. . . at least one technician needs to be good enough to be able to sort out the real nasties.

Photographs taken at ICTV (Southern) Ltd., a Sony ASC. Abové, Seth Butt, engineer.

count a lot. They will also want to be satisfied that there is adequate insurance cover.

The variety of test gear available will be taken into account: in fact certain items will be mandatory. A decent scope with a bandwidth of 60MHz or more on every bench goes down well. Some method of SMD rework, using one of the commercially available units, with its own static-free workstation, is a certain requirement. Some companies grade their ASCs according to how well they are equipped, which relates to the products you will be expected to service. While a firm with a lower grading will be expected to take in equipment of any type, it will be expected to pass items outside its skill range to a higher-grade

A TLO will probably assume that if a company has a lot of gear it knows how to use it. This is where the quality of staff comes in. By the time a product has been referred to an ASC it may have been subjected to a repair attempt by someone else, possible a dealer or even another ASC. Such jobs will nearly always be difficult, with perhaps a few more faults introduced along the way – though this will often be conveniently omitted in any service report you receive.

It follows that staff needs to be of above average calibre in order to deal with such problems. It may not be possible for all your engineers to be at this level, but at least one technician needs to be good enough to be able to sort out the real nasties.

Workshop layout obviously depends on the equipment being serviced. For example the audio section will generate more noise than the camcorder section. The camcorder specialist might not appreciate a quick blast of heavy metal at 100W in his right ear while he is checking around a 100-pin flat pack!

Workbenches should be of decent size and well lit, and carry only as much test gear as is regularly used. Items such as frequency counters can be shared. A bench lamp that incorporates a magnifier is very useful.

Information Technology

Those used to a manual paperwork system may be a bit dubious about using computers to do the same job. My opinion is that once a computerised booking and invoicing system has been installed and its use has been mastered the previous manual set-up will be history. A dedicated software system, such as the Servicebase one available from PC Control Systems, is ideal.

An ASC that repairs camcorders regularly will need a PC as a standard item of equipment – it will be required for set-up routines etc. A good computer system will save time and money and give you access to the awesome amount of information that's now available to the trade. Bear in mind that over a rela-

tively short period of time a vast amount of data will be accumulated: there's nothing better than a PC in which to store and retrieve it.

Ordering spares via the internet is now an option that an increasing number of manufacturers and spares suppliers offer, and it may be possible to obtain a discount when this method of ordering is used. Whether it's faster than simply picking up the phone is, however, debatable.

The Manufacturer's Role

Be in no doubt that any manufacturer will consider sales to be its primary concern over service. But if you are working on behalf of a major manufacturer you have a right to expect to be provided with a decent standard of spares and backup service. Some manufacturers have have their own fully-equipped workshops, while others have only very limited facilities.

It's becoming more commonplace for manufacturers to farm out repairs instead of dealing with this aspect of the business themselves. So, if you find yourself with a repair that, having explored all avenues, you cannot do, the manufacturer will probably arrange for a TLO visit. Some TLOs are prepared to get their hands dirty, while others see themselves as being more in an advisory capacity. If they cannot come up with a solution, they will usually arrange for the equipment to be taken to a specialist repairer or their own workshops.

A proper reception area will be expected. Graham Atkins, managing director, mans the desk.



TELEVISION April 1999 395

It's obviously important to obtain accounts with as many manufacturers' spares departments as possible, as this will ensure that correct parts are available for fitting and will also guarantee that technical advice can be obtained. But the quality of this advice does vary. You will sometimes be given clear and accurate advice. At other times you will find that the engineer you speak to doesn't have much specific knowledge of the item that's causing you trouble and can offer only general advice. It's worthwhile making a note of the specialists in a particular field so that you can ask for them by

Warranty Work

Part of the agreement with a manufacturer will be a requirement to take in warranty repairs. The payment for these comes straight from the manufacturer, in the form of a warranty claimback. Rates vary, but on average the equivalent of about an hour's time is typical. If you have to spend two or three hours you are likely to find yourself well out of pocket. This may explain why a lot of dealers are inclined to shift such

jobs to an ASC. It would be reasonable to expect the dealer to pay the difference between the actual cost of the job and the claimback rate, but most of them will not agree to this. Some manufacturers actually forbid such a charge being levied.

There are cases where the original dealer has ceased to trade or the customer has moved, so you get the job from the customer directly. This will be a manufacturer's referral. Products purchased abroad will also turn up. It's important to stand your ground if an item doesn't constitute a warranty repair, and charge the dealer accordingly.

Field Service

Some level of service of this type will need to be offered, even if it's only an uplift to the workshop and delivery back. This is especially so with the current tendency to produce larger and larger sets. With the exception of some projection models, modern colour TV receivers are not built with field servicing in mind. So it's far more cost-effective to request a customer to bring the product to the workshop.

As far as warranty repairs are con-

cerned, most manufacturers won't pay extra on their claimback rates for a field call. They will simply give the customer a list of repairers, the onus being on the owner to arrange for transport of the unit.

Field calls to audio units are a complete waste of time, and current VCRs are almost as bad. The upshot of all this is don't waste money on providing a high-level field-service facility. Instead, aim at creating an efficient workshop so that you can achieve a decent throughput and a good turn-round time.

In Conclusion

I hope that the above has been of interest, especially to those wishing to broaden their horizons a bit. To run an ASC needs total dedication, but it will bring you into contact with a lot of people, some of whom can be quite influential. It can also broaden the product range that comes your way. Items such as PC monitors, security equipment, LCD projectors and industrial electronic products may well cross your path. You'll need a few black cats as well, plus a nice, friendly bank manager!

Decode and recode car radios & 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 307442.

The Joule A-400 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

For Your Radio Decoding Requirements

Please feel free to visit our Internet web site at elecsys.com where you can download full details, pricing information and demonstration software. Or, visit us for an on-site demonstration. HYDROPONICS DO YOU GROW YOUR OWN?

We have a full colour hydroponics catalogue available containing nutrients, pumps, fittings, environmental control,

WINDOWS 95 CD

WINDOWS 95 CD
As supplied with Hewlett Packard PC's these CD's 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
SATELLITE MODULATOR MODULES. Prices from just 9p.
Surface mount modulators full of components. Fitted with an F type connector and a uhf connector. Pack of 100 £9.95
REF SS20
PRO JECT POWER

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

REMOTE HEATING CONTROLLERS with 30A mains relay from just 99p
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
TALKING COINBOXES. Prices from just 95p
These units were made to convert standard telephones into pay phones, complete with coin slot assemblies and switches etc. OFFERED TO YOU AT A BARGAIN PRICE BECAUSE WE NEED THE SPACE! Pack of 10 £19 REF SS29
AC MOTOR BONANZAI. Prices from just 59p
Again we have piles and piles of these brand new mixed motors which we need to clear in bulk at ridiculous prices! Pack of 50 for £30 REF SS13
PIR CAMERA

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 flot in cliculded) 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. Built in CCTV camera (composite output) IR strobe light. PIR 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 15m. The PIR has a range of 27m. 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

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 240y, brand new, 2 pole, 340x180mm.

3HP MAINS MOTORS
Single phase 240v, brand new, 2 pole, 340x180mm,
2,850rm, built-in 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 propellors. Armed with this publication and
a good local scrap yard could make you self sufficient in
electricity! £12 ref LOT81
CHIEFTAIN TANK DOUBLE LASERS 9 WATT + 3 WATT +
LASER OPTICS

CHIEFTAIN TANK DOUBLE LASERS 9 WATT + 3 WATT + LASER OPTICS
Could be adapted for laser listener, long range communications etc. Double beam units designed to fit in the gun barrel of a tank, each unit has two semi conductor lasers and motor drive units for alignment. 7 mile range, no circuit diagrams due to MoD, new price £50,000? USF £199. Each unit has two gallium Arsenide injection lasers, 1 x 9 watt, 1 x 3 watt, 900nm wavelength, 28vdc, 600hz pulse frequency. The units also contain an electronic receiver to detect reflected signals from targets. £199. REF LOT4
MAGNETIC CREDIT CARD READERS AND ENCODING MANUAL £9.95

MANUAL £9.95

Cased with flyleads, designed to read standard credit cards! Complete with control electronics PCB and manual cover everything you could want to know about what's hidden in that magnetic strip on your card! Just £9.95 REF BAR31 HIPOWER ZENON VARIABLE STROBES

HIPOWER 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 12 vdc operation. £6 each REF FLS1, pack of 10 £49 REF FLS2
CENTRAL POINT PC TOOLS
Award winning software, 1,300 virus checker, memory optimiser, discoptimiser, file compression, low level formatting, backup scheduler, disk defragmenter, undelete, calculators, D base, disc editor, over 40 viewers, remote computing, password protection, encryption, comprehensive manual supplied etc. £8 REF LOT97. 3.5" disks £10. REF LOT97
VIDEO PROCESSOR UNITS 7/6v 10AH BATTs/24V 8A TX
Not too sure what the function of these units is but they

Not too sure what the function of these units is but they certainly make good strippers! Measures 390x320x120mm, on the front are controls for scan speed, scan delay, scan mode, loads of connections on the rear. Inside 2 x 6v 10AH sealed lead acid batts, pcb's and a 8A? 24v torroidial transformer (mains in). Sold as seen, may have one or two broken knobs etc due to poor storage, £15.99. REF. VP2
DIFFERENTIAL THERMOSTAT KIT

Perfect for heat recovery, solar systems, boiler efficiency etc. Two sensors will operate a relay when a temp difference (adjustable) is detected. All components and pcb. £29 REF LOT93

SOLAR WATER HEATER PLANS £6 REF SOLP PC POWER SUPPLIES PACK OF 8 £9.95

That's right! 8 power supplies for £9.95! These are all fan cooled (usually 12v) our choice of specs etc, and are sold as seen. But worth it for the fans alone! REF XX17



COLOUR CCTV VIDEO CAMERAS From £99

Works with most modern video's, Tv's, Composite monitors, video grabber cards. Pal, 1v P-P, composite, 75ohm, 1/3* CCD, 4mm F2.8, 500x582, 12vdc, mounting bracket, auto shutter, 100x50x180mm, 3 months warranty, 1 off price £119 REF XEF150, 10 or more £99 each 100 + £89

We get over 5,000 hits a day ... check us out!

http://www.bullnet.co.uk

SMOKE ALARMS

SMOKE ALARMS
Mains powered, made by the famous Gent company, easy fit next to light fittings, power point. Packet 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 12 vdc electric fence, complete with 200m of fence wire. £49 REF AR2

Contains all components to build a AVV transmitter complete with case £35 RFF VSXX2

Contains all components to build a A/V transmitter complete with case £35 REF VSXX2
33 KILO LIFT MAGNET
Neodynium, 32MM £15 REF MAG33
10 WATT SOLAR PANEL
Amorphous silicon panel fitted in an anodised 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 hd:17 ft Max flow = 8 Lpm, 1.5A. REF AC8 £18.99
SOLAR ENERGY BANK KIT 50"x6"x12" 6v solar panels (amorphous) + 50 diodes £99 REF £112
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/cr connectors. £49.95 REF CC6J
SOLAR MOTORS
Tiny motors which run quite happily on voltages from 3-12 tris. Wicks pen aux 61 camera hours.

SOLAR MOTORS
Tiny motors which run quite happily on voltages from 312vdc. 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, 15x16mm £6.90 REF SMC4011A
LM255X HITACHI LAPTOP SCREENS 240x100mm,
640x200 GATS New with data £15 REF LM2 640x200 dots. New with data £15 REF LM2

SEALED LEAD ACID BATTERIES 12V 7AH, S/HAND PACK OF 4 £10 REF XX1

YOUR HOME COULD BE SELF SUFFICIENT IN ELECTRICITY Comprehensive plans with loads of info on designing systems, panels, control electronics etc £7 REF PV1 200 WATT INVERTERS

Register for our ELECTRONIC NEWSLETTERS **BULL-ELECTRICAL.COM**



250 PORTLAND ROAD, HOVE, SUSSEX BN3 5QT (Established 50 Years)

MAIL ORDER TERMS: CASH, PO OR CHEQUE

WITH ORDER PLUS £4 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 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 'phone and TV as INFRA RED FILM

6" square piece of flexible infra red film that will only allow Is 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 HYDROGEN FUEL CELL PLANS

Honogen Police Cell Plans
Loads of information on hydrogen storage and production
Practical plans to build a Hydrogen fuel cell (good workshop
facilities required) E8 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 each REF LOT71, 10 pack £69 REF LOT72

LOT71, 10 pack £69 REF LOT72
12V OPERATED SMOKE BOMBS
Type 3 is a 12v trigger and 3 smoke canisters, each canister will fill a room in a very short space of time! £14.99 REF SB3. will fill a room in a very short space of time! L14.99 HET DBD.
Type 2 is 20 smaller canisters (suitable for simulated
equipment fires etc) and 1 trigger module for £29 REF SB2.
Type 1 is a 12v trigger and 20 large canisters £49 REF SB1
HI POWER ZENON VARIABLE STROBES.

Useful 12v PCB fitted with hi power strobe tube and control electronics and speed control potentiometer. Perfect for interesting projects etc 70x65mm 12vdc operation. £6 each REF FLS1, pack of 10 £49 REF FLS2

EFFLST, pack of 10 £45 EW LASER POINTERS

A.5mw, 75 metre range, hand held unit runs on two AA batteries (supplied) 670mm. £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, give powerful pure infrared light! Perfect for CCTV nightsights etc. £29 REF PB1

nightsights etc. £29 REF PB1 SUPFR WIDDEBAND RADAR DETECTOR Detects both radar and laser, XK and KA bands, speed cameras, and all known speed detection systems. 360 degree coverage, front & rear ear wave guides, 1,1*x2.7

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?

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 100mx75mm with a 60mmx5mm 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 WER 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

offer price £36 REF MOT5A
SONY STEREO TV CHASSIS
Assemblies comprising complete TVPCB 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 no's 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 remoles but good strippers for servos' motors and

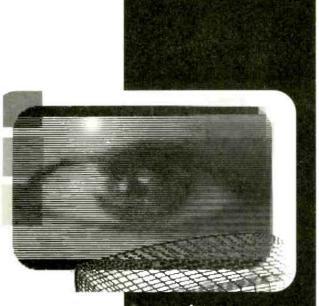
No remotes but good strippers for servos' motors and receivers. Sold as is, no returns, mixed types. £3 each REF

VOICE CHANGERS

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
LOW COST CORDLESS MIC
500' range, 90-105mhz, 115g, 193x26x39mm, 9v PP3 battery required. £17 REF MAG15P1
AUTO SUNCHARGER

AUTO SUNCHARGER AUTO SUNCHANGER
155x300mm solar panel with diode and 3 metre lead fitted with a cigar plug. 12v 2watt. £12.99 REF AUG10P3
SOLAR POWER LAB SPECIAL

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 FDj



Reports from
Philip Blundell, AMIIEelec
Michael Maurice
Pete Gurney, LCGI
Giles Pilbrow
Gerald Smith
Ed Rowland
Steven Leatherbarrow
Alan J. Roberts and
Colin J. Guy

NEI 2591FTXN

If there is no line oscillator operation – the set comes out of standby, the red LED goes out but the green LED fails to come on – check the resistance between the tuner's can and the line output transistor's heatsink. If the reading is 22Ω , check for a dry-joint at the wire link by capacitor C130. This capacitor is near the line output transformer.

If there's no remote-control operation, check whether the TFMT4380N infra-red receiver module is producing a data output.

If you unplug the line scan coil plug to remove the chassis, take care to reconnect it. Should you switch on accidentally with the plug disconnected, R371 (1Ω , 0.25W safety) will go open-circuit. The result is excessive width with bowed verticals. **P.B.**

Philips 14PT1332/05 (L6.1AA chassis)

If the set is dead and the power supply has failed, with transistor 7503 short-circuit and resistors 3514 and 3515 open-circuit, don't just fit the power supply kit and switch on. There could be a fault in the line output stage – the transformer, transistor (7422), optocoupler (7420) or diode 6426 for example – power supply failure being caused by the overload.

TV Fault Finding

Certain component values/types in the power supply have been altered to provide improved performance. The changes are as follows: 2503 changed from $2 \cdot 2nF$ to 33nF, part no. 5322 121 42489; 2512 changed from 220 μ F to 470μ F, part no. 4822 124 40198; 3512 changed from $56k\Omega$ to $68k\Omega$, part no. 4822 116 52297; and 6510 changed from type C15V to type BZX79-C12, part no. 4822 130 34197. These upgrades should be carried out in any set that has the original component values/types.

In common with many other small-screen portables, the power supply in this model will not work with a 60W bulb as a dummy HT load. It will start when the mains input is increased gradually, using a variac, and the line output transistor has been removed. Monitor the power supply's HT output constantly while doing this, in case there's a voltage runaway. P.B.

Philips 25PT727B/05 (GR2.4AA chassis)

The picture was lacking in contrast and the teletext had no red in the display. Checks at the pins of the video processor chip IC7309 showed that the DC voltage at pin 2 (red text input) was low (2V). The 22nF chip capacitor C2358 was leaky. **P.B.**

Grundig T55-730 (CUC7301 chassis)

The mains fuse had blown and the chopper transistor was short-circuit. The snag was that the transistor was short-circuit collector-to-base: 300V at the drive circuit can cause havoe! I had to replace the following components: T665 type MJE18004C; D664 and D666 both type 1N4003; CD654 and CD656 both type LS4148; IC630 type UC3842A; D663, a 6·3V zener diode; and R661 220Ω. In addition

there was a dry-joint at capacitor C669. **P.B.**

JVC CS2190EK (BXII chassis)

The tuning drifted for the first half hour after switching on from cold. Once a steady picture had appeared it was marred by a Venetian-blind effect. Checks showed that the tuning voltage was varying though the supply rails were OK.

The tuning voltage is derived from the station select module, which contains the microcontroller and EEPROM. Apart from resoldering dry-joints at the crystal and microcontroller, the module is regarded as being unserviceable. In this particular set however the three surface-mounted capacitors on the right-hand side of the module responded to heat/freeze treatment. I replaced all four surface-mounted electrolytics, whose values are $3.3\mu\text{F}$, 50V (two of these); $0.47\mu\text{F}$, 50V; and 22µF, 25V. This cured the fault. M.M.

Ferguson TX10 Chassis

The original fault was a dim and then no picture. It was cured by resoldering dry-joints on the tube base PCB, but the picture that appeared was out of focus. So the focus control was adjusted. Then, as the set warmed up, a few bright lines appeared at the bottom of the picture. A squirt of freezer confirmed that the TDA3654 field output chip was responsible for this. The customer said he had not seen these lines before, probably because they were masked by the poor focus. Once the repair work had been completed I was rewarded with an excellent picture. M.M.

Sony KVX2432U (AE1B chassis)

The customer said there was intermittent loss of the picture. Dry-

joints in the IF can are the usual cause, but not this time. When the tube's first anode voltage was turned up there was a picture with no blue content. The blue output transistor Q709's collector connection was dry-jointed. Lack of blue drive to the tube was upsetting the TDA4580 video processor chip IC301. M.M.

Ferguson C51F (ICC6 chassis)

The customer said that it required several goes before the set would switch on. Checks showed that the set was dead when switched on from cold. For once the mains switch was not to blame. The culprit was the chopper transistor's 470µF, 16V base drive coupling capacitor CP29. M.M.

Pioneer SD21AVI

When this set was switched on all you got was a blank screen with a purple haze at the left-hand side. Checks showed that there was no video output from the tuner/IF module. When a colour-bar signal was injected at this point, there were colour bars on the screen and TV programme sound came from the speakers. A check on the 12V rail showed that a lot of ripple was present. Once C522 (100µF, 25V) and C525 (10µF, 25V) had been replaced the ripple was gone, but there was still no video from the tuner. Video demodulation is carried out by a TDA5930 chip inside the tuner. A replacement IC cured the fault. M.M.

Philips G110 Chassis

This set had originally failed because of a defective LOPT. A couple of weeks later it came back. Once again it was dead, but the LED glowed orange for a moment then went out. I brought the set back to life by shorting the protection line, but it died when I tried to switch to standby. To find the cause of the trouble, I disconnected each of the feeds to the protection circuit. The culprit turned out to be D6657 (LLZ-C20), which monitors the 16V supply. When I removed it the set went to standby as it should. A new 20V zener diode restored normal operation. M.M.

Hitachi C2564TN

There was reduced height, some cramping, and intermittent field collapse. Numerous dry-joints were found in the field timebase circuit, particularly around the TDA8178 output chip IC601. Resoldering

them cured the intermittent field collapse, but the scan distortion was still present. Voltage checks then revealed that the supply at pin 2 of IC601 was low – it was 16V instead of 27V. The cause was R609, the surge-limiter resistor (1Ω safety type) in the 27V rectifier circuit. It had risen in value to almost 40Ω . P.G.

Matsui 14V1R (Grundig CUC7301 chassis)

The complaint was low sound. In fact the sound couldn't be increased above the half way position on the on-screen graphics. This suggested that the set had a hotel mode and was stuck in it, which turned out to be the case

The hotel mode is activated/deactivated via the service menu. To gain access, use the on/off switch to switch the set off then press and hold the 'i' button on the remotecontrol unit while you switch the set on again. Use the remote-control unit's selection arrows to select the hotel mode then off.

When the hotel mode is applied, the maximum volume remains at the last setting used and the station channel menu is not available. **P.G.**

Philips CP90 Chassis

This set came in with a blown mains fuse. On investigation I found that the degaussing posistor had disintegrated. So I replaced it and also the 4.7Ω surge-limiter resistor R3657 in the feed to the bridge rectifier. Checks were carried out in the power supply, but no short-circuits were found. The 1nF, 2kV capacitor in the snubber network (C2679) was replaced as a matter of course – it tends to break down under load.

At switch on the surge-limiter resistor and fuse died, but again no measurable fault could be found. This time I replaced the 4.7Ω resistor with a bulb and then applied power. The cause of the trouble was eventually found to be the BUT11AF chopper transistor Tr7677. It had developed a crack in its plastic casing and was breaking down to the heatsink, although the transistor's junctions were found to be still intact when checked. **P.G.**

NEI 14NE3743

This portable refused to store channels. The customer noticed it only when some of the already stored channels required fine tuning. He then discovered that the store function on the menu had vanished.

I had no service information, but

the set appeared to use a conventional microcontroller chip plus an EEPROM for the channel memory and customer control settings. These memory chips are susceptible to corruption or just general failure. So I decided to try a replacement. The EEPROM fitted is a 24C02, which is a 2Kbit I2C memory. As I didn't have this particular type I used a 24C04. The two types have the same protocol and address system, the difference being the memory size - the 04 version stores 4Kbits. Once the 04 had been installed the store function reappeared as a menu option and operation was back to normal.

I've found that with most of these I2C memory chips the next available size up can be fitted if necessary. The microcontroller chip simply ignores the extra memory locations. P.G.

Bush 2867NTX

There was no sound output. I've had several of these sets recently with this fault. The TDA1521A sound output chip goes short-circuit and its 4.7Ω supply feed resistor R811 open-circuit. The resistor is on the main PCB while the IC is on the Nicam stereo module.

Be careful with replacement chips – some makes refuse to work here, though I've had no trouble with ICs of Philips manufacture. As a matter of course I always replace the speaker coupling capacitors C365/366 (both 1,000μF): they tend to develop leakage and kill the IC – use capacitors rated at 63V.

This time however the sound still refused to come on, with the right channel output voltage at 3V instead of the mid-supply voltage. The sound section uses few components, and the cause of the trouble was soon traced to C374 (470nF) which had a measurable $22M\Omega$ leak. It's the right-hand channel input coupling capacitor. In the interests of reliability I replaced the left-hand channel input coupling capacitor C358 as well. **P.G.**

Toshiba 2101T

No picture or sound was the complaint with this set. On test it displayed a channel ident on a blue background (video mute) with no sound. The tuning voltage varied with station selection, and there was a video output at pin 8 of the IF board, but it didn't get as far as the LSI jungle chip IC501 which, amongst other things, carries out the colour decoding and video processing.

On its way to IC501 the signal goes to the AV switching board, where it's split into separate Y and C components. A signal fed in at the scart 1 connector similarly vanished. Most of the processing on this panel is carried out by QV01 (TA8720AN), which controls the audio and video switching for both scart inputs, for the S video socket and the tuner signals. Switching is controlled by pins 15 and 16, whose status is determined by the main microcontroller chip. For TV these pins should both be high (5V). This voltage was correct, the cause of the signal loss being QV01 itself. P.G.

Sony KVX2572U (AE2B chassis)

There was intermittently reduced width, with the HT at about 90V instead of 135V. The cause was transistor Q281, which forms part of the audio protection circuit and is mounted on the scart PCB. G.P.

Sanyo ED1 chassis

At switch on the set would trip a couple of times then die completely. The cause was the TDA1521 audio output chip IC390, which was leaky. Part number is 410 030 8806. **G.P.**

Sony KVA2542U (AE2B chassis)

There was no picture on any channel except AV. A look at the manual program preset menu revealed that all program positions were set to EXT (AV input), and this could not be changed. I put the set in the service mode and looked at the INIT BYTE menu. This revealed that all the available TV systems were set to off. Normal operation was restored by switching System I back on and resetting the system for each program position.

I don't know whether the set had suffered memory corruption or had been fiddled with. But for good measure I replaced the non-volatile memory chip IC072 – after first noting down the settings! G.P.

Sanyo ED1 chassis

The sound came on and there were-on-screen displays, but there was no picture. The VCU2136 chip IC501 on the digital PCB was the culprit. Its part number is 409 212 0608. **G.P.**

Sony KVX2982 (BE3B chassis)

The cause of insufficient width with no EW correction was circuit

protector PS801 (ICPF10), which was open-circuit. The part number is 1-532-605-21. **G.P.**

Nikkai Tara 10

There were two intermittent faults with this portable, either loss of the picture or field collapse. Both were caused by dry-joints – at D103 and the field chip respectively. Resoldering cured the problems. G.S.

Nokia 3725

There was a dull picture: the chroma was OK, but there was lack of luminance. The output at pin 7 of IC DD01 to the text PCB was OK, but when it returned to pin 13 the luminance was cramped. As it's a low-cost plug-in PCB I simply fitted a replacement. This cured the fault. G.S.

Finlux 3821 (8500 chassis)

Heavy black lines appeared intermittently at the right-hand side of the screen. They would gradually get worse until the picture blanked out completely. The video inputs to the colour decoder chip I311 were OK, but the RGB outputs were faulty. The cause of the trouble was noise on the blanking input because of a bad earth lead to the text PCB at pin 5 of St4. Hardwiring this earth connection cured the problem. **G.S.**

Akai CT2870

The customer said this set was dead. In fact is was tripping. He was surprised when I told him that it would have to be taken away for repair. Back in the workshop the LOPT proved to be the cause of the trouble. **E.R.**

Samsung Z68 Chassis

If you get one of these sets with about half an inch of foldover at the top of the screen, replace the TDA8350 field/EW output chip IC301. E.R.

Samsung Cl3352 (P68 chassis)

This 14in. portable had a dead power supply. A common cause of the fault is the SDH209B chopper control chip IC801, but a replacement made no difference. The culprits turned out to be diodes D810/811 (both type 1N4148) and the 7-5V zener diode DZ825. As a precaution I also replaced C852 (470 μ F, 16V), though it read all right when checked with a capacitance meter. It's the LT reservoir capacitor on the primary side of the power supply. **E.R.**

Philips 21PT166B

One of these sets came in with the P6NA60F1 chopper FET short-circuit. As nothing else appeared to be faulty I simply fitted a replacement. Unfortunately the set remained dead. The MC44603P control chip had failed. S.L.

Ferguson T59F (TX92 chassis)

This set sometimes failed to come on from cold, pulsing three or four times. Heating and freezing would not instigate or cure the fault. I eventually discovered that RP28 had gone high-resistance. It's a coil that connects the on/off switch circuit to pin 11 of the TDA4605 chopper control chip. It measured 7Ω : the replacement was nearer to 1Ω . S.L.

Sony KV25F3 (BE3D chassis)

At switch on this set tripped off to standby. As no obvious cause could be found, I decided to disable the protection and run the set up using a variac. This showed, in a spectacular fashion, that the LOPT was faulty. It's important to quote the set's serial number, as the LOPTs differ.

After fitting the replacement transformer I had good colour pictures but there was no sound and EW distortion was present. IC1200 (TDA7264) was responsible for the loss of sound. The causes of the EW fault were IC800 (LM393P) and D800 (ISS133T), which were both leaky. Some slight adjustments then produced normal results. Entry to the service mode is obtained by pressing on screen display, digit5, vol+ and TT. S.L.

Ferguson D59F (ICC9 chassis)

The cause of intermittent loss of line sync when warm was the STV2160 chip IV01. When you fit the modified chip now supplied, CV46 should be changed from 10nF to 33nF – a surface-mounted 22nF capacitor is provided for connection in parallel with the original CV46.

The chip can fail as a result of flashovers. There's another modification to deal with this problem. Remove the SMD jumper JV56 and replace it with a $4.7k\Omega$ resistor, part no. 60079900. S.L.

Toshiba 2512DB

The symptoms with this set were lack of width with severe cogging

from cold. The cause was C424 (4·7µF, 100V) which is on a subpanel at the front right of the chassis. **S.L.**

Sony KV2096

The customer complained about intermittent red and green flashing. I've had quite a few Sony tubes produce this, and suspected the worst. Fortunately the tube proved to be faultless. I resoldered the usual resistors, using HMP solder, and left the set running. After about half an hour strange things began to happen to the picture. Red and green streaks appeared, and at one point there were small red and green squares all over the screen. Just as suddenly the fault would clear.

Somewhere in the back of my mind I recalled a similar fault and reached for the remote control unit. Pressing the teletext button had no effect, except that now I couldn't change channels. So the text mode was being selected but not displayed. I pulled the cover off the text panel and found the SAA5243P chip sitting in a holder.

I've known these holders to go high-resistance. So I removed the chip and the holder, then soldered the chip in directly. The set – and teletext – then behaved correctly. **A.J.R.**

Philips 28DC2070 (D16-III chassis)

Picture flashing was the complaint with this set. When I tested it I found that the picture would blank for a split second at irregular intervals. The signal was fine up to the digital video panel: after that the signals blanked on and off. There is no parts list for the digital board – you have to order a service exchange. Everything was OK when one had been fitted. A.J.R.

NEI CTV61R (Indiana 100 chassis)

This set operated intermittently because of dry-joints at the start-up posistor and D805 (1N4007), which is in the chopper transistor's drive circuit. It also suffered from tuning drift. A replacement ZTK33 tuning voltage stabiliser (D001) cured the drift problem **A.J.R.**

Philips 14PV182 TV/VCR combi

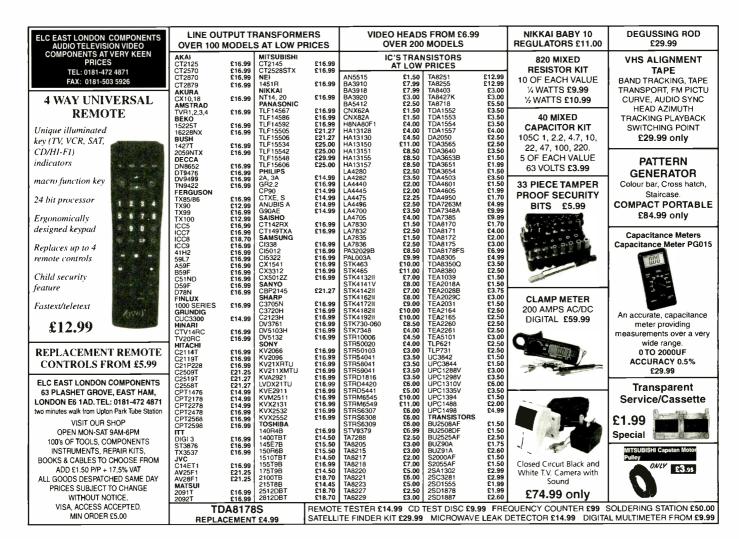
This almost new unit was cycling on and off at about one second intervals. No shorts could be found anywhere, and the line output transformer wasn't suspect as the unit was in standby. The cause of the fault was the MC44603 chip in the power supply (IC7130). C.J.G.

Goodmans 205N (Daewoo CP365 chassis)

The fault symptoms with this set were poor field linearity and tuning drift. Both were caused by the 8V regulator 1402 which was running very hot, though the load on it was not excessive. C.J.G.

Hitachi CMT2700

This complex multistandard set claimed to be a G7PI chassis, but was nothing like the G7PS we all know and love (!). The complaint was loss of field sync. With the aid of the circuit diagram thoughtfully provided by the set's owner I eventually traced the cause to a $10\mu F$ electrolytic capacitor on the NTSC subpanel. **C.J.G.**



What Life!

A varied collection of TV problems – and problem customers. Donald Bullock's servicing commentary

was tidying up the counter the other day when a strange-looking chap appeared at the door. He flung out his arm, looked along it as though it was a rifle, and came in.

"Nothing the matter with my nerves" he announced, "but I'll tell you now. That bus was terrible. Never known anything like it."

I went outside and looked up and down the road but couldn't see a bus. "Where is it?" I asked.

"In the set" he replied, then ran out and came back with a 25in. Mitsubishi Model CT25B2STX, which he plonked on the counter.

I waved him out just as Stephen entered. He plugged the set in and switched it on. There was a prominent buzz over the sound.

"It'll be the usual IF strip trouble" he commented, "dry-joints for a start, and probably some of the 0.47µF, 50V electrolytics will be low."

He was right. When we checked the sound IF circuit it was full of dry-joints. Resoldering brought about an improvement, but the electrolytic capacitors had to be replaced to clear the trouble completely.

Nothin' Wrong

Our next visitor, Mr Clandon, brought with him a Sanyo CTP6134 colour set (83P chassis).

"Don't get me wrong" he started off, "there's nuffin' wrong with 'im. Not at first, anyhow."

"Then why have you brought it here?" I asked.

He looked at me scornfully. "'Cos he's faulty, of course" he replied.

I patted my pockets for my tablets and leaned forward. "What's wrong then?" I asked quietly.

"We switches 'im on, right?" I nodded.

"E works OK, right?" I nodded again.

"Then, just as the cat starts whining to go out, 'e changes channels. Zonk, zonk he goes. Just like that. Zonk, zonk, BBC1. Zonk, zonk, BBC2. I 'ates BBC2. Zonk, zonk, Channel 5. That 'ent too bad. But, I meanter say, surely I've got a right to say what channel I watches, in my own 'ouse anyways?"

"I should think so" I agreed, "I think it's shameful. Leave it with us Mr Clandon. We'll get it right."

Paul tuned in a picture and studied the screen. A slight hum bar was present on the picture, and after a while the set began to change channels of its own accord. "Ripple on the HT I reckon" he said, "case of checking the electrolytics I suppose, biggest first." He found the culprit almost immediately. It was the 130µF, 400V electrolytic on the primary side of the chopper circuit. There was visible leakage and on test it was almost open-circuit.

Quick Departure

There are some folk I just don't like. Yobbos. This fellow barged in with with an ancient Ferguson set – one fitted with the TX10 chassis.

"OK mate?" he asked as he dropped it on my hand, "now I don't wanna spend much on this 'un. That thin bloke at Snoddies almost got a clout earlier. Wanted forty quid. I don't mind parting with a fiver or a tenner, but that's it."

My attention began to stray. Stephen noticed and stepped in. "Why not have an estimate, sir?" he smiled, "it'll cost you only ten pounds, and if you accept we'll deduct that from your repair bill."

There was a bit of banter, then our visitor picked up his old banger. "Ta-la" mate he called as he departed through the door.

Mixed Pair

Mr Ansell lives out in the sticks. He came in clutching a coiled length of coaxial lead in his hand.

Paul stepped forward. "Hello, sir" he beamed, "how can we help you?"

"Me ol' telly's gone a bit dim. Merry Widow next door reckons it's the tube. Anyway I brought this for you to check over." He handed over the length of coaxial cable.

As Paul's face started to contort, Mrs Harpson glided in and smiled sweetly at me. "My set's causing trouble again, Donnie" she cooed, "will you help me bring it in from the car?"

"Leave it to me" I replied. As I went out I glanced at Paul, who was doing his best with Mr Ansell.

"What do you mean Mr Bullock – this ain't the tube?" he was saying.

Mrs Harpson's set was an old Amstrad 20in. TV/VCR combi, Model TVR3. "Takes a while to get going" she said. I went straight to the chopper power supply and found that the 1µF, 50V feedback capacitor C307 had gone low in value. It nearly always does. A replacement got the set working, but a terrible scream now came from the power supply. This was caused by the 3,300pF, 1kV disc capacitor C310 in the snubber network.

Paul was still busy with Mr Ansell but seemed to be making some progress, albeit slow. "So you'll bring it in then" he said.

"Yes" replied Mr Ansell. "Now, do I bring the whole set in, or only this glass thing you reckon is the tube?"

Paul pulled up his stool and prepared himself for more of the same.

Later, while we were having lunch, he said "this trade seems to be a non-stop pantomime. When I

go out to do the calls I'll get more of the same. Do we get all the odd-balls, or just our share?"

"Take it from me" I replied, "it's the same throughout the trade. Always has been. And I've worked in all sorts of workshops."

Coarse Lines

At which point Sid Porter came in with a 21in. Toshiba set, Model 210T6BT. "Hello Don" he started off, looking back through the door, "what do they charge in the pie shop across the road?"

"About forty pounds each" I replied, but he was gone.

Stephen plugged the set in and found that the display consisted of a screenful of coarse lines. He located the field timebase and started to check the electrolytics. When he came to the linearity feedback capacitor C317 (2·2µF, 50V) he made happy noises. "Down to less than lµF" he said. A new one restored normal field scanning. Then Sid reappeared, pie in hand.

"I likes comin' here" he said.
"Ta" I said, "but we're not all that special."

"Ain't that" he replied. "You've a good pie shop opposite. Better than Fat Florrie's place next door to Snoddys. By the way, what do I owe you?"

"Ten pounds" I said, "but if there are any more funnies it'll go up to thirty."

Interference

Mr McCorquadale is a tidy man with a little toothbrush moustache. He speaks in a whisper.

"We've got three sets at home" he leant over and whispered, "and they're all faulty. The pictures keep breaking up every few seconds."

"What about the sound?" I asked quietly, speaking close to his ear.

"It sort of squelches in sympathy with the picture disturbance" he replied, barely audibly. "It all began when we bought the Sony out of the paper."

I pursed my lips and studied my kneecaps for a few seconds. Then I leant across to his ear. "You'd better bring us the Sony" I breathed.

"Thank you Mr Buttock, I'll get my wife to drop it in" he said as he made off.

A while later Mrs McCorquadale appeared with the Sony set, a KVM2151U (BE2A chassis). I turned my ear towards her as she breathed in to speak, then wished I hadn't.

"I've brought the Sony" she blared with a voice like a foghorn.

"Give us a ring dear, would you?"

We plugged it in and sure enough it began to flash right away, with the colour dropping out in unison. What's more, it produced similar troubles with every other working set in the place.

Stephen knew all about this one. The cause is dry-joints at the line output transistor's heatsink, which should be solidly at chassis potential. The earthing becomes intermittent. He reckons it's become quite a common fault. Resoldering the joints cured the problem – with the set and all the others it was affecting.

Grundig G1000 chassis

I don't like sets that are fitted with the Grundig G1000 chassis. There are a lot of them about, and they seem to bounce quite often. This particular example was a Matsui 14R1. The fault was no sound.

After resoldering dozens of dryjoints in various stages I checked R550, the 4.7Ω resistor in the 9V supply to the TDA2822M audio output chip IC550. It was open-circuit. A replacement restored the sound.

No Colour

Mrs Wixey is a big, calm woman. We spied her, in her sheepskin coat, sailing along the pavement towards the shop like an ocean liner. She had a Mitsubishi 21in. Model CT2145BM in her arms. When she arrived she plonked it on the counter.

"He's old, dear, but aren't we all?" she breezily announced to me.

I drew myself up to my full height, but she continued to look down at me.

"Colourless" she added.

"Now look here" I began.

"No colour at all on this set" she continued, "and I ain't paying for a colour licence only to watch a black-and-white picture. No way."

Paul had a go at this one, which was refreshingly easy. The chassis is the Euro 6 and the colour decoder is IC252, type TDA3565. It was discoloured and was running hot. A replacement restored the colour.

The New TX90 Chassis

This is the Thomson chassis, not the older Ferguson one with the same designation. We had two of them in that day. The one Mrs Finnegar brought along was a 20in. Ferguson Model C49F which wouldn't tune. This was also a straightforward fault.

A check at pin 4 of the tuner



"You've a good pie shop opposite."

module showed that there was no 33V input. It's derived from the 180V line – the one used for the RGB output stages. The feed to the ZPD33 33V stabiliser DH04 is via RH04 (27k Ω , 0.43W) and RH06 (12k Ω), an arrangement I've always felt to be a bit unsatisfactory. In this case RH04 had gone open-circuit.

Mrs Cheesman's Ferguson C39F was dead. The cause of the trouble was RP23 (0.22Ω , 0.5W safety) on the secondary side of the chopper transformer. It was open-circuit, the result being no line oscillator startup voltage.

A Philips GR1-AX

It was getting on and we were clearing up after a busy day when Dr Pascall phoned about his Philips 14GR 1227/05B.

"What's up with the Doctor's set?" I asked Stephen.

"Line output transformer" he replied.

"Your set needs a heart transplant" I told the doctor, "forty pounds or so altogether."

The symptoms were sound and EHT but no picture, because the tube's first anode voltage was missing. It's becoming quite a common fault with these sets. We tend to fit an HR Diemen manufactured transformer that we obtain from Grandata under part no. LOT90.



Digital Quality

I read with interest the letters (March) regarding poor digital TV picture quality. While I agree with the comments made, I feel that there is more to be said.

An increasing number of programmes are being recorded digitally, particularly by the BBC, and some older programmes, notably *Last of the Summer Wine* and *Red Dwarf*, are being repeated in 'digitally-remastered' form.

A number of irritating anomalies are seen with these digitally-processed programmes when viewed using normal PAL equipment. Poor lip-sync between sound and vision for example. The cause of this may be the way in which MPEG compression processes moving images in order to reduce the transmitted data rate. I've noticed that facial expressions and eye-blinks are often 'slurred' by varying amounts that could depend on the amount of data compression used. It would be interesting to know whether deaf viewers find it more difficult to lipread with such pictures.

Other anomalies are judder with fast-moving objects, 'cogging' with difficult images such as the edges of bright metal objects, particularly chromium plating, and a peculiar 'cardboard cutout' effect around people standing in front of a background. The latter effect varies as the camera pans sideways.

Like E.C. Westcott, I've noticed that with digital TV the definition

Letters

is often compromised and that peak white often looks crushed, particularly with outdoor scenes that include a lot of sky.

Overall I find that, in comparison with analogue TV, these anomalies make digital images fatiguing to watch. Considerable improvement will be required to bring digital picture quality up to the standard achieved with current analogue technology. I will certainly be sticking with my analogue TV sets for the foreseeable future! Simon Pearson,

Chipping Norton, Oxon.

Salora M Chassis Problem

"Some you win and some you loose" they say. This one I lost big time! The set was an Hitachi Model C25P759, which is fitted with the Salora M chassis. If ever there was a job to shatter your confidence and belief in your abilities, this was it.

It started off as a routine "dead, no functions" job. I followed the guide provided by Chris Watton in his excellent article on this chassis in the August 1997 issue, and soon discovered that the line output transistor was leaky base-to-collector. I was now quite enjoying myself. After fitting a new transistor I switched on, and felt good as I heard the rustle of EHT and watched the tube's heaters start to glow. Life isn't so bad really, I thought. I should have known better of course. As soon as the picture appeared I became totally depressed and stared viciously at the screen, demanding that the east-west bowing go away. It didn't.

The BS208 EW driver FET TB526 had split in half. Though it's very expensive at about £10 (including VAT, post etc.) I didn't have a choice – the set couldn't be returned with a picture like this. I ordered a replacement and fitted it. There was no difference, and the new transistor was getting very hot. In fact it split in half before I had a chance to switch off.

My next step was to check the

estimate I'd given. Two more transistors and there'd be a loss. Just in case, I upped the estimate by £20. This was very reluctantly accepted, so I knew there would be no more funds available for the job. I ordered two more transistors and, feeling rather lonely, had a long conversation with a very helpful, or at least sympathetic, man at the supplier (Chas Hyde). He explained that the transistor was expensive because it had to be specially approved by Hitachi and was costly to buy at source. Normally however it was all that was required to fix the problem. He even phoned Hitachi Technical, then phoned back to confirm this. I was very impressed, but reluctant to possibly destroy two more transistors at a cost of a further £20.

Guided by Chris Watton's article, I checked everything to do with the EW circuitry. I replaced three transistors and, once again, the BS208. Capacitors and resistors were replaced, though I could find nothing wrong with the originals. Ever hopeful, I switched on. There was a perfect picture, and a warm glow spread over my body as I started to write out the invoice. Bet it was a dry-joint I thought.

I confidently turned and glanced at the picture. The warm glow turned to desperation. The raster sides flickered in, out, then finally in again, coming to rest in the original EW bowed state – with a blown BS208. One to go!

The only component that hadn't been replaced was the pincushion modulation transformer. I removed it for closer examination, but there were no signs of stress. Still, what else could I do? It had become a do-or-die situation. The cost of the special-order coil is £22. This, with the remaining BS208, would turn the job into a loss - taking labour into account, it had long since become one. But if I was correct and the transformer was the culprit, at least I might earn something and learn a bit for next time.

continued on page 419



Grandata Ltd

distributor of electronic components

| TRAN | ISIST | ORS/LI | NEAR ICs |
|------|-------|----------|-----------------|
| | | CITO/EII | |

| | Sales, | | | | | | | | | 9/ | - | | | | | | 1973 | | 18.5 |
|---------------------------|---------------------|---------------------------|----------------------|--------------------------------|------------------------|-------------------------------|-----------------------|----------------------------------|----------------------|----------------------------|---------------------|------------------------------|----------------------|-----------------------------|----------------------|------------------------------|----------------------|----------------------------------|----------------------|
| Part | Price | Part | Price | Part | Price | Part | Price | Part | Price | Part | Price | Part | Price | Part | Price | Part | Price | Part | Price |
| BC107 BC108 | 8p 8p | BD434 BD435 | 30p 31p | BU126 BU128 | 65p 125p | BUV48AF BUV48C | 325p 250p | MJ4502 MJ10012 | 300p 300p | 4N35 | 50p | LINEAR IC: AN203 | 210p | AN6340 AN6341 AN6342 | 600p 200p 325p | BA335 BA338 BA340 | 55p 80p 75p | BA7004 BA7007 BA7021 | 200p 200p 180p |
| BC109 BC109C | 8p 10p | BD436 BD437 | 30p 28p | BU133 BU137 | 125p 150p | BUV50 BUV61 BUV70 | 425p 1000p 200p | MJ11015 MJ11016 MJ11032 | 250p 300p 800p | RECTIFIER DIODES | | AN210 AN211 | 165p 150p | AN6344 AN6345 | 440p 400p | BA343 BA336 | 60p | BA7022 BA7025L | 350p 100p |
| BC140 BC142 | 20p 20p | BD438 BD439 | 36p 40p | BU180 BU184 | 100p 100p | BUV90 BUV93 | 175p 375p | MJ11033 MJ15003 | 800p 250p | BY 127 | 8p | AN214Q AN217P | 170p 95p | AN6346 AN6350 | 350p | BA401 BA402 | 60p 50p | BA7107 BA7212S | 475p 200p |
| BC143 BC147 | 20p 8p | BD440 BD441 | 40p 40p | BU204 BU205 | 65p 70p | BUW11A BUW11AF | 200p 225p | MJ15004 MJ15015 | 300p 250p | BY 133 BY 164 | 8p 40p | AN228 AN252 | 280p 150p | AN6352 AN6356 | 450p 300p | BA511 BA514 | 145p 160p | BA7252S BA7604N | 150p 100p |
| BC149 BC159 BC160 | 8p 8p 30p | BD533 BD534 BD535 | 50p 38p 38p | BU206 BU207 BU208 | 100p 150p 70p | BUW12 BUW12A | 125p 150p | MJ15016 MJ15022 | 350p 400p | BY 179 BY 184 | 35p 32p | AN259 AN262 | 250p 140p | AN6359 AN6360 | 500p 320p | BA516 BA518 | 150p 150p | BA7751LS BA7752 | 150p 250p |
| BC171 BC172 | 10p | BD536 BD537 | 38p 40p | BU208A BU208AT | 75p 200p | BUW12F BUW13A | 250p | MJ15023 MJ15024 | 400p 400p | BY206 BY207 BY227 | 11p 20p 19p | AN271 AN274 | 230p 250p | AN6362 AN6363 | 400p 375p | BA521 BA524 | 100p 240p | BA7755 BA7767AS | 150p 155p |
| BC177 BC178 | 14p | BD538 BD643 | 40p 50p | BU208B BU208D | 200p 130p | BUW32A BUW48 | 500p 550p | MJ15025 MJE340 | 700p 25p | BY228 BY298 | 28p 15p | AN277B AN278 | 400p 60p 330p | AN6367NK AN6368 | 400p 275p | BA526 BA527 | 180p 95p | BA8504 BA15218 | 350p 60p |
| BC179 BC182 | 14p 7p | BD645 BD647 | 50p 50p | BU209 BU225 | 90p 120p | BUW49 BUW50 | 550p 400p | MJE350 MJE520 | 80p 30p | BY299 BY329-1200 | 18p 150p | AN301 AN302 AN303 | 650p | AN6371 AN6387 | 350p 480p | BA532 BA534 | 100p 220p | CA3140E CNX62A | 38p 50p |
| BC182L BC183 | 7p 7p | BD649 BD675 | 50p 40p | BU226 BU312 | 120p 90p | BUW81A BUW84 | 150p 75p | MJE2955T MJE3055T | 65p 65p | BY448 BYT11 | 20p 25p | AN304 AN315 | 250p 360p 210p | AN6550 AN6551 | 100p 50p | BA536 BA546 | 150p 160p | CNX82A CNX83A | 60p 80p |
| BC183L BC184 | 7p 7p | BD676 BD677 | 40p 38p | BU325 BU326A | 55p 75p | BUW85 BUX10 | 85p 350p | MJE13004 MJE13005 | 100p 60p | BYT13-1000 BYV96E | 30p 25p | AN316 AN337 | 350p 600p | AN6552 AN6554 | 45p 80p | BA612 BA614 | 120p 70p | CX136 CX139A | 600p 750p |
| BC184L BC212 | 7p 7p | BD678 BD679 | 40p 40p | BU406 BU406D | 60p 85p | BUX11 BUX12 | 200p 150p | MJE13007 MJE13009 | 100p 100p | BYW96E BYX10 | 36p 15p | AN360 AN362 | 100p | AN6555 AN6605 | 50p 35p | BA618 BA631 BA656 | 55p 280p 110p | CX141 CX145 CX150B | 750p 725p 325p |
| BC212L BC213 | 7p 7p | BD680 BD681 | 40p 45p | BU407 BU407D | 55p 75p | BUX20 BUX21 | 350p 450p | MJE15028 MJE15029 MJE15030 | 200p 200p 250p | BYX55/600 IN4001 | 25p 3p | AN363 AN366 | 150p 150p | AN6612 AN6650 AN6651 | 60p 45p 45p | BA658 BA681A | 350p 350p | CX175 CX187 | 325p 825p |
| BC213L BC214 BC214L | 7p 7p | BD682 BD705 BD707 | 45p 50p | BU408 BU408D BU409 | 60p 75p 85p | BUX22 BUX23 BUX37 | 450p 900p 220p | MJE 15031 MJE 18004 | 400p 125p | IN4002 IN4003 | 3p 3p | AN610 AN3211K | 160p 375p | AN6652 AN6671K | 45p 425p | BA682A BA683A | 300p 300p | CX804A CX867 | 775p 575p |
| BC237 BC238 | 7p 7p 7p | BD709 BD711 | 50p 50p 50p | BU412 BU413 | 175p 175p | BUX39 BUX40 | 450p 210p | MJF18004 MJF18204 | 175p 350p | IN4004 IN4005 IN4006 | 3p 3p | AN3215K AN3231K | 350p 300p | AN6676 AN6780S | 600p 80p | BA684 BA685 | 400p 400p | CX868 CX877 | 525p 300p |
| BC239 BC300 | 7p 20p | BD736 BD826 | 50p 50p | BU414B BU415A | 250p 170p | BUX41 BUX42 | 200p 200p | OC28 OC29 | 350p 250p | IN4000 IN4007 IN4148 | 3p 4p 2p | AN3236K AN3310K | 450p 325p | AN6870 AN6875 | 450p 150p | BA715 BA718 | 45p 45p | CX7925B CX20015A | 550p 600p |
| BC301 BC302 | 20p 20p | BD828 BD839 | 50p 55p | BU426A BU433 | 70p 120p | BUX47A BUX48A | 220p 150p | OC35 OC36 | 350p 250p | IN5400 IN5401 | 9p 8p | AN3312 AN3313 | 350p 300p | AN6878 AN6879 | 65p 225p | BA728 BA806 | 55p 220p | CX20106A CX20109 | 75p 140p |
| BC303 BC304 | 20p 25p | BD897 BD899 | 50p 50p | BU500 BU500D | 100p 225p | BUX55 BUX80 | 800p 180p | S2000A3 S2000AF | 175p 90p | IN5402 IN5403 | 8p 8p | AN3320K AN3331K AN3792 | 450p 450p 300p | AN6880 AN6882 | 75p 300p | BA843 BA1310 | 130p 160p | CX20187 CXA1001AP | 700p 1600p |
| BC327 BC328 | 7p 7p | BD977 BDX33 | 50p 60p | BU505 BU505D | 90p | BUX81 BUX84 | 160p 50p | S2055A S2055AF | 175p | IN5404 IN5405 | 8p | AN3794 AN3814K | 325p 450p | AN6884 AN6888 AN6889 | 200p 150p 100p | BA1320 BA1330 BA1332 | 75p 120p 60p | CXA1019P CXA1019S CXA1044P | 150p 225p 550p |
| BC337 BC338 | 7p 7p | BDX37 BDX44 | 100p 100p | BU505DF BU506 BU506D | 90p 100p 70p | BUX85 BUX86 BUX87 | 50p 50p 50p | S2530A TIP29 TIP29A | 100p 15p 22p | IN5406 IN5407 | 12p 12p | AN3821K AN3822K | 600p 600p | AN6889 AN6913 AN700 | 60p 650p | BA1350 BA1355 | 130p 125p | CXA1044BP CXA1081 | 475p 275p |
| BC441 BC446 BC477 | 28p 8p | BDX47 BDX540 BDX620 | | BU506DF BU508A | 100p 60p | BUX98A BUZ71 | 350p 75p | TIP29C TIP29E | 25p 40p | RGP10 | 12p 25p | AN3830K AN3990K | 800p 300p | AN7010K AN7025K | 250p 90p | BA1356 BA1360 | 100p 160p | CXA1081M CXA1081S | 250p 300p |
| BC516 BC537 | 18p 22p 25p | BDX63C | 175p | BU508AF BU508APH | 60p | BUZ71AF BUZ72A | 100p 100p | TIP30 TIP30C | 25p 25p | RGP15 RGP30 SR2M | 25p 16p 50p | AN3991K AN5010 | 400p 250p | AN7060 AN7062 | 175p 300p | BA1404 BA1604 | 120p 125p | CXA1082AS CXA1191M | 1000p 250p |
| BC546 BC547 | 8p 8p | BDX65 BDX66C | 80p | BU508D BU508DF | 75p 85p | BUZ72AF BUZ73A | 100p 150p | TIP31A TIP31C | 22p 27p | SNZIVI | 300 | AN5011 AN2020 | 225p 80p | AN7072 AN7081K | 250p 200p | BA2266A BA3306 | 250p 60p | CSA1209P FT5754M | 400p 600p |
| BC548 BC549 | 8p 8p | BDX670 BDX71 | 275p 70p | BU508DR BU508V | 130p 110p | BUZ73AF BUZ76A | 60p | TIP32 TIP32A | 24p 21p | I.C. SOCKE 8 PIN | TS 4p | AN5025 AN5033 | 250p 400p | AN7105 AN7106K | 170p 135p | BA3308 BA3312 | 70p 60p | FT5764M HA1124 | 250p 125p |
| BC550 BC556 | 8p 8p | BDX77 BDX870 | 175p | BU508VF BU526 | 100p 75p | BUZ80 BUZ80AF | 135p 200p | TIP32C TIP33 | 28p 50p | 14 PIN 16 PIN | ծր 5p | AN5034 AN5070 AN5071 | 400p 125p | AN7110 AN7111 | 75p 100p | BA3402 BA3406AL | 90p 120p | HA1125 HA1137W | 120p 150p |
| BC557 BC558 | 8p 8p | BDX880 BDW24 | 55p | BU536 BU546 | 100p 125p | BUZ83 BUZ90A | 200p 180p | TIP33C TIP34 | 60p 65p | 18 PIN 20 PIN | 9p 10p | AN5111 AN5132 | 100p 450p 250p | AN7112 AN7114 | 45p 120p | BA3416BL BA3422 | 350p | HA1151 HA1197 HA1199 | 175p 130p |
| BC559 BC560 | 8p 8p | BDW93 BDW94 | 50р 50р | BU603 BU606D | 125p 225p | BUZ91A BY448 | 260p 20p | TIP34C TIP35C | 60p 65p | 22 PIN 24 PIN | 12p | AN5135NK AN5138NK | 400p 350p | AN7115 AN7116 AN7117 | 110p 90p 65p | BA3505F BA3506A BA3516 | 140p 70p 120p | HA1201 HA1202 | 130p 225p 125p |
| BC637 BC639 | 20p 20p | BDY29 BDY56 BDY58 | 225p 225p 500p | BU608D BU626 BU705 | 120p 120p 130p | BYT11 IRF120 IRF130 | 25p 225p 475p | TIP36C TIP41A TIP41C | 65p 20p 22p | 28 PIN 40 PIN | 13p 15p | AN5150 AN5151 | 400p 200p | AN7120 AN7130 | 100p 75p | BA3520 BA3521 | 130p 225p | HA1319 HA1338 | 200p 300p |
| BC640 BCY33 BCY34 | 20р 200р 200р | BDY90 BDY92 | 125p 100p | BU706DF BU706F | 175p | IRF140 IRF230 | 550p 550p | TIP42A TIP42C | 20p 22p | ZENER DIO | DEC | AN5210 AN5215 | 675p 100p | AN7131 AN7133N | 90p 325p | BA3704 BA3706 | 200p 75p | HA1339A HA1367 | 350p 300p |
| BCY70 BCY71 | 16p 16p | BF137 BF167 | 35p 30p | BU724A BU801 | 100p 70p | IRF240 IRF250 | 425p 375p | TiP47 TiP48 | 40p 40p | 400 mWatt | s | AN5222 AN5250 | 200p 160p | AN7134 AN7140 | 300p 170p | BA3812L BA3822LS | 80p 80p | HA1377 HA1384 | 120p 600p |
| BCY72 BD115 | 16p 30p | BF181 BF183 | 18p 20p | BU806 BU807 | 70p 60p | IRF330 IRF340 | 600p 325p | TIP50 TIP51 | 60p 80p | 2V7 to 39V 1.3 Watts | 5p | AN5256 AN5260 | 150p 300p | AN7141 AN7142 | 70p 80p | BA3824LS BA3920 | 75p 300p | HA1388 HA1389 | 320p 210p |
| BD124P BD131 | 50p 25p | BF195 BF199 | 7p 8p | BU807F BU808DF | 75p 210p | IRF350 IRF450 | 750p 650p | T1P52 T1P54 | 80p 85p | 2V7 to 39V | 9р | AN5262 AN5265 AN5315 | 175p 80p 600p | AN7145 AN7146 | 195p 210p | BA4110 BA4210 | 75p 85p | HA1392 HA1394 | 120p 170p |
| BD132 BD133 | 25p 50p | BF200 BF225 | 16p 30p | BU810 BU824 | 110p 60p | IRF510 IRF520 | 110p | TIP102 TIP105 TIP106 | 70p 65p | VOLTAGE REGULATO | RS | AN5352 AN5411 | 600p 450p | AN7147 AN7148 AN7149 | 180p 140p 160p | BA4220 BA4234L BA4236L | 60p 70p 110p | HA1396 HA1397 HA1398 | 650p 200p 175p |
| BD135 BD136 | 20p 20p | BF240 BF245 | 16p 25p | BU826 BU826A BU902 | 120p 160p 110p | IRF530 IRF540 IRF610 | 120p 120p 120p | TIP107 TIP110 | 65p 65p 40p | 7805 | 18p | AN5421 AN5429 | 150p 420p | AN7154 AN7156 | 180p 240p | BA4402 BA4403 | 45p 220p | HA1406 HA11123 | 120p 350p |
| BD137 BD138 BD139 | 20p 20p 20p | BF254 BF255 BF256 | 15p 12p 18p | BU903 BU910 | 110p 80p | IRF611 IRF620 | 120p 160p | TIP111 TIP112 | 40p 35p | 7806 7808 7812 | 18p 25p 18p | AN5431 AN5435 | 275p 125p | AN7158 AN7160 | 310p 350p | BA4405 BA4412 | 80p 50p | HA11211 HA11215 | 170p 350p |
| BD140 BD144 | 20p 90p | BF257 BF259 | 18p | BU912 BU920 | 100p | IRF630 IRF640 | 110p 300p | TIP112H TIP115 | 50p 30p | 7815 7818 | 25p 25p | AN5436N AN5512 | 160p 100p | AN7161N AN7163 | 375p 175p | BA5101 BA5102 | 350p 140p | HA11219 HA11221 | 280p |
| BD157 BD166 | 38p 30p | B F262 BF270 | 25p 18p | BU922 BU930 | 110p 130p | IRF642 IRF650 | 200p 200p | TIP116 TIP117 | 30p 30p | 7824 7905 | 25p 25p | AN5515 AN5520 | 160p 550p | AN7166 AN7168 | 350p 200p | BA5115 BA5115L | 75p | HA11225 HA11235 | 130p 100p |
| BD175 BD177 | 30p 30p | BF273 BF311 | 15p 21p | BU932 BU941 | 175p 250p | IRF710 IRF720 | 150p 150p | TIP120 TIP121 | 37p 35p | 7906 7908 | 30p | AN5521 AN5560 AN5601K | 100p 350p 750p | AN7169 AN7170 AN7171K | 225p 260p 400p | BA5204 BA5208AF BA5402 | 200p 110p 180p | HA11244 HA11247 HA11251 | 375p 375p 120p |
| BD179 BD181 | 32p 45p | BF336 BF337 | 20p 20p | BU2508A BU2508AF BU2508D | 100p 110p 130p | IRF730 IRF740 IRF820 | 125p 125p 110p | TIP122 TIP125 TIP126 | 30p 30p 40p | 7912 7915 | 30p | AN5612 AN5613 | 200p 200p | AN7172K AN7173K | 325p 450p | BA5406 BA5408 | 180p 180p | HA11412 HA11414 | 600p 300p |
| BD182 BD184 BD187 | 60p 60p 30p | BF338 BF362 BF367 | 20p 30p 13p | BU2508DF BU2520AF | 120p 170p | IRF830 IRF840 | 110p 110p | TIP127 TIP130 | 35p 30p | 7918 7924 78L05 | 30p 30p 24p | AN5615 AN5620 | 300p 250p | AN7177 AN7178 | 375p 180p | BA5413 BA6104 | 225p 250p | HA11423 HA11440 | 110p 250p |
| BD201 BD202 | 33p 38p | BF371 BF421 | 17p 18p | BU2520DF BU2525A | 225p 325p | IRF9140 IRF9510 | 1000p 150p | TIP131 TIP132 | 30p 30p | 78L08 78L12 | 24p 24p | AN5622 AN5625 | 275p 400p | AN7205 AN7213 | 35p 40p | BA6109 BA6110 | 110p 225p | HA11485BN HA11702 | 330p |
| BD203 BD204 | 42p 42p | BF422 BF423 | 21p 25p | BU2525AF BU2527AF | 220p 400p | IRF9511 IRF9520 | 150p 150p | TIP136 TIP137 | 40p 65p | 78L15 78L18 | 24p 24p | AN5630 AN5633 | 375p 350p | AN7216 AN7218 | 175p 60p | BA6125 BA6137 BA6138 | 75p 55p | HA11703 HA11706 | 400p 280p |
| BD222 BD225 | 31p 31p | BF455 BF458 | 12p 19p | BUF405A BUH315 | 200p 200p | IRF9530 IRF9531 | 200p 200p | TIP162 TIP141 | 110p 65p | 78L24 79L05 | 24p 35p | AN5635N AN5640 AN5700 | 330p 500p 90p | AN7220 AN7222 | 75p | BA6138 BA6146 BA6149LS | 130p 150p 700p | HA11710 HA11713 HA11715 | 500p 250p 250p |
| BD232 BD233 | 31p 30p | BF 462 BF 471 | 50p 28p | BUH315D BUH515 | 175p 200p | IRF9540 IRF9541 IRF9610 | 240p 200p | TIP142 TIP145 TIP146 | 75p 50p 70p | 79L08 79L12 | 35p | AN5701 AN5710 | 150p 100p | AN7223 AN7224 AN7225 | 105p 75p 175p | BA6154 BA6208 | 60p 175p | HA11716 HA11718 | 480p 700p |
| BD234 BD235 BD236 | 32p 28p 30p | BF472 BF479 BF494 | 28p 30p 16p | BUH515D BUH517 BUH517D | 250p 275p 175p | IRF9620 IRF9622 | 120p 110p 200p | TIP147 TIP150 | 80p 90p | 79L15 LM309K LM317T | 35p 100p 100p | AN5712 AN5720 | 180p 70p | AN7254 AN7256 | 150p 250p | BA6209 BA6218 | 85p 85p | HA11724 HA11741NT | 650p 950p |
| BD237 BD238 | 21p 24p | BF495 BF595 | 16p 16p | BUH715 BUT11A | 425p 35p | IRF9630 IRF9640 | 180p 280p | TIP151 TIP2955 | 60p 50p | LM323K 78H08KC | 350p 800p | AN5722 AN5730 | 140p 160p | AN7273 AN7310 | 75p 60p | BA6220 BA6222 | 55p 130p | HA11744 HA11745 | 330p 330p |
| BD239 BD240 | 30p 40p | BF596 BF615 | 16p 30p | BUT11AF BUT12 | 35p 80p | IRFD9220 IRFBC30 | 100p 150p | TIP3055 TIPL760 | 50p 100p | 79H12KC 79HGKC | 700p 800p | AN5732 AN5750 | 120p 75p | AN7311 AN7312 | 90p 70p | BA6227 BA6229 | 50p 130p | HA11749 HA11751 | 350p 1500p |
| BD241A BD243A | 40p 50p | BF617 BF760 | 30p 40p | BUT13 BUT18 | 310p 80p | IRFBC40 IRFP140 | 250p 250p | TIPL762A TIPL763A | 200p 200p | | . ** | AN5753 AN5763 | 130p 250p | AN7315 AN7330 | 40p 110p | BA6235 BA6238A | 50p 130p | HA11752 HA11839NT HA11847 | 325p 375p |
| BD244 BD245 | 50p 50p | BF763 BF870 | 40p 22p | BUT18AF BUT30V | 65p 1700p | IRFP150 IRFP240 | 300p 300p | TIPL791A 2N2369 | 80p 15p | LEDs 3mm | | AN5790 AN5791 AN5836 | 240p 225p 450p | AN7362 AN7363 AN7410 | 200p 225p 150p | BA6239A BA6247 BA6248 | 130p 150p 140p | HA11847 HA12002 HA12003 | 700p 220p 150p |
| BD246A BD265 | 50p 45p | BF871 BF960 | 22p 38p | BUT56A BUT76A BUT90 | 65p 80p 1300p | IRFP250 IRFP350 IRFP450 | 280p 325p 325p | 2N2646 2N2904 2N2905 | 40p 20p 20p | RED YELLOW | 5p 8p | AN5862K AN5900 | 225p 130p | AN7410 AN7411 AN7414 | 50p 275p | BA6259 BA6280AF | 170p 300p | HA12005 HA12010 | 180p 300p |
| BD267 BD269 BD278 | 45p 45p 50p | BF961 BF964 BFQ232 | 35p 38p 75p | BUT92 BUV18 | 1300p 1200p 650p | IRFP460 IRFP9140 | 775p 1450p | 2N2905 2N2906 2N2907 | 18p | GREEN 5mm | 8p | AN608P AN620 | 125p 250p | AN7415 AN7470 | 70p 100p | BA6290A BA6294 | 200p 250p | HA12016 HA12017 | 120p 100p |
| BD311 BD314 | 100p 100p | BFQ252 BFR90 | A 60p 85p | BUV20 BUV21 | 650p 400p | IRFP9240 | 350p 600p | 2N3019 2N3053 | 28p 18p | RED YELLOW | 5p 8p | AN6130 AN6135 | 130p 120p | AN8053 AN8275 | 200p 250p | BA6302A BA6304 | 150p 120p | HA12026 HA12038NT | 125p |
| BD315 BD317 | 150p 150p | BFR91 BR100 | 99p 14p | BUV23 BUV24 | 475p 350p | IRFRC20 IRFZ20 | 250p 6 5p | 2N3054 2N3055 | 40p 38p | GREEN | 8р | AN6209 AN6250 | 350p 50p | AN8370 AN8377 | 1000p 400p | BA6305 BA6321 | 140p 250p | HA12044 HA12045 | 350p 280p |
| BD331 BD332 | 40p 40p | BR103 BR303 | 37p 85p | BUV25 BUV26 | 110p 150p | IRFZ42 IRFZ44 | 275p 160p | 2N3055H 2N3440 | 50p 45p | RECTANGE | JLAR | AN6247 AN6270 | 200p 400p | AN8387 BA222 | 350p 65p | BA6328 BA6334 | 250p 75p | HA12047 HA12058 | 450p 320p |
| BD361 BD362 | 60p | BU105 BU108 | 80p 100p | BUV27 BUV28 | 125p 110p | MJ2501 MJ2955 | 100p 55p | 2N3441 2N3442 | 175p 85p | LEDs | | AN6300 AN6306 | 600p 380p | BA225 BA314 | 100p 40p | BA6410 BA6411 | 220p 250p | HA12088 HA12116 | 375p 130p |
| BD370 BD371 | 30p 30p | BU109 BU110 | 80p 90p | BUV37 BUV46A | 175p 75p | MJ3000 MJ3001 | 100p | 2N3771 2N3772 | 90p | Smm x 2.5 RED YELLOW | 5p | AN6310 AN6320 | 200p 180p 250p | BA301 BA311 BA313 | 55p 80p 60p | BA6418N BA6435S BA6993 | 100p 425p 150p | HA12411 HA12412 HA12413 | 175p 175p 70p |
| BD410 BD433 | 50p 28p | BU111 BU124 | 100p 60p | BUV47 BUV48A | 120p 175p | MJ4032 MJ4035 | 175p 175p | 2N3773 2N3819 | 100p 29p | GREEN | 8p 8p | AN6326N AN6332 | 320p | BA333 | 80p | BA7001 | 150p | HA12430 | 200p |

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

TELEVISION April 1999 405



PLEASE PHONE US FOR TYPES NOT LISTED AS WE HAVE OVER 50,000 ITEMS IN STOCK. QUOTATIONS GIVEN FOR LARGE QUANTITIES



| | | | | | | | | N | ĒÆ | AR | IC | S | | | | | | |
|----------------------------------|-----------------------|----------------------------|----------------------|----------------------------|----------------------|----------------------------------|----------------------|-------------------------------|----------------------|--------------------------------|------------------------|---|-------------------------------|------------------------|----------------------------------|----------------------|----------------------|--------------|
| Part | Price | Part | Price | Part | Price | Part | Price | Part | Price | Part | Price | Part Price | Part | Price | Part | Price | Part | Price |
| HA13001 | 650p | LA2800 | 350p | LA7096 | 200p | LF353 | 48p | MC3302 | 50p | SAB3029 | 525p | STK3102 II 530p | STK5478 | 380p | STR16006 | 500p | TA7281 | 200p |
| HA13002 | 200p | LA3120 | 200p | LA7113 | 275p | LF355 | 60p | MC3401 | 45p | SAB3035 | 275p | STK3106 2500p | STK5479 | 300p | STR17006 | 500p | TA7282 | 160p |
| HA13006 HA13007 | 400p 300p | LA3150 LA3160 | 200p 120p | LA7116 LA7123 | 125p 1300p | LF357 LF398 | 70p 300p | MC3423P MC3488AP | 100p 250p | SAB3036 SAB3037 | 725p 700p | STK3122 III 725p STK3152 II 900p | STK5481 STK5482 | 470p 285p | STR20005 STR20012 | 450p 450p | TA7210 | 200p |
| HA13108 HA13117 | 280p 175p | LA3161 LA3210 | 40p 65p | LA7210 LA7212 | 60p | LH2426S LM301 | 600p 26p | MC34063AF MN1220T | | SAB3042 SAB3064 | 825p 130p | STK3156 500p STK4017 400p | STK5483 STK5486 | 440p 450p | STR20015 STR30110 | 450p 330p | TA7283 TA7284P | 200p 400p |
| HA13118 HA13119 | 140p 140p | LA3226 LA3246 | 60p | LA7214 | 150p | LM311 | 35p | MN1226 | 450p | SAB3209 | 225p | STK4019 480p | STK5487 | 525p | STR30115 | 275p | TA7288 TA7291P | 220p 200p |
| HA13127 HA13128 | 350p 400p | LA3300 LA3301 | 75p 140p 110p | LA7220 LA7222 LA7224 | 125p 110p 150p | LM319 LM324 LM3357 | 165p 30p | MN1228 MN1276 MN1280 | 600p 1300p | SAB3210 SAB6456 | 250p 125p | STK4021 380p STK4024 II 550p | STK5488 STK5490 | 480p 450p | STR30120 STR30123 | 400p 450p | TA7292P TA7294P | 325p 450p |
| HA13130 | 450p | LA3361 | 100p | LA7225 | 250p | LM339 | 120p 35p | MN3004 | 70p 600p | SAB8048 SAB8051A SDA2003 | | STK4025 530p STK4026 480p | STK5632 STK5720 | 450p 400p | STR30125 STR30130 | 550p 250p | TA7299 | 200p |
| HA13135 HA13139 | 500p 600p 1150p | LA3365 LA3370 | 70p 70p | LA7292 LA7294 | 275p 200p | LM348 LM358 | 50p 45p | MN3005 MN3011 | 2000p 4000p | SDA2004 | 450p 325p | STK4028 550p STK4032 II 1050p | STK5725 STK5730 | 450p 450p | STR40090 STR40115 | 350p 600p | TA7302P TA7303 | 75p 70p |
| HA13150A | 875p | LA3373 | 70p | LA7295 | 160p | LM380 | 80p | MN3101 | 110p | SDA2005 | 700p | STK4034 X 925p | STK6316 | 300p | STR41090 | 330p | TA7307 | 100p |
| HA13151 | | LA3375 | 300p | LA7297 | 120p | LM381 | 150p | MN3102 | 110p | SDA2007 | 300p | STK4036 470p | STK6324B | 500p | STR43111 | 950p | TA7310 | 100p |
| HA13403 | 400p | LA3376 | 300p | LA7305A | 350p | LM382 | 130p | MN3207 | 375p | SDA2008 | 400p | STK4038 680p | STK6327 | 1200p | STR44115 | 475p | TA7312 | 120p |
| HA13406W | 400p | LA3380 | | LA7308 | 70p | LM386 | 60p | MN3208 | 950p | SDA2112 | 450p | STK4040 II 650p | STK6328A | 800p | STR45111 | 550p | TA7313 | 70p |
| HA13408 | 350p | LA3390 | 250p | LA7311 | 200p | LM387 | 100p | MN6030B | 350p | SDA2120 | 200p | STK4042 800p | STK6431 | 850p | STR50020 | 350p | TA7314 | 175p |
| HA13412 | 600p | LA3400 | 250p | LA7320 | 120p | LM389N | 105p | MN6163A | 700p | SDA2131 | 225p | STK4044 950p | STK6607 | 400p | STR50092 | 550p | TA7315 | 200p |
| HA13426 HA13432 | 500p 400p | LA3401 LA3410 | 90p 150p | LA7323 LA7330 | 325p 350p | LM393 LM431 | 45p 50p | MTA001M NE555 | 600p 20p | SDA2208 SDA4212 | 450p 775p | STK4046 950p STK4048 1280p | STK6722 STK6732 | 725p 1000p | STR50103A STR50113 | 500p | TA7317P TA7320P | 120p |
| HA13441 HA17524 | 450p 250p | LA3430 LA3600 | 135p 60p | LA7331 LA7332 | 250p 225p | LM710 LM723 | 45p 40p | NE556 NE558 | 40p 80p | SDA5241 SDA5243-2 | 725p 450p | STK4050 II 1600p STK4060 510p | STK6822 STK6922 | 900p 1000p | STR50115 STR51041 | 500p | TA7322 | 200p 130p |
| KA2102 | 100p | LA3605 | 100p | LA7340 | 300p | LM741DIL | 18p | NE565 | 110p | SDA5343 | 1450p | STK4065 650p | STK6932 | 525p | STR50213 | 500p | TA7323 | 80р |
| KA2130 | 150p | LA3607 | 125p | LA7376 | 150p | LM741MET | 45p | NE567 | 115p | SDA5640 | 200p | STK4101 500p | STK6962 | 275p | STR53041 | 400p | TA7234 | 75р |
| KA2131 | 110p | LA4030 | 180p | LA7391 | 550p | LM747 | 55p | NE571 | 290p | SDA5642 | 450p | STK4111 500p | STK6972 | 490p | STR54041 | 320p | TA7325 | 90p |
| KA2206 | 150p | LA4031 | 140p | LA7520 | 200p | LM1017 | 200p | NE592 | 85p | SGSF444 | 500p | STK4112 500p | STK6981B | 600p | STR55041 | 450p | TA7326 | 200p |
| KA2209 | 125p | LA4032 | 140p | LA7530 | 200p | LM1035N | 350p | NE5532P | 140p | SGFS465 | 500p | STK4121 480p | STK6982 | 600p | STR56041 | 550p | TA7328 | 110p |
| KA2210 | 230p | LA4051 | 160p | LA7535 | 175p | LM1040N | 650p | SAA1000 | 350p | SLA4031 | 750p | STK4122 560p | STK6982H | 600p | STR58041 | 250p | TA7330P | 80p |
| KA2212 | 65p | LA4100 | 85p | LA7545 | 160p | LM1203 | 225p | SAA1004 | 650p | SLA7020M | 450p | STK4131 480p | STK7216 | 420p | STR59041 | 300p | TA7331P | 80p |
| KA2213 | 130p | LA4101 | 80p | LA7550 | 275p | LM1203AN | 225p | SAA1005 | 325p | STA301A | 200p | STK4132 600p | STK7217 | 400p | STR60001 | 525p | TA7333 | 100p |
| KA2214 | 100p | LA4102 | 100p | LA7555 | 150p | LM1875T | 330p | SAA1006 | 300p | STA341M | 180p | STK4133 750p | STK7225 | 500p | STR80145 | 475p | TA7335 | 85p |
| KA2224 | 50p | LA4110 | 120p | LA7620 | 500p | LM1881N | 375p | SAA1008 | 450p | STA401A | 220p | STK4141 420p | STK7226 | 600p | STR81145 | 375p | TA7336 | 180p |
| KA2244 KA2261 | 75p 100p | LA4120 LA4138 | 270p 105p | LA7680 LA7681 | 675p 650p | LM1886 LM1889 | 250p 300p | SAA1010 SAA1024 | 400p 250p | STA403A STA405A | 270p 280p | STK4142 530p STK4147 1450p | STK7251 STK7253 | 500p 450p | STR90120 STRD1206 | 425p 500p | TA7337P | 175p |
| KA2263 | 100p | LA4140 | 60p | LA7710 | 250p | LM1894N | 200p | SAA1025 | 250p | STA431A | 250p | STK4151 680p | STK7308 | 350p | STRD1406 | 600p | TA7339P | 175p |
| KA2264 | 100p | LA4142 | 65p | LA7800 | 90p | LM1895N | 275p | SAA1026 | 400p | STA432A | 220p | STK4152 650p | STK7309 | 400p | STRD1706 | 360p | TA7341 | 250p |
| KA2284 | 75p | LA4145 | 65p | LA7801 | 100p | LM2901N | 35p | SAA1027 | 400p | STA434A | 270p | STK4161 650p | STK7310 | 470p | STRD1806 | 360p | TA7342P | 70p |
| KA2309 | 175p | LA4160 | 100p | LA7802 | 300p | LM2902N | 40p | SAA1029 | 150p | STA435A | 270p | STK4162 550p | STK7348 | 400p | STRD1816 | 350p | TA7343 | 120p |
| KA2401 | 150p | LA4162 | 110p | LA7806 | 260p | LM2903N | 40p | SAA1042 | 325p | STA441C | 220p | STK4164 1175p | STK7356 | 425p | STRD1906 | 550p | TA7347P | 120p |
| KA2412 | 225p | LA4178 | 150p | LA7808 | 250p | LM3900 | 40p | SAA1043P | 675p | STA451C | 280p | STK4171 900p | STK7358 | 440p | STRD3035 | 300p | TA7348P | 125p |
| KA2912 | 125p | LA4180 | 150p | LA 7820 | 100p | LM3909 | 100p | SAA1044 | 400p | STA456C | 240p | STK4172 II 680p | STK7402 | 560p | STRD4412 | 500p | TA7349P | 175p |
| KA2913A | 175p | LA4182 | 180p | LA7823 | 200p | LM3911N | 200p | SAA1056 | 300p | STA471 | 210p | STK4181 680p | STK7404 | 600p | STRD4420 | 550p | TA7354P | 65p |
| KA2914A | 200p | LA4190 | 300p | LA7824 | 130p | LM3914 | 160p | SAA1057 | 375p | STA901M | 280p | STK4182 750p | STK7406 | 650p | STRD4512 | 400p | TA7357 | 340p |
| KA22427 | 100p | LA4192 | 140p | LA7830 | 90p | LM3915 | 160p | SAA1058 | 225p | STK0025 | 420p | STK4191 700p | STK7408 | 675p | STRD5441 | 475p | TA7358 | |
| KIA6213S | 60p | LA4200 | 130p | LA7831 | 85p | LM3916 | 270p | SAA1060 | 375p | STK0029 | 1000p | STK4192 700p | STK7410 | 1500p | STRD5541 | 450p | TA7359P | 85p |
| KIA6210AH | 400p | LA4201 | 120p | LA7832 | 130p | LM8363 | 320p | SAA1061 | 250p | STK0039 | 600p | STK4211 1000p | STK7458 | 1250p | STRD6008 | 575p | | 90p |
| KIA6281H | 250p | LA4260 | 230p | LA7835 | 150p | LM8560 | 175p | SAA1062 | 250p | STK0040 | 520p | STK4211 V 800p | STK7554 | 600p | STRD6009E | 450p | TA7361 | 125p |
| KIA6283K | 150p | LA4261 | 300p | LA7837 | 150p | LM13600 | 150p | SAA1063 | 250p | STK0049 | 510p | STK4221 II 1200p | STK7561 | 650p | STRD6018 | | TA7362 | 150p |
| KIA6299H KIA7227CP KIA7313 | 210p 200p 45p | LA4265 LA4270 LA4282 | 125p 300p 350p | LA7838 LA7850 LA7851 | 200p 225p 200p | LM13700 LM18293 M491BB1 | 125p 500p 800p | SAA1064 SAA1070 SAA1073 | 275p 550p | STK0050 STK0059 STK0060 | 440p 620p | STK4231 1050p STK4241 1050p | STK7562 STK7563 | 1000p 800p | STRD6602 STRD6601 | 475p 650p | TA7364P TA7366P | 175p 65p |
| L149V L165V | 300p 250p | LA4420 LA4422 | 140p 130p | LA7910 LA7913 | 150p 90p | M494B1 M5265P | 700p 200p | SAA1075 SAA1086 | 325p 350p 175p | STK0060 STK0070 STK0080 | 820p 1100p 1000p | STK4241 V 1250p STK4272 500p STK4273 550p | STK7573 STK7576 STK7703 | 400p 1500p 1000p | STRM6545 STRM6546 STRM6549 | 900p 900p | TA7368P TA7373F | 35p 150p |
| L200 L272 | 200p 200p | LM4425A LA4430 | 200p 130p | LA7930 LA7940 | 350p 200p | M50115P M50117P | 320p 500p | SAA1089 SAA1101 | 325p 700p | STK011 STK015 | 330p 440p | STK4301 500p STK4311 650p | STK8050 STK8250 | 1600p 500p | STRS5741 STRS5941 | 500p 800p 750p | TA7374 TA7376P | 175p 100p |
| L272M | 110p | LA4440 | 200p | LA7953 | 300p | M50119P | 525p | SAA1124 | 200p | STK016 | 760p | STK4332 365p | STK8260 | 1200p | STRS6307 | 600p | TA7378P | 60p |
| L290B | 225p | LA4445 | 200p | LA9200 | 300p | M50422P | 750p | SAA1130 | 550p | STK025 | 650p | STK4352 500p | STK8280 | 1850p | STRS6308 | | TA7401 | 250p |
| L291B L292 | 300p 750p | LA4446 LA4460 | 170p 120p | LB1205 LB1216 | 170p 150p | M50461 M50784 | 350p 300p | SAA1250 SAA1251 | 280p 380p | STK050 STK077 | 1600p 520p | STK4362 450p STK4372 600p | STK73405 | 550p | STRS6309 STRS6707 | 600p 1000p | TA7402P TA7403 | 200p 325p |
| L293B | 225p | LA4461 | 120p | LB1258 | 100p | M50786 | 500p | SAA1271 | 400p | STK078 | 1800p | STK4392 500p | STK7340 II | 500p | STRS6708 | 575p | TA7404 | 150p |
| L293C | 325p | LA4466 | 225p | LB1268 | 70p | M50790 | 600p | SAA1274 | 280p | STK080 | 550p | STK4412 450p | STK73605 | 375p | | 190p | TA7405P | 200p |
| L293D L293E | 225p 250p | LA4470 LA4475 | 300p 225p | LB1274 LB1290 | 85p 120p | M51014L M51143AL | 120p 110p | SAA1290 SAA1293 | 750p 550p | STK082 STK084 | 2000p 600p | STK4432 600p STK4773 820p | STK73907 STK78617 | 700p 2400p | TA7061 TA7062 | 115p 200p | TA7411AP | 150p |
| L294 | 475p | LA4476 | 225p | LB1292 | 110p | M51161 | 300p | SAA1294 | 800p | STK085 | 900p | STK4793 800p | STR370 | 300p | TA7066 | 120p | TA7415P | 350p |
| L295 | 450p | LA4480 | 225p | LB1405 | 70p | M51161P | 250p | SAA1300 | 200p | STK086 | 1000p | STK4803 1000p | STR371 | 400p | TA7075P | 300p | TA7417AP | 225p |
| L297 | 525p | LA4485 | 300p | LB1407 | 130p | M51162P | 250p | SAA1310 | 200p | STK0100 | 900p | STK4813 800p | STR380 | 350p | TA7089 | 300p | TA7521P | 350p |
| L298 | 400p | LA4495 | 250p | LB1409 | 200p | M51164AL | 80p | SAA1350 | 275p | STK0100II | 1200p | STK4833 850p | STR381 | 390p | TA7102P | 500p | TA7607 | 200p |
| L465A | 525p | LA4496 | 250p | LB1412 | 300p | M51166P | 300p | SAA1351 | 750p | STK420 | 400p | STK4843 720p | STR383 | 410p | TA7119 | 150p | TA7608 | 360p |
| L482 | 400p | LA4498 | 275p | LB1415 | 100p | M51182L | 110p | SAA1900S | 475p | STK430 | 500p | STK4853 1700p | STR384 | 350p | TA7120 | 55p | TA7609 | 170p |
| L497B | 525p | LA4500 | 200p | LB1416 | 85p | M51191L | 85p | SAA3004 | 400p | STK433 | 400p | STK4863 700p | STR440 | 800p | TA7124 | 250p | TA7611 | 210p |
| L702B | 400p | LA4505 | 220p | LB1426 | 125p | M51231P | 200p | SAA3006P | 225p | STK435 | 375p | STK4873 1100p | STR441 | 950p | TA7130P | 85p | TA7612 | 300p |
| L702N | 325p | LA4508 | 200p | LB1450 | 110p | M51308SP | 550p | SAA3007P | 130p | STK436 | 430p | STK4893 1000p | STR442 | 1600p | TA7137 | 60p | TA7613AP | 90p |
| L2720 | 150p | LA4510 | 100p | LB1615 | 270p | M51310AP | 900p | SAA3008P | 200p | STK437 | 600p | STK4913 900p | STR450A | 700p | TA7140 | 100p | TA7614 | 170p |
| L2722 | 175p | LA4520 | 170р | LB1620 | 210p | M51316P | 300p | SAA3010P | 300p | STK439 | 500p | STK5314 475p | STR451 | 800p | TA7141 | 825p | TA7616 | 300p |
| L4960 | 325p | LA4550 | 200р | LB1622 | 220p | M51320 | 200p | SAA3027P | 375p | STK441 | 680p | STK5315 500p | STR452 | 600p | TA7150P | 250p | TA7621 | 300p |
| L6203 | 600p | LA4555 | 120p | LB1630 | 80p | M51356P | 400p | SAA3049P | 550p | STK443 | 700p | STK5322 500p | STR453 | 500р | TA7157 | 100p | TA7622 | 420p |
| L6210 | 250p | LA4557 | 150p | LB1639 | 300p | M51358P | 150p | SAA4700 | 425p | STK457 | 470p | STK5323 600p | STR454 | 1300р | TA7172P | 150p | TA7628 | 110p |
| L6221AS | 300p | LA4558 | 125p | LB1640 | 150p | M51365P | 350p | SAA5000 | 200p | STK459 | 560p | STK5324 450p | STR455 | 550р | TA7193 | 320p | TA7629 | 220p |
| L6506 | 300p | LA4570 | 130p | LB1641 | 75p | M51366P | 360p | SAA5010 | 220p | STK460 | 660p | STK5325 370p | STR456 | 470р | TA7200 | 200p | TA7630 | |
| LA1130 | 240p | LA4571 | 175p | LB1642 | 150p | M51381P | 200p | SAA5012 | 400p | STK461 | 600p | STK5326 750p | STR457 | 600p | TA7205 | 1200p | TA7632 | 200p |
| LA1135 | 120p | LA4581 | 175p | LB1645 | 100p | M51384AP | 750p | SAA5020 | 350p | STK463 | 950p | STK5330 850p | STR470 | 400p | TA7207 | 150p | | 400p |
| LA1145 | 200p | LA4597 | 125p | LB1648 | 200p | M51387P | 600p | SAA5030 | 440p | STK465 | 900p | STK5331 300p | STR1096 | 275p | TA7208 | 125p | TA7640 | 90p |
| LA1150 | 150p | LA4620 | 400p | LB1649 | 190p | M51392P | 300p | SAA5040A | 280p | STK501 | 550p | STK5332 180p | STR1195 | 350p | TA7210 | 200p | TA7641 | 140p |
| LA1170 LA1177 LA1180 | 90p 130p 75p | LA4630 LA4700 LA4705 | 325p 350p 400p | LB3500 LC4966 LC7011 | 125p 65p | M51393AP M51395AP M51397AP | 350p 450p | SAA5040B SAA5041 | 400p 550p | STK561 STK563 | 450p 415p 500p | STK5333 650p STK5335 350p STK5336 350p | STR1229 STR2005 STR2012 | 325p 400p | TA7214 TA7217 | 220p 145p | TA7644BP TA76545P | 480p 65p |
| LA1185 LA1186 | 75p 150p 35p | LA5005 LA5112 | 90p 200p | LC7060 LC7120 | 500p 600p | M51397AP M51436P M51496P | 425p 350p 275p | SAA5042 SAA5050 SAA5051 | 425p 650p | STK583 STK760 STK770 | 500p 600p 400p | STK5336 350p STK5337 500p STK5338 295p | STR2012 STR2013 | 400p 300p | TA7220 TA7222 | 220p 90p | TA7658 TA7659P | 100p 400p |
| LA1201 LA1205 | 35p 75p 75p | LA5511 LA5512 | 200p 50p 50p | LC7130 LC7131 | 350p 300p 260p | M51496P M51533 M51544 | 275p 300p 150p | SAA5051 SAA5052 SAA5054 | 400p 500p | STK772 STK772B | 400p 650p 480p | STK5339 400p | STR2015 STR2024 | 550p 575p | TA7223 TA7225 | 210p 300p | TA7660P TA7666P | 325p 100p |
| LA1207 LA1210 | 120p 140p | LA5522 LA5523 | 45p 150p | LC7131 LC7132 LC7137 | 400p | M51848 M54523P | 150p 150p 200p | SAA5054 SAA5230 SAA5231 | 500p 850p | STK7/2B STK780 STK795 | 575p | STK5342 245p | STR2105 STR2124 STR2106 | 600p 675p | TA7226 TA7227 | 290p 700p | TA7668 TA7672 | 100p 400p |
| LA1222 LA1230 | 80p 130p | LA5524 LA5527 | 80p 150p | LC7181 LC7185 | 450p 350p 350p | M54563P M58484 | 200p 200p 500p | SAA5240PA SAA5243PE | 170p 600p 360p | STK1039 STK1040 | 450p 460p 640p | STK5343 380p STK5353 400p STK5361 375p | STR3105 STR3113 STR3115 | 525p 225p | TA7230 TA7232 | 100p 95p | TA7676AP TA7679 | 450p 475p |
| LA1235 LA1240 | 130p 80p | LA5530 LA5531 | 65p 65p | LC7191 LC7207 | 300p 275p | M51516 M51518 | 260p 200p | SAA5244AP SAA5246AP | 950p 380p | STK1040 STK1049 STK1050 | 700p 650p | STK5362 400p STK5372 260p | STR3123 STR3125 | 400p 400p 480p | TA7233 TA7237 TA7238 | 120p 300p 400p | TA7680AP TA7681AP | 200p |
| LA1245 LA1260 | 110p 75p | LA5537 LA5655 | 45p 175p | LC7215 LC7217 | 160p 350p | M51995P M51977P | 250p 300p | SAA5246P SAA5250P | 750p 750p | STK1050 STK1060 STK1070 | 700p 850p | STK5372 200p STK5373 375p STK5391 375p | STR3130 STR3135 | 500p 250p | TA7240 TA7241 | 160p 165p | TA7687AP | 425p 100p |
| LA1261 LA1265 | 75p 125p | LA5658 LA5665 | 225p 250p | LC7218 LC7230 | 250p 700p | M52307P M54646AP | 900p 400p | SAA5351 SAA7000 | 375p 550p | STK1070 STK1080 STK2025 | 940p 620p | STK5391 375p STK5392 500p STK5421 450p | STR3212 STR3214 | 275p 275p | TA7242 TA7243 | 190p 320p | TA7688 TA7698 | 150p 400p |
| LA1266 LA1267 | 130p 150p | LA5667 LA5700 | 200p 300p | LC7267 LC7351 | 550p 200p | MB3708 MB3712 | 275p 600p | SAA7020 | 600p 1300p | STK2028 STK2029 | 500p 480p | STK5422 375p STK5431 550p | STR3215 STR3315 | 275p 275p 275p | TA7245 TA7245BPO | 225p | TA7699 TA7705 | 600p 300p |
| LA1354 | 225p | LA6339 | 35p | LC7364 | 200p | MB3713 | 130p | SAA7220PA | 550p | STK2030 | 1000p | STK5434 570p | STR4090A | 650p | TA7248P | 575p | TA7709P | 150p |
| LA1363 | 90p | LA6355 | 50p | LC7432 | 425p | MB3714 | 225p | SAA7274P | 600p | STK2038 | 700p | STK5436 500p | STR4142 | 450p | TA7250B | 325p | TA7719P | 200p |
| LA1364 | 200p | LA6510 | 150p | LC7522 | 350p | MB3715 | 250p | SAA7280P | 1450p | STK2048 | 950p | STK5441 400p | STR4211 | 315p | TA7251BP | 325p | TA7727P | 125p |
| LA1365 | 120p | LA6515 | 150p | LC7535 | 300p | MB3722 | 200p | SAA9050 | 450p | STK2058IV | 1600p | STK5443 575p | STR4512 | 400p | TA7256P | 225p | TA7750 | 200p |
| LA1368 | 220p | LA6520 | 175p | LC7537AN | 400p | MB3730 | 900p | SAA9057 | 475p | STK2101 | 1050p | STK5446 350p | STR5015 | 500p | TA7259P | 225p | TA7757 | 200p |
| LA1369 | 200p | LA6531 | 250p | LC7537N | 450p | MB3731 | 220p | SAB0600 | 600p | STK2110 | 550p | STK5451 390p | STR5100 | 550p | TA7262P | 400p | TA7769 | 130p |
| LA1385 | 170p | LA7007 | 400p | LC7560 | 750p | MB3732 | 240p | SAB0601 | 525p | STK2125 | 580p | STK5461 500p | STR5214 | 475p | TA7263P | 325p | TA7772P | 150p |
| LA1503 | 120p | LA7011 | 220p | LC7565 | 300p | MB3735 | 400p | SAB0602 | 625p | STK2129 | 750p | STK5462 500p | STR5315 | 575p | TA7265AP | 300p | TA7784 | 250p |
| LA1805 LA1810 | 175p 130p | LA7016 LA7018 | 45p 100p | LC7582E LC7800 | 300p 175p | MB3756 MB3759 | 160p 200p | SAB1009BP SAB1016 | 225p 600p | STK2139 STK2155 | 675p | STK5464 300p STK5466 500p | STR5412 STR6020 | 280p 270p | TA7267 TA7267BP | 220p 120p | TA7792P | 250p |
| LA1851 | 300p | LA7019 | 130p | LC7815H | 175p | MB3771 | 110p | SAB1046P | 350p | STK2230 | 470p | STK5467 400p | STR7001 | 600p | TA7269 | 260p | TA7796P | 75p |
| LA2000 | 150p | LA7033 | 400p | LC7818 | 280p | MB3773 | 110p | SAB2015P | 525p | STK2240 | 740p | STK5468 300p | STR9005 | 400p | TA7270 | 170p | TA8101N | 230p |
| LA2001 | 200p | LA7042 | 280p | LC7820 | 325p | MB8719 | 360p | SAB2016P | 150p | STK2250 | 650p | STK5471 900p | STR9012 | 300p | TA7271 | 220p | TA8105N | 140p |
| LA2101 | 270p | LA7046 | 300p | LC7821N | 250p | MC1391 | 120p | SAB2022P | 525p | STK3041 | 370p | STK5472 375p | STR10006 | 450p | TA7272 | 260p | TA8110AP | 110p |
| LA2110 | 150p | LA7051 | 130p | LC7822N | 160p | MC1455 | 45p | SAB3012 | 675p | STK3042 | 375p | STK5473 480p | STR11006 | 325p | TA7273 | 300p | TA8119P | 70p |
| LA2200 | 190p | LA7053 | 130p | LC7881B | 135p | MC1488 | 35p | SAB3013 | 200p | STK3044 | 950p | STK5474 500p | STR12006 | 450p | TA7274 | 210p | TA8122AN | 250p |
| LA2205 | 150p | LA7054 | 350p | LC7881M | 325p | MC1489 | 35p | SAB3017 | 320p | STK3062 | 500p | STK5476 350p | STR13006 | 500p | TA7279P | 325p | TA8127N | 100p |
| LA2211 | 350p | LA7060 | 150p | LF347 | 110p | MC1496 | 65p | SAB3021 | 450p | STK3082 | 550p | STK5477 450p | STR15006 | 500p | TA7280 | 190p | TA8132AN | 200p |
| | | | | | | | | | | | | | - | | - | | | - 1 |

Please add £1 P&P and VAT at 17.5% to all orders

All brand new components

We accept payment by Access, Switch, Visa, Cheque and Postal Order. (Government, College etc orders accepted)
Prices quoted are subject to availability and may be changed without prior notice

| | | | | | | | | | | ESE | | | | | | | A STATE | | |
|---------------------------------|-----------------------|-----------------------------------|------------------------------|--|----------------------|--|------------------------------|---------------------------------|----------------------|--|----------------------|-------------------------------|----------------------|--|----------------------|--|--------------------------|--|---------------------------|
| TA8164P | Price 100p | TDA1180 | Price 120p | Part TDA2760 | Price 400p | Part TDA4661 | Price 225p | Part TDA8391 | Price 675p | Part UPC1004C | Price 130p | 2SA771 | Price 90p | 2SA1177 | Price 25p | Part 2SB561 | Price 30p | 2SC738 | Price 15p |
| TA8184P | 350p | TDA1185A | 190p | TDA2780 | 600p | TDA4670 | 475p | TDA8395 | 360p | UPC1009 | 950p | 2SA773 | 50p | 2SA1179 | 20p | 2SB562 | 20p | 2SC739 | 150p |
| TA8189P | 130p | TDA1190 | 80p | TDA2791 | 275p | TDA4680 | 350p | TDA8405 | 550p | UPC1018 | 170p | 2SA777 | 35p | 2SA1182 | 20p | 2SB564 | 15p | 2SC761 | 110p |
| TA8200AH | 325p | TDA1200B | 80p | TDA2795 | 150p | TDA4685 | 275p | TDA8415 | 650p | UPC1020 | 200p | 2SA778 | 100p | 2SA1184 | 120p | 2SB566 | 90p | 2SC762 | 150p |
| TA8201AK | 300p | TDA1220 | 50p | TDA2822M | 60p | TDA4700A | 750p | TDA8416 | 625p | UPC1023 | 60p | 2SA781 | 150p | 2SA1185 | 200p | 2S8596 | 50p | 2SC783 | 85p |
| TA8205 | 220p | TDA1235 | 300p | TDA2824 | 85p | TDA4714C | 350p | TDA8417 | 550p | UPC1024H 2 | 75p | 2SA786 | 25p | 2SA1186 | 500p | 2S8598 | 30p | 2SC790 | 50p |
| TA8207K | 175p | TDA1236 | 240p | TDA2840 | 200p | TDA4716C | 450p | TDA8421 | 300p | UPC1025 | 230p | 2SA794 | 50p | 2SA1198 | 40p | 2S8600 | 500p | 2SC792 | 380p |
| TA8210 | 260p | TDA1251 | 150p | TDA3047 | 100p | TDA4718A | 250p | TDA8425 | 500p | UPC1026 | 95p | 2SA798 | 30p | 2SA1201 | 40p | 2SB601 | 60p | 2SC805 | 225p |
| TA8211AH | 200p | TDA1270 | 150p | TDA3048 | 130p | TDA4725 | 750p | TDA8432 | 550p | UPC1028 | 90p | 2SA812 | 15p | 2SA1202 | 25p | 2SB605 | 25p | 2SC828 | 20p |
| TA8214K | 260p | TDA1327 | 200p | TDA3082 | 200p | TDA4800 | 300p | TDA8433 | 600p | UPC1031H | 150p | 2SA814 | 60p | 2SA1204 | 225p | 2SB631 | 40p | 2SC829 | 15p |
| TA8215 | 300p | TDA1405 | 50p | TDA3083 | 200p | TDA4810 | 500p | TDA8440 | 300p | UPC1032 | 60p | 2SA816 | 70p | 2SA1206 | 60p | 2SB632 | 45p | 2SC839 | 20p |
| TA8216H | 300p | TDA1410 | 220p | TDA3190 | 200p | TDA4814A | 300p | TDA8442 | 200p | UPC1035C | 110p | 2SA817 | 20p | 2SA1207 | 25p | 2SB633 | 80p | 2SC867 | 900p |
| TA8217P | 120p | TDA1412 | 35p | TDA3301B | 1600p | TDA4850 | 475p | TDA8443 | 350p | UPC1043C | 125p | 2SA825 | 20p | 2SA1208 | 70p | 2SB641 | 12p | 2SC870 | 100p |
| TA8220AH TA8221AH | 500p 600p | TDA1506 TDA1508 | 275p 175p | TDA3310 TDA3410 | 120p 150p | TDA4851 TDA4852 | 325p 325p | TDA8444 TDA8451 | 200p 325p | UPC1158H UPC1161 | 70p 110p | 2SA836 2SA837 | 20p 200p | 2SA1209 2SA1210 | 100p 120p | 2SB647 2SB648 | 20p 45p | 2SC897 2SC900B 2SC930 | 175p 30p |
| TA8225H TA8225L TA8227 | 475p 475p 250p | TDA1510 TDA1512 TDA1514A | 170p 140p 325p | TDA3420 TDA3501 TDA3502 | 200p 300p 360p | TDA4860 TDA4866 TDA4881 | 200p 275p 200p | TDA8452 TDA8453 TDA8461 | 200p 350p 950p | UPC1167 UPC1170 UPC1173 | 125p 150p 200p | 2SA839 2SA841 2SA844 | 110p 20p 20p | 2SA1215 2SA1216 2SA1217 | 600p 550p 100p | 2SB649 2SB673 2SB676 | 35p 100p 85p | 2SC936 2SC941 | 15p 300p 15p |
| TA8229K | 200p | TDA1515A | 200p | TDA3504 | 300p | TDA4935 | 300p | TDA8490 | 225p | UPC1176C | 120p | 2SA847 | 25p | 2SA1220 | 75p | 2S8688 | 90p | 2SC944 | 140p |
| TA8400P | 200p | TDA1516Q | 350p | TDA3505 | 275p | TDA4940 | 200p | TDA8540 | 250p | UPC1178H | 250p | 2SA854 | 30p | 2SA1221 | 70p | 2S8703 | 90p | 2SC945 | 10p |
| TA8410K | 200 | TDA1517 | 150p | TDA3506 | 260p | TDA4942 | 200p | TDA8702 | 275p | UPC1180C | 200p | 2SA861 | 45p | 2SA1222 | 50p | 2SB705 | 200p | 2SC950 | 40p |
| TA8410P | 200p | TDA1519 | 200p | TDA3507 | 450p | TDA4944 | 175p | TDA8703 | 500p | UPC185H2 | 400p | 2SA872 | 25p | 2SA1226 | 25p | 2SB707 | 200p | 2SC959 | 225p |
| TA8432 | 200p | TDA1519A | 200p | TDA3510 | 200p | TDA4950 | 100p | TDA8708 | 600p | UPC1186 | 80p | 2SA872A | 50p | 2SA1227 | 250p | 2SB716 | 20p | 2SC980 | 40p |
| TA8605N | 350p | TDA1520 | 275p | TDA3520 | 250p | TDA5030A | 100p | TDA8730 | 225p | UPC1187 | 150p | 2SA879 | 30p | 2SA1232 | 180p | 2SB718 | 60p | 2SC982 | 20p |
| TA8606N | 350p | TDA1521 | 210p | TDA3530 | 250p | TDA5140A | 200p | TDA8732 | 300p | UPC1188H | 350p | 2SA884 | 100p | 2SA1237 | 25p | 2SB727 | 100p | 2SC983 | 120p |
| TA8607P | 320p | TDA1522 | 110p | TDA3540 | 200p | TDA5330T | 300p | TDA8735 | 175p | UPC1191 | 300p | 2SA885 | 35p | 2SA1238 | 30p | 2SB733 | 75p | 2SC1000 | 20p |
| TA8611AN | 250p | TDA1524 | 200p | TDA3541 | 175p | TDA5331T | 200p | TDA8740 | 625p | UPC1197 | 140p | 2SA886 | 45p | 2SA1239 | 30p | 2SB734 | 35p | 2SC1001 | 950p |
| TA8615N | 480p | TDA 1526 | 225p | TDA3560 | 260p | TDA5332T | 150p | TDA8741 | 550p | UPC1198H | 200p | 2SA887 | 20p | 2SA1240 | 45p | 2SB737 | 20p | 2SC1008 | 20p |
| TA8628N | 350p | TDA 1534 | 2000p | TDA3561 | 300p | TDA5500 | 400p | TDA8808T | 325p | UPC1210 | 150p | 2SA893 | 15p | 2SA1242 | 80p | 2SB739 | 22p | 2SC1010 | 225p |
| TA8631 | 500p | TDA 1540 | 420p | TDA3561A | 300p | TDA5600 | 450p | TDA8809T | 350p | UPC1215V | 125p | 2SA896 | 25p | 2SA1244 | 120p | 2SB744 | 55p | 2SC1012 | 75p |
| TA8632N | 550p | TDA1541 | 500p | TDA3562 | 260p | TDA5660P | 250p | TDA9045 | 300p | UPC1222 | 130p | 2SA899 | 40p | 2SA1245 | 55p | 2SB750 | 60p | 2SC1013 | 170p |
| TA8644N | 425p | TDA1542 | 250p | TDA3562TF | 300p | TDA5700 | 200p | TDA9080 | 400p | UPC1225H | 220p | 2SA900 | 45p | 2SA1246 | 80p | 2SB753 | 100p | 2SC1014 | 140p |
| TA8646 | 375p | TDA1543 | 200p | TDA3563 | 350p | TDA5701 | 200p | TDA9102C | 250p | UPC1227V | 225p | 2SA904 | 20p | 2SA1248 | 35p | 2SB754 | 80p | 2SC1030 | 150p |
| TA8653N TA8659AN TA8690N | 1500p 900p 700p | TDA1552Q TDA1553AC TDA1555Q | 350p | TDA3564 TDA3565 TDA3566 | 325p 220p 280p | TDA5708 TDA5709 TDA5800 | 275p 375p 850p | TDA9403 TDA9500 TDA9503 | 130p 750p 550p | UPC1228HA UPC1230 UPC1237HA | 200p | 2SA907 2SA909 2SA912 | 650p 500p 70p | 2SA1249 2SA1252 2SA1253 | 100p 20p 30p | 2SB764 2SB765 2SB772 | 30p 70p 25p | 2SC1046 2SC1047 2SC1050 | 250p 20p 280p |
| TA8691N | 450p | TDA1557Q | 300p | TDA3567 | 350p | TDA5820 | 370p | TDA9513 | 225p | UPC1238 | 120p | 2SA913 | 100p | 2SA1256 | 30p | 2SB774 | 50p | 2SC1051 | 250p |
| TA8701AN | 275p | TDA1558Q | 300p | TDA3569 | 300p | TDA5832 | 125p | TDA9800 | 225p | UPC1241H | 150p | 2SA914 | 90p | 2SA1257 | 30p | 2SB775 | 100p | 2SC1061 | 85p |
| TA8718N | 550p | TDA1560Q | 675p | TDA3570 | 375p | TDA5850 | 175p | TDA9821 | 200p | UPC1242H | 150p | 2SA915 | 30p | 2SA1258 | 70p | 2SB776 | 110p | 2SC1069 | 175p |
| TA8720 | 525p | TDA1571 | 300p | TDA3580 | 300p | TDA5930 | 225p | TEA0652 | 150p | UPC1245V | 130p | 2SA916 | 30p | 2SA1261 | 150p | 2SB788 | 35p | 2SC1070 | 65p |
| TA8739P | 450p | TDA1572 | 175p | TDA3586 | 750p | TDA6100Q | 150p | TEA0653T | 80p | UPC1270H | 250p | 2SA921 | 40p | 2SA1262 | 110p | 2SB791 | 130p | 2SC1079 | 300p |
| TA8872N | 450p | TDA1574 | 125p | TDA3590 | 250p | TDA6101Q | 120p | TEA0655 | 300p | UPC1274V | 250p | 2SA928A | 25p | 2SA1263 | 280p | 2SB794 | 40p | 2SC1080 | 225p |
| TAA550 TBA120S TBA396 | 25p 40p 70p | TDA1576 TDA1578A TDA1579 | 170p 210p 130p | TDA3590 TDA3591 TDA3592A TDA3601Q | 360p 300p 375p | TDA6111Q TDA6200 TDA6600-2 | 225p 750p | TEA0665 TEA1002 TEA1007 | 300p 650p 120p | UPC1277 UPC1278 UPC1288V | 240p 240p 230p | 2SA933 2SA934 2SA935 | 30p 30p 40p | 2SA1264 2SA1265 2SA1283 | 280p 200p 50p | 2SB795 2SB810 2SB816 | 45p 15p 160p | 2SC1096 2SC1098 2SC1106 | 40p 120p 180p |
| TBA520 TBA530 TBA540 | 120p 100p 90p | TDA1589 TDA1591 TDA1596 | 275p 275p 275p 200p | TDA3602 TDA3611 TDA3640 | 225p 450p 350p | TDA6610 2 TDA6612-2 TDA7000 | 1100p | TEA1009 TEA1015P TEA1017 | 100p 110p 280p | UPC1297CA UPC1298 UPC1313H A | 325p 320p | 2SA937 2SA939 2SA940 | 20p 140p 50p | 2SA1284 2SA1286 2SA1289 | 60p 60p 50p | 2SB817 2SB819 2SB822 | 175p 60p 40p | 2SC1114 2SC1115 2SC1116 | 415p 280p 290p |
| TBA560 TBA800 | 90p 40p | TDA1598 TDA1600 | 160p 200p | TDA3645 TDA3651 | 400p 200p | TDA7010T TDA7020T | 120p 175p | TEA1019 TEA1024 | 130p 150p | UPC1316C UPC1318 | 70p 300p | 2SA942 2SA949 | 60p 70p | 2SA1299 2SA1293 2SA1294 | 150p 110p | 2SB824 2SB825 | 60p 135p | 2SC1124 2SC1161 | 270p 110p |
| TBA810AS TBA820 TBA820M | 40p 55p 35p | TDA1602A TDA1670A TDA1675 | 400p 200p 200p | TDA3652 TDA3652-TX TDA3653 | 85p | TDA7021T TDA7050 TDA7052 | 200p 100p 120p | TEA1035 TEA1039 TEA1045 | 200p 150p 300p | UPC 1330HA UPC 1335V UPC 1350 | 320p 115p | 2SA950 2SA951 2SA952 | 18p 60p 30p | 2SA1295 2SA1301 | 450p 500p 260p | 2SB826 2SB827 2SB828 | 75p 200p 200p | 2SC1162 2SC1164 2SC1165 | 30p 600p 750p |
| TBA920 | 100p | TDA1701 | 500p | TDA3654 | 80p | TDA7053 | 200p | TEA1060 | 225p | UPC1352C | 450p | 2SA953 | 60p | 2SA1302 | 300p | 2SB829 | 200p | 2SC1166 | 100p |
| TBA950 | 100p | TDA1771 | 200p | TDA3654Q | 85p | TDA7056 | 200p | TEA1061 | 175p | UPC1360C | 200p | 2SA954 | 30p | 2SA1303 | 400p | 2SB835 | 75p | 2SC1170 | 180p |
| TBA990 | 60p | TDA1870A | 200p | TDA3710 | 300p | TDA7057Q | 225p | TEA1062 | 250p | UPC1362C | 250p | 2SA957 | 185p | 2SA1304 | 110p | 2SB857 | 80p | 2SC1172 | 150p |
| TC5020 | 200p | TDA1872A | 275p | TDA3720 | 175p | TDA7072 | 100p | TEA1064 | 250p | UPC 1363 | 190p | 2SA958 | 60p | 2SA1306 | 110p | 2SB861 | 110p | 2SC1173 | 33p |
| TC5081AP | 80p | TDA1904 | 80p | TDA3724 | 300p | TDA7077 | 175p | TEA1067 | 150p | UPC 1363C | 300p | 2SA963 | 120p | 2SA1307 | 100p | 2SB863 | 220p | 2SC1195 | 210p |
| TC5082P | 170p | TDA1905 | 80p | TDA3725 | 300p | TDA7211 | 100p | TEA1068 | 350p | UPC 1364C | 350p | 2SA965 | 30p | 2SA1309 | 50p | 2SB865 | 25p | 2SC1212 | 35p |
| TC5090A | 230p | TDA1908A | 90p | TDA3730 | 400p | TDA7220 | 65p | TEA1080P | 170p | UPC 1365 | 250p | 2SA966 | 25p | 2SA1315 | 100p | 2SB882 | 180p | 2SC1213 | 10p |
| TC9125BP | 410p | TDA1910 | 160p | TDA3740 | 400p | TDA7222 | 100p | TEA1087 | 40p | UPC 1366C | 130p | 2SA968 | 55p | 2SA1317 | 30p | 2SB885 | 45p | 2SC1214 | 15p |
| TC9130P | 150p | TDA1940 | 180p | TDA3750 | 400p | TDA7230A | 150p | TEA1101 | 425p | UPC 1370C | 300p | 2SA970 | 25p | 2SA1318 | 20p | 2SB891 | 35p | 2SC1215 | 25p |
| TC9134 | 750p | TDA1941 | 300p | TDA3755 | 425p | TDA7231A | 80p | TEA1330 | 65p | UPC1373 | 85p | 2SA979 | 35p | 2SA1319 | 25p | 2SB892 | 25p | 2SC1216 | 200p |
| TC9135P | 125p | TDA1950 | 175p | TDA3760 | 350p | TDA7233 | 60p | TEA1511 | 150p | UPC1377C | 200p | 2SA984 | 25p | 2SA1320 | 45p | 2SB895 | 60p | 2SC1222 | 15p |
| TC9137P | 500p | TDA2002 | 50p | TDA3765V | 225p | TDA7240 | 175p | TEA2000 | 500p | UPC1378 | 1000p | 2SA985 | 60p | 2SA1321 | 80p | 2SB908 | 70p | 2SC1226 | 75p |
| TC9138AP | 150p | TDA2003 | 65p | TDA3771 | 460p | TDA7241 | 250p | TEA2014A | 80p | UPC1379C | 170p | 2SA988 | 25p | 2SA1327 | 130p | 2SB926 | 30p | 2SC1237 | 250p |
| TC9142 | 320p | TDA2004 | 150p | TDA3780 | 400p | TDA7245 | 225p | TEA2018A | 80p | UPC1382 | 110p | 2SA991 | 30p | 2SA1329 | 200p | 2SB941 | 60p | 2SC1247A | 35p |
| TC9143 | 300p | TDA2005 | 150p | TDA3791 | 200p | TDA7250 | 400p | TEA2019 | 600p | UPC1384 | 425p | 2SA992 | 30p | 2SA1346 | 20p | 2SB950 | 180p | 2SC1252 | 850p |
| TC9145 | 150p | TDA2006 | 70p | TDA3800 | 250p | TDA7255 | 400p | TEA2025B | 75p | UPC1387C | 250p | 2SA993 | 50p | 2SA1348 | 45p | 2SB951 | 190p | 2SC1278 | 110p |
| TC9148 | 200p | TDA2007 | 120p | TDA3803A | 500p | TDA7256 | 400p | TEA2028 | 325p | UPC1394 | 120p | 2SA995 | 60p | 2SA1352 | 100p | 2SB953 | 90p | 2SC1279 | 30p |
| TC9149 | 225p | TDA2008 | 100p | TDA3810 | 200p | TDA7262 | 325p | TEA2028B | 375p | UPC1397 | 350p | 2SA999 | 30p | 2SA1353 | 100p | 2SB975 | 100p | 2SC1308K | 350p |
| TC9150 | 425p | TDA2009 | 160p | TDA3825 | 150p | TDA7272 | 170p | TEA2029A | 650p | UPC1403CA | 70p | 2SA 1005 | 25p | 2SA1356 | 100p | 2SB985 | 30p | 2SC1312 | 40p |
| TC9151P | 425p | TDA2010 | 150p | TDA3827 | 110p | TDA7273 | 80p | TEA2029C | 270p | UPC1406HA | | 2SA 1006 | 90p | 2SA1357 | 65p | 2SB986 | 40p | 2SC1318 | 10p |
| TC9152 | 425p | TDA2020 | 120p | TDA3840 | 200p | TDA7274 | 45p | TEA2031A | 125p | UPC1420CA | | 2SA 1008 | 125p | 2SA1358 | 130p | 2SB1009 | 110p | 2SC1325 | 400p |
| TC9153 | 300p | TDA2030 | 80p | TDA3842 | 200p | TDA7275 | 75p | TEA2037 | 200p | UPC1421CA | 650p | 2SA1009 | 200p | 2SA1359 | 45p | 2SB1010 | 25p | 2SC1327 | 20p |
| TC9154AP | 225p | TDA2030H | 100p | TDA3843 | 200p | TDA7282 | 50p | TEA2114 | 200p | UPC1423CA | | 2SA1010 | 225p | 2SA1360 | 45p | 2SB1012 | 55p | 2SC1328 | 15p |
| TC9156 | 300p | TDA2040 | 140p | TDA3845 | 225p | TDA7284 | 100p | TEA2117 | 450p | UPC1470 | | 2SA1011 | 80p | 2SA1362 | 25p | 2SB1015 | 60p | 2SC1342 | 15p |
| TC9158P | 450p | TDA2048 | 600p | TDA3856 | 300p | TDA7302 | 450p | TEA2130 | 350p | UPC1474HA | 75p | 2SA1012 | 85p | 2SA1370 | 50p | 2SB1016 | 130p | 2SC1343 | 200p |
| TC9162 | 275p | TDA2051V | 450p | TDA3857 | 200p | TDA7310 | 800p | TEA2164 | 160p | UPC1484CA | | 2SA1013 | 100p | 2SA1371 | 100p | 2SB1017 | 40p | 2SC1345 | 15p |
| TC9163 | 375p | TDA2052V | 525p | TDA3950 | 225p | TDA7313 | 650p | TEA2260 | 225p | UPC1488H | | 2SA1015 | 10p | 2SA1376 | 30p | 2SB1018 | 130p | 2SC1346 | 100p |
| TC9164 TC9167P TC9172P | 400p 100p 300p | TDA2054M TDA2107 TDA2148 | 110p 250p 325p | TDA4001 TDA4050 TDA4052 | 250p 150p 500p | TDA7318 TDA7330A TDA7350 | 550p 700p 300p | TEA2261 TEA2262 TEA3717DP | 185p 275p | UPC1498H UPC1505C | 500p 400p 70p | 2SA1016 2SA1018 2SA1020 | 30p 100p 30p | 2SA1380 2SA1381 2SA1382 | 75p 100p 120p | 2SB1020 2SB1039 2SB1066 | 120p 65p 40p | 2SC1358 2SC1359 2SC1360 | 270p 15p 70p |
| TC9174P TC9176P TC9177P | 325p 500p | TDA2151 TDA2170 | 375p 1300p | TDA4060 TDA4092 | 500p 250p | TDA7359 TDA7360 | 300p 700p | TEA3718S TEA5030 | 175p 135p | UPC1513HA UPC1514CA UPC1515CA UPC1520CA | 200p 250p | 2SA1021 2SA1023 | 35p 60p | 2SA1385 2SA1386 | 180p 400p | 2SB1068 2SB1077 | 160p 180p | 2SC1364 2SC1368 | 25 p 75 p |
| TCA9940 TCEP100 TD62308AP | 225p 100p 100p | TDA2220 TDA2270 TDA2320 | 200p 250p 80p | TDA4100 TDA4173AF TDA4180 | 145p | TDA7361 TDA7370V TDA7374V | 175p 325p 350p | TEA5040 TEA5101A TEA5110 | 650p 175p 175p | UPC1521HA UPC1536C | 120p 550p | 2SA1026 2SA1029 2SA1036 | 90p 60p 60p | 2SA1387 2SA1396 2SA1399 | 75p 120p 25p | 2SB1098 2SB1099 2SB1109 | 80p 75p 40p | 2SC1382 2SC1383 2SC1384 | 40p 25p 20p |
| TD62382 TD62506 | 200p 200p 200p | TDA2501 TDA2502 TDA2503 | 300p 175p 200p | TDA4190 TDA4200 TDA4210 TDA4260 | 180p 300p 160p | TDA7770 TDA8114 TDA8115 TDA8116 | 140p 225p 200p 350p | TEA5114A TEA5115 TEA5116 | 200p 220p 220p | 2SA329 2SA467 2SA473 2SA483 | 75p 40p 29p | 2SA1037 2SA1038 2SA1048 | 50p 40p 25p | 2SA1400 2SA1423 2SA1428 2SA1441 | 150p 30p 35p | 2SB1123 2SB1133 2SB1134 2SB1135 | 50p 50p 65p 60p | 2SC1393 2SC1394 2SC1398 2SC1399 | 20p 15p 55p 100p |
| TD62705 TD6304AP TD6306P | 250p 300p 350p | TDA2504 TDA2505 TDA2506 | 200p 220p 400p | TDA4280 TDA4282 TDA4283T | 250p 320p 360p | TDA8120B TDA8124 | 400p 250p | TEA5170 TEA5500 TEA5501 | 200p 325p 225p | 2SA484 2SA489 | 90p 80p 50p | 2SA1051 2SA1052 2SA1060 | 300p 15p 120p | 2SA1441 2SA1442 2SA1443 2SA1450 | 110p 110p 130p | 2SB1140 2SB1143 | 45p 40p | 2SC1400 2SC1403 | 50p 500p |
| TD6350P TD6359P TDA1001 | 200p 300p 200p | TDA2507 TDA2507T TDA2510 | 450p 450p 450p | TDA4290 TDA4400 | 450p 125p 175p | TDA8134 TDA8135 TDA8136 | 225p 225p 225p | TEA5550 TEA5560 TEA5570 | 150p 130p 85p | 2SA490 2SA493 2SA495 | 45p 25p 40p | 2SA1061 2SA1069 2SA1073 | 300p 150p 375p | 2SA1459 2SA1462 | 30p 40p 25p | 2SB1151 2SB1162 2SB1163 | 75p 400p 370p | 2SC1407 2SC1413 2SC1419 | 50p 150p 50p |
| TDA1002 | 200p | TDA2514A | 500p | TDA4420 | 120p | TDA8137 | 200p | TEA5580 | 165p | 2SA496 | 30p | 2SA1076 | 230p | 2SA1469 | 100p | 2SB1168 | 50p | 2SC1426 | 700p |
| TDA1003 | 150p | TDA2515 | 450p | TDA4421 | 300p | TDA8138 | 200p | TEA5581 | 200p | 2SA505 | 120p | 2SA1077 | 300p | 2SA1475 | 95p | 2SB1182 | 40p | 2SC1429 | 50p |
| TDA1005A | 175p | TDA2530 | 300p | TDA4426 | 170p | TDA8138A | 130p | TEA5591 | 200p | 2SA509 | 35p | 2SA1080 | 125p | 2SA1488 | 150p | 2SB1185 | 50p | 2SC1431 | 400p |
| TDA1010A | 80p | TDA2532 | 100p | TDA4427 | 300p | TDA8138B | 200p | TEA5620 | 300p | 2SA537 | 170p | 2SA1081 | 80p | 2SA1489 | 300p | 2SB1202 | 45p | 2SC1444 | 275p |
| TDA1011 | 75p | TDA2540 | 150p | TDA4431 | 150p | TDA8139 | 200p | TEA5630 | 225p | 2SA539 | 20p | 2SA1082 | 80p | 2SA1490 | 225p | 2SB1203 | 45p | 2SC1445 | 350p |
| TDA1012 | 120p | TDA2541 | 70p | TDA4433 | 100p | TDA8140 | 200p | TEA5640E | 750p | 2SA544 | 650p | 2SA1083 | 20p | 2SA1491 | 300p | 2SB1204 | 45p | 2SC1446 | 55p |
| TDA 1013A | 110p | TDA2542 | 110p | TDA4437 | 125p | TDA8143 | 160p | TEA5701 | 650p | 2SA550 | 150p | 2SA1084 | 100p | 2SA1492 | 260p | 2SB1205 | 40p | 2SC1447 | 70p |
| TDA 1015 | 85p | TDA2543 | 210p | TDA4439 | 220p | TDA8145 | 120p | TEA6000 | 400p | 2SA562 | 30p | 2SA1085 | 75p | 2SA1493 | 500p | 2SB1223 | 60p | 2SC1449 | 120p |
| TDA 1016 | 140p | TDA2544 | 200p | TDA4440 | 180p | TDA8146 | 200p | TEA6100 | 350p | 2SA564 | 15p | 2SA1091 | 100p | 2SA1494 | 450p | 2SB1243 | 40p | 2SC1450 | 200p |
| TDA 1020 | 110p | TDA2545 | 120p | TDA4442 | 240p | TDA8160 | 125p | TEA6200 | 225p | 2SA571 | 650p | 2SA1093 | 180p | 2SA1516 | 280p | 2SB1274 | 40p | 2SC1454 | 250p |
| TDA 1022 | 330p | TDA2546A | 200p | TDA4443 | 250p | TDA8170 | 170p | TEA6300 | 500p | 2SA603 | 100p | 2SA1094 | 190p | 2SA1519 | 20p | 2SB1282 | 300p | 2SC1470 | 120p |
| TDA 1023 | 130p | TDA2548 | 200p | TDA4445 | 220p | TDA8172 | 200p | TEA6310T | 425p | 2SA606 | 200p | 2SA1095 | 300p | 2SA1523 | 45p | 2SB1318 | 40p | 2SC1472 | 40p |
| TDA 1024 | 150p | TDA2549 | 300p | TDA4450 | 225p | TDA8173 | 175p | TEA6414A | 425p | 2SA608 | 15p | 2SA1096 | 80p | 2SA1535 | 175p | 2SB1375 | 45p | 2SC1473 | 15p |
| TDA 1025 | 320p | TDA2555 | 175p | TDA4452 | 250p | TDA8174 | 200p | TEA6415B | 525p | 2SA614 | 150p | 2SA1102 | 130p | 2SA1538 | 55p | 2SB1382 | 350p | 2SC1474 | 45p |
| TDA 1028 | 175p | TDA2556 | 230p | TDA4453 | 275p | TDA8175 | 300p | TEA6420 | 360p | 2SA628 | 20p | 2SA1103 | 130p | 2SA1540 | 50p | 2SB1468 | 100p | 2SC1501 | 70p |
| TDA1038 | 200p 500p | TDA2557 TDA2558 TDA2574V | 225p 400p 350p | TDA4480 TDA4481 TDA4482 | 280p 215p 200p | TDA8178 TDA8179S TDA8185 | 650p 750p 180p | TEA8172 TL431 TL494 | 125p 45p 100p | 2SA634 2SA636 2SA639 | 50p 50p 60p | 2SA1104 2SA1105 2SA1106 | 140p 250p 160p | 2SA1598 2SA1599 2SA1600 | 220p 220p 250p | 2SC182 2SC372 2SC380 | 75p 25p 10p | 2SC1505 2SC1507 2SC1509 | 55p 45p 35p |
| TDA1041P TDA1044 | 250p 180p 110p | TDA2575A TDA2577A TDA2578A | 100p 200p 200p | TDA4500 TDA4501 TDA4502 | 300p 280p 400p | TDA8190 TDA8191 TDA8192 | 200p 425p 200p | TLO61 TLO64 TLO71 | 40p 80p 38p | 2SA640 2SA642 2SA643 | 60p 50p 25p | 2SA1111 2SA1112 2SA1115 | 90p 150p 30p | 2SA1601 2SA1625 2SA1626 | 200p 40p 90p | 2SC388A 2SC394 2SC403 | 25p 60p 25p | 2SC1514 2SC1515 2SC1520 | 35p 60p 45p |
| TDA 1047 | 200p | TDA2579A | 210p | TDA4503 | 325p | TDA8196 | 120p | TLO74 | 80p | 2SA673 | 15p | 2SA1120 | 40p | 2SA1640 | 100p | 2SC454 | 15p | 2SC1541 | 110p |
| TDA 1048 | 200p | TDA2582 | 130p | TDA4505A | 300p | TDA8205 | 1250p | TLO83 | 55p | 2SA677 | 35p | 2SA1123 | 40p | 2SA1652 | 70p | 2SC458 | 10p | 2SC1545 | 120p |
| TDA 1053 | 300p | TDA2590 | 170p | TDA4505E | 275p | TDA8213 | 175p | TLO84 | 70p | 2SA678 | 26p | 2SA1124 | 60p | 2SA1667 | 175p | 2SC460 | 10p | 2SC1567 | 40p |
| TDA1054 | 180p | TDA2591 | 110p | TDA4505K | 450p | TDA8214B | 225p | TMP47C-434N | 1250p | 2SA683 | 25p | 2SA1127 | 50p | 2SA1668 | 180p | 2SC461 | 15p | 2SC1568 | 35p |
| TDA1057 | 60p | TDA2591Q | 150p | TDA4505M | 1000p | TDA8215H | 300p | TPU2732 | 800p | 2SA684 | 25p | 2SA1133 | 120p | 2SA1671 | 310p | 2SC495 | 45p | 2SC1569 | 55p |
| TDA1059B | 40p | TDA2593 | 80p | TDA4510 | 200p | TDA8217 | 225p | TPU2735 | 500p | 2SA699 | 100p | 2SA1135 | 130p | 2SA1673 | 425p | 2SC496 | 25p | 2SC1570 | 40p |
| TDA1060 | 140p | TDA2594 | 450p | TDA4532 | 200p | TDA8303 | 250p | UC3524 | 100p | 2SA705 | 70p | 2SA1141 | 200p | 2SA1680 | 40p | 2SC497 | 85p | 2SC1571 | 50p |
| TDA1062 | 140p | TDA2595 | 200p | TDA4555 | 275p | TDA8304 | 400p | UC3842N | 60p | 2SA706 | 140p | 2SA1142 | 100p | 2SA1706 | 25p | 2SC515 | 100p | 2SC1573 | 25p |
| TDA1068 | 75p | TDA2600 | 400p | TDA4556 | 370p | TDA8305 | 500p | UC3843 | 125p | 2SA708 | 50p | 2SA1143 | 15p | 2SB175 | 45p | 2SC535 | 30p | 2SC1576 | 550p |
| TDA1072 | 150p | TDA2611A | 100p | TDA4557 | 200p | TDA8340 | 150p | UC3844 | 70p | 2SA711 | 280p | 2SA1145 | 40p | 2SB324 | 40p | 2SC536 | 20p | 2SC1580 | 600p |
| TDA1074 | 280p | TDA2616 | 250p | TDA4560 | 270p | TDA8341 | 250p | UPC20C | 220p | 2SA715 | 50p | 2SA1146 | 200p | 2SB337 | 150p | 2SC605 | 100p | 2SC1583 | 25p |
| TDA1077 | 250p | TDA2630 | 300p | TDA4565 | 150p | TDA8349A | 350p | UPC554 | 130p | 2SA719 | 50p | 2SA1151 | 30p | 2SB474 | 250p | 2SC619 | 100p | 2SC1586 | 540p |
| TDA1082 TDA1083 TDA1085 | 275p 95p 170p | TDA2640 TDA2653A TDA2654 | 350p 350p 200p | TDA4566 TDA4568 TDA4570 | 250p 225p 200p | TDA7350Q TDA8351 TDA8360N3 | 275p 200p | UPC555 UPC556H UPC571 | 60p 80p 220p | 2SA720 2SA725 2SA726 | 20p 80p 20p | 2SA1152 2SA1153 2SA1154 | 150p 30p 22p | 2SB492 2SB511 2SB525 | 80p 55p 65p | 2SC641 2SC644 2SC647 | 80p 10p 300p | 2SC1617 2SC1619 2SC1623 | 340p 170p 50p |
| TDA1087 TDA1092 TDA1097 | 60p 100p 475p | TDA2658 TDA2670 TDA2690 | 300p 150p 100p | TDA4580 TDA4600 TDA4600II | 400p 200p 160p | TDA8361N3 TDA8362AN TDA8362N3 | 900p 1200p | UPC574 UPC575C2 UPC577 | 60p 90p 64p | 2SA733 2SA740 2SA742 | 15p 90p 450p | 2SA1156 2SA1162 2SA1163 | 90p 30p 15p | 2SB527 2SB531 2SB536 | 130p 400p 80p | 2SC681 2SC683 2SC708 | 250p 35p 100p | 2SC1624 2SC1626 2SC1627 | 60p 55p 15p |
| TDA1151 | 40p | TDA2710-1 | 400p | TDA4601 | 120p | TDA8366N2 | 1500p | UPC592 | 95p | 2SA747A | 425p | 2SA1169 | 500p | 2SB537 | 90p | 2SC710 | 15p | 2SC1628 | 75p |
| TDA1154 | 50p | TDA2721 | 200p | TDA4605 | 190p | TDA8372A | 1650p | UPC595 | 190p | 2SA748 | 60p | 2SA1170 | 500p | 2SB544 | 22p | 2SC711 | 15p | 2SC1634 | 50p |
| TDA1170 | 85p | TDA2730 | 200p | TDA4610 | 370p | TDA8380 | 200p | UPC596 | 190p | 2SA764 | 200p | 2SA1173 | 60p | 2SB546 | 45p | 2SC730 | 350p | 2SC1667 | 450p |
| TDA1170N | 85p | TDA2740 | 300p | TDA4650 | 300p | TDA8385 | 275p | UPC1001 | 220p | 2SA769 | 80p | 2SA1174 | 25p | 2SB549 | 50p | 2SC732 | 40p | 2SC1669 | 100p |
| TDA1175 | 175p | TDA2750 | 200p | TDA4660 | 200p | TDA8390A | 650p | UPC1004C | 130p | 2SA770 | 200p | 2SA1175 | 30p | 2SB560 | 25p | 2SC735 | 40p | 2SC1674 | 15p |

GRANDATA LTD

Tel: 0181 900 2329 Fax: 0181 903 6126

TELEVISION April 1999 407

| | | | | | | TA | PAN | ES | 5.17 | RAN | NST | STO | RS | | | | - | | |
|---------------------|----------------|---------------------|---------------|----------------------|---------------------|--------------------|---------------|----------------------|-----------------------|-------------------|---------------------|---------------------|--------------|-------------------------------|--------------|---------------------|----------------|-----------------------------|---------------|
| Part | Price | Part | Price | Part | Price | Part | Price | Part | Price | Part | Price | Part | Price | Part | Price | Part | Price | Part | Price |
| 2SC1675 2SC1678 | 90p 80p | 2SC2261 2SC2267 | 700p 90p | 2SC2719 2SC2721 | 25p 120p | 2SC3263 2SC3264 | 280p 390p | 2SC3798 2SC3807 | 220p 120p | 2SD257 2SD287 | 195p 250p | 2SD880 2SD882 | 40p 25p | 2SD1327 2SD1328 | 150p 60p | 2SD1763A 2SD1764 | | 2SK312 | 750p |
| 2SC1683 2SC1684 | 100р 30р | 2SC2270 2SC2271 | 60p 25p | 2SC2724 2SC2738 | 15p 200p | 2SC3269 2SC3270 | 50p 50p | 2SC3808 2SC3811 | 70p 80p | 2SD291 2SD313 | 250p 250p 25p | 2SD889 2SD892A | 35p 75p | 2SD1320 2SD1330 2SD1347 | 50p 70p | 2SD1765 2SD1769 | 70p | 2SK315 2SK320 | 70p 120p |
| 2SC1685 | 30p | 2SC2274 | 15p | 2SC2749 | 350p | 2SC3271 | 75p | 2SC3831 | 250p | 2SD315 | 75p | 2SD894 | 35p | 2SD1348 | 65p | 2SD1773 | 110p 100p | 2SK323 2SK332 | 130p 175p |
| 2SC1729 2SC1730 | 900p 10p | 2SC2275 2SC2278 | 50р 70р | 2SC2750 2SC2751 | 300р 270р | 2SC3277 2SC3279 | 280p 30p | 2SC3832 2SC3833 | 135p 250p | 2SD325 2SD330 | 30p 65p | 2SD895 2SD896 | 100p 200p | 2SD1350 2SD1376 | 150p 60p | 2SD1776 2SD1783 | 70p 70p | 2SK359 | 40p |
| 2SC1735 2SC1740 | 70p 10p | 2SC2283 2SC2290 | 700p 1800p | 2SC2752 2SC2767 | 75p 30 0p | 2SC3280 2SC3281 | 200p 200p | 2SC3851 2SC3852 | 100p 80p | 2SD348 2SD350 | 300p 320p | 2SD898B 2SD900 | 225p 400p | 2SD1378 2SD1379 | 60р 100р | 2SD1785 2SD1789 | 160p 210p | 2SK363 2SK364 | 50p 40p |
| 2SC1741 2SC1755 | 35p 90p | 2SC2291 2SC2298 | 40p 35p | 2SC2769 2SC2773 | 400p 700p | 2SC3284 2SC3293 | 600p 85p | 2SC3853 2SC3855 | 220p 220p | 2SD357 2SD358 | 40p 40p | 2SD905 2SD916 | 450p 130p | 2SD1380 2SD1382 | 100p 60p | 2SD1796 2SD1802 | 120p 75p | 2SK367 2SK369 | 40p 30p |
| 2SC1756 2SC1758 | 35p 30p | 2SC2307 2SC2308 | 300p 10p | 2\$C2774 2\$C2785 | 500p | 2SC3298 2SC3299 | 50p 120p | 2SC3857 2SC3858 | 500p 550p | 2SD359 2SD361 | 50p 100p | 2SD917 2SD921 | 300p 320p | 2SD1384 2SD1390 | 50p 350p | 2SD1806 2SD1812 | 75p | 2SK373 | 40p |
| 2SC1760 | 70p | 2SC2312 | 300p | 2SC2786 | 20p | 2SC3300 | 400p | 2SC3866 | 275p | 2SD362 | 100p | 2SD923 | 360p | 2SD1391 | 250p | 2SD1815 | 45p 50p | 2SK374 2SK386 | 45p 600p |
| 2SC1775 2SC1781 | 10p 20p | 2SC2314 2SC2316 | 70p 150p | 2SC2787 2SC2791 | 10p 500p | 2SC3303 2SC3306 | 100p 130p | 2SC3868 2SC3870 | 100p 200p | 2SD371 2SD380 | 240p 650p | 2SD946 2SD947 | 120p 100p | 2SD1392 2SD1395 | 85p 80p | 2SD1825 2SD1827 | 60p 120p | 2SK389 2SK400 | 115p 700p |
| 2SC1789 2SC1809 | 100p 40p | 2SC2320 2SC2324 | 10p 120p | 2SC2792 2SC2793 | 220p 700p | 2SC3307 2SC3309 | 600p 150p | 2SC388A 2SC3883 | 25p 210p | 2SD381 2SD382 | 50p 75p | 2SD950 2SD951 | 300p 200p | 2SD1396 2SD1397 | 120p 100p | 2SD1843 2SD1846 | 70p 350p | 2SK405 | 450p |
| 2SC1810 2SC1815 | 250p 10p | 2SC2328A 2SC2310 | 50p 25p | 2SC2808 2SC2810 | 40p 360p | 2SC3310 2SC3316 | 125p 280p | 2SC3884A 2SC3885 | 200p 250p | 2SD386 2SD388 | 70p 150p | 2SD957A 2SD958 | 520p 60p | 2SD1398 2SD1399 | 120p 300p | 2SD1847 2SD1849 | 275p 280p | 2SK414 2SK415 | 550p 500p |
| 2SC1819 2SC1826 | 70р 60р | 2SC2315 2SC2329 | 175p 480p | 2SC2812 2SC2814 | 40p 40p | 2SC3317 2SC3326 | 350p 50p | 2SC3885A 2SC3886A | | 2SD389 2SD400 | 60p 14p | 2SD965 2SD970 | 35p 170p | 2SD1400 2SD1402 | 280p 120p | 2SD1850 2SD1853 | 325p 40p | 2SK423 2SK427 | 75p 50p |
| 2SC1827 2SC1829 | 60р 500р | 2SC2230 2SC2331 | 300p 50p | 2SC2824 2SC2825 | 75p 900p | 2SC3327 2SC3328 | 60р 50р | 2SC3890 2SC3892A | 150p | 2SD401 2SD402 | 50p 120p | 2SD972 2SD973 | 40p 60p | 2SD1403 2SD1405 | 225p 80p | 2SD1856 2SD1857 | 40p 75p | 2SK427 2SK430 | 200p |
| 2SC1833 2SC1834 | 27p | 2SC2333 | 200p | 2SC2826 2SC2827 | 200p | 2SC3330 | 20p | 2SC3893 | 225p | 2SD414 | 45p | 2SD973A | 70p | 2SD1406 | 60p | 2SD1858 | 40p | 2SK511 2SK513 | 450p 325p |
| 2SC1841 | 50p 12p | 2SC2334 2SC2335 | 80p 55p | 2SC2832 | 130p 300p | 2SC3331 2SC3333 | 25p 120p | 2SC3895 2SC3896 | 325p 400p | 2SD415 2SD424 | 55p 350p | 2SD982 2SD985 | 90p 120p | 2SD1407 2SD1408 | 60p 125p | 2SD1863 2SD1864 | 35p 85p | 2SK526 | 160p |
| 2SC1844 2SC1845 | 50p 15p | 2SC2336A 2SC2344 | 150p | 2SC2834 2SC2837 | 280p 250p | 2SC3345 2SC3346 | 100p 130p | 2SC3897 2SC3907 | 400р 250р | 2SD426 2SD427 | 150p 350p | 2SD986 2SD998 | 120p 70p | 2SD1409 2SD1411 | 170p 85p | 2SD1877 2SD1878 | 175p 160p | 2SK531 2SK534 | 350p 700p |
| 2SC1846 2SC1847 | 35p 45p | 2SC2347 2SC2353 | 35p 120p | 2SC2839 2SC2853 | 40p 70p | 2SC3352 2SC3353 | 200p 280p | 2SC3927 2SC3940 | 250p 40p | 2SD438 2SD467 | 35p | 2SD1010 2SD1012 | 40p 40p | 2SD1412 2SD1413 | 75p 60p | 2SD1879 2SD1880 | 275p 360p | 2SK537 2SK538 | 900p 350p |
| 2SC1855 2SC1856 | 85p 25p | 2SC2360 2SC2361 | 120p 150p | 2SC2873 2SC2877 | 60р 120р | 2SC3355 2SC3356 | 50p 120p | 2SC3943 2SC3944 | 75p 80p | 2SD468 2SD471 | 15p 20p | 2SD1020 2SD1021 | 40p 120p | 2SD1415 2SD1417 | 190p 75p | 2SD1881 2SD1884 | 350p 300p | 2SK539 | 1100p |
| 2SC1865 | 700p | 2SC2362 | 50p | 2SC2878 | 20p | 2SC3358 | 50p | 2SC3950 | 120p | 2SD476 | 100p | 2SD1022 | 250p | 2SD1425 | 260p | 2SD1886 | 300p | 2SK544 2SK552 | 30p 250p |
| 2SC1870 2SC1871 | 700р 425р | 2SC2365 2SC2369 | 280p 100p | 2SC2879 2SC2882 | 3200p 60p | 2SC3376 2SC3377 | 300p 50p | 2SC3953 2SC3955 | 50p 60p | 2SD525 2SD526 | 50p 70p | 2SD1024 2SD1027 | 850p 850p | 2SD1426 2SD1427 | 135p 160p | 2SD1887 2SD1894 | 225p 300p | 2SK553 | 225p |
| 2SC1875 2SC1881 | 220p 70p | 2SC2371 2SC2373 | 25p 210p | 2SC2883 2SC2898 | 60р 200р | 2SC3378 2SC3379 | 120p 1200p | 2SC3964 2SC3972 | 100p 250p | 2SD545 2SD549 | 18p 120p | 2SD1030 2SD1031 | 75p 70p | 2SD1428 2SD1430 | 180p 280p | 2SD1895 2SD1910 | 225p 175p | 2SK555 2SK556 | 320p 500p |
| 2SC1890 2SC1895 | 15p 500p | 2SC2383 2SC2389 | 50p 45p | 2SC2899 2SC2909 | 50p 60p | 2SC3381 2SC3383 | 130p 80p | 2SC3973 2SC3975 | 210p 210p | 2SD551 2SD554 | 300p 225p | 2SD1036 2SD1046 | 600p 200p | 2SD1431 2SD1432 | 200p 400p | 2SD1911 2SD1913 | 300p 50p | 2SK557 2SK559 | 400p 600p |
| 2SC1904 2SC1906 | 125p 15p | 2SC2407 2SC2408 | 110p 120p | 2SC2910 2SC2911 | 25p 80p | 2SC3393 2SC3397 | 80p 20p | 2SC3987 2SC3996 | 160p 600p | 2SD555 2SD556 | 500p 225p | 2SD1047 2SD1051 | 180p | 2SD1433 2SD1438 | 300p | 2SD1929 2SD1930 | 50p | 2SK560 | 580p |
| 2SC1907 | 20p | 2SC2412K | 50p | 2SC2912 | 120p | 2SC3399 | 50p | 2SC3997 | 1250p | 2SD558 | 200p | 2SD1055 | 60p | 2SD1439 | 60p 165p | 2SD1933 | 50p 45p | 2SK566 2SK606 | 475p 70p |
| 2SC1909 2SC1913 | 250p 90p | 2SC2440 2SC2458 | 200p 10p | 2SC2921 2SC2922 | 650p 480p | 2SC3400 2SC3401 | 35p 50p | 2SC3998 2SC4006 | 800p 1 0 0p | 2SD560 2SD571 | 50p 20p | 2SD1060 2SD1062 | 130p 150p | 2SD1441 2SD1442 | 220p 80p | 2SD1939 2SD1941 | 60p 350p | 2SK612 | 80p |
| 2SC1914 2SC1921 | 30p 15p | 2SC2459 2SC2466 | 50p 55p | 2SC2923 2SC2928 | 75p 550p | 2SC3402 2SC3405 | 40p 130p | 2SC4020 2SC4023 | 150p 325p | 2SD575 2SD592 | 530p 25p | 2SD1063 2SD1064 | 200p 250p | 2SD1445 2SD1446 | 200p 300p | 2SD1944 2SD1958 | 50p 80p | 2SK684 2SK685 | 950p 1150p |
| 2SC1922 2SC1923 | 175p 10p | 2SC2486 2SC2492 | 275p 50p | 2SC2929 2SC2934 | 280p 75p | 2SC3409 2SC3416 | 400p 30p | 2SC4029 2SC4043 | 350p 45p | 2SD596 2SD600 | 25p 30p | 2SD1065 2SD1069 | 160p 150p | 2SD1450 2SD1451 | 60p 200p | 2SD1959 2SD1978 | 210p 50p | 2SK699 2SK719 | 100p 300p |
| 2SC1929 2SC1940 | 180p 110p | 2SC2470 2SC2481 | 65p 120p | 2SC2937 2SC2939 | 250p 400p | 2SC3417 2SC3419 | 90p 120p | 2SC4046 2SC4056 | 40p 200p | 2SD601 2SD602 | 40р 60р | 2SD1073 2SD1088 | 350p 150p | 2SD1452 2SD1453 | 275p | 2SD1984 2SD1991 | 60p | 2SK724 | 500p |
| 2SC1941 2SC1942 | 27p 350p | 2SC2482 2SC2483 | 20p 120p | 2SC2944 2SC2958 | 300p 50p | 2SC3420 2SC3421 | 80p 45p | 2SC4059 2SC4064 | 400p 140p | 2SD612 2SD613 | 50p 70p | 2SD1094 2SD1110 | 375p | 2SD1455 2SD1457 | 250p | 2SD1994 2SD1996 | 200p | 2SK725 2SK726 | 550p 425p |
| 2SC1944 | 350p | 2SC2484 | 185p | 2SC2962 | 800p | 2SC3422 | 75p | 2SC4106 | 150p | 2SD617 | 300p | 2SD1111 | 225p 20p | 2SD1458 | 50p | 2SD2006 | 45p 75p | 2SK727 2SK739 | 475p 400p |
| 2SC1945 2SC1946 | 350p 1500p | 2SC2485 2SC2491 | 400p 200p | 2SC2979 2SC2987 | 160p 250p | 2SC3423 2SC3425 | 60p 65p | 2SC4107 2SC4123 | 175p 230p | 2SD633 2SD636 | 70p 10p | 2SD1113 2SD1128 | 225p 200p | 2SD1459 2SD1468 | 60p 40p | 2SD2010 2SD2011 | 250p 60p | 2SK758 | 300p |
| 2SC1947 2SC1953 | 450p 45p | 2SC2498 2SC2500 | 50p 25p | 2SC2988 2SC2995 | 150р 60р | 2SC3446 2SC3447 | 150p 130p | 2SC4124 2SC4125 | 200p 275p | 2SD637 2SD638 | 15p 15p | 2SD1133 2SD1135 | 65p 75p | 2SD1487 2SD1494 | 225p 150p | 2SD2012 2SD2018 | 50p 65p | 2SK769 2SK786 | 500p 200p |
| 2SC1957 2SC1959 | 70p 10p | 2SC2502 2SC2503 | 140p 600p | 2SC2999 2SC3001 | 50p 1400p | 2SC3456 2SC3457 | 200p 125p | 2SC4137 2SC4138 | 40p 200p | 2SD639 2SD640 | 20p 350p | 2SD1138 2SD1140 | 40p 40p | 2SD1496 2SD1497 | 300p 230p | 2SD2033 2SD2061 | 80p 100p | 2SK787 2SK791 | 800p 225p |
| 2SC1962 2SC1967 | 175p 1300p | 2SC2512 2SC2517 | 20p 120p | 2SC3019 2SC3020 | 320p 1450p | 2SC3459 2SC3460 | 180p 130p | 2SC4157 2SC4159 | 400p 100p | 2SD655 2SD661 | 18p 60p | 2SD1142 2SD1145 | 350p 25p | 2SD1497-0 2SD1505 | | 2SD2066 2SD2125 | 250p 180p | 2SK792 | 300p |
| 2SC1969 2SC1970 | 160p 100p | 2SC2519 2SC2527 | 60p 300p | 2SC3022 2SC3025 | 1850p 500p | 2SC3461 2SC3466 | 275p 225p | 2SC4161 2SC4169 | 125p 60p | 2SD666 2SD667 | 25p 20p | 2SD1148 2SD1153 | 175p 30p | 2SD1506 2SD1508 | 50p 60p | 2SD2136 2SD2144 | 85p 35p | 2SK793 2SK794 | 300p 315p |
| 2SC1971 | 400p | 2SC2534 | 150p | 2SC3026 | 450p | 2SC3468 | 70p | 2SC4199 | 400p | 2SD669 | 35p | 2SD1159 | 65p | 2SD1509 | 100p | 2SD2151 | 175p | 2SK796 | 600p |
| 2SC1972 2SC1973 | 600p 150p | 2SC2535 2SC2538 | 300p 100p | 2SC3030 2SC3037 | 300p 125p | 2SC3481 2SC3482 | 300p 275p | 2SC4204 2SC4231 | 60р 250р | 2SD673 2SD676 | 350p 250p | 2SD1160 2SD1163A | | 2SD1511 2SD1519 | 75p 250p | 2SD2255 2SD2331 | 175p 250p | 2SK809 2SK812 | 850p 150p |
| 2SC1975 2SC1980 | 120p 30p | 2SC2540 2SC2542 | 1900p 300p | 2SC3038 2SC3039 | 125p 80p | 2SC3486 2SC3502 | 275p 50p | 2SC4235 2SC4236 | 300р 450р | 2SD717 2SD718 | 180p 85p | 2SD1164 2SD1168 | 75p 270p | 2SD1521 2SD1525 | 70p 450p | 2SD2333 2SD2340 | 150p 225p | 2SK817 2SK851 | 325p 550p |
| 2SC1983 2SC1984 | 75p 150p | 2SC2545 2SC2546 | 55p 25p | 2SC3040 2SC3042 | 260p 300p | 2SC3503 2SC3504 | 50p 120p | 2SC4237 2SC4242 | 500р 120р | 2SD722 2SD725 | 240p 200p | 2SD1169 2SD1173 | 280p 350p | 2SD1526 2SD1541 | 100p 350p | 2SJ48 2SJ56 | 425p 700p | 2SK872 | 650p |
| 2SC1985 2SC1986 | 100p 100p | 2SC2547 2SC2550 | 65p 50p | 2SC3052 2SC3057 | 30p 150p | 2SC3505 2SC3506 | 240p 250p | 2SC4278 2SC4288A | 175p 650p | 2SD726 2SD731 | 275p 250p | 2SD1185 2SD1186 | 280p 400p | 2SD1545 2SD1546 | 275p 350p | 2SJ74 2SJ76 | 60p 220p | 2SK875 2SK903 | 475p 500p |
| 2SC2001 2SC2002 | 15p 15p | 2SC2551 2SC2552 | 70p 60p | 2SC3068 2SC3070 | 60p 35p | 2SC3507 2SC3509 | 650p 750p | 2SC4300 2SC4301 | 200p 300p | 2SD732 2SD734 | 250p 15p | 2SD1189 2SD1191 | 55p 120p | 2SD1548 2SD1554 | 400p 170p | 2SJ77 2SJ79 | 350p 225p | 2SK904 2SK951 | 500p 275p |
| 2SC2003 | 20p | 2SC2553 | 200p | 2SC3071 | 25p | 2SC3514 | 170p | 2SC4304 | 225p | 2SD741 | 120p | 2SD1192 | 90p | 2SD1555 | 150p | 2SJ103 | 75p | 2SK952 | 275p |
| 2SC2004 2SC2022 | 20p 110p | 2SC2555 2SC2562 | 120p 90p | 2SC3073 2SC3074 | 100р 200р | 2SC3518 2SC3519 | 120p 250p | 2SC4313 2SC4381 | 600р 150р | 2SD743 2SD757 | 130p 120p | 2SD1196 2SD1197 | 150p 150p | 2SD1556 2SD1565 | 225p 75p | 2SJ109 2SJ113 | 200p 1050p | 2SK955 2SK956 | 450p 400p |
| 2SC2023 2SC2026 | 180p 30p | 2SC2563 2SC2568 | 200р 120р | 2SC3075 2SC3077 | 150p 120p | 2SC3526 2SC3528 | 45p 750p | 2SC4382 2SC4386 | 200p 275p | 2SD760 2SD762 | 70p 100p | 2SD1198 2SD1207 | 60р 40р | 2SD1571 2SD1572 | 170p 100p | 2SJ114 2SJ116 | 1150p 1200p | 2SK962 2SK1023 | 700p 550p |
| 2SC2027 2SC2036 | 200p 50p | 2SC2570 2SC2571 | 30p 350p | 2SC3086 2SC3089 | 150p 130p | 2SC3531 2SC3549 | 225p 200p | 2SC4387 2SC4408 | 425p 50p | 2SD763 2SD768 | 140p 180p | 2SD1210 2SD1211 | 280p 120p | 2SD1575 2SD1576 | 200p 150p | 2SJ117 2SJ119 | 550p 700p | 2SK1036 | 450p |
| 2SC2037 2SC2053 | 50p 120p | 2SC2577 2SC2578 | 110p 170p | 2SC3101 2SC3112 | 750p 35p | 2SC3552 2SC3568 | 270p 200p | 2SC4429 2SC4431 | 275p 90p | 2SD772 2SD773 | 200p 20p | 2SD1213 2SD1218 | 220p 75p | 2SD1577 2SD1579 | 250p 80p | 2SJ162 2SJ175 | 680p 200p | 2SK1057 2SK1058 | 600p 800p |
| 2SC2055 2SC2058 | 150p 20p | 2SC2579 2SC2580 | 110p 175p | 2SC3114 2SC3116 | 40p 75p | 2SC3577 2SC3584 | 275p 200p | 2SC4466 2SC4467 | 325p 175p | 2SD774 2SD777 | 30p 400p | 2SD1223 2SD1225 | 75p 70p | 2SD1589 2SD1590 | 60p 100p | 2SJ182 2SJ200 | 150p 625p | 2SK1081 2SK1082 | 700p |
| 2SC2060 | 40p 75p | 2SC2581 | 225p | 2SC3117 | 120p | 2SC3591 | 200p | 2SC4468 | 250p | 2SD784 | 650p | 2SD1227 | 40p | 2SD1591 | 310p | 2SJ307 | 175p | 2SK1102 | 450p 375p |
| 2SC2061 2SC2068 | 60p | 2SC2588 2SC2590 | 600p 40p | 2SC3122 2SC3148 | 50p 145p | 2SC3595 2SC3597 | 220p 75p | 2SC4517 2SC4517A | | 2SD786 2SD787 | 100p 20p | 2SD1229 2SD1237 | 250p 300p | 2SD1593 2SD1595 | 125p 70p | 2SK19 2SK33 | 45p 40p | 2SK1117 2SK1118 | 250p 225p |
| 2SC2071 2SC2073 | 140p 40p | 2SC2591 2SC2592 | 50р 200р | 2SC3149 2SC3150 | 180p 100p | 2SC3599 2SC3600 | 140p 175p | 2SC4531 2SC4532 | 450p 1000p | 2SD788 2SD789 | 30р 20р | 2SD1238 2SD1244 | 300p 25p | 2SD1608 2SD1609 | 210p 45p | 2SK40 2SK55 | 50р 100р | 2SK1120 | 550p |
| 2SC2075 2SC2078 | 60p 95p | 2SC2603 2SC2610 | 10р 60р | 2SC3151 2SC3152 | 175p 130p | 2SC3606 2SC3607 | 100p 150p | 2SC4542 2SC4742 | 40 0 p 275p | 2SD792 2SD794 | 400p 33p | 2SD1246 2SD1247 | 20p 40p | 2SD1632 2SD1637 | 320p 50p | 2SK68 2SK73 | 100p 75p | 2SK1190 2SK1191 | 350p 800p |
| 2SC2085 2SC2086 | 100p 60p | 2SC2611 2SC2621 | 30p 70p | 2SC3153 2SC3156 | 175p 350p | 2SC3608 2SC3616 | 65p 45p | 2SC4744 2SC4745 | 350p 550p | 2SD795A 2SD798 | 140p 175p | 2SD1251 2SD1254 | 180p 55p | 2SD1647 2SD1649 | 40p 260p | 2SK97 2SK106 | 200p 40p | 2SK1217 2SK1221 | 700p 200p |
| 2SC2092 2SC2094 | 100p 1200p | 2SC2625 | 190p 600p | 2SC3157 2SC3158 | 200p | 2SC3636 2SC3642 | 280p | 2SC4747 2SC4757 | 375p | 2SD799 | 150p | 2SD1263 | 90p | 2SD1650 | 150p | 2SK107 | 40p | 2SK1275 | 275p |
| 2SC2097 | 2300p | 2SC2626 2SC2630 | 1800p | 2SC3159 | 260p 200p | 2SC3657 | 225p 400p | 2SC4762 | 200p 300p | 2SD809 2SD811 | 45p 450p | 2SD1264 2SD1265 | 55p 75p | 2SD1651 2SD1656 | 150p 250p | 2SK109 2SK117 | 150p 50p | 2SK1296 2SK1299 | 350p 450p |
| 2SC2099 2SC2118 | 2500p 1100p | 2SC2631 2SC2632 | 20p 35p | 2SC3164 2SC3169 | 270p 150p | 2SC3659 2SC3668 | 600p 120p | 2SC4769 2SC4770 | 220p 250p | 2SD819 2SD820 | 300p 250p | 2SD1266 2SD1267 | 180p 55p | 2SD1663 2SD1666 | 350p 50p | 2SK118 2SK125 | 50p 100p | 2SK1317 2SK1338 | 900p 250p |
| 2SC2120 2SC2122A | 10p 300p | 2SC2634 2SC2636 | 10р 40р | 2SC3170 2SC3173 | 300р 180р | 2SC3675 2SC3678 | 100р 280р | 2SC4820 2SC4826 | 225p 70p | 2SD821 2SD822 | 550p 290p | 2SD1271 2SD1271A | | 2SD1667 2SD1668 | 120p 90p | 2SK133 2SK147 | 650p 160p | 2SK1341 | 500p |
| 2SC2131 2SC2141 | 550p 60p | 2SC2637 2SC2640 | 120p 1800p | 2SC3175 2SC3178 | 150p 125p | 2SC3679 2SC3680 | 140p 380p | 2SC4891 2SC4923 | 800p 400p | 2SD826 2SD829 | 30p 375p | 2SD1272 2SD1273 | 200p 50p | 2SD1669 2SD1677 | 85p 200p | 2SK152 2SK161 | 40p 30p | 2SK1342 2SK1350 | 500p 200p |
| 2SC2153 2SC2166 | 40p 80p | 2SC2653 2SC2654 | 100p 180p | 2SC3179 2SC3180 | 70p 175p | 2SC3685 2SC3687 | 450p 300p | 2SC4924 2SC4927 | 250p 500p | 2SD836 2SD836A | 50p 50p | 2SD1274 2SD1275 | 80p 50p | 2SD1680 2SD1683 | 225p 45p | 2SK163 2SK168 | 40p 40p | 2SK1356 2SK1357 | 225p 350p |
| 2SC2168 2SC2188 | 120p 70p | 2SC2655 2SC2656 | 50p 550p | 2SC3181 2SC3182 | 200p 120p | 2SC3688 2SC3692 | 550p 150p | 2SC5002 2SC5003 | 300p 350p | 2SD837 2SD838 | 55p 500p | 2SD1276 2SD1277 | 60p 190p | 2SD1684 2SD1706 | 70p 325p | 2SK170 2SK184 | 50p 35p | 2SK1358 | 400p |
| 2SC2200 | 250p | 2SC2660 | 100p | 2SC3198 | 30p | 2SC3715 | 480p | 2SC5027 | 100p | 2SD841 | 110p | 2SD1279 | 600p | 2SD1707 | 400p | 2SK192 | 45p | 2SK1377 2SK1400 | 150p 250p |
| 2SC2209 2SC2216 | 50p 50p | 2SC2665 2SC2668 | 200p 10p | 2SC3199 2SC3202 | 40p 25p | 2SC3717 2SC3729 | 120p 450p | 2SC5048 2SC5044 | 300p 250p | 2SD844 2SD850 | 200p 170p | 2SD1288 2SD1289 | 175p 250p | 2SD1708 2SD1710 | 375p 200p | 2SK193 2SK195 | 40p 150p | 2SK1404 | 290p |
| 2SC2221 2SC2228A | 650p 60p | 2SC2671 2SC2681 | 100p 170p | 2SC3209 2SC3210 | 120p 550p | 2SC3746 2SC3747 | 100р 120р | 2SC5086 2SC5129 | 250p 300p | 2SD856 2SD858 | 48p 250p | 2SD1291 2SD1292 | 280p 60p | 2SD1718 2SD1729 | 275p 230p | 2SK197 2SK212 | 140p 35p | 2SK1461 2SK1462 | 220p 425p |
| 2SC2229 2SC2230 | 15p 80p | 2SC2682 2SC2688 | 70р 27р | 2SC3211 2SC3212 | 220p 260p | 2SC3748 2SC3752 | 100p 250p | 2SC5148 2SC5149 | 300p 300p | 2SD863 2SD864 | 23p 200p | 2SD1293 2SD1297 | 70p 300p | 2SD1730 2SD1732 | 275p 250p | 2SK214 2SK216 | 170p 200p | 2SK1487 2SK1 5 07 | 250p 300p |
| 2SC2233 2SC2235 | 100p 60p | 2SC2690 2SC2694 | 60p 3500p | 2SC3225 2SC3242 | 50p 30p | 2SC3781 2SC3782 | 150p 75p | 2SC5250 2SD188 | 300p 350p | 2SD866 2SD866A | 120p 140p | 2SD1302 2SD1306 | 20p 45p | 2SD1739 2SD1740 | 180p 125p | 2SK223 2SK240 | 50p 140p | 2SK1529 | 700p |
| 2SC2236 2SC2237 | 20p 540p | 2SC2705 2SC2706 | 40p 250p | 2SC3244 2SC3246 | 45p 50p | 2SC3783 2SC3787 | 300p 100p | 2SD198 2SD199 | 140p 195p | 2SD867 2SD868 | 350p 260p | 2SD1308 2SD1309 | 80p | 2SD1748 2SD1756 | 90p 275p | 2SK241 2SK246 | 30p 30p | 2SK1537 2SK1544 | 400p 900p |
| 2SC2238 | 45p | 2SC2710 | 50p | 2SC3259 | 350p | 2SC3788 | 60p | 2SD200 | 180p | 2SD869 | 150p | 2SD1310 | 140p | 2SD1758 | 60p | 2SK300 | 25p | 2SK1767 2SK2038 | 275p 295p |
| 2SC2240 2SC2258 | 15p 30p | 2SC2712 2SC2714 | 20p 20p | 2SC3260 2SC3261 | 220p 230p | 2SC3789 2SC3790 | 75p 120p | 2SD201 2SD213 | 260p 250p | 2SD870 2SD871 | 140p 260p | 2SD1311 2SD1313 | 65p 1000p | 2SD1760 2SD1761 | 80p 60p | 2SK301 2SK303 | 40p | 2SK2039 | 750p |
| 2SC2259 | 60p | 2SC2716 | 50p | 2SC3262 | 280p | 2SC3795 | 140p | 2SD234 | 90p | 2SD879 | 60p | 2SD1326 | 200р | 2SD1762 | 50p | 2SK304 | 25p | 2SK2134 | 225p |

| | REPLACI | EMENT VIDE | O HEADS | |
|--|---|--|---|--|
| Model Price | Model Price | | | Model Price |
| AKAI VS105, 112, 115, 116, 120, 125, 126, 201, | VHSAN3 800p VHSAY3 1200p | HRD750, HRD830, HRD860 1900p HRD250, HRD257 1800p | NVFS 100 4500p NVFS1 4200p | TLS1100 3100p VHR120, 130, 14, 141, 143G, 14SP, 151, |
| 202, 205, 220, 240, 244, 245, 247, 248, 250, 301, 303, 304, VSP8, | VHSBH1, VHSCH1 2100p VHSBP1 850p | 3V32, 8942, HR7655 1800p HRD180, 190, 230, 610, 3V59, FV12L, | N.E.C. N9011, 9012, 9013E, 9014E, 9014G, 9015, | 15, 16, 171, 220, 23, 244, 274, VHR310, 330, 4100, 4105, 4200, 430, 4300, 4400, |
| VSP82 850p VP7100, VS9300, VS9500 650p | VHSBY3 2600p VHSD52 1600p | FV20B, 26, 30, 32, 33, VC141L 1600p HRD370, HRD430, HRD470, 3V58, FV13H | 9016, 901A, 902A, 9033, N9034, 9040, 9053, 9054, 9055, 9056, 9063, 9065, 9066, | 4500, 5080, 5100, VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, |
| VP7200, VS9700, VS9800 900p VS1 900p VS2 900p | VHSEH2, VHSDH2 1600p VHSEY1, VHSEY2 1400p VHSFS1, VHSFS2 1300p | 1800p HRD530, HRD700, HRD840, HRD870, HRD910, FV14T, FV57H 2300p | 906, 9077, N9096, DX1000, 1600, PX1200 850p | 7810, 8000SP, 8801SP, VHRD4400, 4410, 4500, 4600. |
| VS3 900p VS10 1350p | VHSFG2, VHSFG4, VHSF63, VHSFB3 1300p | GRC1, GRC2, 3 V41 2800p BR9060, HRD330, 337, 440, 441, 637, 641, | N911A, 914C, 915A, 916A, 917, 9110, 9120 2400p PVC600, 740, 744, 754, 763E, 764, | VHRD4610, 6700, 4800 3100, TLS2000 4250, |
| VSP1 900p VS33,35, 37, 38, 38EOG MKII, 53, 55, 66, | VHSTJ1, VHSTJ2, VHSTJ3, VHSWJ3, VHSYJ2 700p | 660, 670, 720, 730, 740, 820 HRFC100, SR3300MS, FV44L 1600p | PV2300, 2400, 760, 794, 770, 774 1650p | VHR5300, VHR6500, VHR7400 4500, VHR3500EX 2150, |
| 765, 766, 767, 768, 865, 867, VSF30, 33, 4, 400, 410, 420, 430, 440, 441, | VHSVH4, VHSWH1, VHSXH1, VHSYH2 1600p | HRD950, HRD960, HRD980, FV46 4500p HRS5000, HRS5500, 5800, 9000, | N380, N381, N830, N831, N832, N833, N834, N835, N836 550p | VHR16, 235, 335E, 4150, 4160, 4350, 7250, 7260, 8250 VTC3000 1400 |
| 450, 455, 480, 490, 497, VSG51, 54, 55, VXS450, VXS470 1600p | VHSWJI VHSXJ3 700p GRUNDIG VS410, 415, 435, 450, 456, 460, 500, 505, | FV395.BR\$600, SR\$368E 5550p FV22L 1400p | 82611AH1 (FOR MODEL DX3000), DX4000, N9610, NS7000 2400p N895 1800p | SHARP VC390, VC393, VC496 2750 |
| VS512, VS515, VS516 2250p VS462, 465, 467, 467EOG2, VSF12, 15EK, | 510, 520, 521, 530, 546 1600p BARCELONA, MVS5400, 440, 500, 600, | FV42 2600p VR182LV, VR202LV 1950p | N9052, N9530, DX2000 3400p VCP1 1700p | VC488 4200j VC779 1800j |
| 15EOH, 300, 301, 310, VSF320, 330, 340, 350, VSG30, | SE5100, 6100, 6110, 9100 TVR4500, 4510, 5510, VS400, 440, 441. | FV67HV, FV68TX, FV77 3800p R2000 SERIES 4500p FV61LV, FV62LV, FV67HV 4000p | PVC2300, 2400, 740, 744, 760, 764 1400p | VC789, VC790 2900 VC200, 220, 300, 381, 383, 384, 385, 386, |
| 33, 34, 35 2300p VS11, VS12 1000p VS6, VS8, VS9 2400p | 500, 505, 510, 518, 600, 610, VS5180, VS6190, 700, 900, 901, 902, | FV42L £101.00p VP160L, VR172L 1950p | DS6000 3500p D5600 3500p VH3, VH555, VH600, VH700, VH844, | 387, 388, 471, 477, 481, 482, VC483, 486, 3300, 8381, 9100, 9300, 9400, 9500, 9600 9700 850 ₁ |
| VSX9 2250p VSA1100, 1110, 650, VSF500, 510, 550, | 9091, GV200, 201, 2092, SE2100, 5110 1400p MADRID, SE5140, VS540, | HRJ200, HRJ205 3300p HRJ600EG, HRJ600EK, HRJ605EG, | VH900, VH1000 (ALL MODELS) 1100p | VC108, 208, 382, 402, 405, 408, 500, 550, 571, 573, 581, 582, 583, VC5W20E, 600, |
| 560, 580, 590, 600, 650, VSG60, 64, 65, VSG70, 73, 74, 75, VSX560, 580 3600p | VS5480 3000p MVS550, 620, VS550, 620, 630, 640, 790, | HRJ605UK, HRJ610EK 7100p HRJ300, HRJ305, HRJ315, HRJ316EG,HRJ318E 3750p | VH1, VH2A 700p D1000, D1100 1600p | 651, 674, 681, 684, 6V3, 750, 780, 781, 683, 684, 402, |
| VS155, VS165 2300p VS20, 22, 23, 24, 25, 26, 27, 422, 425, 426, | 930, 940 2400p VS120 2300p | HRJ615, HRJ715, HRJ815 9200p HRJ400, HRJ405, HRJ407MS, HRJ41 | D1000X, D1500X, D4500, VPCD100, D1200, D2000X, D5000 1600p VR6460, VR6520, 64VR60, | VC500, 571, 573, 580, 584, 600, 682, 693, 700, 772, 7810, 782, 7822, VC783, 8481, 8581, VCA10, 100, 102, 103, 1031, 103, |
| 427, 485, VSF 10, 11, 180, 190 VSF 200, 210, 220, 221, 222, 230, 240, 260, | VS680, GV280 4600p VS160, VS740 4400p VS170 4600p | OEK, HRJ415, HRJ416 4500p MATSUI | VR6420 725p VR6711 4 HEAD 1800p | 104, 105, 106, VCA111, 113, 116, 131, 140, 202, 203, |
| 261, 262, 265, 270, 275, 280, VSF290, 510, 550, VSG20, 204, 205, 206, | MVS660, SE6160, VERONA, VS660, VS6690 3500p | VX500E, 800A, 810A, 820, 80A, 770B, 773B 1200p | VR6440 2500p VR6441, VR6540, VR6541, VR6640, | 211, 234, 244, 254, 255, 30, 35, VCA40, VCB311N, 320, VCD801, 802, VCM73, VCD801, 802, VCM73, VCT31214 |
| VSG21, 211, 212, 215, VSG217EOG, 23, 24, 25, 405, 411, 415, 417, VSP 100, 100EM, 110, | GRUNDIG MVS710, 720, 910, SE7120, 9120, VS710, | VCRL3, VX730, VX750 1450p VX735, VX755, VX990 1500p VX735A, VX765, VX850 1750p | VR6642 1300p DV761, VR512, 522, 5229, 63SB7, VR6760, VR6761, VR6762, VR63SB7 7172 | VCT212, 310, 410, VCT510, 72, VCT1314 VCTS313 850 VC6000, 6200, 6300, 7300, |
| VSP88, 88KC, 8111, VSP9, VSR100, 100EDG, 100EM, 110, VSX400 1250p | 716, 720, 800, 810, 910, 920, VS922, 9291, GV210, 211, 220, 2292, | VX735A, VX765, VX850 1750p VX600 1100p VX900 2650p | VR6/60, VR6/61, VR6/62, VR635B/ /1/2 7200p VR6920 2750p | 7700, 7750, 8000, 8300 1800 VC793 3000 |
| VSR9 VS 109, VS603, VS606, VS607 1300p 2500p | MV2105, 2115, SE2120 1700p HINARI | MITSUBISHI HS303, HS304, HS320, HS700 1100p | 41DV2, 4SB11BVR412, 415, 6485, 6490, 6880 1600p | VC473, VC785, VC786 1600 VC699, VCA501, VCA602 2400 |
| VS75 2500p VS965, VC967 3450p VSF400, 410, 420, 430, 440, 441, | VXL2, 3, 4, 20, 25, 35 VXL5, V20H VXL6 1200p | HS306, HS318, HS710 1100p HS307 1900p | VR6948 4850p 20DV1, 20DV2, 20RW7, 21DV1, 21DV2, | VC585, VC685 1700 VC90ET 3900 VFH815 2800 |
| 450, 45S, 480, 490, 497, VSX450, 470 2850p | VXL7 1300p VXL8, 9, 10, 11, 19, 90, VCR34H, VTV 100, | HS319 1900p HS330 2000p HS400 2800p | 21DV3, 2SB01, 02, 11, 12, 30DV2, 31DV1, 31DV2, 31DV3, 3SB02, 03, 05, 11, 12, 13, 68SB4, 71SB4, 86SBI, 91SB2, 92SB2, | VC800, VCH851, VCH852, VCH882 2700 |
| VSG20, 204, 204, 205, 206, 20, 21, 211, 212, 215, 217, 225, 23, 24, 25, | HITACHI 1100p | HS349, HSE27, 31, 32, HSB27, 31, 32, HSM33, 34, 35, 37G 1650p | DV186, 190, 291, 292, 468, 471, VR201, 202, 203, 2115, 212, 213, 223, 231, 232, | VCH80, VCH81, VFH815 2800 VCA33, VCA36, VCA43, VCA44, VCA46, |
| VSP100, 110, 88, VSR100, 110, VSX400 1300p | VT11, 14, 15, 16, 30, 33, 34, 330, 340, 503, 640, 5030, VTP10, 30 850p | H\$411 2400p H\$E30, H\$B30 1600p | 302, 303, 305, 311, 312, VR313, 3210, 3219, 322, 3229, 323, 501, 6180, 6182, | VCA49 1500 VCA55, VCA63 1800 |
| VSG415, VSG415EA, VSG425 2800p VS75, VSA77 2700p VSF1000, VSF1010, VSF1030 5800p | VT7, VT17, VT18, VT19 1600p VT35, VT350, VT38, VT39 1800p | HS338 1600p HSE10, HSE11, HSE20, HSE21, HSE41, | 6185, 6290, 6291, VR6293, 6362, 6367, 6467, 6468, 6470 4600p | VC570 2800g SONY |
| ALBA VDR3000, VCR4000, VCR5000, VCR6000 | VT100, 110, 111, 112, 113, 115, 118, 120, 125, 128, 220, 225, 400, 405, VT410, 413, 414, 415, 416, 418, 510, 515, | HSB10, HSB20 | VR3260, 6349, 6442, 663, 6448, 6449, 6542, 6643 VR601 1800p | DSR-19R FOR SL-T 9ME 3100 DSR-21 R FOR SLC 8-C9 2600 DSR-35R FORC20, C30, C40, SLF1UB, |
| VTV10 1650p 1000p | 517, 518, 520, 525, 5 26 , VTM625, 626, 725, 210, 211, 215, 726, | HS200 550p HS337, HS347 1000p | 49SB6, VR6548, VR6648, VR6843 2750p | SLF1E2 PIN, SLC24PS, 33E, 34, 44PS, SLF11, 30PF, 35, 60PS, SLK85, |
| VCR7000, 7800, 8000, 8800 1100p AMSTRAD | 727, 728, 820, 821, 825, 920, 921 1100p | HSB12, HSE12, HSE22, HSM16G, 18, 23, 25, 30, MX1 1700p | SAISHO VR100, 605, 705, 805, 905, 1000, 1100, | DSR-43R FOR SLC7 RANGE, SL5000, |
| VCR4500, VCR5200, VCR9000, TVR1 900p | VT3000 550p VT4000, VT4200, VT5000, VT5500, VT5600 1100p | HS411EZ, HS411GZ | 1200, 1600 1200p VR3300X, VR3600X, VR3650X, VR3800 | SL5100, SL3000 1 PIN, SLC6E, SL36ES, SL37E 1300 ₁ SL3000, SL8000, SL8080, SLC5E, SLT7ME |
| VCR7000 1000p VCR1000, 2000, 6000, 61000, 62000, 8600, 8602, 8700, 9005, DD8900, DD8904, | VT77, 680, 6500, 6700, 6800, 7000, 8000, 8030, 8040, 8100, 8300, 8500 | 55, 57, 58, 60 3100p HSE51 2600p | VR3200, VR3500 1400p VR2000, VR3300, VR3600 1400p | 1600 SLV201, SLV202 1500 |
| TVR4 1100p | VT8700, 9000, 9300, 9500, 9700, 9900 850p | HS410 3000p HS412, HS421GZ 3100p | VR2500 2650p VRS5000X, VX6000A, VXL12X 1500p | SLK95, SLT50ME 2900 ₁ SLV275, SLV373VB, SLV410, |
| VCR400 1100p VCR8800, VCR8804, VCR9340 2100p | VT8, 9, 56, 57, 570, 575, 576, 580, 585, 588 2500p VT65 1800p | H\$5300, H\$5424, H\$5600 2500p H\$M20, H\$M55 1900p | SALORA 6500, 6600 1600p | SLV412, SLV427, SLV474 1900 DSR49R, SLHF100P, SLHF100UB 3000 |
| VCR8603, VCR8604, VCR8704, VCR8714 1350p VCR9140, VCR9142 2550p | VT130, 135, 138, 145, 250, 255, 258, 420, 425, 426, 428, 430, 431, 435 | HSM40 | SV7300, SV8200, SV8300, SV9200 1500p | SLV656, SLV715, 725, 727, 757, SLV777, SLV815, SLV825 4100 |
| VCR9340 3650p VCR9244 3450p | VT438, 535, 536, VTL30, 301, VTM630, 635, 636 1400p | 2010, 3000, 7000, 7200.7500, NV7800, 7850, 8170, 8200, 8400, 8600, 8610, 8620 | SV7400, SV8400 1600p SV8100 1200p SV900, SV9900 3450p | SLV353UB 2100 CCDF340E, CCDF500E, CCDV90E, |
| UF020, 22, VCR3000, 3002, 9500 1750p | VT52, VT60, VT61E, VT62E, VT63, VT64, VT640 850p VT168, VT150, VT260, VT450, VT498 | 825p NV777, NV330 1150p NV8050, NV8051 2500p | SV601, SV611, SV6910 1500p SV800, SV810 2800p | CCDV95E, CCDSP5E 4800 SLV801, SLV802 2500 SLV310, SLV315, SLV325, |
| FISHER FVHP420, 510, 520, 530, 615, 618, 620, | (4 HEAD) 1900p VT530 1400p | NV8050, NV8051 2500p NATIONAL PANASONIC AG1000, 1050, NV250, 260, 280, 450, | SV6700, SV8710, SV8750 1500p 623N, SV6800, SV6900, SV8850, SV8870, | SLV235 1200 SLV210, SLV212, SLV270, SLV273, |
| 622, 710, 711, 715, 716, 720, FVHP721, 722, 730, 830, 905, 906, 907, 908, 910, 911, 915, 916, 918, | VT522, VTM212, 620, 622, 720, 722, 822, 922, 925 1300p | 460, 465, 470, 480, 650 1100p AG6010, AG6015 2000p | SV8970 1750p SV88110, SV8910 2650p 823N, SV8920 3500p | SLV285, SLV300 950 SLV125, 213, 225, 252, 255, 262, 280, |
| FVHP5000, 5001, 5005, 5050, 5075 1100p | VT660E 2600p VT570, VT575, VT580, VT585, VT588, VTF70 2500p | AG6840 2000p | 923N 4500p SV8600 SV8700 1550p | SLVX1, 20, 3 SLV363, SLV416, SLVX50, SLVX55 2000 |
| VBS3500, 7100, 7500, 7600, 9900, VBR330 1800p | VT540, 545, 546, 548, VTD660, 665, VTM598, 640, 645, 646, | NV630 675p NVD80, NVH65 2600p | SV8420 2400p SV8620 2100p | SLVX75, SLVX90, SLVX95 3000 SLV282 SLVX30 SLVX35 2025 |
| VBS7000, VBS7100, VBS9000 2000p FVHP500, 711, 715, 721, 722, 730, 830, 5100, FVHD720 1100p | VTM730, 731, 735, 736, 740, 745, 746, 748, 753, 754, 830, 831, 835, 838, 840, | AG5150, AG5250, NVF65, NVH75, NVH77 2600p NVF51 4200p | SV9300 2500p SV8830 2200p | SLHF100P, SLHF100UB 3400 SLVE7, SLVE8, SLVE9 3600 |
| FVHP725, FVHP830, FVHP980 2500p FVHP990 2700p | VTM841, 845, 930, 931, 935 VTF770, 774, 775, 860, 861, 865 4100p | NVGI9 2300p NVJ30, NVHJ33, NVL10, 20, NVL21, | SV8720 2250p SV8520 1900p SAMSUNG | SLVE90 5150 SLV615, SLV625, SLVE600, SLVE700, |
| FVHP975 2400p FVHD407, FVHD140, FVHP1, FVHP10, | VT85, VT86, VT88 2000p VTF780, VTF785 4800p | NVG30, 31, 40, 130, NVJ37, 40, 42, NVSD30, 10EE, 11, 2, 30, 35 1000p | SV8500 1500p SVX301, VB900, 910, VVT510, VT320, | SLVE800 3450 TOSHIBA V63 1500 |
| FVHP20 1150p FVHD230, FVHP1100, 1200, 130, 1340, 1410, 2000, 200, 210, 300, | VTF180, VTF185, VTF280 8500p VTF350, VTF351 5150p | NVJ35, NVG46 1400p NVM1, NVM3, NVM5 4200p AG2100, AG2200 700p | 5600, VX510, 511, 520.616, VX626, 627 717, 614, 619, 629, 710, 712, 720, 730, | V9680 3400 V8600, V8650, V8700 3000 |
| FVHP310, 410, 420 1800p FVHD250, 270, 370, FVHP1500, FVHP250 | VTM220, VTM220E, VTM220UK 3000p VT\$390E 5150p | NV430, NV431, NV433, NVSD2, NVSD22, NVSD25, NVSD3 800p | 970, 971, 972, SV716, 717, SVX303, 305, VB510, 520, 610, 616, 617, 619, 620, 626, 627, 629, 710, 971, V1520, 616, 621, 626, | V21, V31, V32, V33, V50, V51, V52, V53, V9600 1100 |
| EVHP132, 1400, 1440, 320. | J.V.C. & FERGUSON HR2200, 3300, 3320, 3330, 3350, 3360, 3660, 3750, 3860, 4100 | NV730, NV730F, NV770 4 HEAD | 900, 910, SVX319, VB770, V1710, 730, 731, 735, 750, 751, 770, VB750, VK8220, VX750, | V55, V57 550 V71, V73, V74, V75, V77, V80, V81, V82, V83, V841V85, V86, V87, |
| 440, 445 3550p FVHP470S, FVHP475HV 4800p FVHP1250, FVHP430S 1950p | 3292, 8900, 8901, 8902, 8903, 8906, 8922, 8928, 3V01, 3V06, 3V22 550p | NV21 HQ, NV 180, NVD48 1700p NV7881 1700p | VX7330, VK770, VK8225, VR1730, 17 3 5, | V88 1050 DV90, 96, 97, NM3, V108, 109, |
| GOLDSTAR 8000 3HSSDB, GHV121, RQ2011, 2031, | HR3660, 7600, 7610, 7650, 7700, HRD110, 111, 120, 121, 220, 225, | NV810, NV8301 | XR20 1900p V11560, VN1560, VN1561, VX1530, VX1560, VX1561, VX1580 2200p | 199, 200, 202, 205, 207, 209, 80, 93, 94 1150 |
| 2051 1900p GVH51, GVH122, VCP4000, VCP4100, | HR\$100, 8904, 8923, 8924, 8925, 8929, 8935, 8941, 8943, 8944, 3V16, 3V233V24, 3V31, 3V35, 3V36, 3V38, | NV870, NV890, NV970 2400p AG6024, NVG33, 46, NVL23, 25, 28, NVJ47. | VX1560, VX1561, VX1580 2200p PL30LR, PX3031, 31R, 32R, 990, 992, 991, PXP30, PXR30, VX 1260, SVX503, | V5470, V5480 1300 V600 2350 V880MS 2600 |
| VCP4200 1100p GHV1232, 1233, 1241, 1242, 1243, 1244, | 3V39, 3V49 550p BR1600, HRD140, 141, 142, 143, 150, 152, | 49, 700PX, NVSD20EE, 400, 44, 45 1200p | SX3230, 3231, 3260, 3261, VK30, 300, 1230, 1260, 1261, | V700G V500G, V509G 3700 2500 |
| 1245, 1246, 1266, 1290, 1291 GHV1295, 1296, 1891, 8210, 8215, 1221, 1240, 1241, 1247, 1248, 2145 | 156, 157, 158, 160, 5101 HR\$10, 8947, 8948, 3V42, 3V44, 3V45, | NVG10, 11, 12, 14, 16, 120, NV250, 280, 450, 465 1100p | VK30R, 31R, 32R, VXK300, 301, 306, 320, 321, 326, 336 1900p S11230, 1240, SVX600, SX1230, 1231, | V9680 V300G, V301, V305, V306, |
| VCP400, VCP4130, 4300, 4301, 4305, 4306, 4310, 4311, 4315, 4316, | 3V46, 3V47, 3V52, 3V54, 3V55, 3V56, 3V57 900p HRD154, 170, 171, 210, 211, 217, 310, | NVG18 1400p NVG20, 21, 22, 25, 28, 200, NVD48 1200p | 1260, 1261, 7120, 7121, 7220, SX7221, 7230, 7301 1900p | V309G 2550 V61, V63 1200 V110, V120, V130, V140, V210, V211, |
| VCP4320, 4321, 4325, 4326 900p C211, GHV1392P, 1393P, 19OOP, 1290, | 320, 321, 350, 521, 522, 525, 526. HRD527, 540, 550, 560, 590, 770, | NVD48 | SANYO VTC5000, 5400, 600, 6000, 6010, 6500, | V212, V220, V221, V222 1100 |
| 1291PQ, 12931Q, 1295P, GSE1295PQ, GSE1296, 1297, 1891, 1910, 20005, 2000, GSEC200, | HRDX20, HRDX22, 8950, 8951, 3V64, 3V65, FV10, FVII, FV20, FV21, FV26 | NVH70 2400p NV688 1650p | VPR5000, VTC 1500, VTCM 10, 11, 20, 21 VTCM25, VTC2000, 5100, 5150, 5300, | V711, V880 2700 VCPB1E, VCP2C2 1000 |
| GSEC205, 211, 2301, GSEG2301, GSEQ12, 204, 20, 22, P416P, P500P | 900p HRD565, HRD566, 3V48 1800p | NV600 1050p AG6800, AH6810, AG6820 2100p | 5400, VTC5350, 5370, VTCNX10, VTCNX15, 20, 30, VPR5800 1800p | V65, V66, V6 950 V312, V322, V412 2600 V91G 4600 |
| QUISY22, QUISY24, RC205P, RG11P, RG20, RG2001, RQ20, | HRD725, HRD755, 3V43, 3V53 8930, 8931, 8933, 8940, 3V29, 3V30 550p | AG6100, AG6200, AG6300 2100p NVG7, NVG9, NV230 700p NV780 2000p | 30, VPR5800 1800p VTC5500, 5550, 9100, 9300, 9350, 9355, 9455, 9500 1700p | V609, V610V610B, V610UK, V611, V659F, V660, V660F 2200 |
| RQ204HP, RQ241, VCP100P, GSEG10 1300p | 8945 3V00, 8902, 8903, 8909, 8912, | NVG 15, NVG400 2600p NVM7, NVMC20 3800p | VHR1110, VHR1150, VHR1300, VHR1700, VHR2300, VHR2370 800p | V312, V403T, V413G 9200 V703W, V813G 4000 |
| GHV4400, 4400, GSE-Q404P, QUISY40, RC405P 2350p GSEQ121, RQ2011, RQ2031, | 8922 1000p FV31, FV41R 1150p | NVF70 5200p NVJ45, NVJ47 1200p | VHR3200, 3270, 3100, 3110, 3150, 3300, 3400, 3310, VHRD500 1100p | V95G 8000 |
| RQ2051 1950p G.E.C. | FV37, FV43H, HRD860 2000p BR7000E, BR7000S, BR7030, BR7030/40H, BR7040 2100p | NVSD40 | VHR1500, VHR2500, VHR3330 1500p VHR2700 2450p VHR7900 3000p | GRANDATA LTD |
| 4000H, 4001H, 4002H V4001H, V4004, V4100 1200p | HR7200, 7300, 7350, 2650, BR6200 600p | NVFS200, NVFS88, NVSF90, NW8000 3600p | VHR5700, VHR7700E, VHRD4710 2700p | TEL: 0181-900 2329 |
| V4005H 1500p GRANADA | HRD455 1600p HRD520 1400p | NVHD90, NVHD 100, NV HD 101, NVHF 100 2300p | VHR150E, 153, 154, 1501R, 240, 250, 251, 27, 350, 474, 5350E, 7500, VHR7530, | FAX: 0181-903 6126 |
| CSI, DS2 1600p VHSAH1 1100p VHSAH3 2400p | HRD300, 400, 580, 600, 620, 640, 650 HR4100 1000p | NVSD1 1000p AG7330, AG7350, AG7355, AG7450 5000p | 7540, 8500SP, 8800, VHRD5350E, 5450E, 6550 1800p TLS1000P, TLS1001P, | - F-IAT-0101-303-0120 |
| VHSAH3 2400p | 1000p | 1000p | .2510001, 12010011, | |

ALL TV & VIDEO PARTS SOLD ARE REPLACEMENT PARTS

TELEVISION April 1999 409

| | V | CR BELT KIT | S | |
|--|--|--|---|--|
| Model Price | Model Price | Model Price | Model Price | Model Price |
| AKAI VP7100, V\$9300, V\$9500, V\$9700, V\$9800 | TX3650, VCR3000, VCR3002, VCR9500 75p | 406, 407, 4092, 410, GV411, 412, 414, 415, 416, 417, 4192, 4200, 420, 430, 434, 435, | N.E.C. N830, N831, N832, N833 100p | V1710, 730, 750, 970, VX710, 712, 720, 730, 970, 971, 97 2 100p |
| 120p VS1, VS2, VS3, VS5, VS12, VS15, VP88 70p | FISHER VBS7000 245p | GV437, 440, 450, 4592, 460, 464, 470, 500, 501, 5050, 5095, | N895 80p PVC2300, PVC2400 180p | VX9880 110p SX7121 95p |
| VS10 65p | VBS9000 120p | GV5105, 511, 530, 5395, 540, 560, 5695, MV4005, 4105, SE4100, 4104, 4120, 5102, | DX1000, 1600, 1800, 2000, 3000, N9012, 9013, 9014, 9016, N9033, 9034, 9053, 9054, 9055, | SANYO VTC5000, 5150, 6000, 6500, VTCM10, 11, 20, |
| VSX9, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 240, 244, 245, 247, | FVHP520, FVHP530, FVHP420 60p FVHP615, 618, 620, 622, 710, 711, 715, 720, | 5104, 5106, TVR37001 70p | 9056, 9066, 9096, 9110, 9120, | 21, 30, 31, 50 65p |
| 248, 250, 512, 515, 516 200p | 721, 722, 725, 730, | HINARI VXL2 80p | N9510, 9520, 9530, 9610 80p NATIONAL PANASONIC | VTC5300, VTC5350, VTC5400, VPR5800 80p |
| VS22, VS23, VS25, VS35, VS37, VS38, VS53, | FVHP830, 840 60p FVHP905, 906, 907, 908, 910, 911, 915, 916, | VXL7, VXL8, VXL9, VXL10, VXL11, VXL19, | NV300, NV330PX, NV332, NV333 NV340, NV366 | VTC5500 70p VTC9100, VTC9300 140p |
| VS55, VS66 80p VS4, VS6, VS8, VS9 95p | 918 75p VBR330, VBS7500, VBS7600, | VXL90, VCR34, VTV 100, 200 100p | NV777, NV788 100p | VTC1100, 1300, 1500, VHR1100, 1110, 1150, |
| VSA77 120p | VBS9900 100p | VXL4, VXL35, VTV300 70p VXL5, VXL6 100p | NV2000, NV2010, NV3000 80p NV7000, NV7200, NV7800 75p | 1200, 1300, VHR1500, 2370, MVR220 80p |
| ALBA 105p | VBS3500 75p FVHD140, FVHD40, FVHD55, FVHP1, FVHP10, | VXL3, VXL20 90p | NV8600, NV8610, NV862 145p NV230, 250, 280, 430, 431, 433, 450, 460, 465, | VHR2100, VHR2300, VHR2500, VHR2700 100p |
| VCR40000 130p | FVHP20 110p | HITACHI VT11, 14, 16, 17, 19, 33, 330, 34, 35, 350, 38, | 470, 650, 730, NV770, 810, 870, 890, 970, AG | VHR3100, 3110, 3150, 3300, 3310, 3400, 3500, 3700, |
| VCR5000, VCR6000 105p VCR161, VCR222 100p | FVHD230, 250, 270, 370, FVHP1100, 1200, 1250, 130, 132, | 39, 88, 165, 5030 75p | 1000, 1050 85p NV370, NV380, NV480, NV630, NV780, | 3800, VHRD500, 700, TLS1000, TLS1001 65p VHR120, 130, 14, 141, 143, 14, 150, 151, 153, |
| VCR3000X, VCR4000, VCR4000X 75p | FVHP1340, 1400, 1410, 1440, 1500, 2000, 200, 210, 250, 3, 300, | VT5000, VT5500, VT18 120p VT7000, VT8000, VT8030, VT8040, VT8300, | NV830, NV850 70p NV600, NV688, AG6010, AG6015 85p | 154, 15, 16, 171, VHR194, 220, 23, 235, 240, 244, 250, 251, 274, 297, 310, 330, VHR335, 390, |
| VCR7000, VCR7800, VCR8000, VCR8800 110p VTV10 105p | 310, 320, 2000, 410, 420, 430, 440, 445, 470, | VT8500, 8700 60p VT680, VT6500, VT6800, VT9300, VT9500, | NVG7, 9, 10, 11, 12, 14, 15, 16, 18, 30, 130, | 4100, 4105, 4150, 4200, 430, 4300, 4350, 474, |
| AMSTRAD | 475, FVSD2905 85p FVHP5000, 5005, 5050, 5075, 5100, 975, 980, | VT9700, 9900 75p | 400, NVH70 50p NVFV1, NVM10, 3000, 3300, 40, 7, 9000, 9900, | VHR4770, 5080, 5100, 5200, 5300, 5350, 5700, 6850, 7100, VHR7200 7250, 7260, 7300, 7400, |
| TVR123, VCR4600, VCR4700, VCR5200 80p | 990 95p | VT52, VT57, VT61, VT62, VT63, 64, 65, 85, 86, 640 60p | NVMS1, 4 70p NVM 1, NVM3, NVM5 70p | 7500, 7520, 7530, 7530, VHR7540, 7700, 774, 7800, 7810, 8000, 8100, 8200, 8250. |
| VCR7000 80p | G.E.C. 4005 150p | VT3000 120p VT100, 110, 111, 113, 115, 118, 120, 125, 128, | PHILIPS | 8500, VHR8800, 8801, VHRD4400, 4410, 4500, 4600, VHRD4610, 4710, 4890, 6700 60p |
| VCR1000, 2000, 6000, 6100, 6200, 8600, 8602, 8603, 8604, | V4004 100p | 130, 135, 138, | VR6460, VR6920 170p VR6540 100p | VMD66, VMD68P 80p |
| VCR8700, 8704, 8714, 8800, 8804, 9000, 9005, 9244, 9340. | V4007 80p GOLDSTAR | VT145, 150, 168, i70, 175, 220, 225, 250, 255, 258, 260, VTL30 60p | VR6442, VR6542 70p VR2025, VR2580 100p | VTR1000 70p VTC6010 75p |
| DD8900, DD8904, TVR4 100p | GHV1221, 1232, 1233, 1240, 1241, 1242, 1243, | VM500 VM600 90p | DV186, 190, 286, 291, 292, 468, 471, 562, 571, | SHARP |
| TX3650, UF20, 22 24, VCR3000, 3002, 4000, 9500 75p | 1244, 1245, GHV1246, 1247, 1248, 1250, 1266, 51, 8000, | HR3300, HR3330, HR3360, HR3660, | 761, VR201, 202, 203, 211, 2115, 212, 213, 223, 311, 312, 313, 3210, 3219, 322, 32, 29, 323, | VC200, 381, 384, 385, 386, 388, 390, 393, 838, 9100, 9300, 9500, VC9700 80p |
| VS 1004 105p | 8200, 8210, 8215, VCP4100, VCP4130 80p | HR4100 130p HR7200, HR7300 50p | 535, VR20DV1, 20DV2, 20RW7, 21DV1, 21DV2, 21D, V3, 25BO1, 25BO2, 11, 12, 302, 303, 305, | VC7300, VC7700, VC7750, VC7800, VC8000 110p |
| BLAUPUNKT RTV100 200p | GHV1290, 1291, 1295, 1296, VCP4000, 4200, | HR7350, HR7600, HR7610, HR7650, | 31DVI, 31DV2, 31D, V3, 3SB11, 3SB12, 3SB13, | VC8300 115p VC300, 387, 471, 473, 481, 482, 483, 486, 488, |
| RTV200, RTV222, RTV224 90p RTV202 RTX200 150p | 4300, 4301, VCP4305, 4306, 4310, 4311, 4315, 4320, 4321, | HR7655 50p HR7700 50p | 72SB8, VR30DV2, 35BO2, 35BO3, 635B7, 715B4, 715B5, 715B8, VR865B2, 915B2, | 496, 8481 80p |
| RTV322, RTV248 100p | 4325, 4326 120p | HRD110, 111, 120, 121, 220, 225, BP5000 60p | 925B3, VR6180, 6182, 6185, 6285, 6290VR6291, VR6293, 6362, 6367, | VC402, 500, 571, 573, 581, 582, 583, 584, 585, VCSF3, VC8581 80p |
| RTV306, 307, 309, 310, 311, 312, 328, 414, 434, 444, 707 135p | GRANADA VHSH1, VHSAH3 100p | HRD140, 141, 143, 150, 152, 157, 158, 160, | VR6390, 6391, 6393, 6467, 6468, 6470, 6561, 6570, 6581, 6670, VR6676, 6710, 6760, 6761, | VC108, 405, 408, 550, 600, 651, 674, 681, 682, 682, 684, 685, 693 |
| RTV211, RTV214 140p | VHSVH4, VHSWH1, VHSXH1 60p | 190, 250, 257, 310, HRD455, 565, 566, 725, 755, HRP50 45p | 6762, 6870, 6970, 6975, VR68SB4, 86SBI, | VC700, 750, 783, VC6F3, VC6V3 70p |
| RTV324, RTV32565p RTV315, RTV316, RTV319, RTV320, | VHSYH2 50p VHSBH1, VHSCH 1 150p | HRD 170, 171, 180, 210, 21 1, 217, 230, 300, 320, 321, 330, 337, HRD 350, 370, 400, 430, | 92SB3 75p VR445B9, VR445B920, VR445B922, VR6443, | VC208, 671, 772, 779, 780, 781, 782, 785, 786, 787, 793, 800, VC7810, 7822, VCA100, 102, |
| RTV317 50p | VHSBP1 135p VHSAN3 110p | 440, 44 1, 500, 530, 700, 750,950, HRS5000, 5500, 8000, 9000, BR9060, BRS600, | 6843, 6843, VR6943 100p VR3260, 6349, 6448, 6449, 6548, 6648, | 103, 104, 131, 140, 170, 202, 03, VCA234, 501, 502, 602, 5011, VCB311, 361, VCD801, 802. |
| RTV301, RTV333, RTV338, RTV404, RTV424 85p | VHSDS2 125p | 605, 920, 925 45p | 49SB620, 644869S, 49SB6 110p VKR6850, VKR6855 70p | VCH851, 852, 882, VCM73, VCT72 65p VCA10, 103, 105, 106, 113, 11613, 211, 234, |
| FERGUSON | VHSAY3 125p VHSBY3 100p | HRD227, 520, 52 1, 522, 527, 600, 610, 620, 637, 641, 650, 830, | VR501 110p | 244, 254, 30, 33, 35, VCA36, 37, 40, 43, 454, |
| 3292, 3V00, 3V01, 3V16, 3v22, 8900, 8901, 8902, 8903, 8904, | VHSEY1, VHSEY2 70p VHSCC1 100p | HRD840, HRDX20, 22, HRJ200, 205, 300, 305, SR330, HRS10 | VKR6800, VKR6810, VKR6820 70p SE4104, VR231, 2310, 2319, 231, 232, 2329, | 48, 50, 505, 51, 52, 53, 54, 55, 56, 57, 58, VCA60, 605, 615, 67, 68, 1031, VCB320, |
| 8906, 8909, 8912, 8922 120p 3V23, 8923, 8924, 8929 50p | GRANADA | HRD840, 550, 560, 580, 590, 640, 660, 670, | 237, 23, 241, 2410, 2419, 242, 243, 245, 2469, 247, 2479, 251, 252, 256, 257, 258, 33, 19, 332, | VCBS97, VCD805, VCD806, 810, 815, VCH80, 81, 85, 865, 910, VC51000. |
| 3V29, 3V30, 8930, 8931, 8933, | VHSDP1, VHSFV2 80p VHSTJ1, VHSTJ2 150p | 720, 730, 740, 770, HRD820, 860, 870, 880, 910, 960, 980, HRDX20, 25, HRJ2 10, | 3329, 333, 337, 339, 3419, 342, 343, 3469, 347, | VCT212, 310, 410, 610, VCT1314, VCTS312, 313, VC790ET 80p |
| 8940 65p 3V31, 3V32, 8941, 8942 60p | VHSTJ3 65p VHSWJ1 VHSWJ2 120p | HRJ215, 315, 316, 318, 400, 405, 407, 410, 411, 415, 416, 507, HRJ6 10, 615, 715, 97, | 3479, 35, 1, 352, 357, 358, 422, 4229, 432, 437, 442, 4229, 432, 437, 442, 44, 5, 4469, 447, | VCC10 70p |
| 3V35, 3V36, 3V38, 3V39, 3V49, 8943, | VHSXJ3 85p | HRS4700, 5800, SR3200, SRS368E 125p | 4479, 451, 452, 457, 458, 459, 512, 522, 5229, 6379, 642, 647, 722, 7229, 723, 7379, 747, | SONY SLC6, SLJ10, SLT6ME 140p |
| 8944 3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, | VHSYJ2 80p VHSFJ2 140p | HRJ600 40p | 8389, 948, 9489 70p | SLC5, SLC7, SLJ7, SLJ9, SLT7ME 140p |
| 3V55, 3V57, 8945, 8947, 8948 45p | VHSFS1, VHSFS2 130p VHSFG1, VHSFG2, VHSFG3, | VR955 180p | SAISHO VR2000, VHL3 90p | SLC9, SL8000, SL8080, SLT50 165p SL8000E, SL8080E, SL8200, SL8600 175p |
| 3V58, 3V43, 3V44, 3V59, 3V64, 3V65, 8950, | VHSFG4, VHSF63 180p | MATSUI VX600, 730, 735, 750, 755, 765, 850, 6000, | VR3800, 3200, 3300, 3500, 3600, 3650, VRS4400, 5000 75p | SLV255, 125, 213, 225, 262, SLVX1, 20, 3 95p |
| 8951, FV10, FV11, FV12, FV13, FV14, FV20, FV21, FV22, FV26, FV32, FV39, VC141L 45p | GRUNDIG MVS400, 440, VS400, 410, 415, 435, 440, 441, | VS888 75p | VR3400 100p | TOSHIBA |
| FV31R 110p FV61L, FV62, FV67, FV68, FV70, FV71, FV72, | 450, 456, 460 55p VS180, 200, 220, 226, 262, 265, 267, 2X40800, | VX6000 80p | SAMSUNG SV716, 717, V1616, V~621, V1626, VX616, | V55, V57 V33, V31, V32, V51, V52, V53, V9600. |
| FV74, FV77 50p | 0850, 0880, 1600, 2000, 2080, 2200, 2280, | VX800 70p MITSUBISHI | VX617, VX619, X626, VX627, VX629, VX714 75p | V9680 85p V61, V63, V65, V66, V67 150p |
| FV43H, FV44L, FV46T, FV57H 125p FV37H 80p | MVS200RC 90p | HS200 200p HS300, 301, 302, 307, 310, 337, 338, 347, 349, | VB520, 510, 610, 616, 617, 619, 620, 626, 627, | DV80B, DV80D, V71, 73, 74, 75, 77, 81, 83, 85, |
| 3V52 55p FV41R_FV42L 100p | V\$150 160p V\$310, 311, 315, 320, 326, 340, 345, 380, 385, | 411, 412, 421, 480, HSB10, 20, 30, HSE10, 20, | 629, V1510, 520, V1611, 616, 621, 626, VX510, 511, 520, VT320, 5600 80p | V108, 109, 110, 120, 130, 140, i99, 209, 210, |
| FIDELITY | 445 85p VS150 75p | 30, 70 80p HS303, HS304, HS30 6 , HS307, HS330, HS400, | VB900, VB910, V1900, V1910 110p PX980, 981, 982, SE9001, SV9001, SVX307, | 211, 220, 221, 411,V421, 609, 610, 611, 659, 660, 711, 880 120p |
| HQS200, VCR1000, 2000, 600, 6000, 6100 180p | LC290N, LC295SN, SVS 180, VS 170 70p VS 160, BARCELONA, FLORENZ, GV4000, | H\$700 110p H\$318, H\$319, H\$410 110p | 319, 322, VB750, 770, 8220, 8225, V1770, 790, 8220, 8225, VK8220, VPX31, VX750, VX770, | V91 G, V95G 115p V212, 213, 22-2, 3i2, 322, 403, 412, 413, 610, |
| VCR100 160p | 4000, 4001, | HSM1000, 16, HSM23, 25, 33, 34, 35, 37, 54, | 790, 8220, 8225, SE9000, 9001 90p | 703, 813 50p |
| VTR1000, VTR1001 100p | | 55, 57, 58, 59, 68 55p | SVX301, 303, 305, SX7301, VB710, 971, | VCPB1E 110p |
| | REPLACEM | ENT IDLERS | & PULLEYS | |

| Make | Models | Description | Make | Models | Description |
|-------------|---|----------------------------|-------------|---|-------------------------|
| Hitachi | VT11, 14, 17, 19, 33, 34, 35, 38, 39, 52, 57, 61, 62, 63, 64, 65, 85, | | Ferguson | 3V39, 3V30, 3V31, 3V32, 3V353V36, 3V38, 3V39, 3V49, 8930, | Take Up Clutch PU 51380 |
| | 86, 330, 350, 640, 16S, 5030 | FF Rew Idler 6886792 | 1 | 8931, 8933, 8940, 8941, 8942, 8943, 8944 | |
| Order Code: | | Price 100p | J.V.C. | HR7200, 7600, 7650, 7655, 7300, 7350, 7610 | Take Up Clutch |
| | VT680, 6500, 6800, 9300, 9500VT9700, 9900 | Play Idler 6861482 6861481 | | ,,,, | PU 53462A PU 51380 |
| Order Code: | | Price: 180p | Order Code: | IDL23 | Price: 200p |
| Blaupunkt | RTV301, 306, 307, 309, 311, 312, 315, 316, 317, 319, 320, 404, | ldier | | DB532, VR6520, 6843, 644 | Reel Idler |
| | 414, 424, 434, 444, 478, 707 | | | VC600, 651, 681, 682, 684, 685, 693, 699, 700, 783, 6FR, 6V3, | Idler Assembly |
| Goldstar | GHV1221, 1232, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247 GHV1248, 8000, 8200, 8210, 8215, GVHP51, VCP4100, 4130 | , idler | | 6F3 | NPLYV0107GEZZ |
| Grundia | MVS400, 440, VS400, 410, 440VS450, 460 | ldler | Order Code: | | Price: 615p |
| National | NV230, 250, 260, 280, 370, 380, NV430, 431, 433, 450, 460, 465, | | | VR6843, 6943, 44SB9, VR44SB920, 44SB922, 6943 | Reel Drive Unit |
| Tational | 470, 480, 630, 650, 730, 780, NV810, 830, 850, 870, 890, NVG7, | 10101711117771 0021 | | | Idler |
| | 9, 10, 11, 12, 14, 15, 16, 18, 30, 130, 400, AG1000, AG1050, 1200 |). | | VC772, 780, 781, 782, 785, 786, VC787, 800, 793, 799, 7810, | |
| | 1500, 1810, AG2100, 2200, NVH65, 70 | | | 7822, VCA100, 102, 104, VCA131, 140, 170, 202, 203, 234, 501, | NPLTV0111GEZZ |
| Philips | VR6460, VR6520, VR6920 | ldler Arm 40340162 | | VCA602, 5011, VCD801, 802, VCH851, 852, VCH882, VCM73, | |
| Order Code: | | Price 100p | | VCT72, VC782MK11 | |
| | VCR7000 | ldler 150280 | Order Code: | | Price: 700p |
| Sharp | VC200, 381, 383, 384, 385, 386, VC388, 390, 393, 3300, 8381, | | | N911, 915, 916, 917, 9012, 9013N9014, 9016, 9033, 9034, 9053, | |
| | 9100, 9300, 9500, 9700 | Idler NIDL0005GEZZ | | N9054, 9055, 9056, 9066, 9096, N9110, 9120, 9510, 9520, 9530, | |
| Order Code: | | Price: 100p | | N9610, DX1000, 1600, 2000, DX3000, PX1200 | Idier Arm Assembly |
| Philips | VR6540 | ldler | Order Code: | IDL245 | Price: 270p |
| Sharp | VC300, 387, 402, 471, 473, 477, VC481, 482, 483, 486, 488, 496, 500, 571, 573. | ldler | Philips | DV186, 190, VR211, 2115, 212, 213, 223, 286, 291, 292, 311, | Pressure Roller Assembl |
| | 581, 582, 583, 584, 585, 8481, 5F3, 5W20E | NIDL0006GEZZ | | 312, 313, 3210, 3219, 322, 3229, 323, 535BO, VR486, 471, 562, | PS403-40205 |
| Order Code: | | Price: 100p | | 582, 571, 761, 201, 202, VR203, 302, 303, 305, 6180, 6182, 6185 | |
| Akai | VS10 | Reel Idler | | 6285, 6290, 6291, 6293, VR6362, 6367, 6390, 6391, 6393, 6467, | |
| | 3V23, 3V29, 3V30, 3V31, 3V323V35, 8923, 8924, 8929, 8930, | noor later | | 6468, 6470, 6561, 6570, 6581VR6670, 6676, 6710, 6760, 6761, | |
| | 8931, 8940, 8941, 8942 | Reel Idler PU48967 | | 6762, 6870, 6970, 6975, 86B1, 63SB7, 68SB4, 71SB4, 71SB5, | |
| J.V.C. | HR7200, 7300, 7350, 7600, 7610, 7650, 7655, 7700 | Reel Idler PU48967 | | 72SB8, 72SB8, 92SB31, 20DV1, 20DV2, 20RW7, 21DV1, 21DV2 | |
| Order Code: | IDL20 | Price: 175p | | 2SB01, 2SB02, 2SB11, 2SB12, 30DV2, 31DV1, 31DV2, 31DV, | |
| Ferguson | 3V39, 3V30, 3V31, 3V32, 3V353V36, 3V38, 3V39, 3V49, 8930, | Take Up Idler PU 51402 | | 33SB02, 3SB03, 3SB05, 3SB11, 3SB12, 3SB13 | |
| | 8931, 8933, 8940, 8941, 8942, 8943, 8944 | m | Toshiba | V91, V95 | Pressure Roller Assembl |
| J.V.C. | HR7200, 7600, 7650, 7655, 7300, 7350, 7610, HRD110, 111, 120, | Take Up Idler PU 51402A | ivanina | ¥31, ¥33 | PS403-40205 |
| O-4 C-4 | 121, 225 | Price 100p | Order Code: | DD222 | Price: 300p |
| Order Code: | IULZZ | rrice roup | Graer Code: | | OFFER |

VXP0433 VXP0463 VXP0521 VXP0581 1430662*15620 NIDL000 72 NIDL000 72 NPLY0107 GEZZ

IT15 IT16 IT17 IT18 IT19 IT20 IT21 IT21

|T07 |T08 |T09 |T10 |T11 |Sanyo |T12 |T13 |T14

| Pr | ice: |
|----|------------------------|
| 20 | p each |
| | p each pack of 5 |
| 13 | p each pack of 10 |
| Pa | cks are for each model |



JVC

Akai

Goldstar Hitachi

M32773

M32773 MZ366960J2 VXP0521 6861471 6861482 6886971 PU48697B

| T01 | Ferguson | T02 | T17 | T17 | T170 | T103 | T104 | National | T105 | T106 | T106 | T106 | T106 | T106 | T106 | T107 | T10

National Panasonic

PU51380 PU51402A PU55373 PU55374 VXP0329 VXP0343 VXP0344 VXP0401

| Proc. Proc | | P | NCH ROLLEI | RS | |
|---|---|---|--|---|---|
| AMP 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | Model Price | | | | Model Prio |
| Fig. 19. 11. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1 | AKAI | | | L | |
| 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1 | VS10, VS9300, VS9500, VS9700, VS9800, VP7100, VP77 | 720, 721, 722, 725, 730, EVHP810, 830, 840 | HRS10 140p | | VC699, 700, 772, 750, 779, 780, 781, 7810, |
| 18. 10. 1 Feb. 19. 10. 10. 10. 10. 10. 10. 10. 10. 10. 10 | VS1, VS2, VS3, VS4, VS5, VS6, VS8, VS9, | FVHP905, 906, 907, 908, 910, 911, 915, 916, | 455 1100p | VC150, 180, VH3, 33, 200, 201, 205, 212, 250, | VC785, 786, 787, 793, 800, 7810, 7822, VCT7 |
| 8. H. S. H. S. P. S. P. D. P. C. P. S. P. | VS12, VS15 140p VS105, 112, 115, 116, 120, 125, | | | | VC6F3, VC6V3, VCA 100, 102, 104, 131, 140, |
| 939 | 126, 155, 165, 205, 220, 240, 244, 245, VS247, 248, 250, 512, VS515, 516 | | 160, 565, 566, 725, 755, | 1000, 2948, 3030, 3312 | VCA602, 5011, VCD801, 802, 851, 852, 881, |
| Part | VSX9 140p | FVHD230, 250, 270, 370, 2000D, FVHP3, 210, | PINCH ROLLER ASSEMBLY | | |
| \$22, \$2.50, \$2.50, \$3.50, \$4.5 | | | | NEVHM, NEVHML. | |
| Column C | VS125, VS155, VS165, VS220, VS240, VS250, | 1410, 1440, 1500, 200, | HRD650, 720, 830, 840, 910, HRJ205, | 362, 400, 416, 512, | VCA10, 30G, 60, 103, 105, 106, 111, 113, 13 |
| 5. C. J. C. M. C. S. C. | V5512 140p V522, 23, 25, 35, 37, 38, 53, 66, 75, 422, 425, | | | | VCA37, 39, 40, 42, 454, 46, 47, 48, 50, 505, 5 |
| ## PARTICLE CONTROL OF THE PROPERTY OF THE PRO | 426, 427, 462, 465, 467, VS485, 765, 766, 767, 769, 865, 867, 965, 967 | | | VH800, 820, 850, 888, 893, 900, 930, 940, 942, | |
| 19. 12.2 (2.6.0. 50) 19. (19. (19. (19. (19. (19. (19. (19. | VSA77, VSA650, | FVHD140, 40, 55, FVHP1, 10, 25, 30, 40, 4000, | HRD230, 271, 300, 310, 320, 321, 330, 337, | | VCB311, 320, VCBS97, VCD805, 806, 810, 81 |
| 92 (19. 10. 19. 10. 19. 19. 19. 19. 19. 19. 19. 19. 19. 19 | | | | 1500, 1660, 1800, 2004, | |
| SPAR 20, 112, 122, 123, 124, 126, 126, 126, 126, 126, 126, 126, 126 | VSF330, 4, 500, 550, VSP88, VSR100, VSX400, | GOLDSTAR | 5500, 9000 875p | VH2960, 2970, 3050, | VC780, 790, VCA10, 103, 1031, 105, 106, 211 |
| Bit | /SF260, 261, 262, 265, 270, 274, 275, 280, | | HRD540, HRD550, HRD580, HRD660, HRD860, | | |
| 5. 65. 0. 66. 0. 67. 0. | 290, 340, 350, 410, 420, 43C | GHV1247, 1248, 1250, 1266, 1290, 1291, 1295, | HRD960 700p | VP 10, 200, 220, 225, 245, VR821, 925, 1032, | |
| Part | 660, 580, 590, 599, 600, | GHV1891, 1900, 2145, 3000, 3010, 4400, 4410, | HRJ600, HRJ605, HRJ815, | 2949, 2959, 2957, 2966, 2979, 2980, VTV300, VXL20, 25, 30 140p | VCH865, 87, 910, VCS 1000, VCT212, 310, 4 |
| Fig. 12, 22, 24, 24, 23, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24 | | 51, 8000, 8200, GHV8210, 8215, 8430 GHVP1240, 1241, 1247, 1248, 1290, 1291 | | PHILIPS | |
| 19 (2) (2) (2) (2) (2) (2) (3) (3) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4 | /SP110, VSX560, VSX580 140p | GHVP1295, 1296, VCP4000, 4100, 4130, 4200, | | | |
| No. 60 (14 Page 1981, 1987, 1981, 1981, 2082) 1 | | 4300, 4301, 4305, VCP4306, 4310, 4311, 4315, 4316, 4320, 4321, 4325, 4326, 4350, GSE1290 | VS888 140p | VR2024 140p | |
| MITCH MITC | PINCH ROLLER ASSEMBLY | 1291, 1295, 1296, 1297, 1891, 1910, 20005, | VX6000A 140p | VR6/11 140p VR6540 140p | VHL3, VR1000, 2000, 2500, 3200, 3300, 3500 3600, 3650, 3800, VRS4400, VRS5000 140 |
| 2) 45.6 69. VERDOX, VE | 765, 766, 767, 768, 865, | | | DV856, 586, VR702, 703, 6485, 6585, 6589, | |
| 12. 22. 22. 22. 22. 23. 23. 23. 23. 23. 2 | 867, 965, 967, VSA650, VSF10, 11, 12, 14, 15, | VT7, 11, 14, 16, 17, 18, 19, 33, 34, 35, 350, 38, | | 0785, 0880, 0948 140p VR445, VR6442, VR6542, VR6643, VR6843. | |
| 30. 35.00. 55.00 | 221, 222, 230, 240, 30, 300, 301, 310, 320, 33, | | HSE12, 16, 17, 21, 22, 27, 31, 32, 41, 51, 52, | VR6943, 44SB9 140p | |
| NCH ROLLER ASSEMBLY 1409 1409 1409 1409 1409 1409 1409 140 | 330, 4, 500, 510, 600, VSP110, VSY100, 400, 450, 470 | 8300, 8500, 8700, 930, VT9500, 9700, 9900, | 0, 16, 170, 190, 210, 23, 25, 250, 27, 33, 34, 35, | | V910, V1510, 520, 611, 616, 621, 626, 900, |
| 1902 1907 19 | PINCH ROLLER ASSEMBLY | | | | |
| CREMON VCHROOD 140p 150p | | 110, 111, 113, 115, 118, | 14, 15, 17, 19, 25, 5600, HV | N-1700, VR2870 140p | SVX301, 303, 305, 307, 319, 322, VB710, 713 |
| CHRODOL VCRRGOO 140p 170p 170p 170p 170p 170p 170p 170p 17 | | | | VR2025, VR6580, VR6581 140p 49S86 VR3260 6349 6448 6449 6548 | 750, 770, 971, 8220, VB8225, V1710, 730, 75 |
| TRIPOD. (1977) (| | VT250, 255, 258, 260, 400, 405, 410, 413, 414, | 948D020010 | 6648 140p | |
| 19800 1990 1990 1990 1990 1990 1990 1990 | /CR7000, VCR7800, VCR8000, | VT426, 428, 430, 431, 435, 438, 450, 498, 510, | | | 971, 972, 8220, PX980, 981, 982, SE9000, |
| ## MSTRAD ## 101000 2000, 4500, 4500, 4700, 5200, 500. ## 101000 2000, 4500, 4 | | 515, 517, 518, 520, 525, | 31, 32, 41, 51, 52, 82, HSM1000, 110, 120, 150, | 291, 292, 311, 312, 313, | |
| 100. 280.0 850.0 1 100 850.0 174.0 174.8 800. 174.0 17 | AMSTRAD | 575, 576, 580, 585, 588 | | | |
| Chesory Septiles (1974) | VCR1000, 2000, 4500, 4600, 4700, 5200, 6000, | | 450, 50, 54, 55, 555, 57, 58, 59, 60, 68, | VR201, 202, VR203, 302, 303, 305, 6180, 6182, | |
| TREADLY SERVICE ASSESSMENT STORY OF THE PROPERTY OF THE PROPER | VCR8602, 8603, 8604, 8700, 8704, 8714, 8800, | VTL30, 1000, 2000, VTLC50, VTM598, 620, | 15, 17, 19, 21, 25, 5600, HVF125, HVF150, 303, | VR6291, 6293, 6362, 6367, 6390, 6391, 6393, | 3260, 3261, VS390, VX30, 31, 32, 3560, 3561 |
| ## 1872 2.3 4 140p 772 PR 730 731 735 PR 730 PR | 8804, 9000, 9005, VCR9244, 9340, DD8900, 8904 | | | | |
| Dissol, Cossol, Victorio, Crop, Sept. (1980). Sept. Se | TVR1, 2, 3, 4 140p | 727, 728, 730, 731, 735, | HS310, HS320, HS330, HS360, | 6762, 6870, 6970, | 356 140 |
| \$22,8603,8684, PREFORO, 8809,009-6,9-140, 9244, PREFORO, 8809,009-6,9-140, 9244, PREFORO, 8809,009-6,9-140, 9244, PREFORO, 8809,009,00-6,9-140, 9244, 924, 924, 924, 924, 924, 924, 92 | | | | | |
| March Collaborary Collab | 8602, 8603, 8604, | | HS347, HS349, HS400, HS410, HS411, HS412, | 20RW7, 21DVI, 21DV2, 2SB01, 2SB02, 2SB11, | SX1231, 1260, 1261, 1566, V11560, VPK43, |
| NUMBER Proceeding Process Pr | | VTS80, 85, 890, 895VM200, 2300, 2380, 3200, | | | |
| CRESSON CHROLLER ASSEMBLY PART NO. 1410, 420, 428, 490, 480, 480, 4816, 520, 527 (520, 520, 520, 520, 520, 520, 520, 520, | PINCH ROLLER ASSEMBLY PART NO: 153148 | | | | |
| NCH ROLLER ASSEMBLY PART NO. **PAGE 509 601 TASSES U.F20 2.2 4, 1409 PART NO. **PAGE 509 601 TASSES U.F20 2.2 4, 1409 PART NO. **PAGE 500 ACT T | /CR9500 300p | VT410, 420, 428, 430, 450, 498, 518, 520, 522, | | 7229, 723 140p | SLC5, 6, 7, SL3000, 8000, 8080, 8200, SLJ 10 |
| Pinch Rollie Rassembly Pinch Rollie Rassem | | | 600, 688, 777, 788, 3321, | | |
| NR 14 14 15 15 15 15 15 15 | DD9900, 9904, TX3650, UF20, 22, 24, | PINCH ROLLER ASSEMBLY | 7450 10, 60 15, 6 100, 6200, 6400, 6800, | | |
| FIRGUSON (0), 30/13, 13/13, 32/23, 31/24, 32/23, 0), 30/13, 31/13, 31/23, 31/24, 32/23, 31/24, 32/23, 23/23, 31/24 | | | | 2300, 2370, 2500, | |
| 100, 891, 891, 891, 891, 891, 891, 891, 891 | FERGUSON | | NV630, 650, 730, 770, 780, 810, 830, 850, 870, | VTC5000, 5150, 5300, 5350, 5400, 5500, 6000, | |
| 112, 8922, 8924, 8924, 8924, 8924, 8924, 8924, 8934, 8 | | VTM230, 231, 235, 284, VTS390 140p | | | |
| 140 | 3912, 8922, 8923, 8924, 8925, 8929 140 p | HINARI | 8300, 8400, 8500, 8600 | VPR5800 140p | |
| 738, 3498, 3493, 3442, 3443, 3444, 3445, 3448, 3453, 3448, 3474, 3475, 3483, 3484, 3483, 3484, 3484, 3485, 3486, 3487, 3488, 3487, 3486, 3487, 3488, 3487, 3488, 3487, 3488, 3487, 3488, 3488, 3487, 3488, 3488, 3488, 3488, 3488, 3488, 3488, 3488, 3488, 3488, 3488, 3488, 3488, 3488, 3488, 3488, 3 | | | | | SLV210, 270, 273, 275, 300, 353, 373, 410, 41 |
| 140 | 3V35, 3V36, 3V38, 3V39, 3V42, 3V43, 3V44, | VXL2, VXL3 140p | AG 1000, 1050, 1200, 1500, 2100, 2200, 6500, | VTC3000 140p | 474, 656, 715 30 0 |
| 7/16, 9843, 8944, 8945, 8947, 8948 140p | V57, 3V58, 3V59, 3V65, FV10, FVII, FV12, | VTV100, VXL10, VXL11, VLX9, | NVH70 140p | 154, 15, 16, 171, 194, 22 | |
| \$56, 8951, FV10B, 11R, 13H, 14T, 20B, 21R, 14D, 12D, 21R, 12D, 330, 330, 330, 330, 330, 330, 330, 33 | V14, 8943, 8944, 8945, 8947, 8948 140p | | NVG9, NVG120 140p | 0VHR23, 235, 240, 244, 250, 251, 274, 27, 297, | SLV275, 282, 315, 325, 353, 363, 373, 410, 41 |
| | 8950, 8951, FV10B, 11R, 13H, 14T, 20B, 21R, | V20H, VXL5, VXL6 MOD KIT 275p | 7355, 7650, NVH65, 75, NVJ30, NVL20, 23, 25, | 4200, 430, 4300, 4350, 4400, 474, 4770, 5080, | |
| 737H, FV44L, FV45T, FV43H, 140p (757) H2050, 7200, 7300, 7300, 7300, 7500, 7600, 7610, 7650, 753 | | | | | SLV125, 213, 225, 252, 255, 262, SLVXI, |
| 735, 3736, 3736, 3738, 3793, 3749, 8943. 3754, 3754, 3754, 3755, 3756, 3 | V37H, FV44L, FV46T, FV43H, | 7700 140p | NVV8000 140p | 7500, 7520, 7530, 7540, 7700, 774, 780, | |
| HAVE NOT ROLLER ASSEMBLY N | V35, 3V36, 3V38, 3V39, 3V49, 8943, | | NVJ700PX 140p | 8500, 8800, VHRD4400, 4410, 4500, 4600, | 363EE, 373, 393, 410, 415, |
| HAZ 3443, 3V44, 3V45, 3V48, 4V5, 5V46, 5 | 944 1100p INCH ROLLER ASSEMBLY | HRD110, 111, 120, 121, 140, 141, 142, 143, | NVHD100, NVHD101, NCHD90, NVSD30, | | SLV416EE, 474, 494EE, 555UC, 559, 575UC, 579, 585HE, 595HE SLV60W, 615, 625, 656 |
| 7/55, 3765, 3765, 3947, 9948 1350p 566, 725, 755, HRP50, BP5000, BR7000, MRD500, 505, 505, 505, 505, 505, 505, 505, | V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, | HRD160, 220, 225, 250, 257, 445, 455, 565, | PINCH ROLLER ASSEMBLY | VHR120, 135, 150, 190, 4150, 4160, 4350, | 676UC, 686HF, 696HF, 715, 725, 727, 757, |
| A | INCH ROLLER ASSEMBLY | 566, 725, 755, HRP50, BP5000, BR7000, | | | |
| All FV42 925 NCH ROLLER ASSEMBLY HD670, 720, 730, 730, 820, 830, 840 860, 870, 880, 910, 980, HD0X20, 22, 25, HRJ200, 205, 210, 215, 300, 315, 316, 318 HRJ400, 405, 407, 410, 411, 415, 416, 507, 507, 780, 875 NCH ROLLER ASSEMBLY SHRJ40, 180, 400, 410, 411, 415, 416, 507, 616, 605, 610, 615, 715, 815 HRJ401, 405, 407, 410, 411, 415, 416, 507, 8130, 330, 386 HRJ401, 303, 303, 386 HRJ401, 303, 303, 386 HRJ401, 303, 303, 386 HRJ401, 401, 411, 415, 416, 507, 8120, 330, 386 HRJ401, 411, 415, 416, 507, 8120, 330, 336, 816, 812, 813, 814, 815, 816, 816, 816, 816, 816, 816, 816, 816 | V37, FV57, FV58 350p | HRD520, 540, 550, 560, 580, 600, 610, 620, | NVFS1, 100, 200, 88, 90, NVG 19, 20, 21, 22, | VHRS700 975p | SLVX35AF, SLVX50AS, SLVX55DH, |
| #1. FV42L PV32L PV | V31R 140p | | NVG50, NVH65, 75, 77, NVJ30, 33, 35, 37, 40, | VHR3100, 3200, 3300, 3310, 3400, 3700, 3800, | |
| 758, 3498, 3464, 34965, FV10, 11, 12, 13, 14, 14, 14, 14, 14, 14, 14, 547, 507, 547, 216, 26, 300, 315, 316, 318 HRJ 400, 405, 407, 410, 411, 415, 416, 507, 60, 605, 610, 615, 715, 815 HRJ 400, 405, 407, 410, 411, 415, 416, 507, 60, 605, 610, 615, 715, 815 HRJ 400, 405, 407, 410, 411, 415, 416, 507, 60, 605, 610, 615, 715, 815 HRJ 400, 405, 407, 410, 411, 415, 416, 507, 60, 605, 610, 615, 715, 815 HRJ 400, 405, 407, 410, 411, 415, 416, 507, 60, 605, 610, 615, 715, 815 HRJ 400, 405, 407, 410, 411, 415, 416, 507, 60, 605, 610, 615, 715, 815 HRJ 400, 405, 407, 410, 411, 415, 416, 507, 600, 690, 6900, 8700, 9800, 9800, 6900, 8700, 9800, 9800, 6900, 8700, 9800, | | 860, 870, 880, 910, 960, | | VHRD500, 7000 1350p | X37277701 |
| 1,21,22,26,30,32,33 33,94,140,41,415,416,507 39, VC141L 876 50, 60,65,65,16,16,15,15,185 50, 60,65,65,16,16,15,15,185 50, 60,65,65,16,16,15,15,185 50, 60,65,65,16,16,15,15,185 50, 60,65,65,16,16,15,15,185 50, 60,65,65,16,16,15,15,185 50, 60,65,65,16,16,15,15,185 50, 60,65,65,16,16,15,15,185 50, 60,65,65,16,16,15,15,185 50, 60,65,65,16,16,15,15,185 50, 60,65,65,16,16,15,15,185 50, 60,65,65,16,15,15,185 50, 60,65,65,16,16,15,15,185 50, 60,65,65,16,16,15,15,185 50, 60,65,65,16,16,15,15,185 50, 60,65,65,16,16,15,15,185 50, 60,65,65,16,15,15,185 50, 60,65,65,16,15,15,185 50, 60,65,65,16,15,15,185 50, 60,65,65,16,15,15,185 50, 60,65,65,16,15,15,185 50, 60,65,65,16,15,15,185 50, 60,65,65,16,15,15,185 50, 60,65,65,15,15,185 50, 60,65,15,15,185 50, 60,65,15,15,185 50, 60,65,15,15,185 50, 60,65,15,15,185 50, 60,65,15,15,185 50, 60,65,15,15,185 50, 60,65,15,15,185 50, 60,65,15,15,185 50, 60,65,15,15,185 50, 60,65,15,15,185 50, 60,65,15,15,15,185 50, 60,65,15,15,15,185 50, 60,65,15,15,15,185 50, 60,65,15,15,15,185 50, 60,65,15,15,15,185 50, 60,65,15,15,15,15,185 50, 60,65,15,15,15,15,15,15 50, 60,65,15,15,15,15,15,15,15,15,15,15,15,15,15 | V58, 3V59, 3V64, 3V65, FV10, 11, 12, 13, 14, | | PINCH ROLLER ASSEMBLY | | SLV210, 212, 270, 273, 275, 285, 300, 310, 33 425, 427 350 |
| NCH ROLLER ASSEMBLY A/3H, FV45X, FV46T NCH ROLLER ASSEMBLY NCH ROLLER ASSEMBLY A/44, FV45X, FV45X, FV46T NCH ROLLER ASSEMBLY NCH ROLLER ASSEMBLY A/44, FV45X, FV45X, FV46T NCH ROLLER ASSEMBLY NCH ROLLER ASSEMBLY A/44, FV45X, FV45X, FV46T NCH ROLLER ASSEMBLY NCH ROLLER ASSEMBLY A/44, FV45X, FV45X, FV46T NCH ROLLER ASSEMBLY NCH ROLLER ASSEMBLY A/44, FV45X, FV45X, FV46T NCH ROLLER ASSEMBLY NCH ROLLER ASSEMBLY A/44, FV45X, FV45X, FV46T NCH ROLLER ASSEMBLY NS0, 33, 33, 35, 399 NS0, 2400, 740, 744, 746, 760, 764, VC2500, 6300, 7300, 7700, 7750, 7800, 8300, 3310, 3400, 3700, 3800, VHD500, 700 13 NS0, 230, 321, 330, 300, 7700, 7750, 7800, 8300, 3310, 3400, 3700, 3800, VHD500, 700 13 NS0, 2407, 740, 744, 746, 760, 764, VC2500, 6300, 7300, 7700, 7750, 7800, 8300, 3310, 3400, 3700, 3800, VHD500, 700 13 NS0, 2407, 740, 744, 746, 760, 764, VC2500, 6300, 7300, 7700, 7750, 7800, 8300, 3310, 3400, 3700, 3800, VHD500, 700 13 NS0, 2407, 740, 744, 746, 760, 764, VC2500, 6300, 7300, 7700, 7750, 7800, 8300, 3310, 3400, 3700, 3800, VHD500, 700, 750, 7800, 8300, 3310, 3400, 3700, 3800, VHD500, 700, 750, 7800, 8300, 3310, 3400, 3700, 3800, VHD500, 700, 750, 7800, 8300, 3310, 3400, 3700, 3800, VHD500, 700, 750, 7800, 8300, 7300, 7300, 7700, 7750, 7800, 8300, 7300, 7300, 7300, 7300, 7700, 7750, 7800, 8300, 7300 | 0, 21, 22, 26, 30, 32, 33 V39, VC141L 875 p | HRJ400, 405, 407, 410, 411, 415, 416, 507, | | VC200, 381, 383, 384, 385, 386, 388, 390, 393, | |
| A34, FV44E, FV45F, FV66 A52, FV66 A5 | INCH ROLLER ASSEMBLY | HRJ97, HRS4700, 5800, 5900, 6800, 6900, | PVC2300, 2400, 740, 744, 746, 760, 764, | VC6200, 6300, 7300, 7700, 7750, 7800, 8300, | SV6700.8750, 9700, VHR3100, 3200, 3300, |
| 761, FV62, FV67, FV68, FV70, FV71, FV72, 775p 774, FV77, FV71, FV72, ALROY, FV71, FV72, FV73, FV73, FV73, FV73, FV73, FV74, FV77, FV74, FV77, FV74, FV77, FV74, FV77, FV74, FV77, FV74, FV77, FV77, FV74, FV77, FV77, FV74, FV77, FV74, FV77, FV74, FV77, FV74, FV77, FV74, FV | V43H, FV44L, FV45X, FV46T 700p INCH ROLLER ASSEMBLY | SR3200, 330, 368 140p | 766 140p | 838, 9100, 9300, 9400, | |
| NCH ROLLER ASSEMBLY 700, 750, 950, HRS5000, 5500, 8000, 9000, BR7030, 7040, PHP420, 520, 530 140p 9060, 910, 910, 9510, 9520, NS530, 9610, PX 1200 DS6000G, DX4000, N9077 910, 910, 9520, NS530, 9610, PX 1200 DS6000G, DX4000, N9077 910, 910, 9520, NS530, 9610, PX 1200 DS6000G, DX4000, N9077 910, 910, 9520, NS530, 9610, PX 1200 NS530, PX | V61, FV62, FV67, FV68, FV70, FV71, FV72, | 320, 321, 330, 337, 350, | 9014, 9016, 9033 | VC300, 387, 402, 471, 473, 477, 481, 482, 483, | SL100, 200, SLC20, 30, 33, 34, 40, 44, 80, 88, |
| SHER HRS5000, 5500, 8000, 9000, BR7030, 7040, MP420, 520, 530 N9530, 9610, PX 1200 DS6000G, DX4000, N9077 140p VC5W20E, VCA1031 VC108, 208, 405, 550, 600, 651, 671, 674, PINCH ROLLER ASSEMBLY 33, 50 34 | V74, FV77 775p PINCH ROLLER ASSEMBLY | | | 486, 488, 496, 500, 571, | 9, SLF1, 20, 25, 30, 35, 45, SLF60, 65, 73, 90, SLHF100, 150, 950, SLK85, 95, SLO1700, |
| | ISHER | HRS5000, 5500, 8000, 9000, BR7030, 7040, | N9530, 9610, PX 1200 140p | VC5W20E, VCA1031 140p | SLS550, StT0, 30, 50 300 |
| VIDEO LAMPS | VHP420, 520, 530 140p | 9060, | DS6000G, DX4000, N9077 | VC108, 208, 405, 408, 550, 600, 651, 671, 674, | PINCH ROLLER ASSEMBLY |
| VIDEO DAMIN | | | VIDEO I AMDS | | |
| | | | | | |

| Models & Description C | Order Code | Price | Models & Description Order | Code | Price | Models & Description | Order Code | Price | Models & Description | Order Code | Price |
|---|------------|-------|--|------|-------|---|------------|-------|----------------------------------|------------|-------|
| UNIVERSAL VIDEO LAMP 9V | VL01 | 25p | | VL05 | 100p | AKAI, GRANADA (VHSTJ2), | VL01 | 25p | AUTHENTIC (N850), DECCA | VL07 | 40p |
| 80mV (310mm WIRES) | | | BLAUPUNKT, FERGUSON, FIDELITY, | | | HITACHI (VT3000), ITT (VR3912, | | | (VIDO200) CDANADA (VIDCT I2 | | |
| PANASONIC VIDEO LAMPS | VL02 | 30p | FISHER, FUJITSU, FUNAI, G.E.C., | | | VRP3833), JVC (HR2200, 3300, | | | (VR8300), GRANADA (VHSTJ3, | | |
| SHARP VIDEO LAMPS | | | GOLDSTAR, GRANADA, GRUNDIG, | | | 3330, 3660), MITSUBISHI (HS20 | | | WJ1, WJ3), ITT (VR3913, 3914, | | |
| | VL02 | | HINARI, HITACHI, ITT, JVC (HRD | | | TELEFUNKEN (VR510, 519, 610) | | | | | |
| HITACHI 5381682 (VT63, VT64) | VL04 | 135p | SERIES), MATSUI, MITSUBISHI, NEC. ORION. NATIONAL. | | | THOMSON (VK300, 305, 306, 33 | | | 3963) JVC (HT7200, 7300, 7350, | | |
| VIDEO LAMPS | | | PHILIPS, SAISHO, SALORA. | | | FERGUSON (3V00, 16, 22, 24, 3; 8900, 8901, 8902, 8903, 8909, 59 | | | 7700) TELEFUNKEN (VR450, 52 | n | |
| AKAI IVS10),GRANADA | VL06 | 40p | SAMSUNG, SANYO, SHARP. | | | 8922, 8925) | 12, | | | | |
| (VHSXJ3), TT (VR3993,3994), JVC | 3 | | SIEMEN, SONY, TELEFUNKEN. | | | 0322, 03237 | | | 529, 540, 549, 620, 640, 920, 19 | 20), | |
| (HR2650, 7600, 7610, 7650, 7655), TELEFUNKEN (VR530, 535, 539, 5 | | | THOMSON, TOSHIBA | | | BLAUPUNKT, ORION (VH1, 2A), NATIONAL (NV200,2010, 3000. | VL02 | 30p | THOMSON (V4100, VK308, 309 | , 312, | |
| 630, 650), THOMSON (V309, 316, | | | GRANADA (VHSAY3),SHARP | VL08 | 45p | 7000, 8150, 8200, 8400, 8600, 86 | 10, | | 410), FERGUSON (3V23, 29, 30, | | - |
| VK309, 411,TX8000), FERGUSON (3V31, 8941, 8942) | | | (VC200, 381, 384, 385, 386, 388, 390, 393, 9300, 9500, 9700) | | | 8620), SHARP (VC2300, 6000, 62 6300, 7300, 7700, 8300) | 200, | | 8923, 8924, 8929, 8930, 8931, 89 | | |

TELEVISION April 1999

| | | VIDEO SERVICE KI | TS | |
|--|-------|--|--------|--|
| AMSTRAD VCR700 Contents BELT SET. PINCH ROLLER. REEL IDLER. VIDEO LAMP Order Code: SK41 | £5.50 | HITACHI VTII/NT33 Contents BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SK08 | £5.00 | NV600/NV688 |
| FERGUSON & JVC 3/342/43 HRD455/HRD725 Contents BELT SET, PINCH ROLLER CLUTCH MECHANISM, TENSION BANO CLUTCH CLUTC | | \text{VTI/\text{VT3}} \text{Contents} & Economy Kit Contents} \\ \text{BELT SET. T/UP REEL TABLE} & \text{BELT SET. PINCH ROLLER.} & \text{BELT SET. PINCH ROLLER.} & \text{F/REW IDLER TYRE. T/UP REEL} \\ \text{TYRE. SUPPLY REEL} & \text{TABLE TYRE.} & \text{TABLE TYRE.} & \text{TABLE TYRE.} & \text{TENSION BAND} & \text{TENSION BAND} & \text{Corder Code: SK45} & \text{E13.00} & \text{Order Code: SK46} \end{array} | £3.75 | NV730/NV770 |
| Order Code: SK37 £16.00 Order Code: SK38 3V58/59/64/65 HRD170/180/210/230/300/320/370/400/430/530/700/750 HRS5000 Contents BELT SET, PINCH ROLLER, IOLER ARM, TENSION BAND | £9.00 | VT52/61/62/63/64/65/85/86/640 Contents BELI SET, PINCH ROLLER, BELI SET, PINCH ROLLER FF/REW ARM. CLUTCH PLATE. TENSION BAND Order Code: SK49 E14.00 Order Code: SK45 | £3.00 | NV370/NV380/480/630/780/830/850/AG2100PK/AG2200PK |
| Order Code: SK44 3V29/3V30 HR7200/7300/7350 Contents BELT SET, PINCH ROLLER, TENSION BANO, IDLER TYRES Order Code: SK05 | £7.00 | VT400/405/410/13/14/15/18/420/25/26/28/430/31/35/48/450/498/ 510/520/25/26/530/35/36/540/545/46/43/570/75/576/580/85/88 Contents TIMING BELT PINCH ROLLER FF/REW ARM. CLUTCH BASE TENSION BAND Order Code: SKS2 | £9.75 | NV777/NV788 |
| 3V35/36, 38/39/49 HRDI10/11/1/20/225 Contents BELI SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SKO4 | £5.00 | VT100/110/111/13/115/118/120/125/128/130/135/138/145/150/ 175/220/225/250/255/258/260/VTL30 Contents BELT SET. PINICH ROLLER FF/REW ARM. CLUTCH PLATE. TENSION BAND Order Code: SK51 | £14.00 | Vo.391 |
| 3V31/3V42 HR7500/7610/7650/7655 Contents ECONOMY KII CONTENTS BELT SET, T/U REEL TABLE TYRE. PINCH ROLLER REEL TYRE. PINCH ROLLER REEL | | PANA SONIC NY2000/NY2010NY7000/NY7200/NY7800 Contents Economy Kit Contents BELT SET. PINCH ROLLER. BELT SET. PINCH ROLLER. TENSION BANO. IDLER TYRES TENSION BANO. IDLER TYRES | | \text{VC500/VC571/VC581/VC582/VC583/VC584/VC5F3} \\ \text{Contents} \\ \text{Economy Kit Contents} \\ \text{BELT SET PINCH ROLLER} \\ \text{BELT SET PINCH ROLLER} \\ \text{BELT SET PINCH ROLLER} \\ \text{BELT IDLER} \\ \text{Order Code: SK60} \\ \text{ f.9.50} \\ \text{ Order Code: SK61} \\ \text{ f.5.00} |
| IDLER T/ID CLUTCH T/U IDLER TREE T/U IDLER TYRE | £5.00 | Order Code: SK03 £5.00 Order Code: SK02 NV300/NV330/NV333/NV340/NV366 Contents BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRE Order Code: SK01 | £5.00 | \(\text{VCA10} \text{VCA10} \text{VCA2} \text{VCA10} \te |
| Contents Economy Kit Contents BELT SET T/U REEL TABLE TYRE SUPPLY REEL TABLE TYRE. PINCH ROLLER. T/U CLUTCH. T/U IDLER. TYRE. IDLER TYRE IDLER TY | £5.50 | NV2000/NV2010 | £3.50 | Order Code: SK64 £13.50 Order Code: SK65 £3.75 VCS81/VC684/VC685/VC693/VC693/VC693/VC673/VC700 Contents Economy Kit Contents BELT SET: PINCH ROLLER BELT SET: PINCH ROLLER REEL DRIVE UNIT TYRE REAND REEL DRIVE UNIT TYRE BAND |
| NV29/3V30 HR0720073007350 Contents BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. SUPPLY REEL TABLE TYRE SUPPLY REAL TABLE | 23.30 | NV7000/NV7200/NV7800 Contents BELT SET, PINCH ROLLER. IDLER UMIT. PLAY IDLER. TENSION BAND Economy Kit Contents BELT SET, PINCH ROLLER IDLER UTTOR ROLLER IDLER TYPE. CLUTCH TYPE | 60.07 | Order Code: SK62 £13:50 Order Code: SK63 £5:00 FOR MORE DETAILS OF OVER 500 TYPES OF SERVICE KITS |
| TYRE PINCH ROLLER REEL IDLER TJU CLUTCH TJU IDLER TENSIDN BAND VIDEO LAMP TJU CLUTCH Order Code: SK31 £10.00 Toder Code: SK31 | £5.00 | Order Code: SK11 £8.50 Order Code: SK12 NV300/NV333/NV340/NV366 Economy Kit Contents BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER. BELT SET, PINCH ROLLER IDLER TYRE. PLAY IDLER | £3.25 | PLEASE RING US! SERVICE KIT & UPGRADE FOR |
| 3.V44/3/48/53/54/55/57 HRPS0/HRD140/150/158/160 HRD250/257/565/565/55 Contents | | TENSION BAND Order Code: SK15 67.00 Order Code: SK16 NVG7/NVG9/NVG10/NVG11/NVG12/NVG14/NVG15/NVG16/ NVG18/NVG30/NVG120/NVG130/NVG400/NVH65 (PX/ACI) AG1810 (P/K) Footenix Francisch Kit Contents | £3.25 | ONWA TV CHASSIS FAILURE OF ZD401 (ZD401 ON THE 20/21 CHASSIS) IS NOT UNCOMMON. THIS KIT HAS BEEN ASSEMBLED AS A REPAIR KIT FOR |
| BAND Order Code: SK39 £15.00 Order Code: SK40 FISHER FVH P905/996/907/908/910/911/918/918 Contents Economy Kit Contents | £9.50 | LOADING BELT CAPSTAN BELT PINCH ROLLER IDLER TENSION BAND Order Code: SK27 66.00 TORRET CONTROL CAPSTAN BELT PINCH ROLLER. IDLER. TYRE 66.00 TORRET CONTROL CAPSTAN TYRE CENTROL CAPSTAN TORRET CONTROL CAPSTAN TORRET TORRET CONTROL CAPSTAN TORRET TOR | £3.00 | COMPONENT FAILURES AND AS AN UPGRADE FOR THE POWER SUPPLY. THE KIT CONSISTS OF ALL THE REQUIRED COMPONENTS AND COMES COMPLETE WITH FULL INSTRUCTIONS AND COMES TO THE WITH FULL INSTRUCTIONS AND COMPONENTS. |
| BELT SET. PINCH ROLLER IDLER, GEAR IOLER UNIT. TENSION BAND Order Code: SK57 f13.00 Order Code: SK58 | £5.00 | NV332 Contents BELT SET, PINCH ROLLER, PLAY IGLER. FF/REW IDLER PLAY IGLER. FF/REW IDLER PLAY IGLER TYRE. FF/REW TRENSION BAND. FF/REW TYRE Order Code: SK29 £12.00 Order Code: SK30 | £5.10 | CIRCUIT DIAGRAM. THE KIT IS DESIGNED TO FIT THE FOLLOWING MAKES AND MODELS *ALBA / BUSH *AKAI |
| FVHP615(618(620/622/710/711/715/716/720/721/722/725/ 730/830/840 | | NV230/250/260/280/430/450/460/470/650/810/890/ AG 1200PK/AG1500PK Contents | | * GOODMANS * HINARI * 3VC * MATSUI ORDER CODE: ONWAKIT PRICE: 1200p * SOME MANUFACTURERS HAVE ALREADY TAKEN STEPS TO UPGRADE THE POWER SUPPLY |
| Order Code: SK68 £11.00 Order Code: SK69 | £300 | Order Code: SK23 ENT VIDEO CASSET | f3.25 | |

| Name | Models | Code | Price | Name | Models | Code | Price | Name | Models | Code | Price |
|-------------------|-----------------------------------|------|-------|--------------------|-------------------------------------|------|-------|------------|-------------------------------------|--------|---------|
| AKAI | VS35, VS53, VS55, | 7. | | | FV31R | CH19 | 4300p | | VCA103, 103GV, 106, 106GVM, | | |
| | VS56, VS75 | CH18 | 3200p | | HRD515, 520, 527, 540, 550, 580, | | | | 254GVM | CH23 | 2500p |
| GRANADA | VHSDP1 | CH05 | 1100p | | 600, 610, 620, 660, 670, HRD830, | | | | VCS211, 244, 5055, 605, VCB230, | | |
| | VHSYJ2 | CH01 | 2800p | | 840, 850, 860, 4050, 6600, FV37H | CH20 | 2200p | | VCD806G, 810G, VCT212, 310, | | |
| GOLOSTAR | GHV1290P, 1291P, 1295P, 9400, | | | | HRD540, 580, 830, 860, 910, 960, | | | | 410G, 610 | CH24 | 2500p |
| | 73401, GSE1295P, GSE1891P, | | | | HR0970, HR0X20, | | | TELEFUNKEN | VR2970 | CH02 | 2800p |
| | 20001Q, 20051Q, VCP4200, 4300, | | | FERGUSON | FV57H | CH27 | 2400p | THOMSON | V320, 321, 323, 326, 4200, 4300 | CH01 | 2800p |
| | 4301, 4305, VCP4306, 4311, 4315, | | | LT.T. | VR3605, VR3905 | CH01 | 2800p | | V342, 343, 352, 353, 360, 364, 368, | | |
| | 4316, 4320, 4321, 4325 | CH25 | 2000p | | VR3916, 3926, 3946, 3948, 3976, | | | | 4210, 4230, 4260, 4400, V5500, | | |
| | GHV51, 1221, 1232, 1240, 1241, | | | | 3986, 3995, 3997, 6948 | CH02 | 2800n | | 6000, 8540 | CH02 | 2800p |
| | 1242, 1244, 1246, 1248, GHV8000, | | | | VR3916, 3926, 3946, 3948, 3976, | | | TDSHIBA | V55, V57 | CH01 | 2800p |
| | 8200 | CH26 | 2900p | | 3986, 3995, 3997, 6948 | CH02 | 2800p | | V65, V66 | CH02 | 2800p |
| FERGUSON & J.V.C. | 3V38, 3V39, 8943, 8944, 8951, | | | NATIONAL PANASONIC | NV730 | CH06 | 4300p | | | | |
| | 3V35, 3V36, 3V49, HRD 110, 111, | | | N.E.C. | N830EG, N831EG, N831EG, N832, | | | | *** | La La | Ja - Ja |
| | 120, 121, 225 | CH01 | 2800p | | N833EG | CH01 | 2800p | MMMM | MAMAMAM | A M M | MM |
| | 3V42, 3V43, 3V44, 3V45, 3V48, | | | | N895 | CH02 | 2800p | * AM | STRAD MOD H | ZIT | 古 |
| | 3V53, 3V54, 3V55, 3V57, 8945, | | | PHILIPS | CASSETTE LIFT ASSEMBLY (691203 | (66) | | AIVI | STRAD MOD I | 711 | (A) |
| | 8947, 8948, HRD 140, | | | | DV186, 190, 286, 471, 562, 761, | | | 7 | | | The |
| | 141, 150, 157, 158, 160, 250, | | | | VR6180, 6182, 6185, 6285, VR6290, | | | | | | PA |
| | HRD257, 455, 565, 566, 725, 755 | CH02 | 2800p | | 6291, 6293, 6362, 6367, 6393, 6467, | | | FITS: | | | * |
| | 8948, 8950, FV10B, 12L, 13H, 14T, | | | | 6468, 6470, VR6561, 6670, 6760, | | | CR 4500 | , 4600 , 4700 , 5200 , TVR 1 | ,2,3 | |
| | 20B, 21R, 22L, 26, 395, HRD 230, | | | | 6761, 6870, 6970 | CH05 | 1100p | * | | | 本 |
| | 430, 530 | CH03 | 2800p | | VR6443 | CH22 | 2900p | A ppi | CD 02.25 . IV.D | | |
| | 3V58, 3V59, 3V64, 3V65, FV11R, | | | | VR6448 | CH23 | 2500p | 🛣 PRI | CE: £2.25 + VAT ex | ach | X |
| | 8950, 8951, HRD170, HRD180, | | | | 49SB6 | CH24 | 2500p | A A A A | AS AS A ASSAULT AS A | N 40 9 | A A |
| | HRD370 | CH04 | 2800p | SHARP | VCA100, VCH851, VCH852 | CH22 | 2900p | K K K K | ***** | 7 77 | A 100 |

TELEUISION

TV/VCR SPARES GUIDE 1999

The following list aives spares department addresses and telephone numbers or, where these are the same, service department or head office addresses and telephone numbers. Also included are details of various spares distributors. Stocks of spares may no longer be available for defunct brands.

Aiwa UK Ltd., P.O. Box 443, West Drayton, Middx UB7 ONZ. Fax 0181 899 0055/0181 564 See also CPC and Willow Vale.

Akai UK Ltd., Haslemere Heathrow Estate, 12 Silver Jubilee Way, Parkway, Hounslow, Middx TW4 6NQ 0181 897 6388

Fax 0181 759 6118 (Service) See also CPC, Wizard, Willow Vale and Chas Hyde.

Akura Spares available from

Alba Radio Ltd., 12 Thames Road, Barking, Essex IG11 OHZ. Spares for Alba, Bush, Roadstar. Some Goodmans and Hinari models and some Brother microwave and Dirt Devil. 0181 787 3000

Fax 0181 787 3110 See also Willow Vale, CPC. Wizard

Ambassador Brand name used by Sentra Electronics.

Amstrad Spares handled by CPC Ltd. See also Chas Hydé & Son Ltd., Willow Vale and Wizard.

Autovox See Comet Group plc.

Beko (UK) Ltd., 40 Caxton Way, Watford Business Park, Watford, Herts WD1 8QZ. 01923 818 121

Fax 01923 819 652/3.

Beovision/Beocord Bang and Olufsen UK Ltd., Unit 630, Wharfdale Road, Winnersh, Wokingham, Berks RG41

0118 969 2288 Fax 0118 969 3388

See also CPC.

Binatone Electronics plc., Unit 1, Ponders End Industrial Estate, East Duck, Lees Lane, Enfield EN3 7SP

0181 344 8888 Fax 0181 344 8877. Trade only.

Blair's Electrical Services, 13 Belgrave Road, Dresden, Stokeon-Trent ST3 4PR. Spares for Saba, Thomson, Telefunken and NordMende. 01782 599 377 Fax 01782 599 378.

Blaupunkt Merrivale Television Services, 1 Lockside, Tatbank Road, Oldbury, Warley, W. Midlands B69 4NS. 0121 544 6250 Fax 0121 552 1503.

BPL Spares for these TV sets

available from Falmouth Hi Fi, 14 Market Strand, Falmouth, Cornwall TR11 3DE. Spares also available for Crown, Dansai, Datsurai, Kuro and Zenor 01326 313 412 Fax 01326 211 210.

Bush See Alba Radio Ltd. Also HRS and Willow Vale.

Cambridge Spares available from SEME.

Canon UK Ltd., Photo Division, Brent Trading Centre, North Circular Road, Neasdon, London NW10 OJF.

0181 459 1266 Fax 0181 459 4202. See also CPC.

Cathay Spares available from Diamond Television.

Comet Group plc., After Sales H.Q., Unit 5, City Park Ind. Estate, Gelderd Road, Leeds LS12 6DR

01132 310 523 Fax 01132 311 463.

CPC Ltd., Component House, Faraday Drive, Fulwood, Preston, Lancs PR2 4PP. **01772-654 455** Fax 01772-654 466.

Authorised spares distributor for Akura, Ferguson, Fidelity, Goodmans, Grundig, Hinari, Ingersoll, LG Goldstar, Logik, Matsui, Orion, Osumo, Pace, Philips, Pye, Saisho, Samsung, Sony, Thompson, Toshiba and

Compatible spares available for Akai, Baird, Bang and Olufsen, Beko, Blaupunkt, Brandt, BT, Cambridge, Canon, Casio, Crown, Daewoo, Decca, Dual, Finlux, Fisher, Fujitsu, Funai, GEC Granada, Hantrex, Hitachi, ITT, JVC, Kenwood,

Loewe, Luxor, Marantz, Maspro, Memorex, Mitsubishi, NEC, Nikkai, Nokia, Normende, Panasonic, Pioneer, Proline, Questar, Rediffusion, Roadstar, Saba, Salora, Sansui, Sanyo, Schneider, Sentra, Sharp, Schintom, Siemens, Skantic, Solavox, Tashiko, Tatung TEC, Telefunken.Tensai, and Thorn.

Crown Corporation Spares available from Key Electronics. See also CPC, HRS. Made in India models see BPL.

Daewoo Electronic Sales UK Ltd., Daewoo Building, 640 Wharfedale Road, Winnersh Triangle, Wokingham, Berks RG41 5TP. 0118 925 2500

Fax 0118 925 2532

Note: Daewoo brand products only, not OEM products. For the latter, refer to the original distributor. Account holders only. See also CPC and Seme.

Decca See Tatung (UK) Ltd., CPC and Wizard Distributors. Spares for chassis up to and including the 110/115 series available from D&S Electronic Services, Building 15, Unit 4, Stanmore Industrial Estate, Bridgnorth, Salop WV15 5HR.

01746 766 641

Fax 01746 766 641.

Denon Spares available from Hayden Laboratories Ltd. Hayden House, Chiltern Hill, Chalfont St Peter, Gerrards Cross, Bucks SL9 9UG. 01753 888 447

Fax 01753 880 109.

Diamond Television

15/15a Rodbourne Road Rodbourne, Swindon, SN2 2AG. Spares for Cathay and Venturer products. Murphy TVs with model numbers starting CTV, the Murphy VCR7101, Sansui SV77 VCR and





GRUNDIG test instruments from Vann Draper Electronics Ltd

The test & measurement specialists

Full data sheets and price lists are published on our web site for the complete Grundig, Kenwood, Hitachi and low Cost ranges www.vanndraper.co.uk

Antenna measuring receivers



General purpose instruments



Free delivery, usually next day from stock

Oscilloscopes



Video, TV & SAT signal generators



Antenna measuring receivers

- Analogue & digital TV
- Cable & satellite
- Bit error rate
- Level measurement
- Constellation diagrams
- Battery portable

Oscilloscopes

- Analogue real time
- Digital storage

General purpose instruments

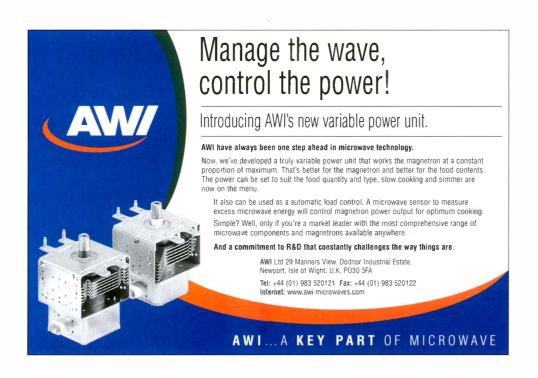
- Function generators
- RCL meters
- Frequency counters
- Multimeters
- Power supplies
- Millivolt & distortion meters
- Audio signal generators

Video, TV & SAT signal generators

- 16:9 & 4:3 formats
- Pal, Palplus, NTSC & SECAM
- TXT, VPS & Nicam sound

For a catalogue, price list or data sheets please contact sales at:

Vann Draper Electronics Ltd, Unit 5, Premier Works, Canal Street, South Wigston, Leicester LE18 2PL Tel: (0116) 2771400 Fax: (0116) 2773945 Email: sales@vanndraper.co.uk Web site www.vanndraper.co.uk







SENDZ COMPONENTS

63 Bishopsteighton, Shoeburyness, Essex SS3 8AF 1000's OF HANDSETS AVAILABLE. WE REPAIR ALL TV AND VIDEO HANDSETS

FOR FURTHER DETAILS PHONE:

01702 338894

EAST LONDON COMPONENTS

SPECIALIST IN VIDEO, TV, HI FI COMPONENTS

IC's & Japanese Transistors, Video-Heads, Motors, Idlers, Tyres, Lopts and Remote Controls.

64 Plashet Grove, East Ham, London E6 1AD **OPEN 9AM TO 6PM**

Tel: 0181-472 4871 Fax: 0181-503 5926 2 Minutes from Upton Park Tube Station

Osaki VCR31/2/3 plus mechanical parts for the VCR35 also spares for the Venturer audio range. 01793 497 591

Fax 01793 431 687.

Dynatron.- Pre 1981 sets, see Philips Service, post -1981 sets spares from SEME.

Elftone Electronics Ltd., 4 Beresford Avenue, Wembley, Middx HAO 1YZ Fax 0181 903 5011.

Etron Brand name used by Nikkai Imports Ltd.

Eurosat Distribution Ltd., 1, Oxgate Centre, Oxgate Lane, London NW2 7JA. Fax 0181 452 6777.

Expert. Sets use Tatung, GEC, or Luxor chassis.

Ferguson Spares available from Thomson Multimedia Sales UK Ltd., Sales Dept, Crown Rd, Enfield, Middx EN1 1DZ. Fax 0181 344 4452. See also CPC, HRS, Chas Hyde, SEME, Willow Vale and Wizard.

Fidelity Spares available from SEME, HRS, CPC, Wizard and Willow Vale.

Finlux Spares available from Genserve Ltd. and CPC.

Finlandia Spares available from Granada Rental Services.

Fisher Spares available from Sanyo UK Sales Ltd., Sanyo House, Otterspool Way Watford, Herts. WD2 8JX. **01923 222 244** Fax 01923 818 251. See also Chas Hyde.

Fujitsu General Ground Floor, Elstree House, Elstree Way, Boreham Wood, Herts, WD6 1LS. 0181 421 7000

Fax 0181 421 7029

GEC Spares available from CPC, HRS, SEME and Willow Vale. General See Fujitsu General

Genserve (GTS) Ltd., Bridgemead Close, Westmead Industrial Estate, Westmead, Swindon, Wilts SN5 7TS. **01793 556 002** Fax 01793 556 015.

GoldStar See LG Electronics UK

Goodmans. See Alba Radio Ltd. or Comet Group plc. depending on model. Also CPC.

Granada Rental Services Unit 37, Roman Way Ind. Estate, Longridge Road, Ribbleton, Preston, Lancs PR2 5BD. **01772 470 480/1/2** Fax 01*7*7 265 4551 Spares for Decca, Finlandia, Granada, Matsui, Rediffusion, Sanyo, Tashiko and Tatung. Trade only.

Granada Spares available from Granada Rental Services.

Grundig Spares available from GCAS, Unit 35, Woodside Park, Wood Street, Rugby CV21 2NP. 01788 570 088 Fax 01788 577 227 Account holders only supplied. See also Willow Vale. Spares for VCR4000 and SVR4004 ranges

Harwood Spares available from Key Electronics.

available only from Willow Vale.

Hinari Spares available from CPC, Chas Hyde and SEME.

Hira The Hira Co., Ltd., Hira House, 1 Elizabeth Street, Manchester M8 8JJ 01618 347 432 Fax 01618 324 566.

Hitachi Sales (UK) Ltd., Hitachi House, Station Road, Hayes, Middx UB3 4DR. Fax 0181 569 1441. See also Chas Hyde and Willow Vale.

HMV Sets use Ferguson or Fidelity chassis.

HRS Electronics Ltd., Electron House, 100 Great Barr Street, Birmingham, B9 4BB. 0121 766 6668 Freefax orderline 0800 212 179 Truedata orderline 0121 766 7247 Wide range of video, audio and television spares for Fidelity, GEC,

Hitachi, Nikkai, Pace, Philips, Pye, Saisho, Sanyo, Sharp, Tatung, Toshiba and many more. Also all leading domestic appliance brand spares. Trade only.

Chas Hyde & Son Ltd Prospect House, Barmby Road, Pocklington, Yorks YO4 2DP. 01759-303 068 Fax 01759-303 620. Sole authorised non-account distributor for Sanyo and Hitachi. Approved distributor for Ferguson, Konig, Matsui, Philips, Saisho. Extensive spares stocks available for various brands including Amstrad, JVC, Samsung, Sony and Toshiba.
Selected ranges of specific spares
for Akai, Alba, Decca, Fidelity, Hinari, GEC, Goldstar, Grundig, ITT-Nokia, Luxor, Mitsubishi, Normende, Orion, Panasonic, Saba, Salora, Sentra, Sharp and Tatung.

ITT Spares available from Genserve Ltd. See also CPC and Wizard.

JVC (UK) Ltd., JVC House, JVC Business Park, Priestley Way, Staples Corner, London NW2 7BÀ. 0181 450 3282

0181 452 5415 Account holders only. Fax 0181452 2534. See also CPC, Chas Hyde and Willow Vale.

Kenwood Electronics UK Ltd., Kenwood House, Dwight Road, Watford, Herts WD1 8EB. Fax 01923 819 131 See also CPC.

Key Electronics Unit 5, Brow Mills Industrial Estate, Brighouse Road, Hipperholme, Halifax HX3 8EF. **01422 203 676** Fax 01422 203 674. Spares for Crown Corporation, Harwood, Kyosho and

Konica Plane Tree Crescent, Feltham, Middx TW13 7HD. **0181 751 6121** Fax 0181 755 0681.

Ssangyong products.

Korting Some spares available from Telefaults, St Michael's Road, Pitts Hill, Turnstall, Stokeon-Trent ST6 6LG. Spares for other brands also available. 01782 813 757

Fax 01782 835 762.

Kuro Made in India models see

Kyoshu Spares available from Key Electronics.

LG Electronics UK Ltd., LG House, 264 Bath Road, Slough, Berks SL1 4DT. **01753 500 400** Fax 01753 517 445. See also CPC and Willow Vale.

Lloytron Electronics Ltd., Service Dept., Laltex House, Matthews Street, Ardwick, Manchester M12 5DT. 0161 272 8833 Fax 0161 272 8844.

Logik Brand name used by Dixons. Spares available from Mastercare, CPC, HRS.

Loewe-Opta Spares available from Wizard.

Longreach Marketing Ltd., Riverside Business Park, Lower Bristol Road, Bath, Avon BA2 3DW. **01225 444 894** Fax 01225 448 676.

Distributors of satellite, aerial and CCTV equipment.

Luxor Spares available from Genserve Ltd., CPC and Willow Vale.

Manhattan Eurosat Distribution Ltd., Oxgate Lane, London NW2 7JA. **0181 452 6699** Fax 0181 452 6777.

Maplin Electronics (NEI Spares Division) Unit 11, Valley Court, Station Road, Wombwell, Barnsley, S. Yorkshire. S73 OBS. 0113 277 4310 Fax 0113 277 4312

Marantz Hi Fi UK Ltd., Kingsbridge House, Padbury Oaks, 575/583 Bath Road, Longford, Middx UB7 0EH. **01753 680 868** Fax 01753 680 428 See also SEME and CPC.

Mastercare PO Box 60, Hemel Hempstead, Herts HP2 7TZ. 01442 888 444 Fax 01442 888 145.

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

(Using a video capture card)

"Llesgang diaty" automatic slide viewer with built-in high quality colour TV camera. It Board cameras all with 512 x 582 pixels 8.5mm 1/3 inch sensor and composite video out. All need to be housed in your own enclosure and have fragile exposed surface mount parts.

They all require a power supply of between 10 and 12v DC 150mA.

47MIR size 60 x 36 x 27mm with 6 infra red LEDs (gives the same illumination as a small torch but is not visible to the human eye). \$50.00 + VAT = \$58.75 40MP size 39 x 38 x 28mm spy camera with a fixed focus pin hole lens for hiding behind

40MC size 39 x 38 x 27mm camera for 'C' mount lens these give a much sharper image than with the smaller lenses. £38.79 + VAT = £45.58

Economy C mount lenses all fixed focus and fixed iris.

VSL1220F 12mm F1.6 12 x 15 degrees viewing angle. £15.97 + VAT = £18.76 VSL4022F 4mm F1.22 63 x 47 degrees viewing angle. £17.65 + VAT = £20.74 VSL6022F 6mm F1.22 42 x 32 degrees viewing angle £19.05 + VAT = £22.38

VSL8020F 8mm F1.22 32 x 24 degrees viewing angle. £19.90 + VAT = £23.38Better quality C Mount lenses

VSL1614F 16mm F1.6 30 x 24 degrees viewing angle... .£26.43 + VAT £31.06 VWL813M 8mm F1.3 with Iris 56 x 42 degrees viewing angle.£77.45 + VAT = £91.00

.20.766 + VAT = 20.90Blue and silver recordable CD ROM bulk... .£1.00 + VAT = £1.18With iewel case.

....£0.98p + VAT = £1.15 20 for £13.00 + VAT = £15.28 P6KE103A 130v diode... RC300 Philips universal remote control.5 for £24.45 + VAT (£4.69 + VAT each) = £27.55

Konig Ultrasonic remote control clearout, limited quantities. Quantity left in brackets: US8207 (15), US8209 (5), US8220 (4), US8224 (5), US8225 (2), US8232 (3), US8233 (2), US8239 (8), US8260 (1), US8264 (124), US8265 (116), US8302 (2), US8306 (1), US8309 (1), US8406 (1), US8513 (21), US8514 (40), US8516 (19), US8519 (2), US8536 (82), US8578 (182).

.£5.50 + VAT each, £22.00 + VAT for 5, £85.00 + VAT for 25.

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

JPG ELECTRONICS

276-278 Chatsworth Road, Chesterfield S40 2BH Tel: 01246 211202 Fax: 01246 550905

Callers welcome 9.30am to 5.30pm Monday to Saturday





Registered Office: 'Fairlands', Beckney Avenue, Hockley, Essex SS5 5NR Tel: Southend on Sea (01702) 201108

C.R.T.'s REPROCESSED TO ORIGINAL MANUFACTURER'S SPECIFICATION.

> PHILIPS, SONY, HITACHI, etc. POLISHING SERVICE AVAILABLE

VIDEO HEADS - BELT KITS - PINCH ROLLERS - IDLERS - IDLER TYRES - AUDIO-VIDEO LEADS

COMPONENTS

Reputation is our motto – UK's number one for:

- Quality components Competitive prices
 - · Stocked items posted on the same day
 - 325 page 1999 catalogue availability
 - Free fax order line open 24 hours a day

R/O 243-247 Edgware Road, Colindale NW9 6LU Tel Sales Hotline: 0181 205 9055

Fax Admin: 0181 205 2053, FREE Fax orderline only: 0800 318498. When you have been let down by the rest come and try us for fast and friendly service

LINE DUTPUT TRANSFORMERS - CASSETTE HOUSINGS - SEMICONDUCTORS - REMOTE CONTROLS

For a large range of ICs, Transistors, Semiconductors, Passives & Video Spares etc.







VISA Access Connect AMERICAN DOPLITA







Cricklewood Electronics Ltd

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

jenServe

A quality service for quality people

- Spare Parts for Nokia/Finlux/Salora/Luxor branded goods CTV/VCR and Satellite and agents for Konig
- Service agents for NOKIA, GRUNDIG, PHILIPS, NOKIA MONITORS, SHARP
- Repair of all makes of product including digital
- Sales agents for Akai
- Various 'B' grade products available including CTV/VCR and Satellite

A specialist after sales service organisation and welcomes all. Experienced in large scale rework and refurbishment.

GenServe (GTS) Ltd., 1 Bridgemead Close, Westmead, Swindon, Wiltshire SN5 7TS. Telephone: 01793 436107 Fax: 01793 556015

Spares for Dixons/Currys ranges – Matsui, Link, Logik, Prinz, Saisho, Sanyo.

Matsui Brand name used by Currys and Dixons. Spares available from Mastercare. Also CPC, Chas Hyde, SEME and Wizard.

Metz No UK source of spares. Manufacturers address: Metz Werke Gmbh 2 Co., D8510, Furth, Germany.

Mitsubishi Electric Europe B.V. Travellers Lane, Hatfield, Herts AL10 8XB. 01707 276 100 Fax 01707 278 859. See also CPC, Willow Vale

and Wizard.

Morphy Richards Spares available from R and M Technical Services.

Murphy Spares available from Diamond Television for TV sets beginning with CTV and VCR 7101. Some sets fitted with Fidelity chassis. Older sets fitted with Rediffusion chassis. Earlier sets fitted with Rank chassis.

National, National Panasonic See Panasonic.

NCS See Genserve (GTS) Ltd.

NEC Spares available from SEME and CPC.

NEI, See Maplin.

Nikkai See Maplin. Also CPC, HRS, SEME, Willow Vale and Wizard.

Nokia Spares available from Genserve Ltd. and Willow Vale.

NordMende Spares available from Thomson Multimedia and Blairs Electrical Services.

Onwa Electronics Simonside East Industrial Park-, Newcastle Road, South Shields, Tyne and Wear NE34 9AA. 01914 271 888 Fax 01914 276 888. Orion See CPC.

Osaki Brand name used by Rumbelows. Spares for models VCR31/32/33, also mechanical parts for VCR35 available from Diamond Television.

Osume See CPC.

Pace Micro Technology plc, Victoria Road, Saltaire, Shipley, West Yorkshire, BD18 3LF. 01274 532 000 Fax 01274 537 128. Spares also available from Eurosat, HRS, CPC and Willow

Panasonic (UK) Ltd., Panasonic House, Willoughby Road, Bracknell, Berks RG12 8FP. 01344 860 133 Fax 01344 861 598. Account holders only. Non-dealer orders handled by SEME Ltd., School Lane, Buckingham, Bucks. MK18 1HD. 01280 823 523 Fax 01280 814 916

Philips Service, PO Box 97, City House, 420/430 London Road, Croydon CR9 4QX.
0181 686 5414
Fax 0181 681 0796.
Account holders only supplied.
Also spares for Dynatron. See also CPC, HRS, Chas Hyde, Willow Vale and Wizard.

Pioneer High Fidelity (GB) Ltd., Pioneer House, Hollybush Hill, Stoke Poges, Slough SL2 4QP. 01753 789 876 Fax 01753 789 534. Account Holders only. See also SEME and CPC.

Prinz Brand name used by Dixons. See Mastercare.

Proline Brand name used by Comet Group plc.

Pye See Philips Service. Also SEME.

Quart see Denon, Hayden Lab.

Questar See CPC.

R and M Technical Services 97-99 Warton Road, Isleworth, Middx TW7 6EG. 0181 560 6644 Fax 0181 560 5853 Helpline 0181 758 0338. Spares for Morphy Richards and Roberts Radio models. Roadstar See Alba and CPC.

Roberts Radio Spares available from R and M Technical Services.

Saba Spares available from Blairs Electrical Services. See also CPC.

Saisho Brand name used by Dixons. See Mastercare, CPC, HRS, Chas Hyde, SEME, Willow Vale and Wizard.

Salora Spares available from Genserve Ltd. and CPC.

Samsung Euro Service Centre, Unit A, Stafford Park 12, Telford Shropshire.TF3 3BJ. 01952 207 171 Fax 01952 293 459 (spares only). Also CPC, Chas Hyde, Willow Vale and Wizard. Agents in N. Ireland M. Black, 33 Somerton Industrial Park, Dargan Crescent, Duncrue Industrial Estate, Belfast BT3 9JP. 01232 370 587 Fax 01232 370 852.

Sansui Spares available from Willow Vale and CPC, or Diamond Television for VCR Model SV77.

Sanyo UK Sales Ltd., Sanyo House, Otterspool Way, Watford, Herts WD2 8JF. 01923 222 244 Fax 01923 818 251. See also Chas Hyde.

Schneider Spares available from Wizard and CPC.

Seleco See SEME.

SEME Ltd., Unit 2, Saxby Road Industrial Estate, Melton Mowbray, Leics LE131BS. 01664-481 818 Fax 01664 563 976. Authorised spares distributor for Beko, Crown, Daewoo, LG,

Authorised spares distributor for Beko, Crown, Daewoo, LG, Marantz, Matsui, Mitsubishi, NEC, Panasonic, Philips, Pioneer, Pye, Saisho, Technics, Thomson/Ferguson. Spares Available for Akura,

Spares Available for Akura, Alba Amstrad, Bush, Cambridge, Crown, Dansai, Dynatron (post 1981 sets) Fidelity, Fisher, GEC, LG/Goldstar, Goodmans, Hinari, Hitachi, JVC, Logik, Luxor, NEI, Nikkai, Samsung, Sanyo, Seleco, Sharp Sony, Tatung, Thorn, Toshiba For Panasonic & Pioneer Spares **Telephone 01280 823523** Fax 01280-814916.

Sentra Post-1991 spares available from Alba. See also SEME, CPC and Wizard.

Sharp Spares available from Willow Vale, CPC, HRS and Wizard.

Siemens Spares available from Appliance Care Limited, Unit 4, Ballymount Drive, Ballymount Road Industrial Estate, Dublin 12. 00 353 145 02655 Fax 0145 02520.

Skantic Spares available from Genserve Ltd. and CPC.

Solavox Brand name used by Comet Group plc. See also CPC.

Sony UK Ltd., Spares Division, PO Box 58, Newbury, Berks RG13 9LQ. 01635 861 133 Fax 01635 874 099 Account holders only. See also CPC, Chas Hyde, Willow Vale and Wizard.

Steepletone Products Ltd., Park End Works, Croughton, Nr Brackley, Northants NN13 5RD. 01869 810 081 Fax 01869 810 784.

Ssangyong Spares available from Key Electronics.

Sunkyong Spares available from S K Global Europe Ltd., Cedar House, Vine Lane, Hillingdon, Middx UB10 OBX. 01895 207 100 Fax 01895 207161. Trade only.

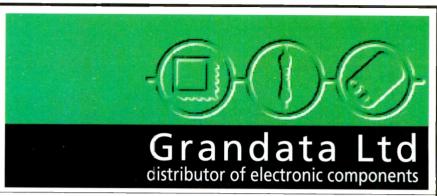
Tandberg R.D.E. Tandberg, Holly Tree House, The Green, Full Sutton, York YO4 1HW. 01759 372 795. Tashiko Brand name used by Granada. Spares available from Granada Rental Services. See also CPC. K.P. House, Unit 15 Pop In Commercial Centre Southway Wembley

Middlesex HA9 0HB tel: 0181 900 2329 fax: 0181 903 6126

website: http://www.grandata.co.uk

sales@grandata.ltd@btinternet.com Business Hours: Mon - Fri 9:00 - 5:30

Sat 9:00 - 2:00



AUDIO COMPONENTS

- ◆ C.D. ASSEMBLIES AND CARRIAGES
- ◆ C.D. PICK UPS
- ◆ CASSETTE DC MOTOR
- ◆ CASSETTE TAPE HEAD

CMOS & 74 SERIES

COMPONENTS

- **◆ BRIDGE RECTIFIERS**
- JAPANESE TRANSISTORS 2SA, 2SB, 2SC, 2SD, 2SK, 3SK SERIES
- LED's
- ◆ LINEAR IC's
- A,B,C,H,I,K,L,M,N,S,T,U,Z SERIES
- PTC THERMISTORS
- RECTIFIER DIODES
- **THYRISTORS**
- **TRANSISTORS**
- TRIACS
- VOLTAGE REGULATORS
- ◆ ZENER DIODES

COMPUTER IC's

CONNECTORS & ADAPTORS

FAULT FINDING BOOKS

FUSES

IC PROTECTORS

IC SOCKETS

REMOTE CONTROLS

SATELLITE SPARES

- ◆ PACE PRD800 UPGRADE KIT
- ◆ PACE SATELLITE TUNERS
- ◆ SATELLITE LNB's
- ◆ SATELLITE MODE TRANSFORMER
- ◆ SATELLITE REPAIR KIT
- ◆ SATELLITE SPARES

SCART KITS

SERVICE AIDS

TOOLS

- **♦ DIGITAL MULTIMETERS**
- ♦ SCRUBS
- **♦ SOLDERING ACCESSORIES**
- ◆ VIDEO HEAD CLEANING STICKS
- ◆ VIDEO MAINTENANCE TOOL

TV SPARES

- BACK UP BATTERIES
- DIODE SPLIT TRANSFORMER METER
- DIODE SPLIT TRANSFORMER
- ONWA TV CHASSIS UPGRADE KIT
- POWER SUPPLY REGULATOR
- ◆ SWITCHES (T.V.)
- TRIPLERS
- TV OUTPUT MODULE
- ◆ TV PSU REPAIR KITS

TV SPARES

- ◆ AUDIO CONTROL HEAD
- CAMCORDER HEAD EXTRACTOR
- CASSETTE HOUSING
- HEAD EXTRACTOR TOOL
- IDLERS & PULLEYS & IDLER TYRES
- MODE SWITCHES
- PINCH ROLLERS
- TRANSPARENT VCR ADJUSTMENT TAPE
- VCR ALIGNMENT KIT
- VCB BELT KITS
- VIDEO HEAD CHECKER
- VIDEO HEADS
- ◆ VIDEO LAMPS VIDEO MOTORS
- ♦ VIDEO SERVICE KITS

FOR A SELECTION OF THE PARTS THAT WE STOCK ... SEE OUR 14 PAGE ADVERT IN TELEVISION MAGAZINE

TV LINE OUTPUT TRANSFORMERS

PHONE: 0181-948 3702 FAX: 0181-332 0583

ALBA · AMSTRAD · BUSH · DECCA · DORIC · BLAUPUNKT · FERGUSON · FIDELITY ·GEG · 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 2EO**

> Approx: 1 mile from Kew Bridge. Mon-Fri 9 am to 12.30 pm & 1.30-4.30 pm



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

Tatung (UK) Ltd., Service Division, Stafford Park 10, Telford, Shropshire TF3 3AB. **01952 290 111**

Fax 01952 292 096. Trade only. Spares also available from CPC, HRS, Wizard and Willow Vale.

Technics See Panasonic (UK) Ltd.

Telefunken Spares available from Ferguson, Blair's Electrical Services and CPC.

Teleton See Fujitsu General.

Texet Spares available from The Hira Co., Ltd.

Thomson TV and VCR spares available from Willow Vale and Blair's Electrical Services.

Thorn brand equipment. Spares

available from Thorn UK Ltd., Glaisdale Drive, Bilborough, Nottingham NG8 4LA. 0115 929 3618 Fax 0115 929 2911.

Toshiba European Service Centre, Units 6/7 Admiralty Way, Southern Trading Centre, Camberley, Surrey GU15 3DT. **01276-694 000** Fax 01276-600 521. Trade only. See also CPC, HRS,

Trical Brand name used by Hinari Consumer Products Ltd.

Chas Hyde, Willow Vale and

Wizard.

Trio See Kenwood Electronics

Triumph Brand name used by Currys. See Mastercare, CPC.

Uniden Eurosat Distribution Ltd., 1 Oxygate Centre, Oxgate Lane, London NW2 7JA. 0181 452 6699 Fax 0181 452 6777.

Venturer Audio spares vailable from Diamond Television.

Willow Vale Electronics Ltd., 11 Arkwright Road, Reading Berks RG2 OLU. 01189-876 444 Fax 01189-867 188 Spares distributor/stockists for: Akai, Alba, Amstrad, Awia, Bush, Ferguson, Fidelity, GEC GoldStar, Goodmans, Grundig, Hitachi, JVC, Mitsubishi, Nikkai, Nokia, Pace, Panasonic, Philips, Pye, Saisho, Samsung, Sansui, Sharp, Sony, Tatung, Thomson, Toshiba. Other spares available. Service aids and Equipment distributor for Altai, Antex, Black-Star, Censol aerosol products, Eagle, Electrotube, ERL, Fluke, Hameg, JBC soldering, Kamasa, Konig, Labgear, One for All, Oryx, Philex, Portasol, Servisol, Uniross, Vogels, Weller and

Manchester M40 3AZ **0161-682 1415** Fax 0161-682 9031.

Wiltsgrove Ltd., 28-29 River Street, Digbeth, Birmingham B5 5SA.

0121 772 2733

Fax 0121 766 6100. Official distributor for Antex, Adcola, CME, Konig, Nikkai, Philex and Thorn.

Wizard Distributors, Empress

Mill, Empress Street, Manchester M16 9EN.
0161 872 5438 or
0161 848 0060
Fax 0161 873 7365
Help Line 0161 873 8370
Spares stocked include Akai, Alba, Amstrad, Decca, Ferguson, Fidelity, Grundig Satellite, Hitachi, ITT, Loewe, Matsui, Mitsubishi, Nikkai, Pace, Philips, Pye, Saisho, Samsung, Schneider, Sentra, Sharp, Sony,

Zenor Made in India models see BPL.

Tatung, Toshiba. Trade only.

General/miscellaneous parts suppliers

Wolsey

Delta Electronics

248 Wickham Road, Shirley, Croydon, Surrey CRO 8BJ. 0181 656 6006

Fax 0181 407 0047 Spares distributor for Konig and Philex. Genuine spares for Ambersil, Beko, Mercury, Mitsubishi, Philips and TDK available.

Economic Devices,

32 Temple Street, Wolverhampton WV2 4AN. 01902 773 122 Fax 01902 429 052.

East London Components,

63 Plashet Grove, East Ham, London E6 1AD. **0181 472 4871** Fax 0181 503 5926.

Electromail, PO Box 33, Corby, Northants NN17 9EL. 01536 04 555 Fax 01536 405 555.

Electrovalue Ltd.

Unit 5, Beta Way, Thorpe Ind. Park, Egham, Surrey TW20 8RE 01784 433 604 Fax 01784 433 605 Northern branch 680 Burnage Lane, Manchester M19 1NA. 0161 432 4945

Fax 0161 432 4127

Express Tubes, The Mill, Mill Lane, Rugeley, Staffs WS15 2JW. **01889 577 600** Fax 01889 575 600.

Farnell Electronic Components, Canal Road, Leeds LS12 2TU. 01132 636 311 Fax 01132 633 411.

Grandata Ltd,

KP House, Unit 15, Pop In Commercial Centre, Southway, Wembley, Middx HA9 OHB. 0181 900 2329 Fax 0181 903 6126.

J.W. Hardy,

231 Station Road, Stechford, Birmingham B33 8BB. 0121 784 8478 Fax 0121 789 7931.

Harrison Electronics,

Century Way, March, Cambs PE15 8QW. **01354 651 289** Fax 01354 651 289.

Irwin Electronics,

Unit 200, JC Albyn Complex, Burton Road, Sheffield S3 8BX. 0114 273 9622 Fax 0114 275 9909.

JJ Components,

Rear of 243/247 Edgeware Road, The Hyde, Collindale NW9 6LU 0181 205 9055 Fax 0181 205 2053.

Distribution Centre:-

Enterprise Park, Reliance Street,

KSA Wholesale Components, 582 Green Lane, Small Heath, Birmingham B9 5QG. 0121 772 2834 Fax 0121 772 7487.

LRC (Spares), 3-5 Whitfield Street, London W1P 5RA. **0171 323 2107**Fax 0171 323 2191.

Manor Supplies, 172 West End Lane, London NW6 1SD. 0171 794 8751/7346 Fax 0171 431 5778.

Marapet Electronic Components,

1 Hornbeam Mews, Gloucester GL2 OUE. **01452 532 253** Fax 01452 549 514

MCES, 15 Lostock Road, Davyhulme, Manchester M41 OSU. 0161 746 8037

Fax 0161 746 8136 Tuner, modulator, upper drum and LNB repairs.

MPS Electronics, PO Box 777, Rayleigh, Essex SS6 8LU. **01702 554 171**

Fax 01702 554 001.

Nikko Electronics, Dalbani House, 257 Burlington Road, New Malden, Surrey KT3 4NE. 0181 336 0566 Fax 0181-336 0579.

Philex PLC, 110-124 The Broadway, West Hendon, London NW9 7PP. 0181 202 1919 Fax 0181 202 0015.

PV Tubes, 104 Abbey Street, Accrington, Lancs BB5 1EE. **01254 236 521/390 936** Fax 01254 395 361.

RS Components, PO Box 99, Corby, Northants NN17 9RS. **01536 201 201** Fax 01536 201 501.

TW Electronics (Newbury)
Ltd, Beacon House, Harts Lane,
Burghclere, Newbury, Berks
RG20 9JZ.
01635 278 678
Fax 01635 278 266.

Vista Electronics

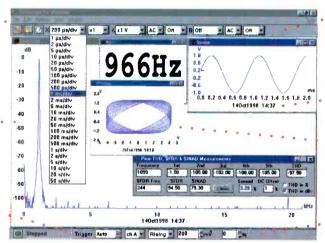
Unit 1B, Wingate Grange Industrial Estate, Wingate, Co. Durham TS28 5AH. Tubes:01429 837 100 Components: 01429 838 057 Fax 01429 837 101.

Transform your PC.... Into an oscilloscope, spectrum analyser and multimeter...

The ADC-200 range of dual channel PC based oscilloscopes offer performance only previously available on expensive `benchtop' scopes. By intergrating several instruments into one unit, the ADC-200 is both flexible and cost effective. Units are supplied with easy to use software which offers many useful features not available on conventional scopes.

Print, save or e-mail * traces and save multiple setups for different tests and experiments

Maximum use of the screen for the display of traces



Use the clipboard to export data for use in other applications or save graphs to disk.

- Date & time stamp
- Accumulate
 successive cycles to
 find intermittent faults

Specify a trigger for collecting data, delays selectable in 1% steps

 ADC-200/100
 £499

 ADC-200/50
 £399

 ADC-200/20
 £299

Products supplied with software for DOS and Windows (3.1, 95/98, NT), cables, manual and power supply.



Call for a free demo disk or visit our web site: www.picotech.com

Tel: +44 (0)1954 211716, Fax: +44 (0)1954 211880, E-mail: post@picotech.co.uk

Up to 100Msps



NV2000, 2010, 7000, 7200, 7800 (VS50048

£3.50 NV230, 260, 430, 810, 870, 2300, 4300

(VSS0110) £2.25 NV830 (VSS0091) £2.10

NV300, 333, 340, 366, 688, 777, 778

(VSS0060 £3.75

NVG21, 25, NVH65, NVD80 (VSS0175A) £2.00

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

AMSTRAD ORIGINAL NO: 153134

Need 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, OMEGE, PROFEX, SCHNEI-DER, SEG, SENTRA, SHINTOM, TASHIKO, TATUNG, TOWADA 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 | 62 5p |
| VBR0125 | | 625p |

SET OF 8 ALLEN KEYS

0.90mm

1.50mm

2.00mm

3.00mm

0.77mm

1.27mm

1.60mm

2.40mm

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

FERGUSON

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

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

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

ITE PSU

| 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 |
| | | |
| | | |

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

| 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 (Surensen) | SATPSU15 | 700p |
| AMSTRAD SRD700, SR950, SRX100, 301, 501, 502, 1002, 2001, SRD2000 SAT250 | SATPSU16 | 650p |

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 impedence: 70 Ohm
- * Power amplifier: 18db * Max. input signal: -10 DBM

*Detection Range: -60 to -10 DBM

ORDER CODE: TOOL22

PRICE: 8500p

REPLACEMIEN

GRUNDIG

PART No: 29703, 29102

USED ON:

C7500, C8500. C8502, C8712 . . .ETC Order Code: SW1 Pric 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

SONY

USED ON: KV2020

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

SONY 2 PIN FUNCTION SWITCH

Price: 110p | Order Code: SW9

Price: 35p

| | | FUSES | 国大型的数量、影響、 | |
|----------------|-----------------|-------|-------------------|------------|
| CURRENT RATING | TIME LAG (20mm) | | QUICK BLOW (20mm) | |
| | 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 |
| IA | 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 | |
| 4A | FUSE14 | 55p | FUSE30 | 50p |
| 5A | FUSE15 | 60p | FUSE31 | 50p |
| 6.3A | FUSE16 | 60p | FUSE32 | 50p 50p |

| CERAMIC PLUG TOP | | | | | | | |
|------------------|------------|-------|--|--|--|--|--|
| CURRENT RATING | ORDER CODE | PRICE | | | | | |
| 3A | FUSE33 | 100p | | | | | |
| 5A | FUSE34 | 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

VOLTAGE TESTER

A terminal screwdriver incorporating continuity & voltage with Euroslot

ORDER CODE: TOOL11

PRICE: 220p

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 CER | AMIC TIME | ELAG |
|----------------|------------------|-------|
| CURRENT RATING | ORDER CODE | PRICE |
| 10A | FUSE48 | 825p |

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 |
| ORIVE 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 |
|---|----------------------------------|------------------------------|
| ANTEX SOLDERING IRONS 25 WATT 240 VAC (XS25W 240V) 15 WATT 240 VAC (XS15W 240V) 25 WATT SPARE ELEMENT 15 WATT SPARE ELEMENT | \$101 \$102 \$103 \$104 | 900p 900p 450p 450p |
| SDLDERING STAND & SPDINGES SOLDERING STAND (MADE BY ANTEX) SPARE SPONGE | S108 S109 | 350p 55p |
| SOLDER 18 SWG 500 GRAMMES 20 SWG 500 GRAMMES 22 SWG 500 GRAMMES | S110 S111 S112 | 500p 650p 700p |
| DESOLDERING AIDS SOLDER MOP STANDARD GAUGE 1.2MM X 1.5M SOLDER MOP 1.2MM X 10M DESOLDERING PUMP SPARE NOZZLE | \$107 \$113 \$105 \$106 | 100p 420p 320p 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

GRANDATA LTD

Tel: 0181 900 2329

CASSETTE DC MOTORS

6V MOTOR 9V MOTOR 12V CW MOTOR 12V CCW MOTOR 13.2V MOTOR

170p 170p 170p 170p 290p

CASSETTE TAPE HEADS

90p MONO HEAD 110p STEREO HEAD 150p MINI HEAD AUTO REVERSE HEAD 200p

| | CD | PIC |
|---|---------------------|----------------|
| Models & Description | Order Code | Price |
| AIWA | | |
| XC007 | KSSS151A KSS152A | 1900p 1600p |
| DX-990A, DX-DIA CXL60, CXL66G, CXL80, CXN3100, CXN320, CXN3300, CXN360, CXN400, CXN430, CXN540, | N30132A | ТОООР |
| CXN550G, CXN990, CXN999, CXNV20, CXSL70, DXZ9100M, FDN636, FDN636, FDN939, | | |
| LCX60, LCX66G, LCX70M, LCX80, M7400, M75, NSX320, NSX360, NSX400, NSX430, | | |
| NXS990, NSX992, NSX999, NSXD636, NSXD939, NSXV20, SXFN550,SXFN520, XC300, | | |
| XC550, XC750, XC900, XC950, XCN992, XG320, XG360, XG400, XG990, ZD3000M, ZD3100M | KSS152A | 1600p |
| CXAP1, CXL7, CXL8G, CXLC50P, CXZ58, DXM740, DXM75, DXM76, DXM77, LCX50, LCX7, | KSS210B | 2000p |
| LCX8G, LCXAP1, XC002, XC004, XC005, XC777 XP31, XP33, XP55, XP80G | KS220A | 2500p |
| XP6.XP7 | KSS331A | 3400p |
| AKAI | | |
| CD73, DC93 | KSS151A | 1900p |
| CD25, CD26, CD27, CD32, CD36, CD37, CD52, CD55, CD57, CD650, CD670, CD69, CD750, CD79, | KCC3104 | 1300p |
| CDM480, CDM600, CDM670, CDEM770, CDM959, MX550, MX570, MX650, MX670, MX750, MX950 | KSS210A | 13000 |
| DENON | KSS151A | 1900p |
| DCD1500II, DCD1520, DCDE3520 | KS152A | 1600p |
| DCD1400, DCD600, DCD800 DCD1420, DCD520, DCD610, DCD620, DCD660, DCD810, DCD820, DCD860, DCD910, DCD920 | KSS210A | 1300p |
| DCD1015, DCD1290, DCD2060, DCD2060G, DCD315, DCD480, DCD580, DCD615, DCD715, | | |
| DCD825, DCD890, DCD895, DN2000F | KSS240A | 2000p |
| GOLDSTAR | | |
| CD952A, CD952AJ, CD952LJ, CD952SJ, FFH101KL, FFH101WL, FFH222A/L, FFH272L, | KSS210A | 1300p |
| FFH333L, FFH373K, FJ606, FR606L | KSS210B | 2000p |
| CD320A/L, CD630S/L, FFH212A/L.FFH212E | 11,002100 | |
| GRUNDIG CD360, CD435 | норм3 | 2150p |
| CCD300, CD101MCD904, MC10, NEW ORLEANS CD | KSS210A | 1300p |
| KRCD100, RR1900CD, RR3100CD, RR4000CD, RR610CD, RR700CD | KSS210B | 2000p |
| CDP60, CDP90 | KSS220A KSS331A | 2500p 3400p |
| CDP65 | OPTIMA5 | 1600p |
| CD905 HITACHI | | |
| DAW560 | HOPM3 | 2150p |
| FX-10 | KSS210A | 1300p |
| AXC10 | KSS210B | 2000p |
| J.V.C. | | |
| 1990-1992, LATE 1987-1988 – XLE300BK, XLE31BK, XLE51BK, XLE900BK, XLME91BK, XLV101BK, XLV211BK, XLV222BK, XLV311BK, XLV333BK, X:21010TN, XLZ411BK, XLZ444BK, XLZ555BK, XLZ611BK | OPTIMA3 | 4000p |
| CDRADIO CASSETTE, MINI SYSTEMS - MODELS 1990-1992 | OPTIMA4S | 5000p |
| CA.C33. CA-MX30BK, CA-MX33BK, UX-A5, UX-A6, XL-M309, XL-M403BK, XL-M408, XL-M409, | | |
| XIM504BK, XL-M505TN, XL-M508, XL-M509, XL-M705TN, XL-V131BK, XL-V1511N, XL-V221BK, | | |
| XL-V241TN, XL-242BK, XL-V251TN, XL-V252BK, XL-Z1050TN, XL-Z551TN, XL-Z552BK | OPTIMA5 | 1600p |
| 1994 ONWARDS - CAE48BK, CAMCG7, CAMXG9, CAS20BK, CAS30BK, VAS50, CAS60RBK, MXS20, MXS30, MXS60, PCX105, PCX130, PCX95, RCX230, RCX320, RCX520, RCX620, | | |
| RCX720, UXA4, UXA5, UXA55, UXC7, UXT1, UXT3, XLF115, XLF116, XLF215, XLF216, | | |
| XI MC100/M, XLMXG7, XLMXG9, XLV163TN, XLV164BK, XLV174, XLV263TN, XLV264BK, | | |
| XLV274BK, XLZ463TN, XLZ464BK, XLZ574, XLZ674, XTMXG7, XTMXG9, XTS60 | OPTIMA6S | 1600p |
| KENWOOD | KSS152A | 1600p |
| DP47, DP660SG, DP8020, DP87, L1000D DP1030, DP1510, DP2010, DP2030, DP3010, DP3030, DP3050, DP4030, DP491, DP5010, DP5030, | K35102A | тооор |
| DP5040, DP520, DP7030, DP7040, DP7050, DP730, DP920, DP930, DP950, DPM650, DPM6630, | | |
| DPM7730, DPM850, DPM991, DX6620, M225, M25, M450, M850, PD3030, PDM991, RDX25, | | |
| RXDC3, RXDC3L, UD202, UD302 | KSS210A | 1300p |
| DPC42, DPC72, DPC77, DPC80, DPC92 | KSS220A | 2500p |
| DP1050, DP2050, DP3060, DP501, DP5060, DP722, DP76, DPB5, DPB9, M77A, PD3060, | KSS240A | 2000p |
| UD502, UD70, UD701, UD90, XE5 DPC321, DPC521, DPC531, DPC631K, DPC721, DPC731 | KSS331A | 3400p |
| DP1060, DP2060. PART No: RCTRH8136AFZZ | RH8136A | 4500p |
| PANASONIC | | |
| SLP177A, SLP202A, SLP212A, SLP222A, SLP277A, SLP377A, SLP477AK, SLP477A. | | |
| SLPG100A, SLPG200A, SLPG400A, SLPG500AK, SLPG500AS, SLPJ24A, SLPJ26A, SLPJ27A, SLPJ28A, SLPJ325A, SLPJ325A, SLPJ37A, SLPJ38A, SLPJ46A | 691-30209 | 5500p |
| SEPJZ/M, SEPJZOM, SEPJSZOM, SEPJSZOM, SEPJS/M, SEPJSOM, SEPJSOM | | |

| Indels & Description | Order Code | |
|--|---|---|
| AD30, SLCH9, SLP150, SLP170, SLP200, SLP202, SLP222, SLP230, SLP250, SLP333, | | |
| LP370G, SLP400C, SLP555, SLP777, SLP999, SLPA10, SLPC20, SLPC25, SLPJ25, | | |
| LPJ26, SLPJ27, SLPJ37, SLPJ45, SLPK25, SLPK26, SLPS50, SLPS70, SLPS700, SLPS840, SLPS900 | SOAAD70A | _ |
| HILIPS | | |
| Z8304, CD070, CD080, 690, 910, 920. PART NO. 4822-691-20768 | 4822-691 | |
| D100, CD130, CD1380, CD1482, CD200, CD204, CD210, CD300, CD303, CD304, CD380, | | |
| D480, CD482, CD500, CD502, CD582, CD583, CD584, CD610, CD620, CD630, CD780, | 691-30209 | |
| D781, CD782, CD840, CD883, CD960, CDF104, CDM4/19, FCD185 .S440, AS445, AS540, AS640, AZ8048, AZ8640, CD070, CD080, CD091, CD163, CD165, | 051-30200 | |
| D690, CD710, CD720, CD732, CD740, CD750, CD910, CD920, CD935, FW17, FW21, | | |
| FW26, FW330, FW36, FW360, FW380I, FW40, FW41, FW46, FW56, FW66, FW68 | CDM12.1_ | |
| D1210/40 | CDM12.4 | _ |
| Z8006 | KSS210B | _ |
| W11 | OPTIMA6S | - |
| MONEER | | |
| DM400, PDM410, PDM500, PDM510, PDM600, PDM610, PDM700, PDM710, PDM730, | | |
| DT303, PDT403, PDT503, PDX940M, PDX950M. PDZ560T, PDZ72T, PDZ73T, PDZ81M, | KSS151A | |
| PDZ82M, PDZ83M, PDZ960M, XDZ53T, XDZ54T 432, N90M, .PD101, PD201, PD32, PD41, PD4500, PD4700, PD52PD5700, PD65,I PD6500, PD6700, | .,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | |
| PD7700, PD8700, PD970, PDCP420, PDCP520M, PDCP520T, PDJ400T, PDJ500T, PDJ800M, PDJ900M, | | |
| PDM430_PDM450_PDM550_PDM630_PDM650_PDM750_PDM901_PDP710T, PDP720T, PDP910M. | | |
| PDP920M, PDS501, PDS601, PDS701, PDS701G, PDS901, PDT310, PDT510, PDZ, PDZ5701, PDZ741, | | |
| PD784M_PD7970M_PXA1349_S125CDT, S135CDT, S303CDM, S303CDT, S505DM, S505D1, S707DM, | DE 4 1030 | |
| 5707DTM, S909DM, S990DT, XCP410M, XCP410T, XDZ54T, XDZ55T, XDZ64M, XDZ84T, XRP310, XRP320 | PEA 1030 | - |
| PDM400, PDM410, PDM500, PDM510, PDM600, PDM610, PDM700, PDM710, PDM730, | | |
| PDT303, PDT403, PDT503, PDX940M, PDX950M, PDZ560T, PDZ72T, PDZ73T, PDZ81M, PDZ82M, PDZ83M, PDZ960M, XDZ53T, XDZ54T, XDZ55T, XDZ62, XDZ62M, XDZ630, XRZ82 | PWY1009 | |
| | | |
| SAMSUNG CD20 | НОРМ3 | |
| CD1200, CD1310, SCM-6000, SCM6900 | KSS210A | Ξ |
| RCD1200, RCD1300, RCD1350, RCD1600, RCD2600, RCD990, RCD995, SCM6900 | SOH90T4N | |
| RANYO | | |
| DCFS3, DCT55, DCX502, DCX701, DCX702, DCX802, DCX891, DCX891N, MCDZ10. | | |
| PART No. 6142186855 | 614218 | - |
| DCFS5, MCD450K, 660K, MCDZ30L, 60F. PART No. 6142205006 | KSS210A | _ |
| DCX1000MD, DCX1003, DCX900MD, DCX903, DCX915 DCD10, DCD11U, DCD20, DCD30, DCD30AT, DCD6, DCD8U, DCMS1, DCX110, DCX120, | 110021471 | _ |
| DCX210, DCX220, DCX993, DCX994, MCDMS40L, MCDMS50L, MCDMS660L, MCDZ1L, | | |
| MCDZ2L, MCDZ3L. PART No. 6142391303 | 614239 | |
| DCD12, PART No. 6450055966 | 645005 | _ |
| MCDZ31L, MCDZ41L, MCDZ61L, MCDZ71L | KSS210B | - |
| SHARP | | |
| CD-111, CD-301, CD-302, CD-304, CD-310, CD-C3, CD-L700, CD-L800, CD-U1, CD-U10, CD-X10, | | |
| CD.X12, CD.X15, CD.X16, CD.X17, CD.X20, CD.X9, CKL650, CMS95CD, DX-150, DX-160, DX-450, DX-460, DX-461, DX-650, DX-660, DX-999, DX-A3, DX-N45, DX-R554, DX-R7, DX-R75, DX-R750, | | |
| DX-480, DX-481, DX-880, DX-880, DX-833, DX-430, DX-71500, DX-71500, GFCD55, QT-30CD, QT-33CD, DX-71500, DX-71500, DX-71500, GFCD55, QT-30CD, QT-33CD, QT-30CD, QT-30C | | |
| QT-350CD, QT-37CD, QT-38CD, QT-CD20, QT-CD33, RS95, SC-77CD, SC-99CD, SC-RS95, SG-A1, | | |
| SG-W1CD, SG-W2CD, SYS302, ZCD7CD. PART No. RCTRH8122AFZZ | RH8122A | _ |
| QT-50CD, QT-60CD, QT80CD, PART No. RCTRH8124AFZZ | RH8124AF | _ |
| DXR-840B, PART No. RCTTRH8130AFZZ | RH8130AF | _ |
| CDS360E, 360H, 370, 450H/E, CMS150CDH, CMSR400CDH, CP150, CPR400, CPS360, 370. | RH8136AF | |
| PART No. RCTRH8136AFZZ | 11110100 | |
| SONY | KSS240A | |
| KSS240AKSS121A | KSS121A | |
| KSS121A | KSS151A | |
| KSS210A | KSS210A | _ |
| KSS210B | KSS210B | _ |
| KSS220A | KSS220A | _ |
| KSS331A | KSS331A | _ |
| KSS360A | KSS360A | |

| | | | REM | IOI | E | CONTROLS | | | | | |
|--|----------------------------------|------------------------------|--|----------------------------------|------------------------------|---|------------------------------------|------------------------------|--|----------------------------------|------------------------------|
| Description | Code | Price | Description | Code | Price | Description | Code | Price | Description | Code | Price |
| AKAI RC-V10A RCV 37 B | RC876 RC891 | 650p 650p | A512120/230 A514790 A5088470 A518612 | RC900 RC901 RC902 RC903 | 650p 650p 650p 650p | PANASONIC EUR51200 TC2200 VSQ0357/NV730 | RC200 RC204 RC202 | 650p 650p 650p | SONY RM604, RM605, RM606 32 CHANNEL RM613 | RC140 RC140 RC141 | 650p 650p 650p |
| V25A DECCA RC70 | RC896 RC894 | 650p 650p | SCL002 C2096 A511940 | RC904 RC905 RC906 | 650p 650p 650p | TNQ1621 PHILIPS RC5002,5154 | RC203 RC134 | 650p 650p | RM632, RM636 TATUNG FXA | RC160 RC877 | 600p |
| FISHER RC905B GRANADA | RC879 | 650p | 655602H | RC1920 RC143 | 650p 650p | KT3 NON TEXT 69117032 69117194 | RC135 RC178 RC180 | 650p 650p 650p | RC70 FX70 FASTTEXT TELEFUNKEN | RC883 RC894 | 650p 650p |
| UNIVERSAL TEXT MK4 TEXT, 70155G, 70115G, 70133G 95288E | RC309 RC880 RC882 RC884 | 650p 650p 650p | IFB13, 14, 15 FS4 RG305 RG306 | RC148 RC305 RC306 | 650p 650p 650p | RC5991-UNIV RC38 KT3 TEXT RC5352 | RC300 RC301 RC5301 RC5352 | 650p | FB632 FB639 THORN/FERGUSON | RC632S RC639 | 650p |
| 94490D GRUNDIG TP160E TP200, TP300 | RC107 RC380 | 650p 650p 650p | FS9/1-10/1 VS5 RUK VS4-1 MULTICONTROL (17C20) | RC307 RC308 RC308 RC311 | 650p 650p 650p 650p | RC5375 RC5 STANDARD RC5903 SALORA | RC5375 RC300 RC5903 | 550p | 3V35-42 3V31-32 3V57-58 TX10 TEXT | RC342 RC344 RC628 RC732 | 650p 650p 650p 575p |
| TP400 TP590-600 TP390, TP610 | RC401 RC600 RC610 | 600p 650p 650p | LOEWE DC11 MATSUI | RC146 | 650p | SERIES L 86173 SANYO | RC190 RC882 | 650p 650p | TX10 STEREO TEXT TC9-90-100 3V55, FV11 | RC738 RC740 RC783 | 575p 600p 650p |
| TP621 TP630, TP650 TP666 TP661 | RC612 RC650 RC660 RC661 | 650p 650p 650p 650p | 010270601 VX770 NOKIA | RC889 RC892 | 650p 650p | RC218, RC222, RC228, RC238 JXGE JXDE VHR2300 | RC140 RC878 RC884 RC890 | 650p 650p 650p 650p | TX100 FASTTEXT TX100 ST, FASTTEXT PROFESSIONAL | RC789 RC789 RC790 | 650p 650p 650p |
| HITACHI CLE800-CLE830 A617402/655602 | RC140 RC1920 | 650p 650p | SATELLITE ORION RC53 | RC550 RC892 | 650p 650p | RC628 SHARP G0121CESA, 123CESA, 204, 251 | RC865 RC140 | 650p 650p | TOSHIBA CT937 CT9117 | RC950 RC951 | 650p 650p |

WE STOCK REMOTE CONTROLS FOR OVER 5,000 DIFFERENT MODELS RING FOR MODELS NOT LISTED ABOVE ON 0181 900 2329

GENIE - 3 way Universal Remote Control

- · Replaces 3 infra red remote controls
- Covers 1000's of models
 Controls TV, VCR and Satellite
- · Auto Code Search
- Unique styling
- Customer helpline
 Order Code: GENIE

PRICE: £9.00 + VAT

2 way Preprogrammed Universal Remote

- Replaces up to 2 remotes (TV/Satellite)
 Simple key arrangement
 Set-up by library review
- Order Code: 2 WAY

PRICE: 925p

| | | \mathbf{R} | EPLA | CE | ME | NT L | NE | | OTPO | ТТ | RÁ | NSFO | RN | /1E) | RS | | |
|------------------------------------|--------|--------------|--------------------|---------|----------------|--------------------|--------|-------|-----------------|----------|----------------|------------------------------------|--------|----------------|----------------|---------|------|
| Part No. | Code | Price | HITACHI | | | I 4515 01 19 | | 1500p | TLF 14520 F | | | | | | | | |
| AKAI | | | 2424593 | LOT44 | 1050p | 4515 01 24 | | 1600p | TLF 14521 F | LOT39 | 1500p 1850p | 094-01020/0.7 094-01021/0.6 | LOT59 | 1400p 1400p | 1-439-303-31 | LOT94 | 1300 |
| 45150344 | LOT56 | 1650p | 2432101 | | 1600p | 4515 01 46 | | 1600p | TLF 14567 F | LOT39 | 1850p | 094-01027/0.0 | | 1825p | 1-439-303-32 | LOT94 | 1300 |
| 101-214017-03 | LOT278 | 1300p | 2432461 | LOT169 | 1500p | 4515 03 01 | | 1500p | TLF 14568 F | | 1500p | 094-01038/0.7 | | 1900p | 1-439-311-00 | LOT95 | 1550 |
| 101-220005-03A | LOT72 | 1600p | 2432611 | | 1800p | 4515 03 02 | | 1550p | TLF 14584 F | | 1700p | 094-01052/0.8 | | 1825p | 1-439-311-11 | LOT95 | 1550 |
| 050/37 | LOT27 | 1450p | 2432651 | LOT80 | 1800p | 4515 03 04 | | 1500p | TLF 14586 F | | 1700p | 094-01057/1.1 | | 1450p | 1-439-311-13 | LOT95 | 1550 |
| D 053/37 | LOT207 | 1550p | 2432761 | | 1500p | 4515 03 0 5 | | 1550p | TLF 15606 F | | 2000p | 610.018.6620 | | 1650p | 1-439-311-31 | LOT95 | 1550 |
| 056/37 | | 1650p | 2432981 | | 1200p | 4515 03 06 | | 1500p | TLF 70012 | | 1500p | 610,018,6637 | | 1800p | 1-439-311-32 | LOT95 | 1550 |
| D 059/37 | | 1400p | 2432981 | | 1200p | 4515 03 08 | | 1250p | TLF 70012 F | LOT78 | 1500p | SHARP | LUIZIS | Тфоор | 1-439-331-22 | LOT96 | 1550 |
| 0 069/37 | | 1650p | 2432982 | | 1200p | 4515 03 09 | | 1500p | TLF 70012A | | 1500p | RTRNF 1220 CEZZ | LOTTO | 1850p | 1-439-331-41 | LOT98 | 1550 |
| CM 2015 AL | | 1500p | 2433011 | LOT171 | | 4515 03 10 | | 1500p | TLF 70018 | LOT274 | | RTRNF 1783 BMZZ | | | 1-439-332-00 | LOT99 | 1600 |
| ERGUSON | | | 2433012 | LOT171 | | 4515 03 13 | LOT30 | 1250p | TLF 70018 F | LOT274 | | | | | 1-439-332-11 | LOT99 | 1600 |
| 0 D-3-508-001 | LOT38 | 1250m | 2433014 | LOT171 | | 4515 03 14 | | 1400p | TLF 70161 | LOT278 | | RTRNF 1783 CEZZ RTRNF 1786 BMZZ | LOTO | 10000 | 1-439-332-21 | LOT99 | 1600 |
| 0 D-3-508-002 | | 1250p | 2433212 | LOT168 | | 4515 03 15 | | 1250p | TLF 70162 | | 1600p | RTRNF 1786 CEZZ | LOTATA | 1850p | 1-439-332-41 | LOT100 | |
| 0 D-3-508-003 | LOT276 | | 2433291 | LOT172 | | 4515 03 18 | | 1550p | TLF 70162A | | 1600p | | | | 1-439-332-42 | LOT101 | |
| 0 D-3-515-001 PL1 | | | 2433301 | LOT246 | | 4515 03 19 | LOT30 | 1250p | TLF 70162B | | | RTRNF 2000 BMZZ | | | 1-439-332-52 | LOT100 | 1500 |
| 0 D-4-208-001 | | 1600p | 2433441 | LOT188 | | 4515 03 20 | | 1650p | TLF 70162G | | 1600p 1600p | RTRNF 2002 BMZZ | | | 1-439-333-00 | LOT270 | 1550 |
| 0 D-4-208-001 | | 1600p | 2433442 | | 1600p | 4515 03 20 | | 1550p | TLF 77001 B | LOT274 | 1000b | RTRNF 2002 CEZZ | | | 1-439-333-11 | LOT270 | 1550 |
| 0 D-4-205-002 | LOT240 | | 2433451 | | 1350p | 4515 03 24 | | 1550p | PHILIPS | LU12/4 | 1000b | RTRNF 2003 BMZZ | | | 1-439-333-12 | LOT270 | 1556 |
| 0 D-4-235-002 0 D-4-235-002 HTI | | | 2433452 | | 1250p | 4515 03 25 | | 1250p | 4822 140 10142 | 1 OT1 12 | 1000- | RTRNF 2004 BMZZ | | | 1-439-363-11 | LOT268 | 1400 |
| | | 1350p | 2433453 | | 1250p | 4515 03 26 | LOT198 | | | LOT142 | | RTRNF 2005 BMZZ | | | 1-439-363-21 | LOT268 | 1400 |
| 0 D-4-235-00201G | | 1350p | 2433455 | | 1600p | 4515 03 28 | | 1450p | 4822 140 101145 | LOT134 | | RTRNF 2006 BMZZ | | | 1-439-387-11 | LOT311 | |
| 0 D-4-260-004 HTI | | 1250p | 2433521 | | 1600p | 4515 03 28 | LOT193 | | 4822 140 10146 | LOT112 | | RTRNF 2007 BMZZ | | | 1-439-387-21 | LOT311 | |
| 0 H-0-701-2400 | LOT182 | | 2433581 | | 1250p | 4515 03 30 | LOT179 | | 4822 140 10151 | LOT102 | | RTRNF 2023 BMZZ | LOT310 | 1500p | 1-439-416-11 | LOT255 | |
| 6 D-3-083-001 | | 1250p | 2433721 | | 1400p | 4515 03 31 | LOT207 | | 4822 140 10161 | LOT103 | | SONY | | | 1-439-416-12 | LOT255 | |
| 5 D-3-083-002 | | 1250p | 2433751 | | 1300p | 4515 03 34 | | | 4822 140 10171 | LOT104 | | 3753100 | LOT275 | | 1-439-416-21 | LOT255 | |
| 5 D-3-084-001 | | 1400p | 2433752 | | 1300p | 4515 03 35 | | 1650p | 4822 140 10176 | LOT114 | | 1-439-243-00 | LOT91 | 1600p | 1-439-416-23 | LOT255 | |
| 5 D-3-087-001 | | 1400p | 2433752 | | 1350p | 4515 03 38 | LOT193 | | 4822 140 10194 | LOT105 | | 1-439-243-11 | LOT91 | 1600p | 1-439-416-41 | LOT255 | |
| 6 D-3-088-001 | | 1450p | 2433891 | | 1400p | 4515 03 40 | LOT27 | 1450p | 4822 140 10198 | LOT116 | | 1-439-243-12 | LOT91 | 1600p | 1-439-416-51 | LOT255 | |
| 6 D-3-093-001 | LOT204 | 1600p | 2433892 | | 1450p | | LOT200 | | 4822 140 10201 | LOT104 | | 1-439-243-31 | LOT229 | | 1-439-430-21 | LOT271 | |
| 6 D-3-095-001 | | 1000p | 2433893 | | 1400p | 4515 03 41 | | 1650p | 4822 140 10236 | LOT118 | | 1-439-243-32 | LOT229 | | 154125A | LOT275 | |
| 6 D-3-095-002 | | 1000p | 2433952 | | 1000p | 4515 03 43 | LOT196 | | 4822 140 10246 | LOT111 | | 1-439-243-41 | LOT229 | | TOSHIBA | LU12/5 | 1550 |
| 6 D-333-512-001 | LOT204 | 1600p | 2434902 | | 1400p | 4515 03 44 | LOT56 | 1650p | 4822 140 10247 | LOT105 | | 1-439-244-00 | LOT48 | 1600p | 37010 | 1.OT121 | |
| ETX 100 90 DEG | LOT04 | 1500p | 2434141 | | 1400p 1000p | 4515 03 46 | LOT201 | | 4822 140 10254 | LOT107 | | 1-439-244-11 | LOT48 | 1600p | 37010 | LOT131 | |
| ETX 90 WHITE | LOT06 | 1650p | 2434141 | | | 4515 03 50 | LOT27 | 1450p | 4822 140 10263 | LOT117 | | 1-439-244-21 | LOT48 | 1600p | 37012 | LOT131 | |
| ETX 100 100 DEG | LOT34 | 1500p | 2434141 | | 1000p | 4515 03 51 | LOT27 | 1450p | 4822 140 10269 | LOT210 | | 1-439-244-31 | LOT48 | 1600p | | LOT131 | |
| RUNDIG | | ` | 2434274 | | 1050p | 4515 03 75 | LOT56 | 1650p | 4822 140 10271 | LOT208 | | 1-439-256-00 | LOT45 | 1650p | 37013 37014 | LOT131 | |
| 9201.008.01 | LOT153 | 1750p | 2434274 | | 1050p | 4516 16 01 | LOT22 | 1250p | 4822 140 10274 | LOT123 | | 1-439-256-11 | LOT45 | 1650p | | LOT131 | |
| 9201.014.01 | LOT140 | 1500p | 2434455 | | 1600p | MITSUBISHI | | | 4822 140 10282 | LOT122 | | | LOT45 | 1650p | 37015 | LOT131 | |
| 201.015.01 | LOT149 | | | | 1600p | 731003 | LOT51 | 1550p | 4822 140 10283 | LOT104 | | | | 1650p | 37016 | LOT131 | |
| 201.017.01 | | 1250p | 2434593 2435062 | | 1050p | 276-16399 | LOT49 | 1500p | 4822 140 10294 | LOT125 | | | LOT230 | | 37017 | LOT131 | |
| 201.018.01 | LOT163 | | 2435062 | LOT296 | 950p | 334 B 07803 | LOT50 | 1450p | 4822 140 10306 | LOT110 | | | LOT92 | 1600p | 37018 | LOT131 | |
| 201.018.02 | | 1700p | | | 1000p | 334 B 078030 | LOT50 | 1450p | 4822 140 10325 | LOT132 | | | LOT92 | 1600p | 37019 | LOT131 | |
| 201.019.01 | | 1250p | 2435131 | LOT251 | | 334 B 08104 | LOT74 | 1600p | 4822 140 10326 | LOT122 | | | LOT46 | 1300p | 1810951 | | 1400 |
| 201.019.02 | | 1250p | 2435141 | LOT282 | | 334 B 08108 | LOT295 | 1600p | 4822 140 10328 | LOT124 | | | | 1300p | 2433751 | | 1300 |
| | | 1700p | 2435301 | | 1450p | 334 P 18506 | LOT51 | 1550p | 4822 140 10349 | LOT106 | | | LOT46 | 1300p | 2433752 | LOT250 | |
| | LOT166 | | 2435671 | | 1600p | 334 P 18507 | LOT75 | 1500p | 4822 140 10353 | LOT284 | 1400p | 1-439-286-13 | LOT46 | 1300p | 23236023 | LOT281 | 1300 |
| 201.022.02 | LOT165 | | 2436201 | LOT 109 | | 5908-05008A-AA | LOT70 | 1500p | 4822 140 10356 | LOT284 | | 1-439-286-21 | LOT46 | 1300p | 23236052 | LOT131 | 1450 |
| | LOT165 | | 2436202 | LOT109 | | D 108/37 | | 1500p | 4822 140 10367 | LOT286 | | | LOT228 | | 23236098 | LOT288 | 1400 |
| | LOT165 | | 2432101-2 | | 1600p | DCF 1577 | LOT273 | | 4822 140 10369 | LOT109 | 1200p | | LOT228 | | 23236198 | LOT288 | 1400 |
| | | | 2433451H | | 1350p | DCF2077A | LOT272 | | 4822 140 10381 | LOT128 | | 1-439-289-00 | LOT47 | 1400p | 23236255 | LOT289 | |
| | | 1500p | 2433453H | | 1250p | KFS 60226B | LOT279 | | 4822 140 10384 | LOT127 | 1550p | | | 1400p | 23236424 | LOT129 | |
| | LOT164 | 1400p | 2433891H | | 1400p | MSH-1FBW08 | LOT78 | 1500p | 4822 140 10395 | LOT116 | 1600p | | | 1400p | 23236425 | LOT288 | |
| INARI | | | 2433892G | LOT84 | 1450p | NIKKAI | | | 4822 140 10406 | LOT73 | | | | 1400p | 23236428 | LOT289 | |
| | LOT24 | | I.T.T. | | | BABY10 | LOT67 | 1450p | 4822 140 10421 | LOT109 | | | | 1450p | 3122113837011 | LOT131 | |
| 13914 1 | | 1500p | 4515 01 08 | LOT113 | | ORION | | • | 4822 140 17078 | LOT103 | | | | 1450p | 150F6D | LOT131 | |
| | | 1500p | 4515 01 15 | LOT136 | | 3714002 | LOT02 | 1500p | SANYO | | | | LOT269 | | TFB 4039 AD | LOT293 | |
| | | 1500p | 4515 01 16 | LOT139 | | PANASONIC | | • | 094-00020/0.9 | LOT113 | 1400p | | | 1300p | TFB 4048 AD | LOT281 | |
| M51-1411834-1 | LOT24 | 1500p | 4515 01 17 | LOT139 | 1675p | TLF 14512 F | LOT39 | 1850p | 094-00035/0.2 | LOT162 | 1350n | | LOT94 | | TFB 4048 BD | LOT281 | |

*********************** * 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 | £1 6.00 | £13.00 |
| KSS 210A | £18.00 | £13.00 |
| KSS 210B | £20.00 | £15.00 |
| KSS 240A | £25.00 | £20.00 |
| KSS 213B | £19.00 | £15.00 |
| KSS 213C | £19.00 | £15.00 |
| OPTIMA 6S | £20.00 | £16.00 |
| OPTIMA 5 | £30.00 | £16.00 |
| RCTRH 8151 | £44.00 | £20.00 |
| RCTRH 8112 | £57.00 | £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

randata

distributor of electronic components

K.P. HOUSE, UNIT 15, POP IN COMMERCIAL CENTRE, SOUTHWAY, WEMBLEY, MIDDLESEX HA9 OHB, ENGLAND

Telephone: 0181 900 2329 Fax: 0181 903 6126 E Mail: GRANDATA.LTD@BTINTERNET.COM Web Site: http://www.grandata.co.uk

CLOW BLOW

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



ASSORTED **WICKMAN FUSES**

This Kit consists of Assorted Wickman Fuses both Slow & Fast Blow: 17 Different Types 10 of Each Type 170 Fuses in Total Packed in a Plastic Storage Box Order Code: Wickmankit PRICE £40.00

| No. of Lot | SLOW BLOV | |
|------------|------------|-------|
| RATING | ORDER CODE | PRICE |
| 0.05A | FUSE74 | 65p |
| 0.063A | FUSE75 | 65p |
| 0.08A | FUSE76 | 65p |
| 0.1A | FUSE77 | 35p |
| 0.125A | FUSE78 | 35p |
| 0.16A | FUSE79 | 35p |
| 0.2A | FUSE80 | 30p |
| 0.25A | FUSE81 | 30p |
| 0.315A | FUSE82 | 30p |
| 0.4A | FUSE83 | 30p |
| 0.5A | FUSE84 | 30p |
| 0.63A | FUSE85 | 30p |
| 0.8A | FUSE86 | 30p |
| 1A | FUSE87 | 30p |
| 1.25A | FUSE88 | 30p |
| 1.6A | FUSE89 | 30p |
| 2A | FUSE90 | 30p |
| 2.5A | FUSE91 | 30p |
| 3.15A | FUSE92 | 30p |
| 4A | FUSE93 | 30p |
| 5A | FUSE94 | 30p |

★★★ PLEASE NOTE THAT ALL WICKMAN FUSE PRICES ARE FOR A QUANTITY OF 1 (ONE) – (EXCEPT FOR KIT) ★★★

| HIGH VOLTAGE CERAMIC CAPACITORS | | | | | | | |
|---------------------------------|---------|------------|--------------|---------|---------|------------|-------|
| VALUE | VOLTAGE | ORDER CODE | PRICE | VALUE | VOLTAGE | ORDER CODE | PRICE |
| 220 pF | 2000v | CAP01 | 90p | 1200 pF | 3000v | CAP08 | 225p |
| 330 pF | 2000v | CAP02 | 90p | 1500 pF | 2000v | CAP09 | 130p |
| 470 pF | 2000v | CAP03 | 90p | 1500 pF | 3000v | CAP10 | 225p |
| 680 pF | 2000v | CAP04 | 95p | 2200 pF | 2000v | CAP11 | 130p |
| 820 pF | 3000v | CAP05 | 150p | 3300 pF | 2000v | CAP12 | 145p |
| 1000 pF | 2000v | CAP06 | 110p | 4700 pF | 2000v | CAP13 | 180p |
| 1000 pF | 3000v | CAP07 | 225 p | | | | |

| SMD ELECTROLYTIC 105° CAPACITORS | | | | | | | |
|----------------------------------|---------|------------|-------|--------|---------|------------|-------|
| VALUE | VOLTAGE | ORDER CODE | PRICE | VALUE | VOLTAGE | ORDER CODE | PRICE |
| 22 µF | 6.3v | CAP14 | 110p | 100 μF | 25v | CAP22 | 300p |
| 47 µF | 6.3v | CAP15 | 110p | 1 μF | 50v | CAP23 | 110p |
| 100 μF | 6.3v | CAP16 | 130p | 2.2 µF | 50v | CAP24 | 110p |
| 10 µF | 16v | CAP17 | 110p | 4.7 µF | 50v | CAP25 | 110p |
| 22 µF | 16v | CAP18 | 110p | 10 µF | 50v | CAP26 | 130p |
| 47 µF | 16v | CAP19 | 130p | 22 µF | 50v | CAP27 | 180p |
| 470 μF | 16v | CAP20 | 320p | 47 µF | 50v | CAP28 | 300p |
| 33 µF | 25v | CAP21 | 130p | | | | |

★★★ PLEASE NOTE THAT ALL THE ABOVE CAPACITOR PRICES ARE FOR A PACKET OF 5 (FIVE) ★★★

SUITABLE FOR MITSUBISHI 21" & 25" TV's

To replace the TDA8178S fitted to the following MITSUBISHI 21" & 25" TV's:

CT21A2STX, CT213STX, CT25A2STX, CT25A3STX CT25A4STX, CT25A6TX, CT25B2STX, CT25B3STX

It comes with clear and concise instruction on how to carry out the work.

ORDER CODE: MITSKIT1 PRICE: 300p



SUITABLE FOR **MITSUBISHI 29" & 33" TV's**

To replace the TDA8178S fitted to the following MITSUBISHI 29" & 33" TV's: CT29AS1, CT29B4, CT29A4, CT29A6, CT29B2, CT29B3, CT33B3

It comes with clear and concise instruction on how to carry out the work.

> **ORDER CODE: MITSKIT2 PRICE: 1500p**

POWER SUPPLY & UPGRADE KIT FOR SAMSUNG Suitable for Samsung Winner 1 Chassis

(VIK310, VIK350, V1375, V1395)

This kit contains the components required to upgrade the power supply for all the above mentioned models. It comes with clear and concise instructions on how to carry out the work

ORDER CODE: SAMSUNGKIT PRICE: 1600p



GENUINE PHOENIX KITS

See Page 418 for more new arrivals

rancata distributor of electronic components

K.P. HOUSE, UNIT 15, POP IN COMMERCIAL CENTRE, SOUTHWAY, WEMBLEY, MIDDLESEX HA9 OHB, ENGLAND Telephone: 0181 900 2329 Fax: 0181 903 6126 E Mail: GRANDATA.LTD@BTINTERNET.COM Web Site: http://www.grandata.co.uk

COMING SOO

NEW POINT & GO UNIVERSAL REMOTES!

Uses new revolutionary Point & Go Technology™ Chip

- Set up in seconds!
- Truly simple Set up!
- Multi Brand compatible
- Replaces lost and broken remotes
 - Easy hot button set up

TV with Teletext Order Code: CM100 Price: £10 + VAT

TV with Teletext and VCR Order Code: CM200 Price: £12.75 + VAT

PINCH ROLLER ASSEMBLIES

PRESSURE ROLLER **ASSEMBLY** PS403-40205

SUITABLE FOR: B & O, DECCA, GEC GRANADA, ITT, PHILIPS, PIONEER, PYE, TOSHIBA

ORDER CODE: PR232 PRICE: 280p

PINCH ROLLER ASSEMBLY X37277701

SUITABLE FOR: SONY SLV215, SLV216EE, SLV275, SLV282, SLV315, SLV325 etc

ORDER CODE: PR207 PRICE: 550p

PINCH ROLLER **ASSEMBLY** 948D020010

SUITABLE FOR: AIWA **MITSUBISHI**

ORDER CODE: PR205 PRICE: 750p

PINCH ROLLER ASSEMBLY VXL 1858

SUITABLE FOR: BLAUPUNKT, GRUNDIG. PANASONIC, PHILIPS, PIONEER, SIEMENS, SONY

ORDER CODE: PR219 PRICE: 300p

Versal replacement remote con

PREPROGRAMMED TO COVER ALL MAJOR BRANDS OF TVS, VIDEOS. SATELLITES AND CD PLAYERS.

REPLACES UPTO 8 DIFFERENT REMOTE CONTROLS.

WITH TELETEXT & FASTEXT FUNCTIONS.



CM3900A DIGITAL MULTIMETER

- LARGE LCD DISPLAY HEIGHT 18mm
- MAXIMUM READING 1999 + UNIT
- SINGLE MANUAL ROTARY SWITCH FOR FUNCTION AND RANGE OPERATION
- AUTO POWER OFF (APPROX 15 min)
- DIODE TEST FUNCTION
- ALL BANGES OVERLOAD PROTECTED
- SUPPLIED WITH TEST PROBES
- DC VOLTAGE: 200mV/2V/20V/200V/700V ACCURACY * 0.5%
- AC VOLTAGE: 200mV/2V/20V/200V/700V
- DC CURRENT A: 200µA/20mA/200mA/2A/20A
- AC CURRENT A: 200uA/20mA/200mA/2A/20A
- RESISTANCE Ω : 200 $\Omega/2k\Omega/200k\Omega/2M\Omega/20M\Omega$

ORDER CODE: CM3900A PRICE: 2900p



CM3230 DIGITAL CAPACITANCE **METER**

FEATURES:

- 3.5 LCD DISPLAY HEIGHT 18mm
- * MAXIMUM READING 1999
- CAPACITANCE 9 RANGES FROM 200pF
- MEASURING FROM 1pF-20000°F
- SINGLE MANUAL ROTARY SWITCH FOR FUNCTION AND RANGE OPERATION

ORDER CODE: CM3230 PRICE: 3950p

CM3920 DIGITALMETER WITH TEMPERATURE MEASUREMENT

- TEMPERATURE MEASUREMENT
- DIODE & TRANSISTOR HEE TEST LARGE LCD DISPLAY HEIGHT 18mm
- MAXIMUM READING 1999 + UNIT
- SINGLE MANUAL ROTARY SWITCH FOR FUNCTION AND RANGE OPERATION
- AUTO POWER OFF (APPROX 15 min) DIODE TEST FUNCTION
- ALL RANGES OVERLOAD PROTECTED SUPPLIED WITH TEST PROBES
- DC VOLTAGE: 200mV/2V/20V/200V/1000V ACCURACY * 0.5%
- AC VOLTAGE: 200mV/2V/20V/200V/700V
- DC CURRRENT A; 2mA/20mA/200mA/20A
- AC CURRENT A: 200mA/20A
- RESISTANCE Ω: 200Ω/2kΩ/200kΩ/2ΜΩ/20ΜΩ/ 200ΜΩ
- CAPACITANCE: 2nF/20nF/200nF/2*F/20*F

ORDER CODE: CM3920 PRICE: 4100p

★★★ PLEASE NOTE THAT POSTAGE ON ALL THE ABOVE METERS IS CHARGED AT £3 ★★★

So, with renewed confidence, I ordered the transformer.

When it arrived I soon had it installed, along with the final BS208. I drew a deep breath and switched on. There was a picture with correct geometry, and the BS208 was running cool. I could hardly believe it. Then, just as before, the sides caved in and the transistor blew out a small puff of smoke and died.

Without further ado I switched off, rolled the mains lead up and refitted the back cover. Then I phoned the owner, told him it had beaten me, and asked him to come and take it away. As I sat on my stool, I wondered whether my days as a TV engineer were numbered. I was brought back to reality by the phone. This time it was a nice, simple job. With luck it might pay for some of the Hitachi set's components – and perhaps renew my confidence for a while.

Is there anyone out there who has the faintest idea about what might have been the cause of the Hitachi set's EW fault? I'd dearly love to know. John Edwards, Welling, Kent.

Security System

In a letter in the November issue Laurie Watkinson suggested using an old piano-key VCR for recording purposes with a security system. This thought had also crossed my mind, but such videos have become something of a collectors' item of late.

Instead, I decided to modify a relative youngster, a Matsui VX820, using the simple circuit shown in Fig. 1. It should work with most single record button machines. My first step was to black out the PIR photocell and fit it with a 240V AC activated DP relay, RLY1 in Fig. 1. RLY2 is a miniature 12V DC relay. The timer circuit was set to minimum, which in this case is four seconds. A single 556 timer chip could be used instead of the two 555s. *Phil Barry*,

Bedale, N. Yorkshire.

Stepper Motors

I was interested to read about Quintin Blane's problem with a stepper motor and his success in dealing with it (February, page 244). It seems to me to have been a torque problem. My experience is that while such motors (known colloquially as Fuji motors) can develop considerable torque when 'plodding', the torque in the 'sprint' mode is much less. This is because the current in the windings reaches its V/R value in the plod mode but never does in the sprint mode, because of the inductance of the windings.

I learnt about this many years ago while working on numericallycontrolled crankshaft grinders in the Midlands. These machines are awesome. The wheelhead (spindle) is about a foot thick, and typically carries

five grinding wheels (about three feet in diameter) so that all five journals can be ground at once. The wheelhead is driven by a 30 h.p. variable-speed drive.

In operation a robot arm loads the crankshaft into the machine. As the crankshaft is rotated, the wheelhead is hurtled towards it by hydraulic rams but is arrested by a stop. At this point the Fuji motor takes control, giving first a coarse feed, then a medium feed and finally a fine feed. The wheels then retract, and the robot unloads the crank. After twenty cycles the grinding wheels are trued with water-cooled diamond picks, and the NC feed memory is incremented by the same dimension that the picks took off the grinding wheels, typically two thousandths of an inch.

A strange fault developed with one particular machine. The first few cranks after a wheel dress would be oversize. Once four or five cranks had been done the machine would somehow correct itself. As a result it produced about fifteen good cranks out of twenty. The electronics section was called in first. Boards were changed, then the entire NC cabinet and the Fuji motor, all to no avail. The works fitters were, let's say, unhelpful, and there could have been a strike had the electronics section tried to carry out a mechanical investigation. So the makers of the machine were called in.

The manufacturer's engineer was also baffled. He eventually removed a cover and applied a huge torque wrench to the lead screw. Being unable to turn it, he

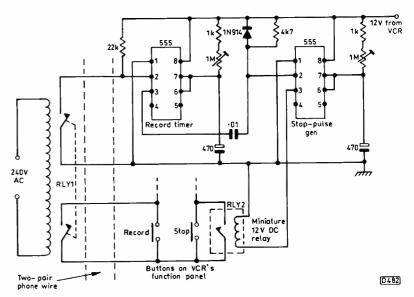


Fig. 1: Record start/timer/stop circuit for security-system use with a single record button VCR.

declared the screw bent. But this wasn't the case either. In the end the repair tools required consisted of a wheelbarrow, shovel, crowbar, large hammer, grease gun and oilcan. These were used to remove thick slabs of 'concrete', made of rusted iron dust, that had accumulated under the machine slides.

Apparently when the Fuji motor was sprinting (catching up after a wheel dress) it was unable to compress the rust. When plodding on its fine feed it could make some headway.

I might add that such errors are caught by automatic gauging. This may be a closed-loop system or, alternatively, 'after gauging' can be used. Zero defects can be achieved by using both systems.

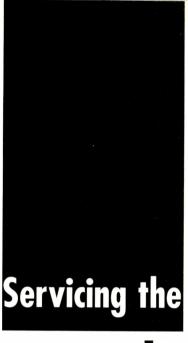
One last point about stepper drives: watch out for multi-voltage supplies that are sometimes used to get more torque in the sprint mode. *D. Benyon*,

Bude, Cornwall.

Corrections

A further correction to the Pace PRD series modification article in the February issue (pages 238/9). The added $1k\Omega$ resistor should be connected between the cathode of the added 1N4148 diode and pin 15 of U3.

Two resistors should be deleted in Fig. 9, page 256 of the February issue (Low-power Standby Operation). There is no feedback resistor between the output of the second op-amp and its non-inverting input, and there is no link between the output of the second op-amp and the bias applied to pin 2 of the UC3842/4 series IC.



Hitachi 46TN Series

John Coombes provides a fault-finding guide for these sets, which first appeared in 1995

he Hitachi 46TN series includes Models C2146TN, C2546TN and C2846TN. There are one or two differences between the 21in. model and the 25 and 28in. ones. In particular the HT is higher in the large-screen models, which also incorporate an EW modulator circuit. The two versions use a different line output transistor and have different chopper and line output transformers.

Power Supply Circuit

The chassis uses a discrete-component chopper power-supply circuit, see Fig. 1, which also shows the excess-current trip arrangement. This is based on thyristor Q704, which is fired in the event of a short-circuit/excess current condition, switching the receiver to standby. Q704 is fired by Q955 in the event of a heavy load on one of the LT rails, by Q4452 in the audio circuit in the event of excess current demand here, or by Q703 should the line output stage be drawing excess current. Q703 monitors the voltage across R705 in the feed to the line output transformer. In addition Q704 will be fired if there is an over-voltage condition in the line output stage: ZD701 monitors the 200V supply that's used by the RGB output stages and the tuning circuit.

Q903 is the chopper transistor, which receives a start-up supply at its base via R901 and R902. The circuit is a self-oscillating arrangement, with feedback from the transformer to the base of Q903 via R903/C911/D906/L903. For regulation purposes, Q902/Q901 set the DC conditions at the base of Q903. The base of Q902 is controlled by the optocoupler IC901, whose LED section is driven by Q954. This transistor monitors the HT voltage via the potential divider network connected to its base. VR950 sets the HT, which is 110V for 21in. sets and 152V for larger-screen sets. Zener diode D951 conducts in the event of excessive HT voltage because of incorrect regulation. Standby switching in the power supply is carried out by transistors Q952 and Q953.

No Results

No results with the mains fuse F901 blown should lead to a check on the mains bridge rectifier diodes D901-4 and the chopper transistor Q903 for shorts. If Q903 has gone short-circuit, check the power supply outputs after fitting a replacement to ensure that there are no overloads. It is advisable to replace the optocoupler IC901 and ZD951 when Q903 has failed. If diodes D907 and D908 have gone short-circuit as well at Q903, Q901 and Q902 should also be replaced.

No results with the mains fuse intact could mean that the start-up feed is missing. Check resistors R901 and R902 in this event. One or the other could be open-circuit or high in value.

No results with ZD951 short-circuit indicates that an excess voltage condition has occurred. The cause could be R950 going high in value or IC901 faulty – check the latter by replacement. If there is no regulation, check Q901 and Q902 which could be open- or short-circuit.

The cause of failure of the power supply to work normally could be a line output stage fault (see later), an overload on one of the LT rails, a trip circuit fault or no on command from the microcontroller chip IC001. If the power supply is pulsing, check for shorts at the cathodes of the rectifier diodes on the secondary side of the circuit, D950, D951 and D952. A line output stage fault will produce this symptom.

The protection system may be in operation because of a fault in the trip circuit. Q703, Q955, Q704 or Q4452 (BC556B) in the audio circuit could be faulty. Q704 and/or Q955 can be disconnected as a check. Note that when Q704 is on Q952 will be switched off and there will be no 12V, 8V and 5V supplies. The receiver is then in the standby lock-out mode. Once a fault of this type has been cleared, the on/off switch must be operated to remove the lock-up. An IC data bus lock-up is another possibility: ensure that the microcontroller chip IC001 is resetting correctly at pin 19.

If there is intermittent operation or the set cuts out altogether, check for dry-joints at the 8V and 5V regulators

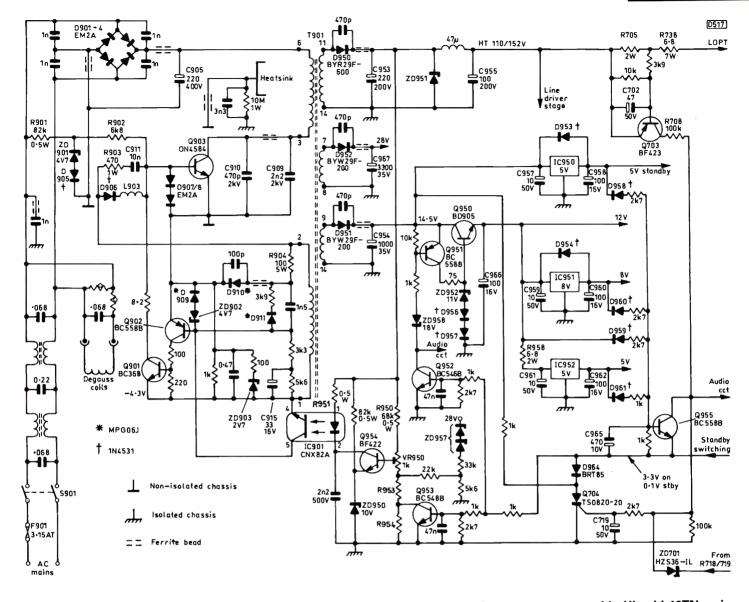


Fig. 1: Circuit diagram of the chopper power supply and the excess-current trip arrangement used in Hitachi 46TN series TV sets. The over-voltage zener diode ZD951 is type PGKE130 in 21in. sets, type PGKE180 in 25 and 28in. models. In the 21in. version ZD957 is two series-connected zener diodes rated at 16V and 6·2V: in larger screen sets a single 22V zener diode is used. In 21in. sets R705 is 1Ω , R951 8·2k Ω , R953 4·7k Ω and R954 1k Ω . The values in larger-screen sets are 0·5 Ω , $12k\Omega$, $3\cdot3k\Omega$ and 560Ω respectively.

IC951 and IC952. Resoldering will usually restore normal operation. The set will go into standby if the 8V supply at pin 37 of IC001 drops to 1.25V

Line Timebase Faults

The first thing to check in the line output stage is that HT is present at pin 9 of the transformer. If not, disconnect the feed and connect a 60W bulb across C953. If it lights, the power supply is OK and there's a problem in the line output stage. The line output transistor Q702 could be short-circuit: it's type BU2508DF in the 21in. model and type BU2508AF in the larger-screen models. In larger-screen sets the EW modulator diodes D706 (BY228) and D707 (BYW96D) are suspect. The transformer could have shorted turns.

If there's no line drive, check for about 27V at the collector of the BF458 line driver transistor Q701. Should this supply be missing, check the transformer T702 which could be dry-jointed or open-circuit, and the feed resistor R732 ($4.7k\Omega$, 7W). If there are no drive pulses at the base of Q701, check at pin 37 of the TDA8361-N4 colour decoder/timebase generator chip IC201. No

line pulses here could mean that the chip is faulty, but before replacing it check zener diode ZD733 (9·1V) which could be short-circuit.

If the line oscillator frequency is incorrect or the output stage tuning capacitor has changed value, zener diode ZD701 will conduct or go short-circuit, operating the trip.

If EHT is present but the tube's heaters don't light up, check for dry-joints at pins 2 and 1 or 3 (depends on CRT size) of the LOPT, at L703 and the tube connector.

No raster could mean that the first anode control is not set up correctly. If this control works intermittently, it may be necessary to replace the LOPT (T701).

Width Faults

The following notes apply to the larger-screen models that incorporate an EW diode modulator and drive circuit. If there is excessive width with no geometry control, check whether D707 (BYW96D), C707 (27nF), Q754 (2SC1983) or C754 (6·8µF, 25V) is short-circuit, in that order. If there is excessive width with some control, check whether the HT output from the power supply is excessive.

If there is lack of width with no control check C707 (27nF) and L751, then if necessary check whether there is drive at the base of Q754. No base drive could mean that Q754, R712 or R770 (both are $1k\Omega$) is faulty. Alternatively the width control VR752 ($10k\Omega$) could have a faulty track, or R774 ($8.2k\Omega$) could have gone high in value.

If there is some control but full width cannot be obtained, check VR752, R774 and R757 (47k Ω).

If there is lack of width with the geometry controls operating, check C712 (2·2nF), C706 (8·2nF) and C708 (470pF). These capacitors are all rated at 2kV.

Field Faults

In the event of field collapse, check that the 27V supply is present at pin 6 of the TA8427K field output chip IC601. If it's missing, check whether R710 or D701 (BYD33J) is open-circuit or C716 (2,200 μ F, 35V) is short-circuit. R710 is 4·7 Ω in 21in. sets, 2Ω in larger-screen sets.

If the 27V supply is correct, IC601 and D601 (1N4002) are suspect, but first check whether there is drive at pin 4 of IC601. This comes from pin 43 of the TDA8361-N4 chip IC201. If it's missing, IC601 or IC201 could be faulty, ZD601 (BZX79C12V) could be short-circuit or there could be a fault associated with pins 42 (field ramp) or 41 (field feedback) of IC201. The ramp capacitor C601A (22nF) is suspect – check it by replacement.

For lack of height check VR601 (200 Ω) whose track may have deteriorated and R608 (4·7k Ω) whose value

may have changed. For excessive height check whether R609 and/or R610 (both $2\cdot2\Omega$, $0\cdot5W$) is open-circuit.

Poor field linearity should lead to a check on the values of R605, R606 and R607 (150 Ω), also C608 which may have become leaky. The values of R605, R606 and C608 vary with CRT size as follows:

| | 21in. | 25/28in | |
|--------------|--------------|------------------------|--|
| R605 R606 | 27kΩ 18kΩ | 10kΩ 12kΩ | |
| C608 | 2.2µF | 12 κs2 4·7μF | |

Colour Faults

If there's no colour, check that the sandcastle pulses are present at pin 38 of the TDA8361-N4 colour decoder/timebase generator chip IC201. Check that the 4-43MHz crystal X501 is working at the correct frequency and is not dry-jointed. IC201 is suspect, but first check the DC conditions at its pins.

Tuner Faults

The tuner unit can be the cause of a number of faults, from a snowy picture with noisy sound to low gain on one channel or tuning drift. It can be replaced, but repair by MCES is cheaper.

Before condemning the tuner, check that its supplies are present. There should be 5V at pin 6, 33V at pin 7 and 12V at pin 8. If the 12V supply is missing, check zener diode ZD101 (BZX79C18V) and C106 (100 μ F, 16V). If the 5V supply is missing check C101 (100 μ F, 16V). If the 33V supply is missing check whether R104 (1.8k Ω) or R741 is open-circuit or ZD102 (33V) is short-circuit. The value of R741 is 82k Ω or 120k Ω (0.5W) depending on model.

ZD102 can be the cause of tuning drift when it's leaky.

Audio Faults

The stereo audio output chip is IC4450, type TDA7263. If there's no audio, check that the chip's 28V supply is present at pin 9. Zener diode ZD4451 (BZX79V36) and C4469 (1,000 μ F, 35V) are suspect if the supply is missing. It comes via muting transistor Q4454 (BD438) and the 1Ω , 2W current sensing resistor R949. IC4450 can fail.

If the output section is OK, check back to the TDA9860 audio processor chip IC402, the SAA7823ZP Nicam chip IC4201 and the TDA9802 sound IF chip IC4051 as necessary.

IC4201 may be in the wrong mode, giving no sound. It's controlled by data from the 24C04 memory chip IC002. If this chip is faulty, the result can be no sound.

If there is no or poor Nicam sound, check the DC conditions at the pins of IC4201, then the chip itself by replacement if necessary.

On-screen Display Fault

C46TN may be displayed on the screen when the set is switched on or after replacement of the TMP47C1637N microcontroller chip IC001. This means that the receiver is in the factory set-up mode. Press the two remote control VCR record buttons at the same time: when the menu appears, go to standby. When the set is switched back on the OSD information will have been removed.

Remote Control Faults

Remote control faults are rare with these receivers. Poor battery connections or dry-joints at the battery contacts are the usual cause. If necessary check for dry-joints at the crystal and LED.

| We have | BACK ISSUES e available a limited stock of the following back issues of |
|----------|--|
| Televisi | |
| 1994 | January, February, May, June, July, September, October, November and December |
| 1995 | January, April, May, June, July, August, September, November and December |
| 1996 | January to December inclusive |
| 1997 | January to December inclusive |
| 1998 | January, February, March, April, May, June, September, November and December |
| 1999 | January, February and March |
| Copies a | are available at £3.00 each including postage. Send o: |
| | Television Back Issues, |
| | Reed Business Information Ltd., |
| | Room L302, Quadrant House, |
| | The Quadrant, Sutton, |
| | Surrey SM2 5AS. |

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: Cabinet for the Finlux Model 5125S/25S21 Mono. Complete non-working set would do. Please phone John S. Cooper on 01634 847 422 with price etc. South East/Kent area only.

Wanted: The following 1kV commutating capacitors for the thyristor line timebase panel in the Rediffusion Model CU/CV5130 (Mk 3 chassis): 5C4 0·1μF; 5C7 0·15μF; 5C10 0·047μF. W.F. Tunnicliffe, 67 Margaret Road, Moxley, Wednesbury, W. Midlands WS10 7QT. 0121 556 4171.

Wanted: Mains transformer for the Panasonic Model AG6200 VCR, or a complete machine for spares. Martin Webster, 1 Thorn View, Luddenden, Halifax, W. Yorks HX2 6QX. 0113 292 3825, 01422 883 197 evenings or fax 0113 392 6305. Wanted: A Philips test tape to program the EEPROM in VCR Model VR231/05 and for alignment. A good copy or loan of the original OK. Believe the Philips' part no.is 4822 397 30103. John Carter, 147 Maidenway Road, Paignton, Devon TQ3 2PT. 01803 556 243.

Wanted: Soundbox upgrade boards for the Quad 33 control unit. Items required are the SB600 disc board and the two SB797 amplifier boards. Also require a chopper/line output transformer (part no. FM0237) for the Hitachi/Salora Model CPT2650 (J chassis). J. M. Ainscoe, 49 Lon Ceredigion, Pwllheli, Gwynedd LL53 5PP. 01758 613 790.

For disposal: 36 back copies of *Television* from March 1978 to February 1981, also 35 copies of *Rediffusion Engineering* 1970 to 1984 and various circuit diagrams/descriptions from 1970 to the Eighties. Please write to R. Kemp, 100 Sherbourne Road, Hove, Sussex BN3 8BG.

Wanted: Desperately require a text board for the Hitachi Model CPT2188. Please phone Micky Wilcox in Weston-Super-Mare on 01934 643 962.

Wanted: Circuit diagrams for the Trio solid-state stereo amplifier Model KA2000 and the Korting Transmare stereo tuner Model T600 (photocopies OK). H.G. Huang, 59 Tylney Road, Forest Gate, London E7 0LY.

Wanted: Copies of *Television* from January 1986-December 1993. Complete years if possible. Will collect or pay postage. Mark Cliffe, 76 Hallfields Lane, Gunthorpe, Peterborough, Cambs PE4 7YW. 01733 576 493.

Wanted: Three capstan drive wheels (idler) and one pinch roller for the Ferrograph Series 7 Mk 2 tape recorder. B.A. Greensmith, 113 High Street, Old Waltham, N.E. Lincs DN37 0PN. 01472 822 001. Wanted: Huntron Tracker 1000. Peter Antcliff, 63 Chester Road, Stevenage, Herts SG1 4JY. 01438

225 602. Wanted: Any information on an RF/AF signal generator believed to be of US origin. Only identification is Superior Model 1130-S. It also has a leakage tester. W. Walsh, 58 Cowal Place, Dunoon, Argyll, Scotland. 01369 707 995.

Wanted: E421 or equivalent dual-FET, also spares for Metex DMMs. Reg Rookes, 261 Rhuvolt, Kinlochbervie, Sutherland IV27 4RH, 01971 521 353.

Wanted: Grundig V2000 system VCR, remote controls, tapes etc. Please phone Steve Hanley on 0114 268 6058 (Sheffield).

For sale: Many manuals for Amstrad, Blaupunkt, Ferguson, Fidelity, GEC, Hinari, Hitachi, JVC, Panasonic, Philips and Sharp VCR and TV models. David Forfar, 65 Ormskirk Road, Old Skelmersdale, Lancs WN8 8TR. Phone 01695 735 132 for availability and to order. Wanted: Two TDA1420 audio

amplifier ICs or info on a source or

equivalent. D. Hunt, 11 Richmond Road, Skeeby, Richmond, North Yorks DL10 5DR. 01748 824 859. Wanted: Exploded view (photocopy OK) of the clutch mechanisms used in the Akai Model GX4000D or DS reel-to-reel tape deck. Brian Ecclestone, 10 Stone Road, Norton Bridge, Stone, Staffs ST15 0NS. 01785 760 315.

For disposal: Sony TV Model KV27XRTU (SX chassis) with teletext, Nicam board and service manual (photocopy). £80. Avi Later, 42 Dorchester Way, Kenton, Middx HA3 9RF. 0181 204 2123 after 7p m.

Wanted: Service manual or circuit diagram/information for the Brother BM74L computer monitor. Victor Holbrook, 84 Haddon Street, Derby DE23 6NQ. 01332 768 122.

Wanted: My Sharp VZ3000E 'bothsides play' record deck has finally died. Has anyone a discarded model they are willing to sell, working or for spares, or part no. Sharp IC RH-IX1209AFZZ? Garry Edwards, Highbury College, Portsmouth. 01705 313 287, fax 01705 378 382.

Wanted: Nicam PCB for the Ferguson Model D51ND. Also remote-control handsets for the following VCRs: Hitachi VTM230 (RM252) and VTF860, and the Philips VR502/05. Peter Haida, 259 North Valley Road, Colne, Lancs BB8 9DR. 01282 864 415.

Wanted: Transistor type 2SK244, Sony part no. 8-765-640-10. A. Snow, 45 Knights Way, Tewkesbury, Glos GL20 8DY. 01684 295 189.

Wanted: Second-hand capstan motor for the Hitachi Model VT498EM. Also side panels for a Mk 2 Escort estate from the Eighties: any company but preferably Telefusion or illuminated van signs. Phil Barry, 6 Cowling Road, Burrill, Bedale, North Yorks DL8 1RN. 01677 424 573.



Reports from
Pete Gurney, LCGI
Colin J. Guy
Gerald Smith
Ronnie Boag
Adrian Spriddell and
Eugene Trundle

Hitachi VTF350

This machine seemed to have a faulty capstan motor. In the customer's house tapes could just about be played, with a mechanical-sounding screech from the capstan motor, frequent tracking lines and picture break up. When the machine was taken back to the workshop it wouldn't even accept a tape and the motor struggled to move.

Voltage checks around the motor showed that the 5V supply was correct while the 12V capstan supply was at about 11.8V. Then, after about five minutes, the loading problem disappeared and the original fault was present.

At this point I began to suspect the power supply. While the 12V output was correct when checked with a meter, a scope check showed that several volts of AC were present. The cause of the trouble turned out to be C12 (470μF, 16V), which was open-circuit. When the other supply lines were checked I found that C16 and C11 had fallen in value. Low-ESR replacements rated at 105°C cured the problem. **P.G.**

Matsui VXA110

This budget-priced machine seemed to have a seized capstan motor. It made more than a few squealing noises at power up. Fortunately the customer hadn't attempted to remove the tape: in view of the low price of these

VCR Clinic

machines, the damage that this can cause is usually terminal.

Once the tape had been removed, by disconnecting the loading motor and using a battery to power it through eject, access was gained to the deck screws. There are two at the front and one at the rear – don't forget to remove the VCR's metal bottom plate, as this also locates the rear of the deck.

When I lifted the mechanism out I saw that the left-hand clutch assembly had fallen apart and jammed the drive mechanics solid. The clutch consists of a small friction plate, a large spring and a plastic cog that holds the assembly together. The plastic cog had cracked, with the result that the full force of the spring was applied to the split washer that locates the assembly on the spindle. The split washer had eventually given up, then the clutch had disintegrated.

Reassembly with a new clutch and replacement of the washer cured the fault. I've come across this problem several times recently, which suggests that it might be becoming a stock fault. Clutch assemblies are available from CPC under part nos. MA850A200049 (supply) and MA850A200050 (take-up). P.G.

De Graff WHSVC1

This old-timer is based on the **Philips C deck**. The complaint was no operation. At switch on the machine powered up, but when an attempt was made to insert a tape the power supply made a few squealing noises then the machine reverted to standby. A new power supply made no difference.

As the supply lines all dropped together, there seemed to be an excess-current problem. So I checked the loading motor's DC

resistance. The reading was much the same as that obtained with a new motor, but a replacement motor cured the fault.

Although the faulty motor's resistance was almost correct, when a 9V supply was connected the current drawn was in excess of 2.5A. **P.G.**

Sanyo VHR2300

The cause of intermittent stopping in playback and record, but not during rewind or fast forward, was eventually traced to dry-joints on the drum motor PCB, particularly around the connector. C.J.G.

Hitachi VTF770

This machine's capstan motor was running amok. The cause turned out to be C622 (0.47 μ F). C.J.G.

Ferguson FV62LV

Fast forward and rewind were very sluggish, and would eventually come to a stop. Play was OK. The capstan motor had very little torque in fast forward and rewind. The cause of the problem was RP83 (120 Ω), which was cracked. It's under the power supply PCB, in the capstan motor control circuit. **C.J.G.**

Panasonic NVSD200

This machine would stop after a couple of seconds in play or record. The plastic cover on one of the reel sensors had not been properly pushed home. C.J.G.

Ferguson FV62LV

There was no UHF output where I expected it, at around ch. 68. I found it drifting around aimlessly in the ch. 36 area. The cause of the trouble was the fact that the synthesiser for the modulator wasn't locking the oscillator. A check on the 33V supply showed that it was

low at about 12V, because of a cracked surface-mounted link in the feed.

As it was tuned to the low channels the tuner had not been affected, but the modulator couldn't make it to ch. 68 on the reduced supply. C.J.G.

Marantz MV762

The customer complained that this machine's clock did not keep correct time. I'm always sceptical about this sort of report. But as the station tuning had also disappeared I replaced the nicad battery, set up the tuning, set the clock to the time shown in the bottom corner of my PC monitor's screen, then left the VCR on soak test.

When I checked an hour or so later the clock had lost about three minutes. The station tuning had also disappeared again. The cause of both faults turned out to be dryjoints at the ribbon cables that connect the front panel to the main PCB.

This machine is a **Philips VR6462** clone. **C.J.G.**

Panasonic NVG40

The cause of erratic capstan speed and intermittent stopping was not the usual electrolytics in the power supply but a fault in the capstan motor's stator. Replacement restored normal operation. **C.J.G.**

Sanyo VHR7700

This machine was dead except for the clock display. The cause was the 12V supply switch Q5402. It's located in the blackened bit right in the centre of the main PCB. C.J.G.

Hitachi VTF350

The report that came with this machine said that it had a noisy capstan motor. The motor was OK mechanically however. I then noticed that the E-E picture flickered badly whenever the machine was asked to do anything mechanical. This was caused by poor power supply regulation. Everything was OK once C12 (470µF) had been replaced. C.J.G.

Daewoo V200

This machine was totally dead. The switch-mode power supply, which is of Sony manufacture, is well sealed in a tin can and is presumably intended to be replaced as a unit. But in view of the low cost of these machines, a new power supply would hardly be justified. So I opened up the can and replaced several sorry-looking electrolytic

capacitors inside it. The machine then worked as well as ever. **C.J.G.**

Tatung TVR933

This machine had a record picture fault that showed as lack of luminance and picture tearing. The E-E picture was OK. IC4001 carries out the record picture processing. A replacement chip cured the fault. G.S.

Panasonic NVD80

This older machine was dead with no clock display and no functions. When I checked the power supply I found that the primary side wasn't running. Normal operation was restored once C1045 (47µF, 10V) on the power supply sub-PCB had been replaced. **G.S.**

JVC HRDX22EK

This machine was dead with no clock display and no functions. I replaced CP1 (ICPN20) which was open-circuit, but the switched 5V supply was still missing. L959 had gone open-circuit. This item is not shown in the circuit diagram – it supplies CP801 and the 12V switch regulator. Once L959 had been replaced the machine worked normally. G.S.

Sharp VCHM64

The fault report said that there was intermittent loss of the hi-fi sound when recording. When I checked the machine I found that this was partially correct: as the right channel was missing in the E-E mode, the recording was faulty. The machine was OK once the Nicam chip had been replaced. G.S.

Sanyo VHR286

This machine would power up, go dead (no display) then pulse on and off. The cure was to replace PR512 in the power supply. Its part number is 645-014-2529. **R.B.**

Daewoo DVF522

There was no E-E sound. The BA7790LS chip IC201 had an input at pin 16 but no output at pin 21. A replacement chip cured the fault. **R.B.**

GoldStar GHV1290I

The E-E output had a hum bar and there was patterning in the playback and record modes. The cause of the trouble could be seen as HF interference on all rails. Various electrolytic capacitors in the power supply had fallen in value. Check in particular C118, C112, C108,

C107, C155, C120, C122 (all 47 μ F), C121 and C123 (both 100 μ F). I replaced the 12V regulator as a precaution. **A.S.**

Saisho VR1200/Matsui VX800A etc

Check for dry-joints on the luminance sub-modules and/or luminance PCB connectors if there is intermittent or no picture recording. A.S.

Ferguson 3V56

If the machine is permanently or intermittently dead with the switch-mode power supply inoperative, apparently in the over-current mode, unplug its output leads and bring up the mains input slowly using a variac. The machine may then work, even with low-value capacitors.

The following voltages should be present at the power supply plug: pin 1 SW5V; pin 2 SW12V; pins 3-6 0V; pin 7 SW5V; pin 8 AT12V; pin 9 AT13·8V; pin 10 power-on 12V (0V in standby). C24, C23 and C35 on the primary side of the power supply dry out and cause no or intermittent power-up or alternatively intermittent shut-down with no current load. Replace with low-ESR 105°C types. A.S.

Goodmans TX1200

If the drum is rotating too fast, resolder the $104k\Omega$ chip resistor R525 near the servo IC. A.S.

Ferguson 3V56

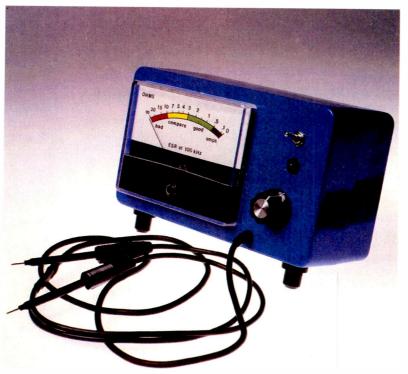
If there's no mechanism control with the micro confused, the drum and capstan running and the loading motor turning even when unloaded, check the 12V supply to the loading cam optos. If it's missing, check protector F10 at the rear centre of the top PCB, by some rework with an inductor across cut print. We've used a 500mA Wickman fuse as a replacement, though this might be frowned upon by Thorn. A.S.

Tatung TVR6122

There was no tuning voltage. I found that R5 $(100k\Omega)$ in the power supply had gone high in value. A.S.

Toshiba V804

We've now had three inoperative machines because the deck mechanism has jammed. In each case the cam lever beneath the main loading cam at the rear right-hand side of the deck had broken. Its part number is 70363446A. E.T.



In this second part Alan Willcox deals with construction and setting up of the meter, upgrades and use, and provides additional background information

Design of an ESR Meter

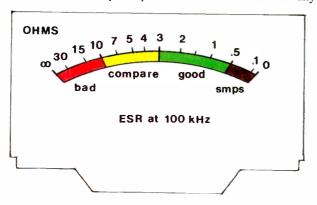
n part 1 last month the design criteria were specified and a full description of the operation of the circuit was provided. The meter is simple to build and the effort required is well worthwhile.

Construction

Fig. 8 shows the board layout. For convenience, 0-1 in. matrix stripboard is used. The most common problem concerns the print cuts. If these are made by twisting a drill bit by hand, as I do, instead of using the correct tool, it's all too easy for the cut to be incomplete or for some of the print to spread over to an adjacent track.

If a double-pole on/off switch is used, this is a convenient point for the connection of an on/off indicator. A flashing LED with a $10k\Omega$ series resistor does the job well: although it takes only a couple of mA, the flashing light does catch your eye.

It is best to use screened cable for the test leads, in order to avoid pick-up of unwanted radiation from any



working TV line output stage in the vicinity. Rather than use plugs and sockets, solder the test leads to the PCB: we are often concerned with ESR values of less than $0 \cdot 1\Omega$, and it doesn't take long for a plug-and-socket connection to deteriorate and produce resistance values greater than this. The length of the leads is not at all critical. I use a 24in. length of screened audio lead terminated by two 8in. lengths of flexible wire.

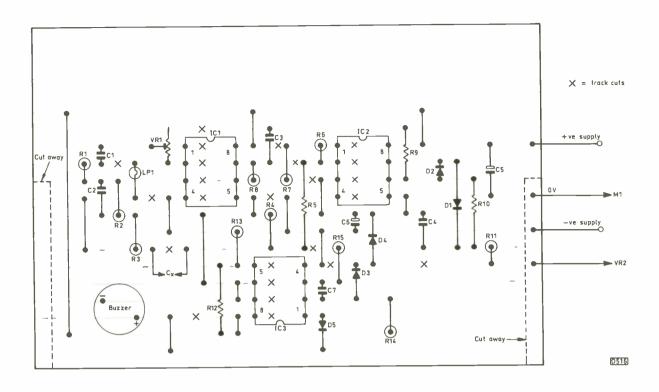
On a cold, frosty morning, before the workshop has reached its normal comfortable, cosy (?) temperature, the meter's readings may increase slightly. Although this increase may amount to the equivalent of less than $0{\cdot}1\Omega$, the fact that accurate low-resistance readings are often required justifies the use of an off-the-board setzero control rather than a preset type as used in the Wizard ESR meter.

This control also comes in handy if you want to squeeze the last ounce out of the batteries, but the buzzer can't be relied on when the batteries produce less than 5V and the output from the oscillator begins to fall. Also useful in this respect is the ability to alter the pointer position easily at maximum output, to be able to observe the operation of the bulb and the correct functioning of the oscillator. This is covered in the set-up notes later.

Probe clips were used for the all-important probes. The hooks were cut off, the internal springs were removed, then the plastic was cut back to expose more of the probes. They have proved to be ideal in practice, and are small enough to often be able to get under the capacitor on the component side of the PCB. The probes are not polarity conscious, and it doesn't matter which connection is used for the screen of the test lead.

The suggested board size (3 x 2in.) is slightly larger

Fig. 7: Suitable meter scale, reproduced full size.



than it needs to be to accommodate the components. There are two reasons for this. First, so that it will slot into the case that was selected, and secondly to allow space for future upgrades. With this in mind the set-zero control is offset to the right, allowing space for a modular preset shaft.

The batteries are secured with self-adhesive Velcro. It's a simple solution, and the Velcro will transfer several times.

Upgrades

The first upgrade, which will be described in a follow-

ing issue of the magazine, arose from feedback within the trade. In common with the Wizard this meter does not differentiate between a short-circuit capacitor and a really good one (with an ESR around 0.05Ω). Now although we all know that a short-circuit electrolytic capacitor is quite rare, it can occur and has caught me and others out. A lot of time can be wasted when it occurs and is missed. So I've been testing an addition that gives an audible indication when a short-circuit is present. A further refinement is an auto power-off facility.

I've not included these extras at present because I feel it best to present as simple and economic a project as possible initially. But space has been left for these additions.

Component Sources

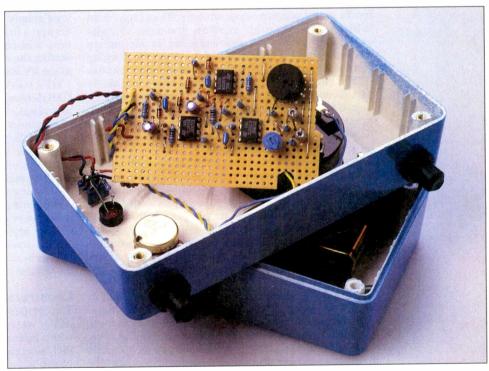
I obtained most of the parts used in the prototype from Maplin Electronics and have included this company's part numbers in the components list. The buzzer and meter movement were obtained from CPC. For correct operation of the oscillator it's vital that C1 and C2 are good-quality polystyrene capacitors.

Apart from the bulb, the specification of the other components is not critical.

The Meter Scale

The geometry of the meter's scale (see Fig. 7) is dictated by the relative values of R3 and R4. If the value of R4 was increased to say 10Ω , this would be the midscale reading and R3, being low in comparison, would have less effect. Say a capacitor with an ESR of 10Ω is connected. Half the signal across R3 will be passed on, and little of its current will be diverted to reduce R3's voltage, which is the result of the current through the

Fig. 8: Meter circuit layout on stripboard. Board size is 3 x 2in. to allow for upgrades. See text.

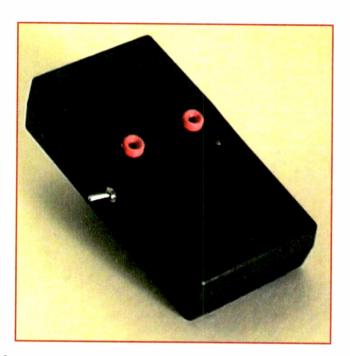


Internal view of the meter.

continued on page 436

427

Short Locator



Adrian Spriddell presents an electronics short locator unit that's particularly useful for tracing faults on data bus lines

ecause of the nature of much of the equipment we service, we probably have to contend with a greater than normal number of bus-connected IC failures. I had long felt that to help speed up our fault-finding procedures a short locator of some sort would form a useful addition to our armoury. Then I read Alan Willcox's article on his excellent low-ohms extender unit in the August 1998 issue and noted its relevance to our requirement. I hope he will forgive me for pinching most of his design to form the basis of this short locator.

The ability to read low resistance values accurately would certainly be of use to us, but it might be difficult to justify the time needed to build the original low-ohm extender unit. A device that enabled us to locate a dud IC without having to chop out umpteen good ones could be given top priority however.

Alan's low-ohms extender circuit can be used to drive some additional circuitry to provide an audible indication of resistance – the lower the resistance the higher the pitch. This enables you to continue fault-finding without constantly having to take your eyes off the board being checked in order to refer to a digital display. The ear's sensitivity to changes of pitch would, I decided, enable me to find shorts much more quickly than by using actual resistance readings, however accurate

So my design and assembly wizard Janet was asked to build a low-ohms extender without the range switching. Substitutions could be made wherever necessary to meet the needs of our Ordering Department: Janet again, who holds the belief that if most of the letters on an IC match it will do – we can alter the design later if necessary to make it work!

Circuit Description

The circuit diagram of the unit is shown in Fig.1. A TL082 dual op-amp chip (IC1) is used in the same way as in Alan's design, but the output at pin 7 is taken to Tr1 to provide inversion and buffering. A BC182 was used simply because we have hundreds of them in the drawer: a low-noise device such as a BC550 might have been a better choice. It's biased for 0V input by connecting the emitter to the negative rail via R11 with D3 to the 0V line.

Tr1's collector is taken to the control pin (9) of a 4046 CMOS phase-locked loop IC (IC2) which is here used as a simple voltage-controlled oscillator. Only a couple of extra components are required to enable it to perform this task, R12 and C1, which set the basic frequency. I aimed for an output at around 2-10kHz, which is achieved with R12 = $100k\Omega$ and C1 = 4.7nF. If you want to offset the frequency range, try connecting a $1M\Omega$ resistor between pin 12 and the 0V rail.

This arrangement provides at pin 4 of IC2 a rough squarewave output whose frequency depends on the DC voltage applied to pin 9. The output is fed to another BC182 transistor, Tr2, which drives a piezo-ceramic tweeter with coupling via C3 – R15 is included to lower the volume to a more acceptable level.

Construction

The components were mounted on a small tri-pad PCB which was popped into a hand-held instrument case with a battery compartment large enough to take the two PP3 batteries required.

Lead resistance is of no consequence, as long as it remains constant, so 4mm banana sockets were fitted to

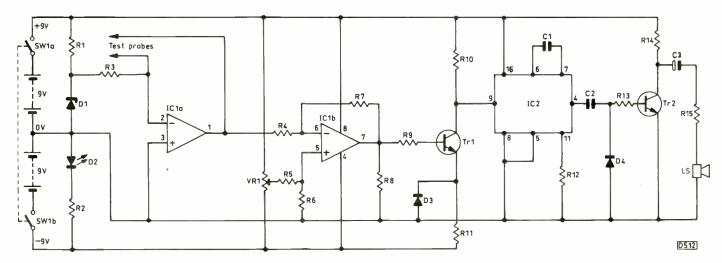


Fig. 1: Circuit diagram of the short-circuit locator unit.

the front of the case to enable any one of our sets of test leads to be brought into service.

Use

Use of the unit is more a question of feel than science. If you have a fault condition where for example one data line is being held high, plug in some leads, switch on, jab one sharp test prod on to the positive supply rail and use the other sharp prod to check along the data line concerned, moving from one IC to the next, always in the direction of the higher-pitched signal. The faulty IC is the one that produces the highest frequency sound. Beats cutting print tracks every time.

Status

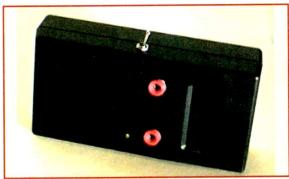
I feel it would be best to describe the unit as a development project. It contains no artificial additives, no animals were harmed in its construction, and no calculators were employed to work out the values of the extra components! The component values listed work, but their selection was quite arbitrary. So a detailed specification is not provided.

C1, which sets the basic oscillator frequency, is a polystyrene capacitor: probably anything other than a

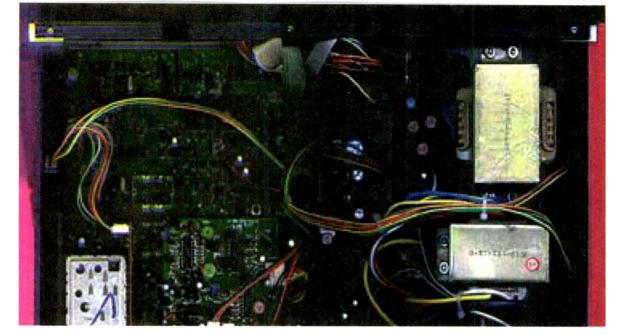
ceramic type would do. A piezo-ceramic tweeter was used because it's cheap and, more importantly, we had one in stock. The type used can be obtained from CPC as part number AR70987. The instrument case is available from CPC as part number EN55046 or from MPS as part number YK24B.

If I ever get around to producing a Mk 2 version I might perhaps make it a little more sensitive, use something more practical than a toggle switch and select component values more carefully.

Feel free to experiment and improve on the Mk 1!



| Parts list | | | |
|--------------------------------|--|----------------|--------------------------|
| R1 R2 | 3.9kΩ 3.9kΩ | VR1 | 47kΩ preset |
| R3 | 1kΩ | C1 | 4-7nF polystyrene |
| R4 | 1kΩ | C2 | 220nF polyester |
| R5 | 820kΩ | C3 | 2.2µF electrolytic |
| R6 | 1kΩ | | |
| R7 | 100kΩ | D1 | ZN423 |
| R8 | 1ΜΩ | D1 | 2mA LED |
| R9 | 100kΩ | | |
| R10 | 4·7kΩ | IC1 | TL082 |
| R11 | 4.7kΩ | IC2 | 4046 |
| R12 | 100kΩ | | |
| R13 | 4·7kΩ | Tr1 | BC182 |
| R14 | 2. 2 kΩ | Tr2 | BC182 |
| R15 | 560Ω | | |
| | | LS | Piezo-ceramic tweeter |
| AII 1%, 0⋅25W | | | |
| Case, double- two PP3 batte | pole on/off switch (Series with connectors | SW1), banana s | sockets, tri-pad PCB and |



Satellite Notebook

Updating Digibox EPG Software

The SkyDigital electronic programme guide software has been updated at a rapid rate since the launch of the service. To see which version is in the digibox, go to the system set-up menu and press 5, the system details option. The EPG software version is at the bottom of the system details list.

To force the receiver to download the latest version, remove the mains power - also remove the viewing card just in case of a problem here. Hold in the back-up button on the receiver's front panel while reapplying mains power. After a few seconds the front panel LEDs will all light up and you can release the button. It takes a few minutes for the upgrade to be completed. Once done, the receiver reverts to standby. You can then go back into the system details menu to see if a new version is in place. At the time of writing, version 2.1.20.2 is the current one. C.H.

Amstrad SRD500

Low audio output was the complaint with this receiver: the TV set's volume control had to be at maximum before anything at all was audible. To narrow the field of search, an initial check was made using the scart output. The result was normal audio, which reduced the search area to one IC.

Audio is taken from the leftand right-hand channels at the scart socket, combined via a resistor network and fed via C771 (10µF, 25V) to the operational amplifier IC307d, which acts as a buffer. Voltage checks around this IC failed to reveal anything amiss, but a scope check showed that there was no signal input. When tested, C771 was found to have fallen in value to $1\mu F$.

The audio was certainly better when a replacement had been fitted, but was still low. There's a similar coupling capacitor for the output from IC307d, C346 (10µF, 25V). Once this had been replaced there was normal sound. P.G.

Low-threshold Reception

An Irish bar along the coast from here was keen to receive the Irish sports channel Setanta via Telecom 2C at 3°E (12.606GHz with vertical polarisation). Unfortunately we are right at the edge of the 2C footprint in southern Portugal. As a result you get beam-edge wobble during the 24-hour period, and reception from morning to early evening is tolerable only when a 2.8m dish is used – reception is non-existent during the night! Over the course of about half an hour in the early evening the signal fades out in front of your eyes.

Fortunately the bar had been aware of the problem before paying its subscription and the arrival of the specially modified VideoCrypt decoder. I connected the decoder to a Pace MSS228/LT low-threshold receiver. Operation of this fairly recent receiver follows normal Pace analogue practice, but threshold extension is adjustable on a per-channel basis by first pressing the level button on the conventional Pace remote control unit. A bar display then appears on the screen, and the receiver can be made more or less sensitive by moving the bars across the screen using the remote-control buttons to the left and right of the menu button. Once the required picture quality has been has been achieved, you press the store button. This facility operates independently of the normal blue-screen tuning menus, where the vision IF bandwidth can be switched between 15 and 27MHz to give basic picture improvement alongside the normal tuning parameters.

White dots disappear as if by magic when the sensitivity is increased, but a price has to be paid for this improvement. Captions start to streak badly when too much extension is used. Fortunately the VideoCrypt system is fairly tolerant of weak signals, and the receiver has its first few channels stored with varying degrees of threshold extension at the same frequency.

If the Irish sports channel goes over to MPEG-2 transmission/ encryption with the same satellite, reception will no longer be possible here as there is no such thing as digital extension!

I've tried this receiver with weak South American and African C band (4GHz) signals. It works excellently. C-band LNB selection (5·15GHz local oscillator frequency) is carried out via the installation menu. The only disadvantage is that C-band frequencies cannot be keyed in directly via the remote control unit – the receiver will tune up and down the band only manually. H.C.

Sky Digibox: Adding Extra Channels

It's not widely known that the digital satellite Astra 2A transmits a couple of free-to-air channels that

Reports from Christopher Holland, Pete Gurney, LCGI and Hugh Cocks do not appear automatically in the Sky electronic programme guide (EPG). Further channels could be added in future. You can include them in the guide, and can also add free-to-air channels transmitted via Astra at 19.2°E or Eutelsat at 13°E, though the digibox will receive only signals that have a symbol rate (SR) of 27,500 or 22,000. The digibox is somewhat touchy when used with other satellites however, so if the customer has a real interest in non-Astra 2A digital channels it's best to use a separate receiver.

The main free-to-air channels not listed in the Sky EPG are Chinese News and Entertainment (CNE), which is transmitted between 9 p.m. and 3 a.m. at 11·758GHz with horizontal polarisation, and Travel, which is at 12·032GHz with horizontal polarisation and is nothing to do with the Sky Travel channel. Another example is CNN radio at 12·051GHz with vertical polarisation. We'll use the CNE channel as an example of how to load channels into the digibox's memory.

Go to the services menu and select option 4, the system setup menu. Again go to option 4, add channels – see photograph 1. The manual tuning menu will then appear. Enter the frequency (11.758) and the polarisation (H). Leave the symbol rate and forward error correction (FEC) as they are, at 27.5 and 2/3 respectively. See photograph 2. Once the frequency and polarisation have been set, go to find channels and let the receiver scan the 11.758GHz digital block. On completion of its scan the following channels should be displayed on the new channels list, see photograph 3: Channel 5, The Box, CNBC, Sky Sports News, Channel 4 CNE and FilmFour. Apart from CNE these channels are already included in the Sky EPG: add CNE by highlighting its name and pressing the yellow store channel button. A tick will then appear alongside CNE, as shown.

To select the channel, press the TV Guide button and press option 8, the other channels menu. See photograph 4. CNE will be listed here and can be viewed by highlighting it and pressing select. Remember that it's only on-air between 9 p.m. and 3 a.m., though a channel identification is present outside these hours.

The above channels are free-toair and can therefore be loaded into a non-Sky digital STB. Additional channels that can be stored in this type of receiver are: CNN, Shop! and QVC UK at 12-051GHz vertical; Sky News at 12-070GHz horizontal; and BBC Parliament at 12-148GHz horizontal.

In the Hot Bird position (13°E) you can, for example, add the Italian RAI channels to a digibox EPG. The procedure is as follows. Connect to the digibox a dish aligned to 13°E and enter 11.766GHz, vertical polarisation. Repeat the previously-described scanning procedure. A list of the channels that have been found should then be displayed, in this case RAII, RAI2, RAI3, RAI Widescreen, RAI Sport Satellite, TEST2RAL and TEST3RAL Highlight each channel in turn and tick it into the memory, using the yellow button. But, as previously mentioned, if the customer is interested in the Hot Bird channels the Sky digibox is not the ideal receiver to use. A dedicated receiving system with a non-Sky digital STB will give better results.

The Sky digibox can crash if too many channels are added in the extra channels section. It can also be quite stubborn sometimes and be convinced that no 13°E signal is present. At other times it behaves impeccably!

Going between these non-Sky EPG channels can be awkward. You can't just flick through them by using the up and down buttons: you have to revert to the other channels menu and select the required channel from the list. But going back to an EPG channel is easy: just key in the channel number, e.g. 104 for Channel 4, and it will appear.

Two very useful features that are missing with digiboxes are a last channel recall facility and a favourite channel list. One hopes that these facilities will be made available with future models.

When 11.798GHz horizontal is scanned you will find BBC1 Wales and BBC1 Scotland (with the standard digibox SR and FEC, i.e. 27,500 and 2/3). BBC1 England and BBC1 Northern Ireland can be found at 11-720GHz, again with horizontal polarisation. But the Sky viewing card has authorisation for only your local BBC region: it automatically places this on channel 101, ignoring the other BBC1 regions which are not viewable after the extra channel scan though the channel name and programme identification are seen. C.H.

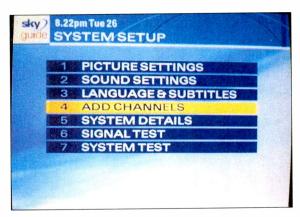


Photo 1: The system setup menu, with add channels highlighted.

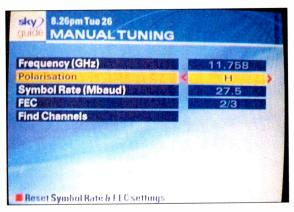


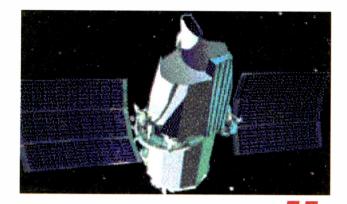
Photo 2: Enter the frequency and polarisation (CNE details shown here). This menu will first appear with the default frequency 11-778GHz, vertical.



Photo 3: After the frequency-block scan, the digibox comes back with the list. CNE can then be stored as described in the text and will be added to the other channels menu.



Photo 4: The other channels menu, with CNE added.



DX and Satellite Reception

Terrestrial DX and satellite TV reception. News from abroad and from the satellite belt. A multi-standard receiver from Comet. And some aerial history. Roger Bunney reports

There was very little by way of terrestrial DX reception during January. The only Sporadic E activity occurred at midday on the 6th and 15th, when signals were received on channels R2 and E4 respectively – source unknown, as reception was of unidentified programming. The 21st brought a slight tropospheric lift, with reception of French/Benelux UHF signals in the south east.

F2 Reception

F2 layer activity can be expected to increase as the sunspot count rises. Several people have already reported reception of various communications signals across the 30-45MHz band. To monitor this band you will need either an elderly communications receiver such as an Eddystone 770R plus preamplifier or a modern scanner – one that can

tune quickly across the band to find signals and can switch between AM and narrow FM.

Many North American police and domestic utility signals are audible in the late afternoon. The mornings bring signals from E and SE Europe as the MUF rises. On December 16th ch. R1 video (49.75MHz) was just audible with a scanner. Skywaves reports that the local police in Montgomery, Alabama have been heard in Europe at 37·160MHz. There are numerous studio-transmitter links below 30MHz, often used for reverse music feeds to mobile radio station vehicles. So, if you hear a US Medium Wave signal at say 25.870MHz from WFLA, Tampa using narrow-band FM, your scanner isn't faulty: what you are hearing is the studio transmitter output using a modified CB whip aerial to communicate with the traffic spotter plane that inserts observations in the local WFLA news.

Town pagers at 35·22 and 35·58MHz have been heard during previous winter F2 openings, with audio loop idents, but these have largely been superseded by data paging. Signals have been so strong that they would break through at the receiver's IF!

DTT

With digital terrestrial TV now spreading across the UHF bands, interleaved with the standard four/five analogue transmissions per transmitter, so the incidence of DTT interference is increasing. Channels that were once empty are

now filling up with DTT, decreasing the potential for DX-TV reception and also, incidentally, increasing the interference experienced by domestic TV viewers.

The situation will worsen, so greater thought will have to be given to the use of more directional aerials, with sharper beamwidths and reduced side-lobe pickup.

Analogue TV should be around until about 2014. An earlier switch-off, say in 2010, is likely in mainland Europe.

Amateur TV

The British Amateur Television Club has just produced issue number 185 (February) of its magazine CQ-TV, marking the fiftieth anniversary of the BATC. The size has gone up from A5 to A4, with a glossy cover. The publication is very impressive: my congratulations to editor Ian Pawson for his courage in taking this dramatic step forward. For details of BATC membership, contact Dave Lawton, GOANO at Grenehurst, Pinewood Road, High Wycombe, Bucks HP12 4DD, phone no. 01494 528 899 or e-mail

memsec@batc.org.uk

There is concern that the 435MHz ATV band may be lost, as some authorities appear to think it's underused. There is undoubtedly commercial interest in the band. If you are an active ATV operator at 435MHz, contact Graham Shirville, G3VZV with details as soon as possible. It's a question of use it and prove it or lose it – you'll never get it back! Graham's address



The BARTV

(Television of



is The Hill Farm, Potsgrove, Milton Keynes, Bucks MK17 9HF. Phone 01525 290 343 or e-mail g3vzv@amsat.org

Satellite Reception

Following the mid-December Desert Fox campaign, the Iraqi Space Channel is back on air via NileSat-1 at 7°W, with a digital downlink at 11-823GHz vert (SR 27,500, FEC 3/4). There was a special propaganda event on the evening of January 17th: in view of the sync disturbance/dropouts it must have been a recording.

For mature DXers such as myself, who hanker after the days when summers were always sunny and monoscope test cards prevailed, it was a delight to come across the Television of Bosnia test card via Eutelsat W2 at 16°E. The signal is an analogue one at 11·163GHz hor. You first get an uplink test pattern ident BOS-SAR-3 then, at 2024 GMT, the homegrown test card appears for six minutes prior to the evening programmes.

While checking out the regular transatlantic circuits via New Skies/Intelsat K (21·5°W) on the evening of January 5th I came across, at 11·590GHz vert (Reuters lease, SR 20,145, FEC 3/4), frequency bars with the inlaid caption LONDON VIA 332.5E IS 605 TIERNAN CHA. The time was 2300. Nothing appeared by way of moving pictures. I assume that the reference was to another news circuit, via the 605 craft at 27·5°W, from Tiernan, China.

Cyril Willis tells me that the GMTV SNG truck UKI-149 is still in business at 21.5°W most mornings with analogue transmissions. On January 22nd he received a live news insert from the Hastings police station with an update on the missing girls who were later found at Eastbourne. A favoured spot to find UKI-149 is 11.529GHz.

Check out 48°E: the currently redundant Eutelsat II F3 is being moved there from 16°E and should have arrived by the time you read this.

On January 27th UKI-425 OTRANTO (a naval base) provided coverage of the NATO naval presence in the Adriatic in connection with the Kosovo troubles. This was a new UKI number to me. The signal was digital (SR 5,632, FEC 3/4) via Intelsat K at 11-566GHz hor. That same evening Telefonica, the Spanish telecomms carrier, provided an analogue insert for the Spanish TVE network from outside an unknown cafe. There was no closedown ident and a rapid switch off, suggesting that the crew departed rapidly. This was at 11-697GHz hor via PAS-3R/6 at 43°W.

On the 28th there was live coverage from rubble-strewn streets in Columbia. This was a digital signal at 11.595GHz, again via Intelsat K. The APTN COLOMBIA EARTH-QUAKE SITE caption appeared on colour bars. There were several live reports to US networks: also onwards, over the Atlantic, transcoded to PAL for European use.

I've been logging very highlevel 3.448 and 3.623GHz (RHC) C-band carriers at about 40°E using my old 1.5m dish. They are completely noise free. It's definitely not Gorizont at 53°E. Can anyone identify this mystery bird?

Terrestrial News

RSL-TV: The Isle of Wight RSL station TV-12 has applied to the ITC to use increased power, from 1kW to 2kW ERP, at its ch. E54 Rowridge transmitter to improve reception for both island and mainland viewers. A newstext service, in conjunction with local papers, is to start shortly. Response from mainland viewers has been far higher than expected. TV-12 has also applied for the West Sussex RSL-TV licence – an area based around Chichester.

The Southampton RSL-TV licence has been awarded to Solent City Television, which plans to run a 24-hour local-programming service, starting in October, financed by advertising and sponsorship.

France: A new broadcasting bill is expected to be introduced in late summer, after the European Parliament elections. The government will seek a national poll to gain support for changes that are likely to include reduced advertising revenue for the France 2 and 3 networks.

The Netherlands: SBS was due to open a second network, NET 5, on March 1st. It will be aimed at a largely female audience. SBS is hoping to achieve an 18 per cent market share.

Estonia: TV5+, a commercial channel, is expected to open shortly, increasing the number of commercial channels to four. There may be a reduction when the franchises come up for renewal at the end of August.

New Zealand: Wilson-White has



formed a Y2K group to provide an early warning of millennium problems in the Pacific region on New Year's Day 2000. NZ is twelve hours ahead of the UK and will be the first country to experience any such problems. Wilson-White will run a 'beacon alert system' to spread the word internationally as problems arise in NZ.

first purchase over £20)

11 Kent Road, Parkstone, Poole, Dorset BH12 2EH

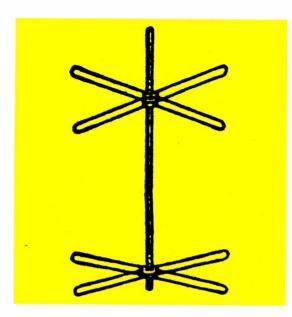
Tel: (01202) 738232 Fax: (01202) 716951 E-mail: atech@dircon.co.uk

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

Digital reception tends to produce either a good-quality picture or nothing at all. As the signal level becomes marginal, video breakup occurs and the audio cuts in and out. This example of video breakup occurred with the BT Washington feed via Intelsat K at 21.5°E.



terrestrial broadcasts



The Double Dublex aerial, designed to counter heavy ghosting in extreme fringe areas, was featured in Aerialite's 1957 trade catalogue. This version is for horizontal polarisation. Quoted performance figures were: 9-1dB forward gain; 62 acceptance angle; 29dB front-back ratio. With its crossed, folded elements it could have been a forerunner for efficient Band I DXing.

Multi-standard Receiver

Gareth Foster has drawn attention to the Goodmans C520 multi-standard receiver which Comet is selling at £139.95 (January price). The 5.5in. receiver covers the TV bands in the 48-860MHz spectrum, decodes PAL and Secam colour and has system B/G/I/D/K/L capability. At VHF there is automatic switching from the lo to the hi band, also out-of-band (cable channel) coverage. The receiver has baseband audio and video inputs/outputs and operates at 12V DC – a 13A mains power supply is included. Gareth points out that the instruction booklet is none too well written, suggesting that the coverage is less than it actually is.

Satellite News

Hong Kong based Star TV switched off decoder authorisation for Indovision C-band viewers (via Palapa C2 at 113°E), blacking out all 19 channels on December 13th. Problems arose when Indovision failed to pay debts rumoured to be over \$25m. A limited service continues via Cakrawarta at 107°E, but this is in S band (2.6GHz).

The Italian government, concerned about the power of Rupert Murdoch's News Corporation, is considering the introduction of a broadcasting bill that would limit advertising revenues and establish quotas for European-made programming. News Corporation has agreed to buy 80 per cent of the Italian 'Stream' digital service.

Euronews is to go over to digital transmission only from Hot Bird at 13°E from end March.

Several PanAmSat craft developed control processor problems last year and continue in operation by using standby equipment. The same problem is now understood to have occurred with PAS-4. Galaxy 81 and PAS-4 have also apparently developed battery cell failure, making them vulnerable during solar eclipses/darkness.

According to SatFACTS magazine (New Zealand) the Pacedesigned Sky digibox Model DSR620 (New Zealand version) manufactured by Dovatron de Mexico radiates a high level of UHF interference when a terrestrial aerial is plugged into the diplexing arrangement at the back. Apparently chopper power supply shash and digital processor harmonic beats go to the terrestrial aerial as modulated UHF interference which is sufficient to affect neighbouring TV sets.

Aerials of Yesteryear

You would think that domestic VHF TV aerials are a thing of the past, but some stalwart alloy monuments to a bygone TV era are still to be seen adorning chimney stacks. While visiting my daughter at Guildford recently I noticed several combined Band I/III aerials of a type made by C Aerials of Croydon. After maybe thirty years they were still intact.

This is less likely to be the case with the monster Band I Telerection aerials such as the Multimus, which featured a delta matching arrangement on the dipole. A dramatic upward tilt of the aerial by perhaps 15° was claimed to provide enhanced reception in extreme fringe areas. You still see versions for channel 5 (Wenvoe) in Wiltshire and Dorset, often with parts of the elements missing because of metal fatigue collapse - Telerection often filled the elements with sawdust or sash cord to minimise vibration. The company's smaller, stacked Band III systems, with straight dipoles and phasing bar terminations, have stood the test of time examples that are largely intact are still seen. Telerection eventually became part of the Thorn group: prior to its closure, most of the Weymouth factory's output went to the rental market.

If you pass through the village of Corfe on Purbeck you will see a Dale Parabolic Mk 1 Band III system on a disused building. It has a series of eight reflector elements mounted on a curved boom, with a single dipole at the focal point. These aerials were popular in hilly areas, where ghosting was a problem, and a Mk 2 version with a V-

type corner reflector was subsequently introduced.

When sorting out old catalogues after a recent house move I discovered a lot of interesting material. Fringevision Ltd. of Marlborough made very substantial aerials of largely alloy diecast hardware. The company also sold components for the home constructor. The Fringevision catalogue I found features a dipole and an H aerial for the "new" 90MHz BBC FM transmissions from Wrotham, so it must date from the mid-Fifties. This was a golden era, when Band III was being opened up across the UK.

Fringevision didn't survive, but Maxview Aerials of Norfolk did. Aerialite's trade catalogue for 1957, its silver jubilee year, shows up to four-element Band I arrays and double mounting kits to stack the aerials for extra gain. The company's double Dublex, a stacked horizontal X arrangement, was perhaps a forerunner for wideband, omnidirectional DX-TV systems. The Dublex consisted of folded elements.

I also found an almost mint copy of *The Radio Constructor* dated November 1960. On page 276 there's a report of a visit to a TV dealer in Buckingham, where Ian Beckett was then a TV engineer. Ian confidently announced "there's something coming in now" and, within five minutes, the reporter was astonished to find himself looking at Test Card G from Budapest. Exiting, pioneering

Amongst the aerial catalogues I found a mint condition World Radio Atlas and Gazetteer for 1933. It lists "The Concerts of Europe". Daventry 5XX for example then radiated the National Programme, and a new station at Droitwich was shortly to open with greatly increased power. Daventry. the home of Empire Services, had seven short-wave transmitters. GSA to GSG, in operation in the 16 and 49m bands. The smaller regional relays, such as Bournemouth 285.7m, relayed the London regional programme. Hamburg 331.9m is listed as "sometimes sending morse letters HA . . . in the interval and often strikes gong before announcing"!

It's always interesting to get a glimpse of earlier periods. If you are moving house or clearing a workshop, please don't throw away any old aerial catalogues. Just let me know what you might have available.





STEWART of READING 110 WYKEHAM ROAD, READING, BERKS, RG6 1PL Telephone: (0118) 9268041. Fax: (0118) 9351696 Callers Welcome 9am-5,30pm Monday to Friday (other times by arrangement)

VISA





Handheld LCD display. 2 Channel 50Ms/s. Auto range 4 Digit DMM/Capacity/frequency counter. Battery operation or external 7.5-9.5V DC ie. AC adaptor (not supplied). RS232 comes in black carrying pouch complete with 2 scope probes; DMM leads; Manual.
For Only £400



Dual trace 40Hz 20 MS/s Storage. Cursors + On Screen readout. Sweep Delay; interface etc. etc. Supplied unused in original box complete with 2 probes & Manual. Amazing Value £400



Dual Trace 20MHz

Alt Mag TV Irig etc unused & boxed with 2 probes &



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

Used £450 Unused £750



KENWANA FL 180A WOW/FLUTTER
METER 0.003%-10%; Freq 3KHz/
3.15KHz RMS/AVERAGE/PEAK: Weighted Filters; Digital Display of RPM: 4 digit Freq Counter 0.01KHz-

Unused £500

9.999KHz/0.01KHz-55KHz POWER SUPPLY Model HSP3010 30Volts; 0-10 Amps Current Limiting

9 P Used £160 GVT427 DUAL CHANNEL AC MILLIVOLTMETER 10... V 300Vin 12 Ranges

Unused £125

requency 10Hz-1MHz

XIII CTROMIC

Used £100



Used Equipment - GUARANTEED. Manuals supplied.

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



P.O. BOX 142, NOTTINGHAM, NG9 3RX, ENGLAND Tel: +44 (Ø)115 932 Ø152 Fax: +44 (Ø)115 944 4ØØ4

E-Mail: tony@iche.com WEB SITE: http://www.iche.com



Underwriters

FAULTY ELECTROLYTIC CAPACITORS?? FIND THEM FAST WITH THE FAMOUS "CAPACITOR WIZARD"

£170.37 INCLUDING CARRIAGE & V.A.T.

1 Years limited warranty. NO SURCHARGE FOR CREDIT CARDS.

The Capacitor Wizard has earned the UL Listing Mark for both the United States and Canada!!! It conforms to UL3111-1 "Electrical Measuring and Test Equipment". Representative samples of the Capacitor Wizard have been evaluated by UL and meet the applicable U.S and Canadian Standards and Requirements.

The Capacitor Wizard also conforms to the European Standard EN-55822 and EN-58882-1 earning the Capacitor Wizard the "CE"mark.

WE ALSO STOCK & SOURCE. MONITOR SCHEMATICS & SERVICE INFORMATION. MONITOR LOPTS & uprocessors, weltrend ics,.....plus lots more! Give us a call for a free catalogue!!



"ALWAYS THE FRIENDLY PROFESSIONAL SERVICE"



continued from page 427

bulb. A mid-scale reading of this order may be more appropriate for testing surface-mounted electrolytic capacitors, which seem to have higher ESR values. I have no data on this type of capacitor at the time of writing however.

Anyway, the value of R4 used here, 2.7Ω , does affect the source voltage to an extent that has to be considered. The current that flows through the bulb is controlled by the setting of VR1. R3, being only 1Ω , does not affect the operation of the oscillator.

Scale calibration with an 0-100 dial ideally follows the rule

Reading =
$$(R3 + R4)/(R3 + R4 + ESR) \times 100$$
.

In practice the signal becomes so low at high ESR values that some non-linearity in the circuit is apparent, the result being a slight departure from this formula. Because of this, it's better to use either fixed resistors to calibrate the scale or copy Fig. 7. If a standard 90° movement of a different size is used, it is easy enough to reduce or enlarge the scale by photocopying.

Setting Up

The first consideration is the oscillator's output level. With the specified lamp, the oscillator will work down to 2V peak-to-peak. But bear in mind that the oscillator's output setting is not important in itself – full-scale deflection is simply adjusted by VR2 with the test leads shorted together. Low setting of the oscillator's output provides a longer battery life, reducing the level at which the bulb ceases to function as a regulator. The test signal can however be so low at high ESR values that accuracy suffers. In practice an oscillator output of about 5V peak-to-peak is a good compromise.

If an oscilloscope is not available, the following simple method can be used. Connect a 1Ω resistor between the test leads and turn the set-zero control VR2 (shown incorrectly as a preset in Fig. 5 last month) anticlockwise. Advance the setting of VR1 slowly. Just after the half way point the oscillator will start up and the meter's pointer will deflect. Carry on until the buzzer sounds steadily. At this point the oscillator's output should be close to 5V peak-to-peak. Note that with each adjustment the pointer will twitch briefly as the bulb settles, giving the impression that the potentiometer is noisy.

Table 1: Typical ESR values at 100kHz.

| Capacitance value | Voltage rating | Impedance* |
|-------------------|----------------|---------------|
| 1μF | 50V | 4Ω |
| 2·2µF | 50V | 2⋅8Ω |
| 4·7μF | 50V | 2 ⋅4Ω |
| 10μF | 63V | 1.9Ω |
| 22µF | 50V | 1.3Ω |
| 47µF | 25V | 1.3Ω |
| 47µF | 50V | 0.7Ω |
| 100µF | 16V | 0.5Ω |
| 100µF | 35V | 0.25Ω |
| 220µF | 16V | 0⋅25Ω |
| 220µF | 35V | 0⋅114Ω |
| 470µV | 16V | 0-114Ω |
| 470µF | 35V | 0.065Ω |
| 1,000µF | 16V | 0.065Ω |
| 1,000μF | 25V | 0.041Ω |
| 2,200µF | 25V | 0.036Ω |
| 2,200µF | 35V | 0.034Ω |
| *When new – lov | w-ESR type. | |

Leave the set-zero control at minimum and observe the operation of the bulb by switching on with the probes shorted together. You will see the pointer deflect high then almost immediately jump down to the stabilised position.

Once the oscillator's output has been set, adjust VR2 for full-scale deflection with the probes shorted together. Finally, centre the control knob.

Using the Meter

Experience with the meter provides the best guide as to what ESR value to expect of a good capacitor. Some general guidelines can be given however. The reservoir and smoothing capacitors on the secondary side of a chopper power supply should all give readings of less than 0.5Ω . A practical ESR limit is 0.05Ω . With an electrolytic capacitor of $100\mu F$ or over value, you should expect a reading close to this and certainly below 0.5Ω .

There are some exceptions however. I'll mention them here as they can cause confusion. A high ESR value is to be expected with $1\mu F$, high-voltage electrolytics: if the meter deflects at all, the capacitor is often OK. This type of capacitor is widely used as a start-up component. Being operated in a DC context, its ESR is less important. As an example a new 450V type may well produce a reading of the order of 30Ω . At the other end of the range you get the $1,000\mu F$, low-voltage type. If one of these doesn't produce a reading of 0.1Ω or less it's duff.

Table 1, from Dubilier, provides a useful guide. In addition, if you are unsure what reading to expect it's easy enough to make a comparison with a similar type from your well-stocked tray of electrolytics.

The meter has good protection against placing the probes across a charged capacitor, but this should of course be avoided. The only real cause for concern is the 'main smoothing block', i.e. a mains bridge rectifier's reservoir capacitor. We all know that this capacitor can deliver a hefty punch when a power supply has failed to start up. If you are of the type with a tendency to such accidents, it would be prudent to wire a couple of beefy diodes back-to-back across the meter's input. This should protect the meter, but it won't help your heart – or your probes – in the event of such a misfortune. It's good practice to discharge this capacitor with a mains-type bulb – it is always reassuring to have a visual indication that little charge remains. See warning note later.

Inductance

As the meter operates at 100kHz, any inductance in the circuit under test becomes significant. The loudspeaker that reads 8Ω on your conventional ohmmeter appears to be nearly open-circuit with the ESR meter.

This property can be quite useful. When testing a line output stage for example you might find that there's a short-circuit across the transistor. In this event there are in general three possibilities, (a) the transistor is short-circuit, (b) the line output transformer has a primary-to-secondary short, or (c) the HT line has a short-circuit across it. If the short-circuit is still present when the ESR meter is used, the transistor is almost certainly the culprit: in the other two cases the ESR meter will give an open-circuit reading because of the inductance of the transformer's primary winding.

Video head testers operate by measuring, in effect, the inductance of the head. Its impedance falls as the gap deteriorates with wear. Although this meter operates at a frequency that's inappropriate for a video head, it can

give a relative indication of the head's condition. I don't have a collection of heads in various states of health to be able to confirm any figures, but it seems that new heads produce a reading of about 2Ω while worn heads produce a reading of about 1Ω .

Inductors with millihenry values, of the type used in EW modulator circuits, normally give an open-circuit reading. But if a shorted turn is present the inductance drops dramatically and the meter's pointer will deflect.

Analogue v Digital

In dealing with the problem of in-circuit ESR measurement I've used traditional analogue technology. But, as is often the case, there's another way of doing things. Bob Parker, an engineer 'down under' who was convinced of the importance of such an instrument, first tried analogue circuitry. After "a few fairly unsuccessful attempts" he opted for a digital approach. His solution is to use a Zilog processor with, instead of a sinewave as a test signal, short current pulses applied to the capacitor being tested. The resultant voltage pulses, which are proportional to the electrolytic's ESR, are compared to the level existing on a ramp generator. Time measurement by the Z86 processor determines the amplitude of the pulses.

As far as the power requirement is concerned, there's a parallel in the form of a remote-control handset. The LED is pulsed with a high current for a short period, the average current drawn being low. The brief high current is supplied by a reservoir of stored power in an electrolytic capacitor that's wired across the battery's connections.

Friendly rivalry between the analogue and digital camps has existed for a long time. This brings to mind an old story that sums it up well. Two male engineers, one specialising in digital design and the other in analogue design, are working together in a lab. A nude female appears at the door, attracting the attention of both men. This vision of beauty announces that every ten seconds she will reduce the distance between herself and the engineers by one half. The digital engineer looks disappointed and cries "that's terrible, she'll never get here". The analogue engineer smiles and then replies "that's OK, she'll get close enough".

More on ESR

Bob Parker (*Electronics Australia*, February 1996) puts it this way.

"The electrolyte has an electrical resistance which, along with the (negligible) resistance of the connecting leads and aluminium foil, forms the capacitor's equivalent series resistance. Normally the ESR has a very low value, which stays that way for many years unless the rubber seal is defective. Then the electrolyte's water gradually dries out and the ESR creeps up with time. The electro gradually comes to act like a capacitor with its own internal series resistor . . . Heat makes it worse. If an electro is subjected to high temperatures, especially from heat generated internally as a result of large ripple currents, the electrolyte will start to decompose and the dielectric may deteriorate - the ESR will then increase far more rapidly. To make things worse, as the ESR increases so does the internal heating produced by the ripple current. This can lead to an upward spiral in the capacitor's core temperature, followed by complete failure - sometimes even explosive . . .

Both Bob (Dick Smith Electronics) and Ray Porter, in an article on ESR meter design in this magazine a few years back, mention the use of fixed resistors to assist with meter calibration. Armed with this information, and considering the fact that ESR is an in-phase component, I have made the assumption in my calculations that ESR amounts to the same thing as an equivalent fixed resistor.

Other uses for the meter emerge the more it is used. For example, non-electrolytic capacitors can be measured and their capacitance estimated. But because of the different types of capacitor construction in use, I can't come up with any hard and fast rule. A lower limit for measurement is about $0.1 \mu F$. There seems to be less and less need these days to measure the actual value of a capacitor. With line output stage tuning capacitors and timing components a conventional capacitance meter is more appropriate.

The ESR meter is one of those things that, once you have one, you wonder how you ever managed without it. Hats off to whoever came up with the idea — it's not mine. I've just taken this opportunity to share with you the course I adopted to end up with the solution presented here. I haven't clapped eyes on the Wizard yet — we can't afford one down here in Wales. I'd like to know how the Wizard designer approached the problem, but no information has come my way.

The idea for my meter was triggered off by the Wizard. When I first read about it I was impressed. It would test that most troublesome of all components, the electrolytic capacitor. Not only that but it would do so in-circuit, ignoring associated components. I liked the idea of a conventional meter movement with its easy-to-interpret scale, also the buzzer feature for quick checking. But the meter was shrouded in mystery and its price tag was beyond me. So I decided to have a go myself.

Development

A clear picture formed in my mind as to how to go about it. My idea was to supply a low-value resistor (10Ω) with a constant-current 100kHz sinewave, amplify and rectify the resultant voltage waveform across this resistor and feed it to a meter movement. In this situation the meter is to be set at full-scale deflection. The test leads were to be connected across the resistor. Now if the capacitor being tested has an ESR of say 10Ω , the voltage across the resistor would fall by half. Thus half-scale deflection would correspond to an ESR of 10Ω and so on. A very low ESR (good capacitor) would produce a near-zero reading while a poor capacitor would have little effect, the pointer remaining at near full-scale deflection. The result is a meter scale in opposite sense to that of the Wizard.

Within a couple of months of the start of development work on the project I had a working prototype and decided to write an article about it. Then, at the eleventh hour, I had second thoughts. Something was nagging me. The meter looked OK, did its job, and others were happy with it. But after using it for some time I felt that something was not quite right.

My main concern was that it seemed to be very sensitive to the inductance of the test leads. This impedance meant that even with the test leads shorted the reading could not be brought down to zero. I had introduced measures to offset this, but in this connection a more serious problem emerged after some further use.

When a capacitor with a very low (near zero) ESR was being measured, the pointer would vary about the zero point if the distance between the test leads was altered. If they were close together, their inductance would tend to cancel and the reading would decrease. I was aware how important it was to be able to differentiate between say 0.5Ω and 0.1Ω or between 0.1Ω and

zero. This was a design weakness, and I was not happy.

At this time Bob Parker's K7204 ESR meter became

At this time Bob Parker's K7204 ESR meter became available. I had one with which I could make a comparison, and noticed the same sensitivity to inductance that I was experiencing. Both meters monitor the voltage across the capacitor, whereas the Wizard measures the current through the capacitor – this was clear from its scale.

I went on to build a little circuit to do just that and, lo and behold, this over-sensitivity disappeared. The effective lead impedance dropped dramatically, and that which remained could be simply compensated for by means of the FSD preset. So it seemed that the Wizard way was the right way. All this can be explained using the relevant maths, but I'm not about to brush up on my theory and extend this article longer than it is already.

Reluctantly, I accepted that I had to scrap my original idea and start all over again. This was by now becoming an obsession with me – I had to come up with the best solution, and it had to be the simplest.

Certain things had to go. After some use I realised that plugs and sockets for the test leads were out of the question. Their increasing contact resistance made low-ohms readings unreliable. I had also been determined that the meter should operate with a single PP3 battery.

To this end I had built a DC-DC converter to provide a negative supply line. This provided operation down to 7V. But it used 7mA and greatly increased the circuit complexity. To do away with it meant that I needed a higher supply voltage. The use of two PP3s in series to obtain this may seem to be a backwards step, but isn't really. The meter now takes half the current used by the first prototype, and will regulate down to less than 5V per battery. In fact the meter reading remains unchanged over the supply range 10-30V with the oscillator set at 5V peak-to-peak.

Now, almost a year after building my first prototype and quite a few versions later, I have presented this – my final (?) solution!

Warning

It seems that forgetting to discharge the main smoothing block or HT reservoir capacitor before measurement is a more frequent occurrence than had been expected. When this happens R4 at least will blow. As replacing components on stripboard is a messy job, I strongly recommend that protection is built in. A small board with two 1N4007 diodes wired back-to-back and a 1A (N25) circuit protector in series with one of the test leads can be mounted on the back of the meter movement.

Thanks

I have to thank Martin Pickering for his constructive comments after testing an earlier, voltage-sensing prototype meter.

| ltem | Value/type | Order code |
|----------------------|---------------------------------------|-----------------------|
| R1, R2 | 3kΩ, 1% | МЗК |
| R3 | 1Ω | M1R |
| R4 | 2.7Ω | M2R7 |
| R5, R7, R9 | 10kΩ | M10K |
| R6, R8, R15 | 100kΩ | M100K |
| R10 | 91kΩ | M91K |
| R11 | 5.6kΩ | M5K6 |
| R12, R13, R14 | 56kΩ | M56K |
| R16 | 2.7 k Ω or 10 k Ω * | M2K7 or M10K |
| √R1 | 500Ω cermet preset | WR39 |
| VR2 | 10k Ω linear potentiometer | JM71 |
| *Value for current e | conomy | |
| C1, C2 | 470pF, 1% polystyrene | BX53 |
| C3, C4, C7 | 0-1µF miniature resin dipped | RA49 |
| C5, C6 | 22μF, 16V | VH09 |
| C1, IC2, IC3 | TL082CN | D 4 7 4 |
| D1, D2, D3, D4, D5 | 1N4148 | RA71 |
| 06 06 | Flashing LED plus clip | QL80 QY96 and YY40 |
| 50 | riasining LED plus clip | Q196 and 1140 |
| LP1 | Miniature wire-ended | |
| | 28V, 24mA lamp | BT44 |
| M1 | 100µA meter movement | CPC code PM11125 |
| SW1 | DPST switch | RD17 |
| Buzzer | Miniature alarm | CPC code LS-M3 |
| Stripboard | ADC L A DAMOS | JP47 |
| Case | ABS box type BM22 | CC83 |
| Cnob Batteries | True DD2s store stires | YX01 |
| Probe clips | Two PP3s plus clips | HF28 HF21 |

Answer to Test Case 436 - see page 383 -

Even though it can sometimes be the only possible course of action, especially in a case of random mainsfuse blowing like this one, fault diagnosis by trial-anderror replacement of components is very wasteful of time, money and parts. In this particular case, progress might have been made by observing the interior of the TV set in total darkness at switch on, or even perhaps by temporarily fitting extra fuses to establish where the excess current was going.

In this Panasonic set a 2.5A anti-surge fuse added in the AC feed to the mains bridge rectifier D801 would not have blown when the fault occurred, but another such fuse included in the lead to the degaussing system would have ruptured violently. A flash inside the casing of the degaussing posistor would also have been visible, for this is where the cause of the problem lay. At switch on there was sometimes a flashover across the outer edge of one of the posistor's two resistive elements. A scar and burn mark were clearly visible when the device had been broken open.

The problem is in fact not unusual in these sets – and many others of many makes. Yes, Television Ted would have known about it. He may even have sent Colin out equipped with a posistor at the outset!

NEXT MONTH IN TELEVISION

A Mains-operated RC Tester

It's a nuisance to be caught out by a flat battery. When the need for a new remote-control tester arose, Michael Dranfield decided to devise a mains-operated unit. The result is this simple tester, which gives audible and visual outputs. To save space, a capacitor-dropper power supply is used.

Servicing the Indiana 100 and 200 Chassis

These chassis were used in a number of Bush, NEI, Nikkai and Perdio TV models. Alan Dent presents a detailed fault guide.

Test Report: The Satfinder Alignment Meter

This simple-to-operate, battery-powered meter has been developed for digital satellite dish alignment. The requirements with a digital signal differ from those with an analogue one. This meter takes the following signal parameters into account: frequency, BER, polarisation, symbol rate and FEC. Eugene Trundle has been trying the meter out.

PC Operation and Repair

In Part 2 of his new series K.F. Ibrahim describes the booting up process, i.e. what happens when a PC is switched on, and takes a look at basic system configuring and customising.

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 guote 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 ONU, 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 (Carlisle) Ltd., Newtown Trading Estate, Carlisle, Cumbria CA2 7NR. Distributed by MarketForce (UK) Ltd., 247 Tottenham Court Road, London W1P 0AU (0171 261 7704). Sole Agents for Australia and New Zealand, Gordon and Gotch (Asia) Ltd.; South Africa, Central News Agency Ltd. *Television* is sold subject to the following conditions, namely that it shall not, without the written consent of the Publishers first having been given, be lent, resold, hired out or otherwise disposed 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.

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 vou 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

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.



THE EURAS DATABASE ON THE INTERNET

 Authorised service workshops can now access the latest EURAS Service information online via the Internet

THE EURAS MONITOR DATABASE ON THE INTERNET

 Thousands of monitor repair tips are available online with hundreds more added each month



FAX BACK SERVICE

NO PC? NO PROBLEM.

- You can have access to the EURAS Database System, including circuit diagram extracts via your fax machine.
- covering all important service information
- for most manufacturers
- ...more than 510.859 repair tips for 624 manufacturers
- ...TecTra with more than 83,008 components
- ...30,087 IC diagrams
- ...35,175 compatible transistors on ECA
- ... More than 60,500 extracts of Circuit diagrams
- ...Diagram Archive Management
- ...Complete power supply circuit diagrams for 2,812 models

Save YOUR money and call us now on 0117 9860900 for trial details or visit us on the Internet@ http://www.euras.com



As a company that has been trading for 22 years, we fully understand the difficulties that today's High Street Trader faces. With the start of a recession, tighter margins and fierce pricing from larger stores, it becomes increasingly difficult to stay in profit.

Let us help you with FANTASTIC PRICES on BOXED 'B' GRADE STOCK

TVs: R/C FROM £60 FASTEXT FROM £75
SONY 28in WIDESCREEN £325 PANASONIC TXW28R3 £295 TOSHIBA 3377DB £550
MITSUBISHI C28C7B £195 SHARP 66DS03 £195
(ALL PRO-LOGIC TVs ARE COMPLETE WITH ORIGINAL STAND AND SPEAKERS)

VCRs: DAEWOO £45 FERGUSON Video Plus £60 PHILIPS Video Plus £60 AIWA Video Plus £70 PANASONIC Video Plus £75 JVC Video Plus £75

FERGUSON Nicam, £75 PHILIPS Nicam £85 AIWA Nicam £85 PANSASONIC Nicam £85 JVC Nicam £85

HI-FIS: AIWA NSX 522 £65 AIWA ZR300 £80 SANYO SYS755 £80 SANYO DCF300 £90
SHARP DCD470 £90 SHARP DCD570 £95 JVC D301T £80 JVC D60IT £110
PANASONIC SCAK25 £80 SONY MHC RX70 £110 SONY MHC RX90 £155
KENWOOD D500 £135 KENWOOD D553 £160 TECHNICS SCEH60 £175 TECHNICS SCE600 £185

PLUS genuine untested Hi Fi's to be cleared at unbelievable prices

MEGA-DEAL ON VOLUME PURCHASES OF EX-RENTAL STOCK TO CLEAR

Sanyo, Hitachi, Ferguson, Toshiba, Decca, Tatung, JVC, Mitsubishi, Philips - All Plastic Cabinet Type

ALL WORKING STOCK £30 IN R/C

All ex-Rental working stock VCR's, including Nicam. eg: FERGUSON FV57, FV67 £25

Fax Machines to Clear from £5

Multimedia Computer & Monitors to Clear from £65

All prices are based on a quantity of 5 units and subject to VAT

AT THESE PRICES WHY BUY EX-RENTAL WHEN YOU CAN HAVE TOP END GRADED STOCK!

Head Office:

BIRMINGHAM 0121-327 3273

Fax: 0121-322 2011

CLEVEDON

01275-341789

LONDON

0181-961 5005

PRESTON

01772-312101

SUPERSCREEN

NOW OPEN AT LISTER ROAD, NORTH WEST IND. ESTATE

PETERLEE

TEL: 0191 586 1600

AND AT

ARMSTRONG IND. ESTATE (OPP. DICKENS)

WASHINGTON

HITACHI GRADED STOCK
INCLUDING 32" WIDE
SCREEN/28" NICAM PRO LOGIC.
ALL BOXED & GUARANTEED.

GOOD SELECTION OF MODERN EX-RENTAL STOCK AT UNBEATABLE PRICES!

NEW HANDSETS FROM ONLY £5! BELT KITS ETC.

HEAD OFFICE ADDRESS STILL AT CANON PARK IND. ESTATE, MIDDLESBROUGH

TEL: MIKE ON 01642 250850

Peacock Electronics

We are now supplying
First Class Top Quality Major
Branded Audio & TVs/Video
to North Wales, North West,

Ireland

DIGITAL CAMERAS

CAMCORDERS VIDEOS

TELEVISIONS MUSIC SYSTEMS

RADIOS FAXES

PHONES MICROWAVES

FAXES VACUUMS

We can HELP you to make MONEY PHONE FOR TRADE LIST

ALL ITEMS CAN BE WORKED OR UNWORKED ALL ITEMS DIRECT FROM MANUFACTURER

UNIT 39 GAERWEN INDUSTRIAL ESTATE ANGLESEY LL60 6HR

Tel/Fax: 01248 422123



Wholesale Distributors & Export Agents of Domestic Electronics & Appliances

Current Stock

10" ac/de

14" r/e

14" text

20" r/c

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

No shortage of stock

Guaranteed to beat anybody's price for a similar product

SPECIALS

Ferguson 14" R/C UHF/VHF 25" Dolby Pro Logic... .£250 28" Dolby Pro Logic.....£300 ... £68 Ferguson 14" Text......£75 28" Widescreen.. £350 Ferguson VCR VideoPlus£69 32" Widescreen.

SONY

KP 4154. .£1,000 KP 4654. ...£1.450 KP 5354. .£1.650

KV29. £300 Dect Phones. ...£45 Anologue BT Phones from

MANY MORE OFFERS AVAILABLE

....£185



Current Stock Radio/ Cassettes Car Audio CD Port Hi-Fi **Phones** Faxes Kettles rons Mixers/ Blenders Microwaves Vacs **Printers Speakers BT Phones** Fridge/ Freezers Cookers

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**



Hobs

Direct

Loads



Sole UK Agents for

SADELTA



Built-in loudspeaker for AM and FM reception

■ Frequency Indication with 4 digit LCD Display

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

■ Multi-turn potentiometer to enable tuning Weight including batteries: 1.9 Kg

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



- Full Band Frequency Sweep Switchable 14V or 18V LNC Power Supply

The TC-80 has been designed for the reception of TV Satellite systems, the installation and testing of domestic and SMATV systems

- Rechargeable 12V / 2.6 Ah Battery
- Weight including batteries: 3.3 Kg.

Available from most wholesale distributors across the UK or direct from

Unit X2, Rudford Industrial Estate, Ford, Arundel BN18 OBD Telephone: 01903 723726 Fax: 01903 725322 Mobile: 0976 241505



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

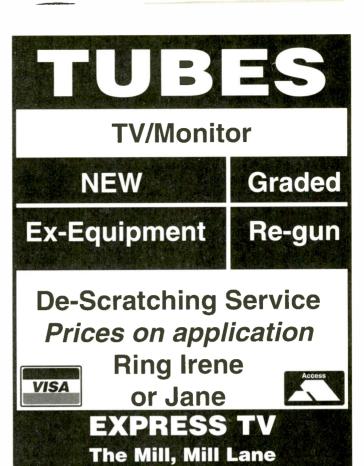
Free Delivery Service to most areas of the UK

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 90B Just 10 Mins from M5 Junct. 6 Worcs North

01299-879642 (3 lines) FAX: 01299 827984







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

DARTEL ELECTRONICS

RUGELEY, STAFFS WS15 2JW

TEL: 01889 577600 FAX: 01889 575600

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

108 ABBEY STREET, ACCRINGTON, LANCS BB5 1EE Tel: 01254 872500 / 390936 Fax: 01254 872166

TRADE COUNTER OPEN MON-FRI 9-5, \$AT 9.30-12.30 Please add VAT to all prices. We accept payment by cheque, cash, Access, Visa. Add £2 pp for all orders up to 1k. Heavier parcels add £4. Next day delivery on Parceline. nz pp for all orders up to TK. Heavier parcets and 14. Next day delivery on Parceline. Consignments POA. Goods will be despatched on the day we receive your order. If we are out of stock we will inform you ASAP. Please allow up to 28 days for delivery.

The PV1 multi purpose degaussing wand is a compact and cost effective unit intended for use with a 240 volt mains supply. This unit will be of particular interest to

TV Service Departments, TV Manufacturers, Rental Companies, TV Broadcasting Authorities, Universities and Colleges, The Armed Forces, Aviation and Computer Companies.

ORDER BY MAIL ORDER TODAY FOR ONLY £32.50.

This month's special offers:

Aerials from only £3.00

from only £10,00 2 Way TV amps Assorted Goody bags

of mixed components from only £2.50

from only £70.00

CCTV Cameras Valves

from only £2.50

We have literally hundreds of products, here are just a few: Aerials, brackets, batteries, cable, connectors, CMOS capacitors, discs, diodes, fuses, IC's, loptx, leads, manuals, push button lights, phones, phone access, potentiometers, relays, remote controls, satellite systems, scanners, semiconductors, strip board, switches, tuners, tools and test equipment, valves and all you need for video repairs - heads, idlers, tyres, pinch rollers, cleaners, test cassettes, TV's, video tape.

IF WHAT YOU NEED IS NOT LISTED - ASK! RING ANDY, MARK OR IRFAN

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 1 BD BM RDV BDW BDX BF BFR BFS BFT BFW BFX BFY BLY BLX US BR BRX BRY BS BSS BSV BSW BSX BT BTA BTB BRW BU BUK BUT BUV BUW BUX BUY BUZ CA CD CX CXA DAC DG DM DS DTA DTC (L 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 CM 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 TO TBA TC TCA PDA 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 electonic components.

Mail, Phone, Fax, Credit Card orders & callers welcome







Connect DERESS



Cricklewood Electronics Ltd

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

W WAREHOUSE





G90 21" PHILIPS R/C TXT £30 CP90 21" PHILIPS R/C TXT £25 CP110 PHILIPS 25" FST R/C TXT £35 FINLANDIA 21" NICAM STEREO £40 **FINLANDIA 28" NICAM STEREO** £65 N-CHASSIS FINLANDIA 28" NICAM £50

ONE & ONLY GRANADA DEALERS IN BIRMINGHAM

NEW TOSHIBA TV'S

ALL SIZES 14" - 52" WE WILL BEAT ANY PRICE

SURROUND SOUND SPKRS 25 WATTS (SET OF 4) ONLY £10

FRONT LOADING VIDEOS U/T From Only...



221/2 BRIDGE ST WEST **NEWTOWN BIRMINGHAM B19 2YU**

TEL: 0121 359 0800 FAX: 0121 359 2300 MOB: 07970 290121



EST 1970

WHOLESALE DISTRIBUTION LTD

SPECIAL CLEARANCE ON

| MAKE | QTY OF | QTY OF |
|---------------------|--------|--------|
| | 5 AT | 10 AT |
| GRUNDIG 2000 | £25 | £40 |
| BT 200 | £30 | £50 |
| FIDELITY SR950 | £35 | £60 |
| VIDEO CRYPT DECODER | £25 | £40 |
| PACE 800 | £40 | £70 |
| AMSTRAD SRX 400 | _ | £30 |
| AMSTRAD SRX 200 | _ | £15 |

AMSTRAD SRD's 510, 540, 545 MIX OF 10's @ £60

EX-RENTAL TV's & VIDEO's **ALWAYS AVAILABLE** PHONE NOW FOR BEST PRICES



FOR ALL EXPORT **ENQUIRIES CALL OUR BIRMINGHAM** OFFICE NOW!!

HEAD OFFICE: MICK 369 STRATFORD RD, SPARKHILL, BIRMINGHAM, B11 4JY. TEL: 0121 772 1591 FAX: 0121 766 6383

LONDON DEPO: JOSHI ELEY ESTATE, NOBEL RD. EDMONTON, LONDON, N18. TEL: 0181 807 4090 FAX: 0181 884 1314

LASSIFIED TEL:0181 652 83

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.

CLASSIFIE

PHONE 0181-652 8339

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 171/2% VAT. All cheques, postal orders etc., to be made payable to Reed Business Information. Advertisements, together with remittance, should be sent to Television Classified, 11th Floor, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS

Repair Information

IF YOU WISH TO JOIN THOUSANDS OF ENGINEERS WORLDWIDE SAVING TIME AND MONEY DAILY - PLEASE READ ON.

Just released: Ed 21 Fault Indexes in book format OUT NOW Edition 21 of the Television Magazine Index Covers over 14,000 Television, Video, Satellite, Camcorder & Monitor faults, Large easy to read A4 format The newest addition to a highly acclaimed & recommended series. ISBN 1898394253

Edition 21: Complete set £14.75 Offer Price £9.75

Brand New: Fault indexes on disk - Version 1.7 Latest faults together with ALL data from ALL previous versions, Covering a MASSIVE 20,500!! Television, Video, Camcorder, Satellite, CD & Monitor faults listed in 19 years of Television.

Indexes on Disk Version 1.7 £17.50 Low cost updates are available for all Disk fault indexes - Current price £5.50

New: Kwik Tips on Disk Version 1.1

Already proving itself a valuable service resource in workshops large & small, Kwik Tips V1.1 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 1 repair.

Kwik Tips on disk Version 1.1 £27.95

<u>Latest release – Equivalents guides – 2nd Edition.</u> Equivalents & Models to chassis, TVs, Videos Camcorders & Satellites, 5 sections, Over 6,300 Entries, Need we say more!!

Edition 2: Equivalent guides book £5.95

All programs require a PC or compatible & are supplied with a user manual.

Technical Publishing (Est 1985)

316, Upton Road, Noctorum, Wirral, Merseyside. L43 9RW. Tel/Fax 0151 522 0053

Please add £1.75 P & P to total (Europe £2.75, r o.w. please enquire).

SERVICE MANUALS AND CIRCUIT DIAGRAMS

Thousands of different models available

For most U.K. European, Far East & USA makes

| | Service Manual | Circuits |
|---------|----------------|----------|
| B/W TV | £ 6.00 | £3.00 |
| CTV/VCP | £10.00 | £5.00 |
| VCR | £14.00 | £7.00 |

Audio/Satellite/Microwave also available - P.O.A. Cheque/PO with order 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 INFORMATION

CIRCUITS and SERVICE MANUALS from 1930s-1990s: Radios, amps, radiograms, tuners, CDs, TVs, videos, cassette radios, ICE etc. LARGE QUANTITY USED TV and VIDEO SPARES

BACK COPIES PW and TV MAG **DAVE WILLIAMS**

16 Church Street, Owston Ferry, Doncaster, S. Yorks DN9 1RG Tel and Fax: 01427 728046

Mail order only. No callers.

THE 'HOOKINGS' INDEX

More than 14,000 entries including remedies where appropriate, from 'TELEVISION' magazine

Bang up to date: Jan '88 to Apr '99

Only £10.00 inclusive for the set of three books covering TV, VCR, SAT, CD etc

Too good to be true? Ring 01766 522444 for free sample *****

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 f | 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

SERVICE MANUAL

PAY ONLY £5 LOAN FEE FOR ANY SERVICE MANUAL OR KEEP IT FOR £10

Lifetime Membership £99

- FREE Data Reference Manual showing the 1,000'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 Combis, Test Eqpt, Audio, CD, Satellite, Dom Eq). Complete repair Data (Not the few faults offered everywhere else) and Technical Literature.

ANY ITEMS ASKED - FREE QUOTE

SOME CURRENT POST-FREE OFFERS

| Any CTV circuit from stock | £8.50 |
|--|---------------|
| Any VCR circ from stock | £10.50 |
| The NEW European Scrambling Systems (The one the | |
| £37 | .50 post free |
| Practical TV & VCR Repair Manuals for | |
| Servicing PC's (Tooley) or VCR's (Beeching) for | £25 each |
| Microwaves | £12 |
| Oscilloscopes (How they Work - How to Use Them) | £15 |
| The PAL System | £10 |
| Practical Radio Repairs | £9 |
| | |

A discount of £2 on every item after the first in your order PHONE NOW USING MASTERCARD, VISA, EUROCARD FOR IMMEDIATE DESPATCH

> Send now for our FREE listing of 100's of offers (many only available from us)

You can also E-Mail s_manuals@hotmail.com

Fryerns

Service Information IEES

Circuit Diagrams

SATELLITE AUDIO & HI-FI

Most models/makes old & new covered

Also fault guidance service available Prices are from £3.75 + £2.50 P/P i.e. 1 item - total £6.25 inc

2 items - total £10.00 inc

3 items - total £13.75 inc 4 items - total £17.50 inc

Payment by credit card or postal order for next day delivery. Cheques

to clear. Tel/Fax 01206 211570 Answerphone outside office hours



P.O. Box 5830 Basildon, Essex SS13 3RX

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 . . .
HE MANUALS LIBRARY
For details and membership

application form write, phone or fax:

HARVEY ELECTRONICS

Loop Road, Beachley, Chepstow, Gwent NP6 7l Tel: 01291 623086 Fax: 01291 628786 Visa, Access accepted

CIRCUITS? SERVICE MANUALS? TEL/FAX A.T.V. on 0114 285 4254 SAT/CTV Circuits VCR Circuits CTV Manuals £7.00 £10.50 **VCR Manuals** (P/P add £2.50 to each order) 419 LANGSETT ROAD, SHEFFIELD S6 2LL

REPAIRS

TECHNIC

CAMCORDER REPAIRS

Collection and delivery anywhere in the UK.

All makes, fast service.

Phone free for details.

Fax: 01905 796385 (0800) 281009

SPARES & COMPONENTS

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 · KÍMARA · NIKKAI MATSUI · MURPHY · OSAKI · NORDMENDE · LOEWE-OPTA PANASONIC · PYE · PHILIPS · SANYO · SAISHO · SHARP · SONY · SOLOVOX · SUSUMU · TANDBERG · TELEFUNKEN · THORN · TRIUMPH · THOMSON · GOLDSTAR · BINATONE ·

FULL RANGE OF KONIG: VIDEO HEADS, BELT KITS, IDLERS, PINCH ROLLERS, TENSION BANDS. LARGE RANGE OF REMOTE CONTROLS IN STOCK

TIDMAN MAIL ORDER LTD · 236 SANDYCOMBE ROAD RICHMOND · SURREY · TW9 2EQ

Approx. 1 mile from Kew Bridge.

REGULAR SUPPLIES

Ex Rental TV &

Videos.

fast collection,

fair prices paid.

Tel: 0114 231 2832

Mon-Fri 9 am to 12.30 pm & 1.30-4.30 pm

BILLINGTON WANTE

Billingshurst, West Sussex RH14 9EZ

VALVES WANTED FOR CASH

(KT88, PX4, PX25, DA100, EL34, EL37, CV4004, ECC83)

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

Visitors, please phone for an appointment, we're a very busy export warehouse.

Tel: (01403) 784 961 Fax: (01403) 783 519

Email: billingtonexportItd@btinternet.com

CHEAPEST HEADS IN THE UK

| ı | Make id | Model No | Price | Hitachi | VTF70 | £25.00 | JVC | HRD750EK | £19.00 |
|---|----------|----------|--------|---------|----------------|---------|------------|--------------|--------|
| ı | Ferguson | 3V29 | £5.50 | Hitachi | VTM598 | £21.00 | Panasonic | NV370 | €6.99 |
| ١ | Ferguson | 3V30 | €5.50 | Hitachi | VTM622 | £14.00 | Panasonic | NV430 | 28.00 |
| ı | Ferguson | 3V32 | £18.00 | Hitachi | VTM630 | £15.00 | Panasonic | NV730 | £12.00 |
| ı | Ferguson | 3V43 | £18.00 | Hitachi | VTM640 | £21.00 | Panasonic | NV850 | £21.00 |
| ı | Ferguson | 3V46 | £9.50 | Hitachi | VTM722 | £14.00 | Panasonic | NV870 | £25.00 |
| ı | Ferguson | FV10B | £10.00 | Hitachi | VTM822 | £14.00 | Panasonic | NVF55 | €30.00 |
| ı | Ferguson | FV12L | £16.00 | Hitachi | VTM930 | £21.00 | Panasonic | NVFS90 | €36.00 |
| ı | Ferguson | FV14T | £23.00 | JVC | HR2200 | €5.50 | Panasonic | NVG10 | £11.00 |
| ı | Ferguson | FV31R | £12.00 | JVC | HRD110 | £5.50 | Panasonic | NVG17 | 29.00 |
| ı | Ferguson | FV441 | £17.00 | JVC | HRD140 | £9.50 | Panasonic | NVG20 | £13.00 |
| ١ | Hitachi | VT100 | £11.00 | JVC | HRD150 | £9.50 | Panasonic | NVG21 | £13.00 |
| ı | Hitachi | VT11E | £8.50 | JVC | HRD170E | £10.00 | Panasonic | NVG33 | £11.00 |
| ı | Hitachi | VT130 | £15.00 | JAC | HRD180 | £16.00 | Panasonic | NVG9 | 00.83 |
| ı | | | | JAC | HRD230 | £16.00 | Panasonic | NVH70 | £25.00 |
| 1 | Hitachi | VT17E | £16.00 | | | | | | |
| ı | Hitachi | VT33 | £8.50 | JVC | HRD330 | £17.00 | Panasonic | NVH77 | €26.00 |
| ı | Hitachi | VT330 | £8.50 | JVC | HRD370 | £19.00 | Panasonic | NVHD100 | €23.00 |
| ı | Hitachi | VT425 | £15.00 | JVC | HRD401 | £17.00 | Panasonic | NVJ30 | £11.00 |
| ı | Hitachi | VT522 | £14.00 | JVC | HRD440 | £17.00 | Panasonic | NVJ35 | £13.00 |
| ı | Hitachi | VT535 | £15.00 | JVC | HRD530 | £23.00 | Panasonic | NVJ47 | £11.00 |
| ı | Hitachi | VT540 | £21.00 | JVC | HRD620 | £16.50 | Panasonic | NVL25 | £11.00 |
| | Hitachi | VT570 | £25.00 | JVC | HRD660 | £17.00 | Panasonic | NVSD40 | £11.00 |
| 1 | | | | | CATAL COURT AL | LUEADOA | DE CHARANT | FFD FOD 10 H | ONTHO |

TOO MANY TO LIST, PLEASE RING FOR A FREE CATALOGUE. ALL HEADS ARE GUARANTEED FOR 12 MONTHS. ALL ORDERS RECEIVED BEFORE SPM ARE DESPATCHED THE SAME DAY BY FIRST CLASS POST. OPEN MON-FRI 9AM-SPM SAT 9AM-1PM FREE PAP

RCS VARIABLE VOLTAGE D.C. BENCH POWER SUPPLY



RADIO COMPONENT SPECIALISTS

Tel: 0181 684 1665 , In

LINEAGE

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.

150 VIDEOS and large quantity of video spares for sale, £300 ovno the lot contact Dave on 01427 728046.

WANTED

Phillips projector TV model 41GR8841 for spares.

Cabinet must be complete.

Leslie Hine

Cumbria 01229 582557

To Advertise in Television Classified Telephone Pat Bunce on 0181-652 8339 or Fax on 0181-652 8931



Simply the best!

BENCH ENGINEER £ NEG

Due to our continued expansion, we are now looking to recruit a Bench Engineer to join our team at our Chalfont St Peter, Buckinghamshire workshops.

You should have a wide experience of servicing CTV and VTR equipment to City & Guilds 224 I, II and III or equivalent.

Please send your current CV and salary details to:-

Steven Thackham
CCTV Servicing Centre, 25 High Street
Chalfont St Peter, Buckinghamshire SL9 9QE.



FIELD ENGINEERS ATTRACTIVE SALARY + CAR + BENEFITS

Together, we have the power to make things work

NOTTINGHAM, COVENTRY, BIRMINGHAM AREA & NORTH EAST

Here at ScottishPower we know a thing or two about customer care. Hopefully, you do too. We're growing fast because we put the customer first - a formula that's proven a huge success. This is your chance to expand your skills, working for one of the UK's top 3 electrical retailers.

Right now, we're looking for skilled Engineers, qualified to City & Guilds 224 or equivalent with experience of repairing brown goods. In this job, it's all about getting it right first time and minimising inconvenience for the customer - and that's where you come in. You'll enjoy solving problems and talking to people, gaining a real sense of achievement at seeing a job well done.

We offer all the training and encouragement you need to help your career advance, and if your skills need updating, we offer support there too including full back-up from the manufacturers, plus a competitive benefits package and company car. All we ask in return is enthusiasm, a flexible approach and a full driving licence.

Please write, with your CV, stating current salary details to: Mark Perrier, Recruitment & Training Manager, Electricity Plus, California Drive, Whitwood Industrial Estate, Castleford, West Yorkshire WF10 5QX. Alternatively, telephone 01977 605295 or e-mail: mark.perrier@scottishpower.plc.uk



A CAREER WHERE QUALITY COUNTS

EXPERIENCED AUDIO VISUAL ENGINEER

Required to

Work on complete SONY and PANASONIC range of products.

Staff discounts, latest equipment, modern workshops

References essential Apply in Writing to:-

Company Secretary, Unit 2B, Aberconway Road, Morden, Surrey SM4 5LN

TEST EQUIPMENT



Sound & Vision System

Due to expansion we require:

Field Installation Engineer

You should have a basic knowledge of electrical wiring and experience in the installation of audio-visual products. Service experience would be an asset but not essential.

Field Service Engineer

You should have a wide experience of servicing audio/visual equipment. Qualification required City and Guilds 224 or equivalent.

Applicants will need to be self motivated, able to work as part of a team and prepared to travel to sites throughout the UK. A current driving license essential.

Salary dependent on experience. Vehicle supplied.

Please apply in writing to:

Mrs Bannister Kimbolton Electronics 7 Buckwins Square Burnt Mills, Basildon SS13 1ZJ

HOW DO YOU CHECK YOUR INFRA RED REMOTE CONTROLS?

THE EASY WAY IS WITH THESE HANDY TESTERS - EACH HAS A TRIANGULAR SENSOR WHICH GLOWS ORANGE IN INFRA RED. SPECIFY CREDIT CARD OR HANDY KEY FOB.



Card IR5 Key fob IR6

Suppliers to most major distributors. **BOTH TYPES**

L9.00 EACH INC VAT INC PGP.



ecs PO Box 7455 Tamworth B77 2PJ

ecs@CallnetUK.com Tel: 01827 261800 Fax: 01827 261900

FOR SALE

AS NEW 'A' GRADED PRODUCT IN ORIGINAL PACKAGING &
BOX WITH INSTRUCTION BOOK LEADING BRANDS ONLY.
FULLY GUARANTEED ALL SOLD AT APPROX HALF USUAL RETAIL

| MICROWAVE OVENS | |
|------------------|-----------|
| 28" LARGE SCREEN | from £295 |

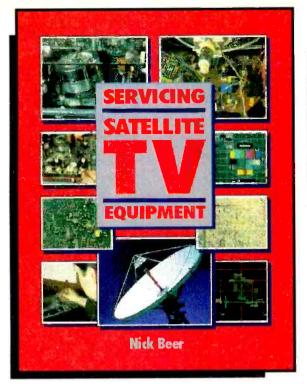
KG PURCHASING LTD · BRADFORD Tel 01274 660196/665670 Fax 665246

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)



Written by Nick Beer for service engineers, enthusiasts and students

This is the definitive practical guide to faultfinding, troubleshooting and servicing satellite television equipment, both indoors and outdoors. It will take you through all areas of satellite television system servicing from the simplest fixed dish to fully motorised systems. From PAL to Mac to MPEG all contemporary systems are covered.

Satellite TV systems have been installed in a wide variety of locations, using a bewildering range of equipment. That equipment is beginning to need maintenance and repair. To cope with the volume and variety of work, Nick Beer has written the first guide to satellite TV that concentrates on what to look for and what to do when it goes wrong. This book is up to date and crammed with real-life experience - not theoretical data or manufacturer's ideal specs.

Nick Beer has already written the best-selling Servicing Audio and Hi-fi Equipment and is a technical correspondent for many UK and international journals such as Television. He also works as an engineer and teaches satellite servicing to technicians.

- A practical guide to a new and important area for service engineers
- Covers indoor and outdoor equipment
- Written by an experienced author, teacher and engineer

Servicing Satellite Equipment

Contents

Introduction • Tools and test equipment • Dishes and feeds

- De-polarisers and low noise blocks
 Distribution systems
 - Actuators and positioners
 Tuners and tuning systems
 - Video processing circuits Audio processing circuits Power supply circuits ● System control circuits ● RF
- amplifiers and modulators Decoders and descramblers
 - MPEG Digital Television System Repair techniques •
- Appendix Reference data Appendix 2; Safety BEAB and

BS415: 1990 • Appendix3; useful addresses.

This 224 page hard backed book contains 50 photographs and 50 line illustrations - price £35.00

** Price includes delivery and package **

Return to Jackie Lowe, Room L333, Quadrant House, The Quadrant, Sutton, Surrey, SM2 5AS

Please supply the following title:

| Servicing Satellite TV Equipment |
|---|
| Total |
| Name |
| Address |
| |
| Postcode Telephone |
| Method of payment (please circle) |
| Access/Mastercard/Visa/Cheque/PO |
| Cheques should be made payable to Reed Business Information |
| Credit card no |
| Card expiry date |
| Signed |
| Please allow up to 28 days for delivery |

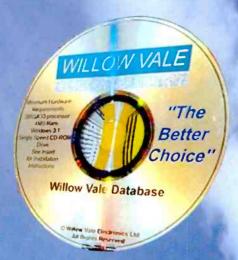
Special Offer Sale - 20 Remote Controls £20.00 (mixed all well known brands) FERGUSON ICC 7 HAND SET CAMCORDER LENS 2 OFF. NOKIA RC202 VP9401 D1096 VXA1100 AND VIDEO PLUS **BIG SALE** TELE-CONVERSION LENS x1.4 & x0.7 CARDIOID CAMERA MICROPHONE-VA SUPER FERGUSON VIDEO HITACHI 218 TELESCOPIC BOOM & STAND £5.00 FV90 LV HAND SET FV80 LV HAND SET CHASSIS-TX80-NEW-NO TUNER CHOKE MAINS INPUT TX9-TX10 CHROME BOARD-ICCS P/P £5.00ea £15.00 £4.00 £3.00 VT-F 150E VT-M 230E VT-M 230E VT-F 250E VT-F 450E FERGUSON ORION TV AND VIDEO VIDEO WITH LCD – 1992/93 MODELS BATTERY CONVERTER TA606 24V DC/240V AC I/Cs U4647TKF OR HAT1498 £6.00 DBCK AND CAPSTAN MOTOR: FV61LV, FV62LV, FV67LV, FV68LV, EACH FV70B, FV71LV, FV72LV, FV74LVX EACH BENCH LAMP-FLUORESCENT VITH MAGNIFIER P/F BENCH POWER SUPPLY VARIABLE 0-30V 3A-TWIN MITTERS P/F P/P £5,00 ea £50.00 PANASONIC PANASONIC EURS 1142 TC1632, TC1642, TC2232 TX2034, TX2144, TX2200, TX2234 TX2244, TX2300, TX2636, TX3300 RC201 – TV – REPLACES TNZ1411/2 €10.00 FV77HV EACH £8.00 EACH £8.00 EACH £8.00 LO.P.T. 30061.36162.36362,36383,36481 36482.36761.36881,36882,36922 36943,36962 2432211,2432351,2432491,2432851 2432871,2432981,2432984,2433751 243451,2434902,2434141,243493 2434451,2434492,2434494, 2435016,2435062 2435642,2435685,2435121 2435372,2435701,2436773 2436742,2436797,3216001 243066,243063 3220029.3714016,47003481 AT20767/8.472976/88,AT2078/25 AT2077/R1 DSTRINZ414972593-00 EVRID BRIDGE RECTIFIERS 10 BURGLAR ALARM KIT full description CAMCORDER UNIVERSAL BATTERY 9.6V HEAD AND DRUM MODULATOR-SATELLITE-T1040 SRD3/4 PANEL-10 MIXED FROM TX9 TO ICCS £2.04 1400MA FOR JVC-PANASONIC-PHILIPS PERDIO PANEL-DECODER-ICCS CAMCORDER-RIPOD SHOULDER POD CAPACIFORS:-£3.00 PHILIPS NEW TYPE UNIVERSAL RC4001 11N/2KV, 2NZ/2KV, 4NZ/4KV EACH £8.00 (3 in 1) PANEL-REMOTE AND POWER SUPPLY 5N6/2KV, 6N2/2KV, 9N1/2KV 35V-22UE, 50V-4 7UE, 50V-100UE EACH FV31R DISPLAY P/P £2,00ea PANEL-REMOTE-TX9, TX10 PANEL-REMOTE-TX10-540/01 £5.00 251 SAMSUNG AA BATTERIES 1.5 VOLT HANDSETS, TV & VIDEO - 12 TYPES EACH €3,00 £5,00 STC ALKALINE PANEL REMOTE TX 10. WITH BATTERY SANVO £5. AND 4 I/Cs = 1544-033C PANEL-REMOTE TX90 139.001 I/Cs M293B1 AND MS1000 €2.00 UNIVERSAL VIDEO £3.00 DIGITAL CAPACITANCE METER CMC200 AT2077/R1 DST81N243/472593-00 DST81N243/472593-00 DST88N234/400086AD, &/40153200 DST88N234/400086AD, &/47805200L DST88N234/47320041, &/47317590 SIEMENS 200PF-20MF FILTERS - 455 & 480 EAG GAS SOLDER IRON-PORTASOL HOBBY £28.00 €10.00 TV/VIDEO - 1994 MODEL £5,00 PANEL-REMOTE TX 100 THORN €10.00 I/C M293B1-SAA5012 0000 9600 TYO TYIO TYIOO PANEL-REMOTE TX100 WITH STAND-BY BATTERY AND I/Cs INFRA RED DETECTOR DST186N243/473058-00 9000, 9600, TX9, TX10, TX1000 TEXT AND NON-TEXT CPT1408T, CPT2176, CPTZ178 CPT2476, CPTZ478 TEXT, REPLACES PHILIPS KT3, K30, K4 ETC U/V TFB3035D, TFB3069D, TFB4023AD TFB4039AD, TFB4066AD EACH £10.00 WIDE/SHORT ANGLE WITH RELAY \$5.00 INFRA RED RECEIVER-MATSUMI MINIATURE \$1.00 £5.00 EACH £5.00 PANEL- 17228B TEXT FERGUSON TX9 TX10 TX85, TX86 TX89, TX98, TX99 Y260781 FOR TX89, TX98, TX99, TX100 PANEL-TX90 THORN FRONT – – 8 BUTTONS UIM4-515-002 MILLI VOLTMETER-ELECTRONIC LEADER LMV 181A 40V A/C IN-IMV F/S IMV-300V CALIBRATED - COST £225.00 PHILIPS 3 IN 1 HAND SET FERGUSON WITH TEXT IKZ £5.00 PANEL TUBE BASE ICCS COLOUR TV BATTERY CONVERTER IN 24VDC TO 240V OUT MODULATOR-TUNABLE SATELLITE-TV PANEL-IK2-FM2211 STEREO PANEL TUBE BASE-TX89, TX98, TX99 PANEL TUNING 1509G-TX9, TX10 POWER SUPPLY 12V-3A P/P £5.00 £10.00 P/P £4.00 £10.00 CHASSIS CHASSIS TX%6 CHASSIS ORION AND MATSUI CARRIAGE 1500 TYPE D1096 ETC SANYO LOPT P/I 240V ADAPTOR 9V AC IA FSTY260482 FOR VIDEOSTAR CAMERA PP3 LOPT RED SPOT LOPT WHITE SPOT & YELLOW SPOT PANEL CVCX0-POWER P/P £2.00 4 FOR £5.00 POSITOR: 18 2 PIN POSITOR: 2322 662 98012 POSITOR: 3 PIN POS.PTH451 BLACK TYPE PUSH BUTTON UNIT-TX85, TX86 - 8 BUTTONS ES.00 RECEIVER - INFRA-RED - ICSL486-TX 100 TRANSFORMERS-SWITCH MODE:-PANASONIC TC2203, TLF 1456B TLF1457B, TLF701/6 POWER SUPPLY — 12V DC & 24V DC-REGULATED POWER SUPPLY-REGULATED 3-12V 500MA TX85, TX86, TX89 TOSHIBA TFB 3035D, TFB 4023AD, TFB 4032BD TFB 4038AD, TFB 4110AD TFB 3089D, TFB 4088AD TUNERS IF TERC8-022A TBJZA-00ZA-ALPS SATELLITE SXT2302180968 TX100 473190-00, 40153000 £3.00 PSU AC 12V 500MA PSU AC 9V IA QUARTZ HALOGEN WITH BASE BAND MIN SXT2302234 HITACHI SMALL UNF/VHF VHF/UHF - TEKE4-112A DECODER-TELETEXT PC232A5 - ISSUE 4 HEAD AND DRUM - 620E MAINS SWITCH WITH STAND-BY VIDEO DECKS 500W 200V FOR OUTDOOR LAMPS R.S. SAFE BLOC AIWA 1500 MATSULVXA 1100 4944 U321, U341, U342, U343 U344, U411, U412, U944 U743, 7744 RELAYS-SUB MINIATURE SATELLITE TUNER UNIT - 2427611 25p MODULATOR No 5587881 MATSULISON WITH HEADS MATSUL 1500 ORION D1094 ORION D1096 ORION D2096 ETC CAPSTAIN MOTOR FOR ABOVE DECKS AND HAND SETS 4 HEAD DECK FOR 1500 20 HIGH VOLTAGE CAPS 1500V – 20000V MIXED VIDEO PATTERN GENERATOR MODEL T9535 24 MAINS SMALL OSCILLOSCOPE 20MHZ DOUBLE BEAM BASE BAND/VIDEO OUT SCART TO 4 PHONO LEADS 1.5M SCART TO 6 PHONO LEADS V212 PANEL-TELETEXT G8P -- ISSUE 6 PANEL-TELETEXT PC315-11 -- ISSUE 7 PANEL-TEXT-V1753E POWER SUPPLY TV SWITCH MODE £3.00 SCART TO "D" PLUG SCART TO SCART LEADS — ALL PINS CONNECTED — 1.5 METRES MRF7-7E33 MATSULORION VIDEO TUNER IF £5.00 FERGUSON £2.00 £8.00 STR 4211 ISSUE 10 POWER SUPPLY VIDEO SWITCH MODE SOUND 5.5MHZ MPM 1000T 1F2105-RE £5.00 SOUND 6.0MHZ MPM 1040 TRANSFORMER-RS ENCAPSULATED MAINS 0-120V-0-120V PRI 0-9V-0-9V SEC MTP2011-AP00 PAL TV ADAPTOR - RGB IN UFH OUT HHF - ICC5 VHF - ICC5 TX85, TX86, TX89, TX90 TX98, T99, TX100 £5,00 £5,00 £4,00 £4,00 THICK, FILM-HM9204A HOSIDEN TRIPLER KT3/K30 HANDSETS TUBE BASE – MIXED 10 for AA Batteries made by STC Group of Companies 10p each AMSTRAD ORION 1500 -- UE33 BO9 AMSTRAD £4.00 AMSTRAD HEAD AND DRUM -- 6000 HEAD AND DRUM -- NICAM PANEL-CLOCK DISPLAY -- 8,900 PLASTIC FRONT WITH FLAP -- 8,900 POWER SUPPLY VSIDWL-VSTOW POWER SUPPLY LONG OR SHORT CHASSIS 1991/1992 MODELS POWER SUPPLY -- SWITCH MODE -- DRUBLE DECKER 20 OFF MIXED NOKIA ITT SALORA FINLEX SERVICE MANUAL PANASONIC SMALL UHE/VHF JF MODULES:-5827-01-51, 5827-03-51 5828-04-10, 5829-02-58 5929-03-41 £3.00 6800 FERGUSON DOUBLE SIDE NICAM ICCS NICAM SINGLE BOARD ICCS UNIVERSAL. £3.00 TELETEXT CONVERSION KIT CORE 2 90° FIT TEXT PANEL €4.00 SHARP TUNER AND IF 1810587 PAT UK €3.00 FERGUSON BSB FV41R/3V59 FV41R/FV42 - PV51-52 £1.50 1996/7 MATSUI £5.00 TATUNG: €10.00 UNIVERSAL 205 OR EQUIVALENT WITH AERIAL SOCKET P/P £5.00e: £10.00 ICC5 POST 4.00 MATSUI - ORION 1K2000, 1K7000 MAINS ADAPTOR 12V AT 500 M/A NEGATIVE CENTRE NEGATIVE CENTRE POSITOR EQV 98009 – SALE PRICE MATSUL - UKLUN DECKS WITH HEADS DIP90 VXALIO VP 9401 HEAD-VSR 1500 - ORION D2096 PANEL -MAIN-VSR 1500 - P/P £5 POWER SUPPLY-VSR 1500 POWER SUPPLY & REG. TYPE STK 5343-VP9501 POWER SUPPLY-SWITCH MODE-1500 SRD2, SRD3, SRD4 MOTORS TV/SATELLITE WITH FST HPIACHI P/P £5.00ca CAPSTAN 150E HITTACHI £3.00 CPT2158 (NO REPLACEMENT) VIDEO RM933E VIDEO PLUS MATSUI CAPSTAN I/C NO. M56730 ASP 2 TYPES 1995 TO 1997 MODELS MATSUI VIDEO DECKS WITH CAPSTAN MOTOR FERGUSON PERCUSUN ADAPTOR - VPT - TEXT - VA354 AC MAINS & BAITTERY VA365 - P/P £3.00 ea CAMCORDER BATTERY 6V-1400MA-VA366 CAMCORDER BATTERY, HIGH CAPACITY '9,6V 1800MA-VA310 MATSUL MATKU 1590 VSR 1500 VX 3000 3000CRON - TV AND VIDEO RC = PACE 900, FERGUSON, SONY, GRUNDIG P/P £5.00 £20.00 PHILIPS AND HEAD DECODER-TEXT-K40-KT3 IF PANEL FOR CP90-CP110 MITSUMI CAMCORDER BATTERY CHARGER MOD MRF7-UF32 9.6 VOLTS VAZ65 EAC CAMCORDER CAR ADAPTOR CHARGER 66.00 MOD TMUG3-103A TEXAS NICAM BOARDS MK II MITSUBISHI RM35 - VIDEO METSUBISHI CAPSTAN-HSE41-I/C M51782ASP AND BATTERY-VA308 £2.00 £1,00 £1,00 £1,00 £2,00 15p £1,00 £1,00 HD6140815 HB4528BP HEF4029BP HEF4093 HGA1124A HM6264 No accounts 61.00 BYW95C BYW562A SENDZ COMPONENTS 100V BYX10 BYX38/300 BYX55/350 BYX55/600 BYX71/60 BYX71/60 BZW43-C20 CA3123Q CD4555BE CLE871A FE3B HA1140 HA1185 HA1196 63 BISHOPSTEIGNTON, SHOEBURYNESS. ESSEX SS3 8AF. HM6264 ALP-15 IK7ST 6931 BJ IN5401 IR 106A 1,298N LA7830 LA7830 LA7830 HA7830 LA7830 S135224 S135224 SAA5010 SAA5010 SAA5010 SAA5010 SAA5010 €3.50 £3.00 3p 10p £4.00 £1.00 £1.50 £1.50 £1.00 £1.00 £1.00 £1.00 £3.00 £2.00 Tel: 01702 338894 Fax: 01702 338805 Specific P/P charges are PER ITEM • For UK addresses add P/P to order then 17.5% VAT to total. This applies to EC unless VAT No. is 20p 50p 50p 50p 20p 20p 15p 80p £1.00 2SD401 2SD716 2SD787 2SD787 2SD820 2SD868 2SD880 2SD1266 2SD1266 2SD1398 2SD1415 2SD1427 given • Exports - P/P at cost • Postal Order/Cheque with order. Unless otherwise specified add £1.70 P/P to SMALL ORDERS + HA1196 HA11485ANT HA11485ANT HA113041NT HA513385PI HA51338SP3 HCF4520 HCF4520BE HD6140425J Additional P/P for HEAVIER GOODS. Technical information by BU826 BUK444/800 BUK445/600 BUK454/600 BUT11 BUT11AF telephone only . Government/School Orders on offical headings. Callers to shop - 212 London Road, Southend-on-Sea. Closed Monday, Tuesday, Wednesday (all day), open Thursday, Friday, £2.00 Saturday. Open 10.00-1pm. 2.15-5pm, PLEASE ADD 17.5% VAT TO BOTH THE GOODS TOTAL AND P/P CHARGE

WILLOW VALE DELIVERS

A World of Spares

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-val**e.co.uk.**

Phone: 0118 987 6444

Fax: 0118 986 7188

C.O.P.S. 0118 931 1969

Willow Vale can supply genuine spages for the iOllowing manufacturers:

- Sharp
- Phillips
- Pace
- JVC
- · Waisui
- Grundig
- Ferguson
- Tatung
- Nokia
- Saisho
- Coldsiar (LC Electronics)
- Panasonie
- Sony
- Toshiba
- Thomson
- Misubishi
- Akai
- Aiwa
- Fiancer
- Samsung
- Hitaehi
- Amstrad
- Alba
- Bush
- · Goodmans
- Whilelecol

C.O.P.S. Computer ordering parts system via our viewdata' based order/emquiry system.

SERVICE PROFESSIONALS CHOOSE
TO BUY FROM



'The Better Choice'

11 Arkwright Road, Reading, Berkehire RG2 OLU.

NOMINATED FIRST CHOICE SUPPLIER (Source) - Marvyn Hamlyn survey 'Independent Retail & Service Engineers' June 1997