THE LEADING UK CONSUMER ELECTRONICS TECHNOLOGY MAGAZINE

SERVICING. VIDEO. SATELLITE. DEVELOPMENTS

AUGUST 1998 £2.50

Digital satellite receiver design

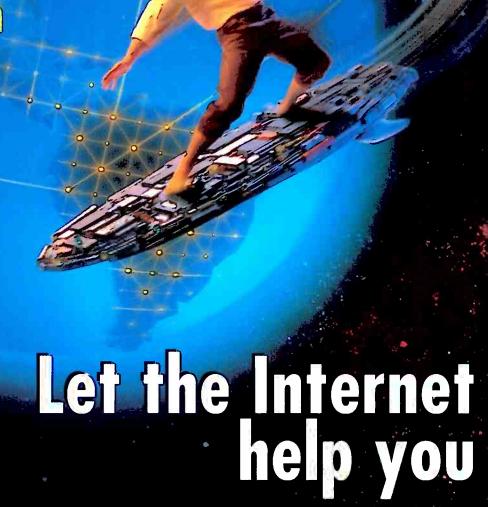
Low-ohms meter extender

Service notes on the Mitsubishi EE3 chassis

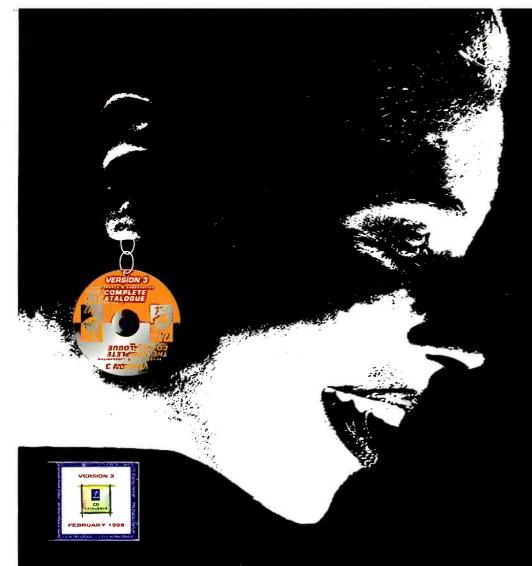
CabSat '98 show report

Toshiba service briefs





Fault Reports TVs, VCRs, Camcorders and Satellite



The perfect accessory

The new Philex catalogue on CD-ROM3 is now available with superb products, up to date information, fast search facilities, enhanced graphics & a fully updated cross reference.

A complete guide to over 16,000 line items:

- audio visual accessories
- computer accessories
- components and remote controls
- semi conductors
- electrical wiring accessories
- electrical lighting accessories

Make your life easier and phone our SALES HOTLINE now for prompt dispatch of your free copy!



SALES 0181 202 1919

PHILEX ELECTRONIC LTD. PHILEX HOUSE. 110-124 - THE BROADWAY. WEST HENDON. LONDON NW9 7PP
Tel: 07000 Philex - Fax: 0181 202 0015 - Web site: http://www.philex.com - Email: sales@philex.com

CONTENTS

687

August 1998

Vol. 48, No. 10

Delivering TV

Letters 690

End of the CRT? The non account holder's problems and other matters.

Teletopics 692

Start of digital TV. Soldering on solder. Latest cable TV, business and other news.

Toshiba Service Briefs 694

Technical know-how on dealing with various TV and VCR faults.

Satellite Notebook 696

Solutions to problems with satellite TV equipment and installations.

Digital Satellite Receiver Design 698

Chris Carter explains the operations that have to be carried out in a digital satellite TV receiver and the way in which they are performed by the current STMicroelectronics chip set.



Cable & Satellite '98 702

George Cole reports on the developments and new products presented at this year's CabSat show, which took place during the lead-up to the start of digital TV.

705

Camcorner

Servicing notes on camcorders.

Satellite Workshop 706

Jack Armstrong's column on satellite receiver servicing.

Test Case 428 **707**

Using the Internet 708

Peter Marlow explains the way in which the internet works, how you can get connected and how it can help with servicing matters.



What a Life!

Problems with tellys, a camcorder and, of course, people. Donald Bullock's column.

TV Fault Finding 714

Help Wanted 718

VCR Clinic 732

The Mitsubishi EE3 Chassis 734

John Coombes describes some faults you could encounter and some modifications that might be required.

The Microvitec Series 13 736

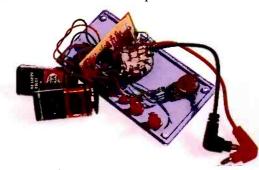
In this follow-up article Stephen Moorhouse explains the operation of the line scan/EHT generator system used in the Series 13 monitor chassis.

Technology at MCES

Martin Pickering pays a visit to this specialist repair company to find out how they tackle LNBs, tuners etc.

Low- Ω Add-on Unit 740

Alan Willcox describes a simple unit that increases the



sensitivity of a digital meter, enabling unambiguous low-resistance readings to be obtained.

Pace Link Memo

743

Martin Pickering, B.Eng., reviews the latest Pace Link system development.

DX and Satellite Reception 744

Terrestrial DX and satellite TV reception reports and news. Band S signals. The problem of feeder matching with a wideband aerial. Roger Bunney reports.

Monitor Faults

748

Hints and tips on dealing with PC monitor faults.

Next Month in Television 749

Editor John A. Reddihough

Production Editor Tessa Winford

Consultant Editor
Martin Eccles

Publisher Mick Elliott

712

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 8309

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

August issue on sale July 15th.
Next issue, dated September, will be on sale on August 19th.

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.

Wallis

Remote Controls

for TVs • VCRs • Satellite • Hi-Fi

Can't Find a Particular Remote?



WE 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

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 blocks.

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







Delivering TV

ow will we be getting our TV signals in say ten years time? Right now the options are on the increase, with digital TV giving us more for our money technically. The three basic options of course are off-air terrestrial, cable and satellite: all, during a transition period, in either analogue or digital form. There is also the added complication of the internet – one already sees references to webcasting and internet channels.

Digital TV will give us more channels whatever the transmission medium. But one interesting by-product of the digital revolution is duplicated services. We will for example find that the same BBC channel is there whether we are receiving in the traditional off-air way, via a dish or via cable. This raises the question of whether all these alternative methods of delivering TV signals are necessary?

You could say that off-air TV exists for historical reasons. It came first, and in the early days of TV there were no satellites and cables were prohibitively expensive and had limited bandwidth. So we stuck our aerials up and tuned in. Cheap and simple and you got all that was on offer. Right now off-air is still the cheapest option, but is also the most questionable way of going about it. If TV was started from scratch today, satellites would undoubtedly be the way of doing it.

Cable is relatively expensive but has certain advantages. It's simple to bundle with a telephone service, giving full access to the internet and the possibility of various data links. Cable is never likely to be an option for everyone however. Right now 18m of the 22m homes in the UK are in cable franchise areas, and the

cables run past about two thirds of these homes. While these cable networks cover a lot of the country huge, sparsely-populated areas are not covered and probably never will be. Many such areas have also had problems with off-air signals, hence all those relays. The obvious solution for those outside the likely extent of the cable franchise areas is the dish. Satellite signals get almost everywhere.

A case could thus be made out for cable services in urban and suburban areas, with satellite as an alternative option that extends coverage to just about everyone. No need for traditional terrestrial TV. Close down the transmitters and sell the airwaves for other use. It could happen.

It could, but then again it may not. People are used to their off-air signals, which most can receive using a simple set-top aerial. It's a cheap and cheerful option. Pay your licence fee and get the excellent services provided by the BBC, the ITV companies and others. People would be reluctant to give this up. It's become a sort of right. Why pay more for services that, in terms of value for money, provide little extra - or extras such as interactive TV that many are happy to be without? But services have been withdrawn before, and are going to be again: 405-line VHF transmissions ceased with barely a whimper, and analogue transmissions will be cut off before all that long.

Right now satellite TV seems to be making greater headway. It has two disadvantages, highish cost and the need for a dish. Cost could be reduced (as with cable) by offering smaller programme packages, while dishes are not all that

conspicuous today – size has decreased as transponder powers have increased and LNB noise figures have fallen. It's the ideal solution for rural areas.

The interesting thing to watch will be the development of cable. Networks have been laid in the UK at enormous cost -£8bn to date - and so far there has been negligible if any profit. Someone must see profitability in the future however. Hence the takeovers that have now led to three main players controlling nearly all the networks in the UK. Hence also moves like the amalgamation of ATT, a leading long-distance 'phone company in the USA, and TCI, one of the main US cable companies, with interests in the internet field. This is of course the clue: all that data and information down the line, with easy implementation of interactive services and so on. Developments in software and other computer technology will enhance this considerably.

The problem with cable has always been its relatively high cost. This is why there are only some 2.5m cable TV subscribers in the UK, a take-up rate of 22.4 per cent. And the churn rate is still high, at over 30 per cent on average.

But there's a lot money going into cable, presumably because of the technological prospects. It is interesting that Disney, the world's largest media company, is developing web TV technology – and it's not on its own in this respect. Cable has an assured future therefore. The satellites offer less technically but are a cheap and cheerful way of delivering TV. Where does this leave the traditional terrestrial off-air approach? It's unlikely that we shall have all these options indefinitely.

COPYRIGHT

© Reed Business Information Ltd., 1998. 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 47 are available at £3.50 each from SoftCopy Ltd., who can also supply an eight-year consolidated index on computer disc. For further details see page 749.

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 691.

SUBSCRIPTION ENQUIRIES

 Telephone:
 01444 445 566

 Fax:
 01444 445 447

 Credit card orders:
 01622 778 000

Address: Television, Subscriptions Dept, PO Box 302,

Haywards Heath, West Sussex RH16 3YY, UK. **Make cheques payable to:** Television

Subscription rates:

UK £30.00 per year
Airmail Eire £34.00 per year
Airmail Europe £43.00 per year
Airmail Rest of World £56.00 per year

NEWSTRADE ENQUIRIES

Distributed by MarketForce

Telephone: 0171 261 7704

WEB SITE

For a full list of RBI 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 (markets) special offers.....

BITTIA @ 99Deach BUTTIAF @ 38P each BU508A @ 60P each Fully wired scan lead 699

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

BU208A BU508A X 5 \$3 00 UC3842
BU508AF X 5 \$3 00 CNX62A
BU508D X 5 \$4.45 S2000AF
BUT11A X 5 \$1.45 TDA3653B
BUT11AF X 5 \$1.90 TDA3654
Philips type 1 2 volt Back up battery X 5
Phillips type 2.4 volt Back up battery X 5
Scart Scart lead 1.5m Fully Wired X 2
Positor PT37 TH98009 (White) X 5
Thorn TX100 Green spot LOPTX each BU508A **£3.00** £1.80 \$1.80 \$6.00 \$1.98 each \$12.95

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

TRADE GUIDE

to **ECONOMY** Remote Controls

Contains over 5000 references to model numbers for which we can supply an economy remote control. The range has been well tested over a number of years and the

majority are available at £6.95. Send now for your FREE guide and you will be well on the way to increasing your profits. All are normal stock items - phone

today - with you tomorrow Well Well only



Satellite division - Send for FREE price list - LNB's - decoders - receivers etc.

PSU repair - refurb

KIT1 &6.95 Pace - PRD800,PRD900,PSR800,PSR900, Ferguson SRD5,SRD16,Grundig STR1, Maspro SRE250S/1,350S/1, Philips STU802/05M, Manhattan 850,950 Goodmans ST700, Toshiba TU-SD200,SAT99

KTT2 86.95 Pace - SS900,9200,9210,MRD920, Ferguson SRV1, Grundig GIRD2000,3000, Philips STU801, Network

900,9200, Bush IRD150, Nokia SAT1500, Maspro SRE250S,350S,450S,Alba SAT6600, Finhux SR5700, Thompson SRS4

KTT3 86.95 Amstrad - SR510,520,540,SRDR45,SRD550

KTT4 86.95 Amstrad SRD 500

KITS &6.95 Amstrad SRX320,340 etc (export models) KET7 #6.95 Churchfll D2MAC decoder

KIT9 &9.45 Pace MSS200,300,Apoilo

KTT11 &5.95 Ferguson SRD4 KTT13 &29.71 Echostar SR6500,7700,8700

KIT15 &7.36 Minntec (Sorenson PSU type only)

KIT6 &6.95 Pace D100,120 KTT8 45.95 Pace MSS100 KTT10 £13.11 Pace MSS500,1000

KIT12 £16.45 Echostar SR5500(early PSU with adjuster) KIT14 #23.95 Amstrad SRD600

ad + VAT

The Satellite

You could say that what author Martin Pickering doesn't know about satellite receivers isn't worth knowing. 240 pages crammed full of useful information on common and not

faults, resets to factory sequences for parental lock on LNB's, lists of manuf Recoup the cost REPAIR MANUAL

SATELLITE

kepair Manua

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

http://www.telepart.co.uk

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

have you ASSLE USE your AGGESS OF VISA

Economic supply TV & Video parts vener vener Fast

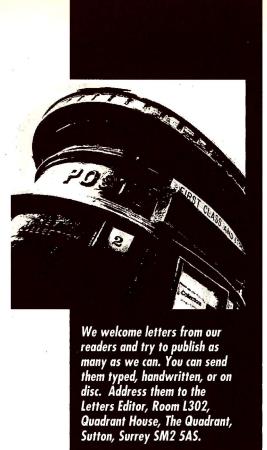
Our experienced staff WANT WANT WANT to help you.

We can give you an instant answer from our database which contains over 100,000 references and we can give that answer IN SECONDS.

If we can't find it immediately, we will HASSLE & HASSLE our supplier, HASSLE the manufacturer. We will make phone call after phone call, and Fax after Fax on your behalf. WE WILL DO ALL THIS FOR YOU.

YOU NEED ECONOMIC We do it willingly and for FREE TDA3654Q TDA4500 TDA4501H MAX232CPE TA7281F BZX6122 1N400 1N400 BT151500R 2SC2335 2SC2458 2SC2482 AC127 AD162 AF127 0.04 BC557B BC558B BT151800R B7X612V4 0.07 MC13002F BZX6133 BZX6136 BU208/ 0.19 MC7812CT 0.77 TA7778P 5.11 1N4003 MJ15003 MJ2955 TDA4503 4.00 1N4004 0.11 BC5580 BU208D TA8210AF TA8210H TA8215H 0.00 TDA45058 1N4005 1N4006 1N4007 BC559B 0.14 2SC2570A 0.38 AN5265 1.76 BU2508A BZX613V9 11.97 2.74 10.05 TDA4505M TDA4510 2SC2655 2SC2705 AN5512 AN5515 AN5521 BC560C BC635 BC636 0.11 0.23 0.14 0.11 BU2508DF 1.58 BZX615V6 0.11 MJ802 2.91 BU326A BU406 BU426A 1.36 B7X6168 MJE13005 0.86 0.69 0.86 1.41 BZX616V2 BZX616V8 TA8216H 8.01 1N4148 0.36 1.66 9.74 TA8221H TDA4600 2.14 1N5062 2SC3225 AN5601K BC637 TDA4600/2 2SC3330 2SC3400 2SC3423 1N5401 1N5402 0.52 AN7171K BC639 0.21 BU500 BZX617V5 TDA4601/2 TDA4601D TDA4605 2.82 1.46 1.46 4.10 0.11 0.52 0.35 0.41 AN7190 BA157 11.11 2.05 BC640 BU500S 2.05 BZX618V2 0.19 MJF18004 BC8468 BC8488 BZX619V1 BZX61C22V MJF18204 MN650 6.07 TA8718N TA8739P 0.60 1N5404 1N5408 1.71 0.35 0.18 0.07 0.09 2SC369 BA158 MPSA06 MPSA13 TAASSOR TDA46052 186263 0.20 2SC3807 0.91 BA159 0.11 BC8480 BU508APH BZX7910 BZX7912 0.30 TBA120S TBA120U TBA820M TDA4950 0.02 BA3910B BC856B BU508D 0.47 0.35 1.56 1.37 TDA7240A TDA8138 2SC4517A 2SC458 BU508DF BU508V 1 88 R7X7936 MPSA63 2.40 1.65 1.03 BZX793V9 BZX795V6 0.09 0.09 0.08 2.48 MPSA93 0.11 2N2222A TDA8140 4.62 1.97 TDA1013A TDA1015 2N3055 0.50 2SC4742 5.11 BA6209 BD131 0.26 BU536 TDA8145 2N3055H 2N3773 2SC4769 2SC536 4.02 BA62091 BD132 BU806 BZX796V2 TDA1035T TDA1044 TDA1060 TDA1085C TDA8170 4.70 BA6219E BA6222 RL1908 B7X79C33 NE555N 0.46 0.31 0.24 0.23 BUH515D BUK444500 BUL54AR BZX79C5V1 BZX853V9 BZY8812 P600A P6KE130A 2.55 P6KE180A 4.65 PIC16C8404S04.50 0.77 P600A 0.32 2SC945 2N3904 2N4401 0.11 2SD1207 0.57 BA6247 BAT43 1.95 0.52 BD140 5.95 4.87 2N555 2SD1246 BD233 TDA1170 TDA8180 2SD1275 2SD12**7**6 0.23 2SA1013 2SA1015 BAT85 RD234 BUT 11 BZY882V7 2.57 2.05 2.48 3.59 4.27 TDA1170N TDA1170S TDA1180P TDA8190 0.31 0.24 0.45 BUT11A BUT11AF BUT12A 0.21 BD237 B7Y883V0 0.11 TDA8350Q TDA8380 TDA9503 BZY884V7 BZY885V1 2SA1020 2SD1292 0.64 BAX14 2.53 2.13 2SA1029 2SD1330 BC107B 0.20 BD243 TDA15160 2SD1397 2SD1398 BC109 REGBABY10 RD243A BUT12AF 1.87 BZY88C12V 0.09 TDA15180 TEA1039 0.44 0.34 0.43 BD243C BD244A 0.00 BUT18A CD4001 RG2 0.64 2 29 TDA1519/ TFA2018A BUT56A BUV48A CD4017 CD4049 CD4052 RGP10G RGP15G RGP15J RGP15M 0.60 0.36 0.24 TDA1520B TDA1524A 2SA1286 2SD1426 3.51 2.91 BC141 BC147A 2SA1370 2SD1427 BD2440 2SD1432 2SD1439 2SD1441 2SD1453 BC148A BC148B BC158B 2SA1706 2SA733 BD2450 0.94 BUW11A 1.32 0.29 3.40 2.48 TDA15530 BD433 BD434 BD436 0.29 BLW41B 1.39 CD4053 0.61 0.44 TDA15540 8 12 TFA2260 CNX62A CNX82A CNX83A BUW84 BUX84 1.03 RGP30M TEA2261 TEA5101A TIC106D TIC246D TICP106D TDA1557Q TDA1558Q TDA1670A TDA1675A 2SA872/ 6.10 4.23 7.69 2.98 3.85 1.63 5.61 \$2000A \$2000A3 \$2000AF 6.48 0.82 1.54 0.60 2SA933 2SA940 2SD1497 BC182 BD437 254950 0.18 2SD1541 BC182 BD438 0.38 BUZ80 CNY75E BC184A BC184L BC187 BD681 BD826 BD839 BD901 5.95 3.25 2SA966 2SA992 BUZ80A DTAIL14ES 0.31 S2055AI TDA1904 BUZ90A BUZ90A BY127 3.40 3.30 0.18 DTC124ES DTC144ES SAA129302 10.37 TDA1908A TIP110 0.35 0.77 0.19 1.90 0.43 3.85 SAB3035 SG264A SGSIF344 TDA2002 TDA2005 TDA2006 TDA2030H 2.65 5.11 2SB1010 0.35 2SD1555 TIP112H 2SB1066 2SD1556 BC212 0.09 2SD1651 2SD1858 2SD1877 BC212B BC212L BC237 BC237B **FXT749** 0.19 BD902 0.60 BY133 0.08 0.43 2.14 BD911 BDT64C BDT65C BY206 0.20 HA13001 SL1430 SL1431 HA13119 HA13151 HA51338SI BY227 BY228 TDA2030V SN74141N 0.29 TIP3055 2\$8643 2SD1878 TDA2050 4.56 10.00 BY2291000 BY255 TDA2270 TDA2540 TDA2541 TDA2577A 12.08 1.29 1.12 2SB647 0.57 2SD1879 3.16 BC238 BF194 TIP31A 3.35 3.56 0.85 TIP32C TIP35C TIP41C 2SB649# 2SD1884 BC238B 0.16 BF195 0.07 HM6251 0.40 0.18 0.18 0.04 0.21 BY299 BY397 BY398 BY399 BY448 2SB688 2SB698 BC307 BC307B BF197 BF199 0.18 ICH281 STK4142II IR9594 IRFBC40 KIA6210AH 0.15 STK4152II 3.45 3.20 4.91 STK4192II STK5332 0.43 258716 2SD350/ 1.97 BC308A BF258 TDA25784 TIP420 0.52 BF420 BF421 2SB772 2SD381 1.66 0.09 TDA2579/ TIPL761A 1.85 BC308C BC309B BC327 STK5342 TDA2581Q TDA2582 TDA2593 TIPL791A TL072CP TMP47C432A 2SB774 1 61 250400 0.24 0.30 LA4270 2.73 3.12 0.19 0.14 0.43 BYD14J BYD33D BYD33J 2SB891 2SB892 2SD400 2SD401/ 2SD468 LA4280 STK5372H 6.84 1.03 LA4282 LA4445 LA4460 LA4700 STK5421 0.35 2SC1008 2SD667 BC328 TDA2600 15.19 TDA2611A TDA2611AQ TDA2653A TDA3190 2SC12 2SD669/ BC337 BF471 0.37 BYD33M TMP47C434N3537 BC338 BC368 BC369 BC372 2SD718 BF487 0.57 BYV10-40 2.55 4.27 STK7308 15.22 0.21 0.28 0.27 0.41 BYV95B BYV95C 1 46324 STK7348 TMP47C434N3555 2SC1473 LA6510 LA7830 LA7832 7.37 9.40 9.38 4.48 STR11006 STR4211 16.63 10.05 2SC1573 2SD837E TPU2732 2SC1679 250856 0.53 BF759 BYV96D BYV96E TDA3330 14.21 2SD882 BC546 0.38 0.53 STR50020 TDA3505 U2829B UC3842 UC3844 UC3844N BC546B BC547 BC547A BC547B 0.41 0.18 0.30 0.43 BYW56 BYW950 BYW96E 2SD898E 2SD965 BF871 BF959 LA7835 STR50103 TD43560 LA7837 LC7132 LED3G TDA3561A TDA3562A TDA3565 STR50103A 5.56 5.15 4.02 STR54041 STR5412 STR58041 2SC2001 0.23 2SD965F 1.05 2SC2023 2SK1117 0.11 BF970 BYX55600 UPC1318AV 2SK1117 2SK1118 2SK30A 7407 2SC2073 2SC2078 1 03 3 40 RC548 RFR90A B7V10 LED3R TDA3566 UPC1365C UPC1378H 1,70 BC548A BC548B BC548C BC549B 1.00 0.39 BZV85C5V1 LED3Y 0.10 STR59041 TDA3576B UPC1378H UPC1394C UPC1488H UPC1498H UPC574J X2402P 0.16 0.10 0.13 BZX6110 BZX6111 LM317T STR6020 6.07 TDA3592A 1 92 2SC2120 LM324N LM339N STRD1816 TDA3640 TDA3650 0.14 2SC2229 0.31 74HC04 0.88 BR103 0.62 2.31 0.86 5.78 7805 7806 7809 0.78 BRX44 BZX6112 STRD4420 BC550B BC550C BC556A 2SC223 1.35 BRX49 0.43 B2X61120 0.28 M494B1 T9053V 1.54 2.82 BRY55 BSX20 BT139600 0.69 B7X6113 M5218 T9064V TDA36530 BZX6116 BZX6120 TDA3653C0 ZTK338 7812 ZTX650 0.51 BC5568 2SC2271

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



End of the CRT?

I can recall when colour TV was fairly new in the UK and a 22in. four-channel, manual-control set cost about £300. Most were snapped up as soon as they were made. At that time a TV serviceman earned £26 a week, or £32 if he repaired colour sets. A new car cost about £600 on the road. When VCRs first appeared they cost about £650. The first satellite receivers came in at about £1,500 installed.

Now, with increased competition and reduced production costs, prices have dropped to the extent that a 22in. colour set which costs £300 has remote control, 99 channels and teletext. A VCR can be bought for £100, and satellite receivers are given away free with washing machines.

But a new age looms. The TV licence is nearing the £100 mark, and digital TV transmissions will be available for between £300-£400 per year extra. After a suitable period, the analogue transmissions will be closed down.

Projection TV seems to me to be the coming thing. Forget the old rear-projection units that have been around in one form or another since the days before colour, and have to be watched from one chair in the centre of the room: I'm talking about front-projection units. There are two main types, CRT driven and lamp-driven LCD units. The former have to be installed permanently, usually mounted on the ceiling, and are converged rather like early colour TV

Letters

sets. The latter are about the size of a VCR and project a wall-sized picture from your coffee table, with little or no setting up required. They cost from under £700 for a poor-quality basic model to £4,000 or so for a good one, and will project pictures from satellite receivers, VCRs and DVD players.

The picture quality produced by these projectors is increasing daily. The cost is decreasing fast as newer models hit the market. Last year's models now cost 20-30 per cent less than when they first appeared. At the present time the CRT driven models have the edge in picture quality, but the LCD types are catching up fast. If sales increase, production costs will be less than those for a standard TV set. All that's needed is for one innovative manufacturer to flood the shops with a good-quality unit at less than £2,000 on sale or return and I think we will be saying goodbye to TV sets as we know them.

So, is the end in sight for the CRT that has been a part of our daily life for almost half a century, and will we get decent-quality projection TV at about £500 (in terms of today's prices) within a few years? If so, what will be the fate of the flat-screen, hang-on-the-wall TVs that have been in the pipeline for the past thirty years? Anyone out there got a crystal ball?

John Hopkins, Felixstowe, Suffolk.

Non Account Holders

Graham Richards (Letters, May) asks why manufacturers treat non account holders the way they do. The theory is that manufacturers expect an account holder to meet certain requirements in terms of premises, test equipment, spares stock etc. In other words the account holder is expected to invest in order to obtain an account. It is for this reason that preference is given to account holders for spares and technical advice. In addition, manufacturers seem to find it more cost-effective to appoint distributors to handle non account holder spares orders and, in some cases,

provide technical advice. In principle this should work, but there are flaws – here's a brief list.

(1) The distributor often doesn't hold a comprehensive stock of spares for each manufacturer, preferring to keep in stock only fast-moving lines. Other spares are obtained to order. This causes problems and can delay a repair for up to ten days. You then appear to your customer to be inefficient. All distributors require a minimum order of between £10 and £50, otherwise hefty handling and postage charges are incurred.

(2) As a non account holder one would expect to pay more for a part. The question is, how much more? In some cases the increase can be over 200 per cent. One distributor makes no price distinction between a trade account holder and a member of the public referred to it by a manufacturer. One customer took me to task because he had phoned up the manufacturer who had given him the trade price of a component over the phone. This price was much below what I had to pay my local supplier for the part. Most distributors price spares at what appears to be a retail price. SEME prices Panasonic spares half way between the dealer and retail prices.

(3) Willow Vale's technical line is excellent. It is manned by trained engineers who have been on manufacturers' courses and have developed close relationships with the manufacturers concerned. Not all manufacturers support the service however. Thus it cannot always match the experience of manufacturers' engineers who have first-hand knowledge of the products through carrying out repairs themselves.

The policy of giving technical advice to account holders only started some ten years ago, with Grundig. Presumably the company was fed up with having valuable time wasted by some engineers who called about simple faults before they'd even taken the back off! Since then other manufacturers have adopted this policy.

There are exceptions. Toshiba offers an excellent technical advice

service to all engineers. Ferguson also gives technical advice to non account holders. I was recently told by Samsung that if I faxed a technical query I would get a faxed reply. I did, complete with part numbers.

To resolve my own problems I have come to an agreement with another dealer who has accounts with several manufacturers. He lets me have parts at cost price plus a small handling charge of say five per cent. If you do the same with local dealers it will make your life much easier and your service more efficient.

Some manufacturers allow you to open a spares account even if you operate from home. You will be expected to spend a certain amount annually. If you can find others who will buy spares from you it should be possible to reach the target. The advantage of having a spares account is that you get an account number which you can use to obtain technical advice. Michael Maurice, Wembley, Middx.

The Front Line

I started in this business in 1955. After nine years as an apprentice, improver, bench and field engineer and subsequently service manager, not to mention National Service in the Royal Signals, I decided to work for myself – a mixed blessing, as many will confirm! Now retirement looms, and I find myself reflecting on the failure of our trade to recruit more idiots like me, and the current lack of training provision, as mentioned in the April issue leader "Preparing for Digital TV".

The number of competent engineers in my area has fallen year by year. I taught some of them at Blackpool Technical College and Fleetwood Nautical College. Many were trained by Rediffusion, Granada and other rental organisations, now mainly defunct. I consider those I know who remain working to be the salt of the earth, ever ready to share information, service manuals and spares - a far cry from the lack of support those of us in the front line receive from many manufacturers' service departments today. Who hasn't heard the fateful question "Have you an account, sir?" from a disembodied, usually female voice, finally contacted after six diverted calls and engaged lines, with over-loud, irritating music while you wait? We are the front line and collect all the flack: we deserve better support. I know firms only want to sell their latest widescreen, digital offerings - but these will be even more full of dry-joints than the one whose cabinet splits at the drop of a hat!

Never mind, tempus fugit and I

must return to that nasty Nicam VCR with the expensive multi-wound video head and a totally ineffective, not to say damaging, auto head cleaner. But that's another matter. Take care! Jim Kirkman,

Poulton-le-Fylde, Lancs.

The End is Nigh

I have been fascinated by recent letters in *Television* on the future of the servicing trade. I refer to the *servicing* trade, as for many of us the *retail* side of the trade evaporated several years ago because of falling prices.
Unfortunately this downwards price spiral is now hitting the repair trade as well.

I find that customers bring in three-four year old TV sets or VCRs, plonk them on the counter, ask me to take a look at them and then say "if it's going to cost 'owt, I'll bin it and get new". This also applies to microwave ovens, where the cut-off point for servicing seems to be about £35. You can get new ones for £60 in Argos! In my part of the country, prices for new equipment are typically £99 for an Alba VCR with LP and VideoPlus, and £249 for a 25in. Alba TV set with Nicam and Fastext.

Mike Haywood asks (July) where people will take this cheap stuff when it goes wrong. The answer is back to Aldi, where they will be handed a replacement or refund under the guarantee. Once out of guarantee, it will go to the tip!

I started in this trade in 1966 BC (Before Colour), served a five-year RTRA indentured apprenticeship and am now an impoverished sole trader, repairing TV sets, VCRs, Hi-Fi and satellite equipment and microwave ovens for little reward (financially or otherwise). It is galling to hear of rising interest rates because of economic overheating and rising wages. In 1967 I was delivering £300 colour TVs in a £500 van (new). Now it's £250 TVs in a £10,000 van. The end is certainly nigh!

Mike Scott, Southport, Merseyside.

Lucky Hips etc

I can shed some light on the "LUCKY HIPS" label that Chris Plaice (Letters, May) mentioned seeing in GoldStar TV sets. HIPS stands for High Impact PolyStyrene. The cabinet back could have been made of this commonly used plastic material, which was probably made by Lucky, GoldStar's parent company.

Incidentally Acer flatbed scanners of recent manufacture have a small movable pointer in the mould tool to indicate whether the case is made from ABS or HIPS. The pointer can be seen on the underside of the lid in one corner, near the "clocks" that indicate when the cabinet was moulded. HIPS is cheaper than ABS, but doesn't feel so good to the touch. This gives retailers the choice of a 'luxury' model at a higher price or a cheap version to be sold at a discount.

In the June issue Donald Bullock mentioned the tiny speakers used in Daewoo portable TV sets and the awful sound they produce. These "singing yoghurt pots" seem to be used in many TV sets with screen sizes up to 21in. nowadays. I think the idea is to prevent annoying rattles with today's flimsy plastic cabinets!

Also, I cannot understand the current trend to use mini-neck tubes in sets with screen sizes up to 21in. Although the deflection power required is less, the purity tolerance and focusing are poorer than with the older so-called narrow-neck tubes. Electronic image sharpening is often used to compensate for the poorer focus, but this can cause ringing, with the result that the small print at the bottom of some commercials is almost unreadable. Tatung for one seems to prefer the wider narrow-neck type of tube, possibly for this reason. Simon Pearson, Chipping Norton, Oxon.

BACK ISSUES

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

1994	January, February, May, June, July, August, September, October, November and December
1995	January, April, May, June, July, August, September and December
1996	January to September inclusive, November and December
1997	January to December inclusive

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

May, June and July

1998

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

January, February, March, April,

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

TELETOPICS

Digital TV: Here we Go!

BSkyB has launched its digital satellite broadcasting service to the UK. Some hundred channels are available from Astra 1D at 28·2°E – there were just two or three during the test period. BSkyB has described the start of its service as a "soft launch". It's being offered to selected existing subscribers initially, during the period when settop boxes will be scarce. Other subscribers will then be offered the service, with a general public offering in the autumn. BSkyB plans to spend £100m on promoting its digital service, which will be under the Sky banner.

The ITV companies are refusing to allow BSkyB to add their programmes to the digital satellite channels. However the BBC has announced that its programmes will be available. Four TV channels will be offered initially, BBC-1, BBC-2, BBC Choice and BBC News 24. Two more, BBC Learning and digital Ceefax, are to follow. The BBC's five radio stations will also be available via the digital

satellite service. To comply with copyright agreements outside the UK, the BBC's channels will have to be scrambled. So viewers will require a conditional access (CA) smart card.

British Interactive Broadcasting (BIB), which will be offering interactive facilities with Sky's digital satellite service, has now been given the go-ahead by the EC's competition authorities. The first BIB services are expected to become available next year.

Meanwhile on the terrestrial front BDB has, as previously announced, selected the MediaGuard CA system and the Mediahighway interactive system (from Canal+). Philips and Canal+ are helping BDB to finalise its set-top box specification, which has taken longer to develop than expected. As a result, few IDTVs (Integrated Digital TV sets) are likely to appear in the UK before next summer.

Hitachi plans to be one of the first to launch, later this year, IDTV models designed for digital terrestrial TV reception. Model C28W40DTN, at around £1,400, will be a 28in. 16:9 receiver with a Dolby Pro-Logic decoder, a Super Flat CRT and a common interface for use with a variety of CA systems. Model C32W40DTN will, for some £1,600, provide the same features with a 32in. CRT.

The BBC has been running a pilot digital terrestrial TV channel – a world first. Amongst material it has broadcast is World Cup football in widescreen format. Programmes have been shown at public displays around London and parts of southern England – display equipment has been provided by Hitachi, Philips and Sony. Transmissions are from Crystal Palace, which is being fed via a satellite link. The BBC believes that between 50-66 per cent of British homes will be receiving digital TV by 2007.

A Japanese government panel has recommended that terrestrial digital TV should start in 2000, five years earlier than previously planned.



US Electronics has introduced The Integrator remote control/keyboard unit (see photo) which has been designed for use with PC, TV, VCR, satellite and DVD systems. It integrates a multifunction remote control for TV sets, cable converters and VCRs with a compact PC keyboard. The latter is revealed when the cover is removed and is compatible with all Windows applications. US Electronics' UK arm, based at Chesham, Bucks, can be reached on 01494 794 382.

Cable TV

In a significant move towards consolidation in the UK cable TV and communications industry, NTL has acquired ComTel and Diamond Cable. The deals are worth some £1.4bn. This leaves just three major players in the UK cable industry, CWC, Telewest and NTL. Comcast was also acquired by NTL recently. NTL wants to establish its Digital TeleNetwork, which will offer customers digital TV, internet access and telephony services.

According to the latest figures from the ITC, the cable TV take-up rate rose to 22.4 per cent in the first quarter of 1998, the highest level for this quarter. Cable service penetration (TV and/or phone) rose to 33 per cent, its highest level yet. Broadband cable services now pass over 11m homes, with almost 3.65m TV and/or phone connections.

The ITC's annual survey reveals that the average monthly TV subscription is £24.29 including VAT. This means that on an annual basis cable TV subscriptions are generating over £718.8m including VAT.

The Digital Dish

Satellite TV equipment distributor Longreach Group Plc has announced a multimillion pound deal with Cambridge Industries. Longreach is to stock the digital dish system that has been developed by Cambridge Industries and Channel Master to meet the requirements of BSkyB's digital satellite transmissions. It consists of an elliptical dish with an integrated, matched elliptical feedhorn. The elliptical design minimises dish size while maintaining high efficiency with minimum off-axis (adjacent satellite) interference.

Skew setting is simplified with a new saddle-clamp design that provides 0°, ±4° and ±8° fixed positions. There's a basic 13.5° offset for Astra 2A in the UK.

Soldering on SolderA bismuth-tin solder developed by Mining and Chemical Products Ltd. enables new connections to be added to joints that have already been soldered. The MCP solder has a melting point of 135°C, some 45°C lower than that of ordinary lead-tin solder. It can therefore be used for secondary soldering-on, or close to a conventionally made joint, without any risk of melting or softening the existing lead-tin solder.

MCP's bismuth-tin alloy wets readily and can be used to solder any metals that can be bonded by lead-tin solder. It is one of a range of specialised low-melting point alloys developed for soldering at temperatures between 58°C and 220°C. The series includes several lead-free formulations. Manufacture is to ISO 9002 quality-assurance standards.

MCP is based at Whitchurch, Hants and can be reached on 01256 897 200.

Business News

Alba's pre-tax profits last year rose by 29 per cent to £12.6m, helped in particular by strong sales of home-cinema TV sets in anticipation of the World Cup. The company's brands include Bush, Goodmans, Roadstar and Dirt Devil.

Thorn, the Radio Rentals group, has sold its American business to Renters Choise for £545m.

Carlton Communications has bought Nimbus Technology, a leading manufacturer of video and compact discs, for £160m. Carlton already owns Technicolor, the world's largest producer of prerecorded video cassettes.

Philips has sold, for what is believed to have been a nominal sum, its only manufacturing plant in Russia. Some £40m had been invested in the plant, which manufactured CRTs. A quadrupling of energy prices and import tariff cuts made it impossible to operate profitably. The Velt plant had a production capacity of 2m tubes a year but had been running at less than five per cent of this.



Texas Instruments has announced four new link-layer FireWire (IEEE 1394) chips that will enable designers of PCs, peripheral equipment and consumer electronics to increase the data throughput of their systems - the chips are optimised for 400Mbits/sec operation. The GP2Lynx (TSB12LV32) is for general-purpose PC and peripheral applications; equipment PCILynx2 (TSB12LV21B) for PCI bus-to-1394 applications; TSB12LV01 for high-end networking equipment; and the DVLynx (TSB12LV42) for consumer electronics products involving digital

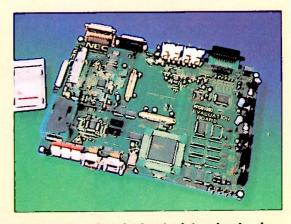
The DVLynx, which is intended for use in items such as camcorders, VCRs and set-top boxes, enables the system processor to operate at peak performance levels by automatically parsing digital video data and non-DV isochronous data into 1394 packets for transmission: this transfers some of the burden from the processor, whose capability can thus be devoted to system-level requirements. With its large on-chip FIFO (8kbytes) and a bulky data interface, the chip can perform full bi-directional DV data transfers or simultaneous DV and isochronous data transfers.

TI has also announced a breakthrough in CMOS transceiver technology that will more than double the speed at which information can be accessed, saved and shared across networks. The technology makes it possible to send and receive data simultaneously at speeds up to 2.5Gbits/sec.

BSkyB Remote Control

Philips was selected by BSkyB to develop and manufacture a universal remote control handset for use with its digital set-top boxes. Volume production has now started. The handset was designed jointly by Frazer Designers and Philips Remote Control Systems. It's preprogrammed to work with most TV brands sold in the UK, and has an easy-to-follow programming process.

Philips has licensed its RC6 technology to BSkyB, and the RC6 transmission protocol has been optimised for set-top box use. This version of RC6 will also be used for future IR input devices, such as wireless keyboards, to cater for interactive services such as those to be provided by BIB.



NEC has introduced what is claimed to be the world's most advanced digital set-top box/TV receiver chip, the µPD61030, which combines a high-performance, code-efficient 64-bit processor (VR4110), an MPEG transport stream demultiplexer, MPEG A/V decoders and a graphics generator: peripheral support functions include smart card interfaces, IEEE1284 parallel port, I2C interfacing and UARTS. The chip therefore requires only the addition of memory, an appropriate front-end and interface components to provide a digital set-top box system. The μPD61030 comes in a 304-pin PQF package and can be used with a low-cost, two-layer PCB. Our photograph shows it in an evaluation board that has been designed by NEC Electronics (U.K.) Ltd., which can be reached on 01908 691 133.

Dixons Recognises Union

Dixons has entered into an agreement with the Amalgamated Engineering and Electrical Union (AEEU). It covers some 1,600 technicians and back-up staff employed by Mastercare. Shop staff are not included. The agreement is also limited to the brown goods arm of the company, and includes a no-strike deal. The AEEU estimates that half the engineers at Mastercare are members.

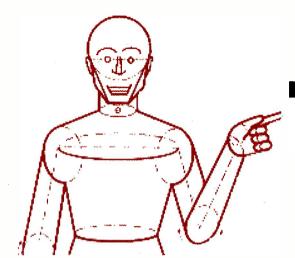
DVD/Video News

Sharp has announced its first DVD player, Model DV650H. Features include digital gamma correction and Super Picture circuits. The latter provides edge detail sharpening. Other features include Dolby Digital and MPEG-2 decoding and Dolby Virtual Surround sound. The AV connectors include component (Y, Cb, Cr) video, S video, composite video out (phono), scart, audio via six phono sockets, stereo headphone and coaxial and optical digital outputs. It is expected to sell at about £500. Sharp forecasts that UK DVD player sales will reach some 30,000 this year rising to 350,000 in 2001.

Dolby says that worldwide sales of DVD players have reached 720,000, with an estimated quarterly growth of 270,000. Dolby Digital processing is a feature of 95 DVD models worldwide.

The DVC digital camcorder format seems to have taken over in Japan, where apparently eight out of ten camcorders sold are now of this type.

Hitachi is to start producing projection TV sets at its Hirwaun plant in South Wales. 34 and 45in. models with Dolby Digital Surround sound will be available from next summer.



Toshiba Service Briefs

More know-how from Toshiba, based on Technical Bulletins CDH/AH70 Feb/May

TV Sets

Model 2151TB (C4E-R Chassis)

Tuning drift. Will not stop at channels during a search tune. Fine channel tuning is possible, but the channels pull off tune slightly when the channel is changed: The AFT buffer transistor Q106 has collectoremitter leakage. As a result, the AFT voltage at pin 9 of ICA01 is incorrect. Replace Q106, which may be either type 2SC1470S (part no. 23114528) or 2SC1815Y.

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

RF and AV inputs both produce a ringing (ghosting) effect with distorted verticals and poor colour and contrast: The TC9090N digital comb filter chip QZ01 is faulty. Replace. Part no. is B0410687.

Green smear when the colour is turned up (check with a colour-bar generator): The B-Y signal amplitude is low because capacitor CQ35 at pin 23 of the TA8772AN chip QQ02 (1H DL PCB) has fallen in value. Replace CQ35 (0.47 μ F, 50V).

Models 2557DB, 2857DB and 3357DB (C5SS Chassis), 2577DB, 2877DB and 3377DB (C7SS Chassis)

Distorted sound at power up (sounds like a Dalek). Distortion clears when the set warms up: There is ripple on the audio mute line because the 12V rail that supplies the base of the off-mute transistor Q612 is insufficiently smoothed. The cure is to add a 47µF, 25V electrolytic capacitor on the print side of the PCB, with its positive lead connected to the junction of R612 and the anode of D612 and its negative lead connected to chas-

sis. Fig. 1 shows the points at which to make the connections.

Models 2577DB, 2877DB and 3377DB (C7SS Chassis)

Good picture but swirling patterns and no sound: The 8V output from the power supply is inadequately smoothed because C897 is open-circuit. Replace C879 (2,200µF, 16V).

Models 28MW7DB, 28MW7DG, 32MW7DB and 32MW7DG (C7SS Chassis)

Very slow channel change. Channel selection can take typically ten seconds or more. Although this is the primary symptom, other effects may be encountered as follows:

- (1) The channel ident, which is obtained from teletext packet 8/30 and is normally displayed at the bottom of the screen, is missing.
- (2) When text is selected, no text is displayed. If the mix mode is selected there is only an L-shaped picture at the left and bottom of the screen with the rest of the picture blacked out.
- (3) The picture has a mosaic effect.
- (4) There is incorrect Fastext operation.
- (5) There is an oversized OSD display within a normally-sized OSD window.

The cause of all this is a data communication problem between the teletext processor chip and the DRAM on the text module. The cure is to fit service kit part no.

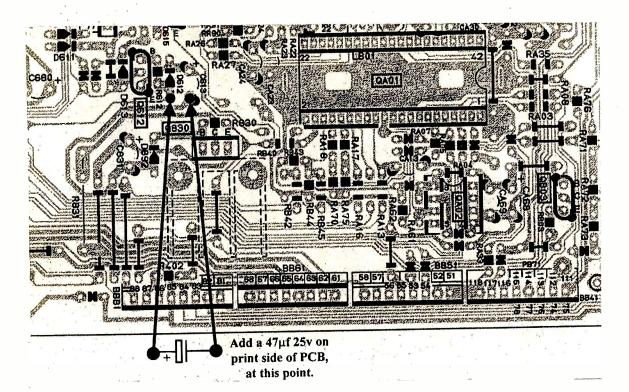


Fig. 1: Where to add extra smoothing (47µF, 25V) in the C5SS and C7SS chassis.

TCP01421 in the case of Models 28MW7DB and 28MW7DG, or service kit part no. TCP01422 in the case of Models 32MW7DB and 32MW7DG.

Model 32W6DB (C6SS widescreen chassis) No picture (blank screen), text and OSD both OK: If the video input at pin 15 (VA) of the 100Hz UP converter unit U908A is OK but there is no output at pin 9 (UU), and the external power supplies, timing signals and data/clock bus inputs at the converter are OK, replace the Up converter module. The part no. is 23709123.

Projection TV

Models 48PJ6DB and 55PJ6DB (C6SS Chassis)

Dead with the 2A fuse F807 open-circuit: The STR-S6708 switching device Q803 has an internal short-circuit. When this happens the 6.2V zener diode D854 also goes short-circuit. Replace Q803, part no. 23904247, and D854, part no. A7270200.

Dead with the PRF5000 circuit protector Z889 opencircuit: The LA4282 audio output IC Q601 has failed. Replace Q601, part no. 23318413, and Z889, part no. 23144451. To prevent a repeat failure it is advisable to replace the IC protection diodes D601/2/3/4, all type 1N4148, part no. 23115599.

Right-hand channel is very noisy with TV and AV inputs. Noise does not vary with volume control adjustment and finally mutes the sound: The 2SC2878-A mute transistor O682 is faulty. Replace. Part no. is A6342206.

VCRs

Model V226B (V3 CAT 1)

Appears to be dead, is actually running in the backup mode: Power Good 5V supply is missing at pin 5 of the power supply connector BP002 because resistor

RP052 (1k Ω) has gone high in value. Microcontroller chip IT001 runs in the back-up mode when this supply is low or missing, i.e. the 32.768kHz clock is running but the main 16MHz clock is shut down and there's no display. Cure is to replace RP052.

Models V804B, V825B, V854B (V3 CAT 2) One level meter displays maximum output when a hi-fi recording is being played back: The PNR (Playback Noise Reduction) amplifier in IC920 has a short-circuit decoupling capacitor. This is C928 for the left channel, C929 for the right channel. Both are 10µF, 16V. Replace whichever one is faulty.

Models V856B and V857B (V3 CAT 2)

No E-E or playback video: Check whether the video output signal at pin 11 of the video processor chip IV001 is reaching the buffer transistor TV011. If not, RV011 has gone open-circuit. This is a 100Ω chip resistor, part no. 24872101.

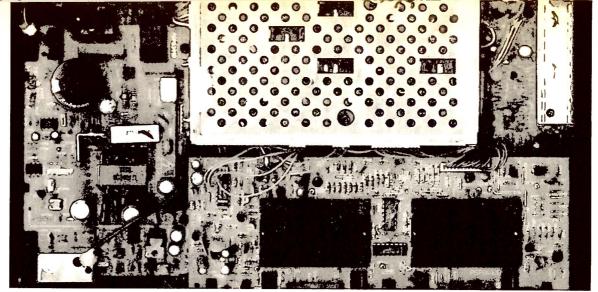
Reverts to standby within seconds of powering up: The 2SC2236-Y 12V regulator transistor TW003 is probably leaky. As TW003 also forms part of the standby switching circuit, the VCR switches back to standby. Replace TW003, part no. A6325549.

Clock Crystal

An alternative 27MHz teletext clock crystal is being supplied by Toshiba, under part no. 23153472. It's a replacement for the crystal used in many models, with the component reference number XT01 or ZF01 and part number 23153012, 23153457 or 23153472. The new crystal comes with a 10pF capacitor which replaces CT02 (crystal XT01) or CF16 (crystal ZF01).

Technical Information

Version 2 of the Toshiba Technical Data Disc, part no. TTDD98, is now available from Toshiba Spares, Units 6/7 Admiralty Way, Camberley GU14 3DT at £8. Version 2 of the Toshiba Technical Repair Book, part no. TTRD98, is available at £6.



Satellite Notebook

Motorised Dish Problem

A Pace MSS508IP receiver-positioner that was connected to a fairly ancient 3m Channel Master dish via an 18in. motor arm would intermittently display "dish error" while the dish was moving between two satellite positions. Once the message appeared, the dish would no longer move until a new channel had been selected at the receiver.

The unit had been replaced a couple of years previously and was quite quiet in operation. A sure sign that oiling is required is when loud noises come from the arm, more often than not when the dish is being moved a fair distance between two satellites spaced far apart. Such noises are guaranteed to annoy the neighbours, but in this case the dish was way out in a field at the back of the house, well away from the neighbours.

A reed switch was used as the sensor, connected in the positioner circuit to indicate that the dish is in motion. It's adjacent to a rotating magnetic disc which is driven by the actuator's gearbox. When the motor is turning, the reed switch should open and close. In this case the reed switch was faulty. Moving it fractionally nearer to the magnetic disc helped a little, but it subsequently refused to work.

The easiest way to test a reed switch is to connect a multimeter set to the low-resistance range to the wires that are normally connected to the receiver's pulse input, then move the motor east or west. The meter should 'kick' (an analogue meter is best for this test) as the motor moves and the reed switch opens and closes. When the switch stops working, it will stick in either the open or shut position. Some receiver-positioners don't

like driving the motor when no pulse feedback is present, though they can usually be persuaded to do so in the 'set-motor limit' mode. Take great care during this test. If the dish's mechanical limit switches have not been set correctly there is nothing to stop the arm at the two ends of its travel. This could lead to a bent arm or dish or, at worst, both.

Be careful not to confuse the reed switch and motor wires. If the reed switch is connected across the motor supply it will certainly not work afterwards!

Older systems used a ten-turn wirewound potentiometer as the sensor. This method fell out of favour some years back, mainly because of the inevitable corrosion in the potentiometer case, leading to intermittent wiper contact.

Manufacturers of motor actuator arms often stick a label on the unit to warn that the motor must be mounted uppermost – there's a drain hole at the bottom of the case to let out any water. H.C.

Switch-on Channel

When they phone us some customers have trouble describing the problem with their satellite receiver. For some years, since the introduction of the PRD series, all Pace receivers can be forced to switch to a designated channel when mains power is reapplied after a power cut. This can make it easier to understand what the problem is. Wherever possible with our installations and repairs we force the receiver to switch on with Sky News, usually on programme position one. If a strange fault appears to be present, we ask the customer to unplug the receiver, plug it in again and report back on what he

sees. Sometimes Sky News appears and the problem has been solved. If not, at least we have a clearer idea about what's happening.

Programming MSS series receivers is fairly straightforward. If you have a Pace Link PC programming system it's easily done by going into the "global options" menu and selecting the appropriate switch-on number. Direct programming of PRD models with the remote control unit is a little tricky. Proceed as follows.

Press the function (F) button followed by Recall in quick succession. At this point the receiver shouldn't return to the channel it was previously on (this is the normal recall function of course). Quite often a receiver seems to have a problem obeying this command, so keep the buttons depressed a little longer than for normal channel changing and keep trying until the receiver remains on channel.

Once this has been done press the P- - button on the remote control unit (top left) and enter the number of the channel you wish the receiver to select at switch on. A message, "Press Store to confirm", should then be displayed in the middle of the screen. Once store has been pressed, "enabled" will be displayed. Remove then reapply mains power to test that the switch-on works correctly.

To remove the auto switch-on facility, repeat the procedure described above (remember to enter the correct channel number!), the only difference being that the final message will be "disabled" instead of "enabled".

You may find that the receiver is somewhat reluctant to be programmed in this way. Several

Reports from Hugh Cocks and Chris Watton attempts may be required for success. Remember the button sequence: F, Recall, P- - then two numbers (message appears) and finally Store. H.C.

Scrambled Pictures

Mr Goodfellow owns a Pace MSS138 receiver that's connected to an external VideoCrypt decoder. This model is similar to the MSS100, but doesn't have the internal decoder. He was having some very unusual problems when trying to watch certain videocassettes. For some reason they were "full of lines", though the sound was OK. Other tapes played back perfectly.

The Panasonic VCR was connected via a scart lead to the MSS138 receiver's video scart socket. It could thus record satellite pictures on AV. Playback was via the same scart lead to the MSS138, which was connected to the TV set via its TV scart socket. As the decoder was connected to the MSS138's third scart socket, and the hi-fi to the phono sockets, the receiver's rear panel was full to capacity.

Connected in this manner, the

VCR would override satellite pictures when playing a tape, the MSS138 acting as a scart switching box. This is where the problem lay.

The VideoCrypt decoder also 'saw' the tape. Unfortunately all the programmes taped from Sky included the VideoCrypt scrambling information at the top of the picture. The decoder was reacting to this information, which is not affected by the unscrambling process. It thus thought that it had to unscramble the off-tape image, thereby turning it into scrambled lines! An instant diagnosis is simply to disconnect the decoder from the receiver. This is the same system that VH1 (Germany) uses to prevent VideoCrypt-decoder equipped UK viewers watching its Astra signal!

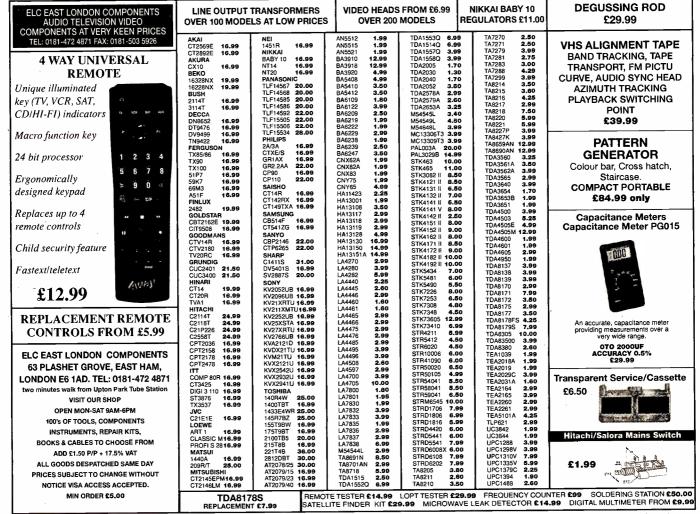
The cure is straightforward: disconnect pin 8 of the decoder scart lead. This stops the decoder's automatic switching facility triggering the receiver's switching circuitry. As a result, all VideoCrypt channels had to be altered to "Dec V" in their set-up menus, to route video into the decoder ("Dec AV" could be used, but external sound switch-

ing isn't required with VideoCrypt). This is rather a tedious business, but had to be done only once – it was then added to the Pace Link PC memory, in a file for MSS138s with an external decoder.

I keep four different channel-setting files for this model: German Astra channels first, with menus in German; VideoCrypt Sky channels with an external decoder; non-scrambled English-speaking TV and radio channels first; and finally a Eutelsat 13°E file. We have several of these receivers out on rental: they sometimes require a change of 'personality' depending on the customer's nationality! H.C.

Amstrad SRD400

The customer complained that the terrestrial TV picture became snowy when he switched his satellite receiver on, and that the satellite channels didn't produce any pictures. A check on the switched and unswitched 12V supplies showed us why. The latter was at 8V. Both rails were at 5V when the receiver was switched on. The cause of the problem was CP03 (4,700µF). C.W.



Low-cost

Digital Satellite Receiver Design

Chris Carter explains the operations that have to be carried out in a digital satellite TV receiver and the way in which the current STMicroelectronics chip set handles them

ithout compression, a broadcast-quality digital TV signal would need over 200Mbits/sec to transmit. This would call for a bandwidth many times that of the initial analogue video signal. So compression is essential, and the standard chosen is MPEG-2 — named after the Motion Picture Expert Group that defined the specification. MPEG-2 uses both spatial and temporal compression to reduce the data rate required to 4-8Mbits/sec (16Mbits/sec maximum), with only a minimal loss of quality. Spatial compression removes redundant information within a field: temporal compression avoids unnecessary repetition of information between one field and the next — in practice between a series of fields.

For temporal compression, three types of frame are used, intra (I), predicted (P) and bi-directional (B). I frames are subjected to spatial compression only, using techniques similar to those employed in JPEG compression for still images. P frames are compressed likewise, but first a prediction based on the previous I frame is subtracted so that only the much smaller difference between the frame and the previous I frame need be compressed. B frames are similar to P frames, but the prediction is based on a combination of previous I and P frames, giving a further data reduction. The frames are arranged in groups of twelve: each group starts with an I frame, the following sequence consisting of three P frames and eight B frames (the full sequence is I B B P B B P B B P B B).

Satellite transponder bandwidths are typically within the range 26-54MHz, giving useful bit rates in the range 20-60Mbits/sec, see Table 1. Thus with compression a single transponder can transmit 4-10 digital channels (compared with only one using analogue transmission). The satellite operator, broadcaster and viewer all benefit. Services such as near video on demand (NVOD) can be offered. NVOD works by transmitting the same programme on several digital channels with the start times staggered by say twenty minutes. For example a two-

hour film could be broadcast on six channels at twentyminute intervals, so that on average the viewer is no more than ten minutes from the start of the next broadcast.

Transmission equipment manufacturers, receiver manufacturers and service providers have obviously had to adopt systems that work together. A considerable amount of work went into developing standards for the whole digital satellite system, not just the compression part. The majority of systems around the world now conform to the European Digital Video Broadcast (DVB) specification, which covers most requirements.

Receiver Block Diagram

Fig. 1 shows the basic building blocks required in a typical digital satellite receiver. European digital satellite TV signals are normally transmitted in the Ku band range 10·7-12·75GHz, using QPSK modulation. The LNB at the dish downconverts the signals to an IF band of around 1-2GHz for feeding to the tuner, which selects the required channel and produces baseband outputs in separated I and Q (In phase and in Quadrature with the carrier) form. Because, with QPSK modulation, the transmitted signal is in analogue form, analogue/digital conversion is next required to produce suitable data streams for digital demodulation.

The QPSK symbol rates are anywhere from 3-7Msymbols/sec when the transponder is being used for a single channel (SCPC – single channel per carrier) to more than 30Msymbols/sec when the transponder is being used to transmit several channels (MCPC – multiple channels per carrier).

The raw data streams (I and Q) obtained from the demodulator will have errors introduced by noise. This is anticipated and catered for at the transmitter by adding forward error correction (FEC) data to the original data stream. The process involves Reed-Solomon and convolutional encoding, the result providing robust protection from such errors. Signal recovery in the

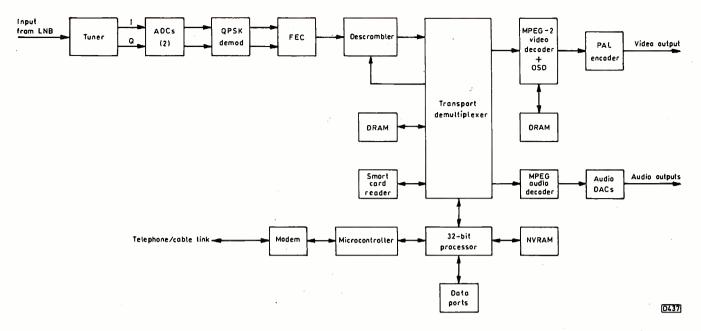


Fig. 1: Block diagram showing the basic operations that have to be carried out in a digital satellite TV set-top box.

receiver is carried out by an FEC circuit that performs the required Viterbi decoding, de-interleaving and Reed-Solomon decoding. The result is a clean bit stream that contains the service data. It's called the transport stream, as it 'transports' the video, audio and other information.

With a pay-TV service the transport stream will be scrambled. So some hardware, i.e. a descrambler, and some software are required to make the data usable. Authorisation is normally carried out by interaction with a smart card that contains data to identify the user and enable charges to be levied. This can be done with a prepaid card, or the set-top box may contact a subscriber management centre for authorisation via a low-speed (e.g. 1-2kbits/sec) modem with the smart card to identify the viewer. This, together with the infrastructure required at the transmission end and the subscriber management centre, is referred to as the conditional access (CA) system.

The DVB standards specify the descrambler hardware and a mechanism for transmitting CA data, but they do not specify how these are to be used together. This is at the discretion of the CA provider.

All this activity requires software to run in the box. For this, and other functions that will be covered later, a powerful (normally 32-bit) microprocessor is required.

We have seen that the transport stream contains video, audio and other data. As each bit stream can contain

data for several channels, there may be several independent video, audio and data streams within one transport stream. To enable these to be identified and separated, the different streams of data relating to different channels are put into 'packets'. Each packet is labelled with a header that contains a Packet IDentifier (PID). This enables the channel to which a packet belongs to be identified. With a TV transmission, the transport demultiplexer uses the PIDs to separate and pass on the video and audio packets for the channel the viewer has selected. With digital radio, only the relevant audio packets are demultiplexed.

The video and audio packets obtained in this way then have to be decompressed for display. MPEG video and audio decoders are required for this purpose. The decoded video must then be PAL encoded so that it can be displayed by a standard TV set. To ensure that the video and audio are synchronised, software in the main processor checks the time stamps that are sent with each data packet and makes sure that the outputs are correctly aligned.

To enable the set-top box to know which PIDs relate to which channel, Service Information (SI) data is also transmitted as part of the transport stream. This data includes information on which transponder handles which channel. The software in the box can thus tell the tuner which transponder to select. In this way, and using other data transmitted at the discretion of the service

Transponder bandwidth (MHz)	Symbol rate (Msymbols/sec)	Useful bit rate (Mbits/s)				
		1/2 conv	2/3 conv	3/4 conv	5/6 conv	7/8 conv
54	42.5	39-2	52.2	58.8	65.3	68.5
46	36-2	33.4	44.5	50	55-6	58.4
40	31.5	29	38.7	43.5	48-4	50.8
36	28.3	26.1	34.8	39.1	43.5	45.6
33	26	24	31.9	35.9	39.9	41.9
30	23.6	21.7	29	32.6	36-2	38.1
27	21.3	19.6	26.2	29.4	32.7	34.4
26	20.5	18.9	25.2	28.3	31.5	33.1

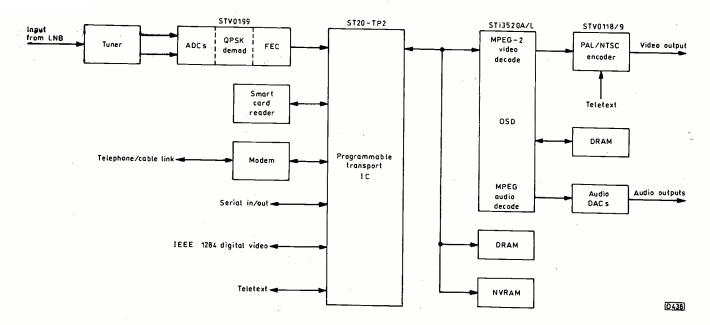


Fig. 2: Block diagram showing the way in which the current STMicroelectronics chip set handles digital satellite TV signal processing.

provider, a more or less sophisticated set-top box user interface can be arranged. If the service is scrambled, this user interface also has to handle the conditional access requirement.

The User Interface

Initially, user interfaces consisted of basic graphics and text. Some service providers consider the way in which the user interacts with the box to be part of the overall service however. So there is a trend for providers to insist on more sophisticated graphics. In some cases they have taken on the responsibility of defining how the user should interact and what is displayed.

One way for a service provider to do this without having to write the whole software for the set-top box is to specify an Application Programming Interface (API), a software layer that the box manufacturer must provide in his products. The API is integrated with the service provider's application software before the box is approved for sale. Examples of such APIs are MediaHighway from Canal Plus and OpenTV from Thomson-Sun Interactive (TSI).

An on-screen display (OSD) capability is required to generate the graphics. Various options are possible, depending on the amount of memory available in the box – higher colour depths and multiple display planes require extra storage. Most current receivers use four bits per pixel resolution (from a large palette of colours) with three graphics planes (video, graphics and text). There is a trend towards eight bits per pixel however, and extra graphics planes, e.g. for showing bit-mapped images such as icons and advertising stills.

Better graphics are required only in set-top boxes that provide a high level of interactivity. In such a case the modem can, in addition to providing viewer authorisation for specific programmes, also be used as a backchannel for requesting non-broadcast data. In the case of home shopping for example, the viewer might want information on a specific product. A higher-speed modem is required for such applications.

Design Solutions

Low-cost silicon chips are required for the production of digital satellite set-top boxes at a price viewers will be prepared to pay. STMicroelectronics (previously known as SGS-Thomson Microelectronics) has developed suitable chip sets which are already in production. Fig. 2 shows the current STMicroelectronics solution for a digital satellite set-top box. It consists of four ICs that carry out all the functions previously described and have been designed to work together.

The STV0199 is an integrated digital receiver that incorporates two A/D converters, a QPSK demodulator and FEC circuitry in a single low-power package. As it can handle data rates from 2-45Msymbols/sec it can be used for either SCPC or MCPC transmissions with a single tuner.

Because of its high level of integration, the ST20-TP2 programmable transport IC replaces several ICs in previous set-top box designs. It combines a 50MHz, 32-bit microprocessor (ST20) with the transport demultiplexer function and all the peripherals required in most satellite set-top boxes. Its main blocks are as follows: (1) An ST20 microprocessor that carries out demultiplexing and runs the system software. (2) A dedicated interface to the STV0199 QPSK receiver chip. (3) Dedicated memory space for connection with an STi3520A MPEG decoder, so that the selected video and audio packets can be fed out with minimum processor overhead. (4) A DVB descrambler - for conditional access systems that use standard descrambling. (5) ISO-compliant smartcard interfaces for conditional access and other services. (6) PWM outputs for synchronising the system clock with the source encoder clock. (7) A teletext interface to allow for teletext reinsertion in the vertical blanking interval, using the STV0118/9. (8) An IEEE 1284 interface - the DVB standard parallel interface. (9) UARTs implementing RS232 interfaces, low-speed data ports etc. (10) I2C for control of peripherals such as the ST0118/9, the ST0199 and EEPROMs. (11) Parallel input/output for other control requirements.

The STi3520A combines an MPEG-2 MP@ML video decoder and an MPEG audio decoder in a single chip. In other MPEG decoders three frame stores are required to decompress the video bit stream, one each for the current I and P frames and one for the display. With a PAL picture this calls for just over 16Mbits of memory. To avoid the need for an extra DRAM with each decoder,

the STi3520A incorporates lossless memory usage optimisation to fit PAL in 16Mbits, thus saving set-top box cost. The STi3520A also incorporates an on-screen display generator that can provide up to sixteen colours (four bits per pixel) from a palette of 16k colours in each region defined on the screen.

The STi3520A has become a de facto standard MPEG-2 decoder worldwide. For higher-end applications the STi3520L version, with eight bits per pixel of graphics resolution and provision for an extra bit-mapped graph-

ics plane, is available.

The STV0118 is a video encoder able to provide PAL or NTSC outputs in all common formats as well as RGB, composite video and S-VHS outputs. It can also perform closed-caption, CGMS or teletext encoding, and includes several unique features such as line skipping/insertion to reduce the amount of external circuitry required. The STV0119 version includes provision for the widely-used Macrovision anti-taping system.

Other Digital TV Transmissions

Cable and terrestrial transmission are the two main alternatives to satellite services.

Cable has the advantage of providing two-way communication: the user can send requests and receive data on demand. In the short-term this is likely to be internet data or dedicated services such as home shopping or banking. This requires a large infrastructure investment, as the cable network has to provide switching and expensive servers are required to store data. Transmission is normally QAM, with QPSK for the return channel.

Telecom companies already have a switching network and connections to homes. For them low bandwidth is the problem, as the connections were originally installed for voice telephony only. Their problem is to find a low-cost way of re-using this slow connection for video transmission. Asymmetric Digital Subscriber Loop (ADSL) technology solves the problem, but expensive servers are still required if true on-demand services are to be made available.

Terrestrial transmission uses the same broadcast frequencies as current analogue TV services. Digital compression enables more channels to be broadcast in the same spectrum space, or alternatively the same number of channels can be broadcast with higher definition (HDTV). The modulation technique to be used in Europe for digital terrestrial TV is Orthogonal Frequency Division Mulitplexing (OFDM).

With all these transmission schemes, except HDTV which requires a higher-performance MPEG-2 decoder, the processing of the bit stream once it has been demodulated is much the same – transport demultiplexing, MPEG video/audio decoding and display, generation of a user interface, etc. So the processing and silicon required are the same in each case.

Next Generation

There are at present two trends in set-top box design. One is cost reduction, which will be achieved mainly through a higher degree of integration on the silicon. The other is for designs that incorporate provision for the alternative forms of transmission mentioned above.

With respect to integration, STMicroelectronics has recently announced the availability of its One-chip Multimedia EnGine Architecture (OMEGA) ICs. These integrate on a single chip an ST20 microprocessor with its associated functions, an MPEG video/audio decoder and a PAL/NTSC encoder. The first member of this family of devices is the STi5500, which is a single-chip

set-top box back-end (post demodulation) IC suitable for satellite, cable and terrestrial use.

It is interesting that this combination of a processor, MPEG decoder and video encoder is the same as that required in a DVD player. So, with different software, the STi5500 can also be used for DVDs.

The level of integration in the STi5500 produces cost reduction not only because of the lower device count but also because less memory is required. The OMEGA family uses a patented memory-reduction technique that saves more than 4Mbits of the DRAM required for video decoding. As the MPEG decoder and microprocessor in the STi5500 can share memory, the freed capacity can be re-used by the processor to optimise overall memory use. Performance is also improved, as the bus between the processor and the MPEG-2 video decoder is wider than is possible using two separate devices.

The other trend requires new devices for the front-end section of a set-top box. STMicroelectronics already has the STV0197 for cable use and is about to announce an OFDM chip. For services that use the existing telephony structure, the company has a chip set for ADSL.

STMicroelectronics is to introduce new devices to provide market diversification. They are to be based on the same technology, providing long-term design security.

Acknowledgement

The above article is an edited version of a paper presented by Chris Carter at the recent Cable and Satellite '98 Show.





Astra's digital network control centre in Luxembourg will be at the centre of the digital satellite TV revolution.

Cable & Satellite '98

This year's Show featured many digital TV products and systems. Two mini shows, Digital Terrestrial Television (DTT) and iTV (interactive TV) ran alongside the main show. George Cole was there to report for us

his year's show was again held at Earl's Court 2, in late May. The emphasis, with UK services due to start later this year, was naturally on digital TV. France, Germany, Italy and Spain have had digital TV for some time. The UK is now gearing up for its first services, from BSkyB and BDB.

BSkyB

BSkyB had a large stand that included a vast demonstration area. Most of the things on show, such as the Electronic Programme Guide (EPG), had already been seen at the *Electrical Retailing* Show earlier in the year. This time however the four digital satellite settop boxes (called Digiboxes) that the manufacturers selected by BSkyB – Amstrad, Grundig/Hyundai, Pace and Panasonic – will be producing were on show. My favourite was Amstrad's box, which has a smart silver/grey fascia. Although the boxes look different, they all have the same basic specification. This includes 4Mbytes of DRAM, 4Mbytes of flash memory (a form of EEPROM) and a TP2 processor.

The Application Program Interface (API) is the computer instruction system that the set-top box understands. BSkyB's box uses a version of Open TV. The boxes also provide Dolby Pro-Logic (but not Dolby Digital) sound. Software upgrades will be delivered by

satellite downloading – the software for British Interactive Broadcasting's interactive services will also be provided in this way.

The list of developers will give you an idea of the complexity of the box. STMicroelectronics (previously SGS Thomson Microelectronics) has developed the key ICs and supporting software; Open TV Inc. has developed the operating system software and API; NDS has developed the EPG application software; Oracle has developed the BIB interface software. This helps to explain why the boxes will cost some £400 to manufacture – their subsidised price is to be about half this figure.

The Digiboxes also use the same universal remote control unit, which has been developed by Philips (see Teletopics). It also controls many TV sets. This is a good idea, since it means that shop staff need to learn how to use just one handset to control all four digital receivers. The handset has been designed to suit both right- and left-handed users (as a left-hander I thoroughly approve of this!). The unit will be used for a wide range of operations, including EPG navigation, ordering pay-per-view events and the use of interactive services.

There was also a chance to see the new digital dish. It's an elliptical design with a maximum 53cm diame-

ter. Cambridge and Grundig will be manufacturing the LNBs.

By the time you read this more information on programming and charges should have been released. At the show it was suggested that BSkyB will be offering a series of subscription packages, including a low-cost one at about £6-£8 a month.

Astra

Astra Marketing also had a large stand, and was showing digital TV from various countries including France, Germany and Spain. There were also transmissions from Astra 1D at 28.2°E. The Astra 2A satellite was due to be placed in orbit at this position late last year, but because of technical problems the launch has been postponed to this autumn.

The Astra-Net system was being demonstrated. This delivers data and internet information to PCs at high speed. The company was also pushing its "disappearing dish" campaign, to get through to consumers that a satellite dish can often be located in a discreet location and camouflaged.

Eutelsat

Although not as well known in the UK as Astra, Eutelsat's satellites deliver TV services to over 65m homes across Europe. The Hot Bird satellites at 13°E provide a mixture of analogue and digital TV channels.

A new service, Convergence1, was being demonstrated. It delivers digital TV, the internet and multimedia services via satellite. Tests are currently being conducted using transponder 74 aboard Hot Bird 3. The data rate is high – up to 40Mbits/sec. A pilot service has been started in the UK: it also involves BT Broadcast Services and the internet service provider Easynet.

To use Convergence1 you need a Digital Video Broadcasting (DVB) compliant satellite set-top box, a dish and a PC equipped with a special card. Convergence1 uses the DVB standard to deliver a mixture of digital TV, internet and multimedia services within the same multiplex. At present the TV pictures are delivered to the set-top box and the data to the PC, but according to Eutelsat both services will in future be delivered to either a TV set or a PC.

Eutelsat is also testing a system called Skyplex. It will provide satellite multiplexing of digital TV, radio and multimedia material. The conventional way of 'bundling' such signals is to send them to a ground-based, centralised multiplexing facility then uplink them to a satellite. With Skyplex, signals can be uplinked from a number of locations then bundled into a single DVB multiplex at the satellite for retransmission to Earth. The Hot Bird 4 satellite can assemble material from up to six uplink carriers, with a net bit rate of 6.3Mbits/sec. The downlink data rate is 38Mbits/sec. Hot Bird 5, to be launched later this year, will be able to handle bit rates as low as 350kbits/sec, using time-division multiplex techniques.

Set-top Boxes

The Pace stand was full of set-top boxes, including those for BSkyB and BDB. There was also a WebTV box – this is a system that brings the internet to the TV screen. The system is owned by Microsoft and has some 300,000 users in the USA. A UK trial is planned, involving BT.

The "WorldBox" that was on show has been developed for News Corporation, which has a forty per cent stake in BSkyB. It is to be launched later this year for

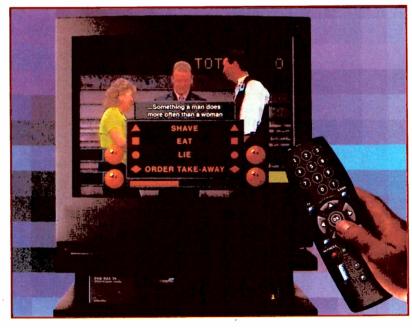


The Pace BSkyB digital set-top box.

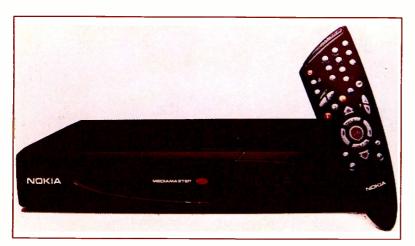
use by Sky broadcasting operations in Mexico and North America. The set-top boxes will have slightly differently-configured software in each country.

The analogue satellite set-top box display included models in the MSS100 and MSS1000 ranges. Andrew Wallace, Pace's marketing manager, said that analogue TV will continue to be an important part of the company's business.

He also had some interesting things to say about interoperability between the BSkyB and BDB set-top boxes. The present plan is that users of BDB boxes will be able to receive digital satellite tranmissions via an optional "side car". According to Andrew Wallace this might not be the best solution, as the side car will be large, expensive and will require its own power supply. He felt that it would be better to opt for a separate digital satellite box or invest in an integrated digital TV (IDTV) receiver that could be fitted with a modular upgrade. These views were shared by a number of manufacturers at the show.



A Two Way TV interactive display. Screen shot reproduced by kind permission of Carlton Television Ltd.



One of the latest Nokia Mediamaster range of digital set-top boxes, with remote control unit.

Nokia Multimedia Network Terminals had a number of digital set-top boxes on show, including the 9850T which has been built to BDB's specifications. It was a working prototype, as some of the finer points in the specification were still being ironed out. The preliminary specification includes an MPEG-2 video decoder that can handle data rates of up to 15Mbits/sec and offers 4:3 and 16:9 displays. Its audio decoder conforms to the MPEG-2 standard and offers mono, dual channel, stereo and joint stereo sound. The box has a 32-bit RISC processor, 2MBytes of RAM, 4Mbytes of SDRAM for the video/graphics and 4Mbytes of flash memory. The input frequency range is 470-862MHz and the bandwidth 8MHz. AV connectors include an RF loop-through, twin scart sockets, two phono sockets for analogue audio and one to provide a digital output. There's also a 9-pin serial data connector and a telephone socket. For conditional access the 9850T has a smart-card reader. It also has a common interface connector. As with its BSkyB decoder, software upgrades can be sent over the air.

Nokia's second-generation free-to-air digital satellite set-top box, Model 9800S, has a new EPG that enables each viewer to create a favourite channels list or select groups of channels by theme or genre, such as films. It will be launched this autumn.

To show that analogue is not dead, Nokia demonstrated a switching system for use with analogue and digital satellite receivers. The Smart Priority Switch enables viewers to switch between two receivers fed from a single dish. If both receivers are switched on, priority is given to the analogue receiver.

There was a special Nokia presentation hosted by president Heikki Koskinen and Helmut Stein, who is senior vice-president of new technologies and operations. Mr Koskinen highlighted the problems of developing an IDTV receiver, as there are more than a hundred possibilities. These include aspect ratio (4:3 and 16:9), screen size, projection technology (front or rear) and resolution (standard or high).

Helmut Stein believes that internet pages delivered via the DVB system will become an important part of TV reception. He foresees a time when viewers will be able to select internet pages from a carousel of the five hundred or so most interesting web pages. Since settop boxes will be addressable via a conditional access system, viewers could use their remote control unit to call up specific pages, with the telephone line as the back-channel to the broadcaster.

According to Helmut Stein the next generation of settop boxes will use single-board chassis and have an expansible amount of DRAM up to 24Mbytes. He talked about the problem of creating a standard API for set-top boxes. The current multitude of APIs means that we have what he calls an "electronic Babel". There is MHEG-5 (Multimedia and Hypermedia Information Coding Expert Group), which has been selected by the UK Digital TV Group for DTT broadcasting, and Open TV which is to be used by BSkyB. Others include Java from Sun Microsystems and Windows CE from Microsoft. It's certainly a confusing business.

At the Grundig stand there was a working BSkyB decoder and a non-working BDB decoder.

Digital Terrestrial TV

The Digital Network, which includes all the major broadcasters that are involved with DTT, had a large stand. Live DTT broadcasts from the Crystal Palace transmitter were being displayed using a 16:9 Sony TV set. There were DTT boxes on show from manufacturers including Grundig, Nokia, Pace, Sony and Toshiba – but the Philips space was empty. It was clear that none of the boxes had reached the final production stage. In fact one or two of them looked like mock-ups. There was a DTT decoder on the Thomson stand.

Interactive TV

The Two Way TV company developed an interactive TV system some years ago. It transmits text and graphics, which can be superimposed on a TV picture like teletext, during the vertical blanking interval. The idea is that viewers can participate in live or recorded programmes by answering multiple-choice questions on the TV screen. Answers are given by pressing a button on a special remote control handset. Two Way held an interactive trial in the Central TV area a few years ago. By all accounts it went fairly well.

Two Way TV was originally a proprietary system, but with the arrival of digital TV the company has decided to reposition itself. It is now offering the system to digital satellite, terrestrial and cable broadcasters.

The company has also developed "Puck", which is a cross between a remote control handset and a wireless computer mouse that can be used to navigate around a TV screen. Two Way says that as TV screens begin to resemble computer displays, viewers will need a simple-to-use device. Apparently a number of companies have expressed interest in the Puck.

Another company that has repositioned itself is Acorn Group. It has much experience of interactive TV, having developed interactive set-top boxes and run a large iTV trial in Cambridge.

Acorn is now offering the acTiVe range of digital technologies, which includes a powerful Strongarm 1500 processor that can decode MPEG using software. A second stream can also be decoded. Andy Mee, Acorn's vice-president of marketing and development, says that this feature could be used to provide a more flexible digital TV recording system – like satellite TV users, digital TV viewers will be able to record only the channel the set-top box is tuned to.

In Conclusion

The message from the broadcasters and manufacturers at CabSat '98 was that digital TV is coming. In many ways this is the easiest bit – the trade has now to convince the public that digital TV is worth the investment.



Reports from David C. Woodnott

Electrolytics

The extremely useful Capacitor Wizard was reviewed in these pages recently (June). One of them now has a permanent place on my workbench. I agree with all that was said in the review, but would like to add a note on its use.

Anyone who is familiar with the Camcorner page will realise that I have to replace a lot of electrolytic capacitors, especially the small types used in the Canon E60 range etc. When using the Wizard to check these capacitors the readings obtained could lead to misunderstanding. The Wizard's display is divided into three sections, Good, Compare and Bad. The instructions supplied emphasise that a degree of judgement is required in interpreting readings in the Compare area. This is fine. But note that these small electrolytics show up as Bad even when new! I checked several dozen from a reel. All measured Bad but were perfectly OK. A really bad capacitor of this type (10µF, 16V) won't even move the pointer off the end stop!

So beware of misinterpreting the readout. Always compare and everything will be OK. It's a truly excellent and much-needed piece of equipment.

Sony CCDTR805E

Intermittent operation was the complaint with this Hi-8 unit. On test everything at first seemed to be OK, but after a while the unit powered down. It wouldn't switch on again

Camcorner

until the supply had been removed then reapplied.

When it was working again (in the play mode) I noticed that if the bench power supply's output voltage was slightly altered – by only about 1V from nominal – there were picture disturbances. These took the form of horizontal bands that moved in the background of the picture, or white spots that covered it completely. I also noticed – nothing much gets by me! – that the unit didn't always power down correctly. Even when the supply voltage was reduced below the nominal cut-off level, to about 4.5V, it would still hang on.

The cause of the trouble was a faulty MC141600FU DC-DC driver chip, IC231, in the power supply. When a replacement has been fitted the unit needs to be set up correctly as per the manual.

The chip is used in various models and is suspect whenever this type of fault occurs.

Sony GVS50E (Video Walkman)

This particular unit is used as part of a mobile surveillance system. It came in for repair because there was no AV input operation. Playback worked correctly via the LCD, and there were AV output signals. But there were no LCD pictures, or monitor pictures via the AV connectors, in the record mode.

The cause of the trouble was failure of circuit protector PS402 on the audio PCB (AU147), on which the AV connectors are fitted. This CP is at the earth connection side of the video input socket. Another CP (PS401) provides similar protection for the audio input. No cause of the failure could be found – it's likely that an incorrectly earthed input had been connected, producing a voltage across the CP.

Samsung VPJ52

Intermittent record colour was the reported symptom. The effect could be readily seen in the E-E mode. Playback of a previous recording was OK. The cause of the trouble was

simply dry-joints on the multipin connector between the camera head and the main PCB.

We've had other intermittent faults caused by these connections. Impact damage is probably the basic cause: the connections are very close to the case internally.

Sony CCDTR350E

No operation was the complaint with this newish Handycam. In fact there was no power up, and an inspection revealed that circuit protector PS901 was open-circuit. As no shorts could be found, a replacement was fitted. The unit was then switched on.

A check on the various outputs from the power supply showed that they were all missing. The DC-DC driver chip IC901 was suspect and was replaced, curing the fault.

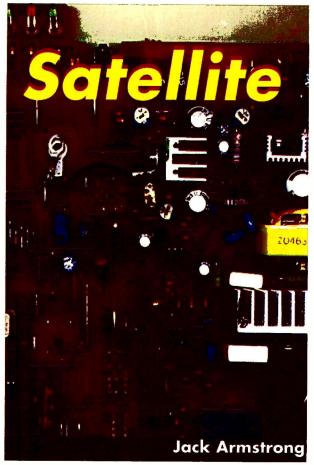
With all functions now working, the final step was to set up the power supply circuits as laid down in the manual.

Sanyo VMEX280P

We recently replaced the complete lens assembly in one of these camcorders because the iris vanes had become contaminated with oil that had leaked from the motor unit. As cleaning is seldom successful, and the iris assembly is not available separately, the complete unit usually has to be replaced.

Focusing may not work correctly when a new assembly has been fitted. The unit really needs to be set up, for which operation an interface is required. The EEPROM chip that holds the focus data etc. is mounted on the lens unit on a small, flexible PCB that connects all the sensors and motors etc. to the main PCB. If the old EEPROM is transplanted on to the new lens unit you will probably find that, as in this case, all will be well. There's no servicing information for the components mounted on the lens assembly, so setting up is at best an educated guess!

When we subsequently replaced a lens unit in a similar Sanyo model we found that transplanting the old EEP-ROM was again successful.



Maspro ST8

I don't see many of these receivers, but two arrived in the same week. One displayed a permanent "no signal" message on every channel. The other one was dead.

The "no signal" fault was caused by the tuner module – it's easy when you have two identical receivers to compare! As the importers want a silly price for a replacement, I'm looking for an alternative. The Sharp tuner used in early Pace PRD800 receivers is almost identical, but has three fewer pins and doesn't work in the ST8. If I can't find something, I'll send the faulty tuner to MCES (phone 0161 746 8037) in Manchester for repair.

The dead receiver was repaired using Satkit 25. I ordered it from SatCure's internet site – www.netcentral.co.uk/satcure/

All Greek to Me!

With the seemingly continual changing of Greek and Cypriot channels, some installers have become increasingly confused about how to get as many English and Greek stations as possible. At one point you had to have three separate LNBs on

WORKSHOP

a 1m dish! At least one station is present in the 'high band' above 12GHz.

An installer brought me his problem. He'd been using a universal LNB, an enhanced LNB and a standard LNB, with a Global ADX and a Global tone inserter. Please don't ask me how it all worked! But after several satisfactory installations one, at our local chip shop, didn't work. The 22kHz tone switch wouldn't let the tone through to switch the universal LNB to high-band operation.

After a number of phone calls we discovered that a 22kHz switch, unless otherwise ordered, prevents the tone going through to the LNB – except for a few that might have left the factory with bad connections to the relevant capacitor. This particular installer had apparently been using faulty units until now. His new batch wasn't faulty – but no longer worked as far as he was concerned.

Anyway, this is the answer. If you want the 22kHz tone to switch the LNB, open the tone switch metal box and look for the small (and only) capacitor. It hangs over the edge of the board. Simply cut it off. If you don't want the tone to pass, ensure that the capacitor is soldered in place firmly.

My grateful thanks to Mike Hancox of Satellite Scene who solved this problem. If you are Greek and want to watch Greek and Cypriot transmissions, Mike will happily install your system. You can reach him on satscene@onto.co.uk

A Pace SS9000

This old, 60-channel receiver came from a local TV repairer. His fault report said "blank screen with what look like flyback lines on it". When I checked the receiver I found that the picture from the decoder scart connector was OK (but flickering of course). Every other output produced a blank raster. The "flyback lines" occurred because the TV set, without a proper PAL signal, lost sync.

Using my old 20MHz scope, I soon traced the cause of the problem to the video amplifier U21. This is a very unusual condition. It's so

unusual for this chip to fail that I have dozens of them on scrap boards, so finding a replacement was no problem.

Pace D100

"PSU ticking" said the fault report with this D2-MAC decoder. I suspected the electrolytic capacitors in the power supply and, as I didn't want a loud bang when I applied mains power, I checked them all in situ with my Capacitor Wizard.

C142 ($22\mu F$), C144 and C145 (both $10\mu F$) all produced ESR readings above 10Ω , which is clearly unacceptable! The large electrolytics on the secondary side of the circuit all produced readings of less than 1Ω , so I left them alone. Once the small electrolytics had been replaced with shiny new $105^{\circ}C$ types the decoder produced, in conjunction with my old SS9200 test-bed receiver and with the dish aligned at 0.8° west of south, perfect pictures.

Scart Leads

My mail box always seems to be full of enquiries from readers with picture faults. Many of these problems arise from the use of incorrect scart leads. A scart lead used with an external D2-MAC decoder needs to be as short as possible. It's often a good idea to pay the extra and buy the best lead you can find at a Hi-Fi shop. The video wires should be individually screened.

A scart lead used to connect a satellite receiver to a TV set should have the minimum number of wires possible. A nine-wire lead is usually adequate, but you should disconnect the wire at pin 19 (TV end only) otherwise ghosting or patterning can occur should the TV set send out a signal on that wire.

Pace SS9200

This receiver had the usual symptoms associated with old electrolytic capacitors. When I had replaced all those that come in Relkit-2 it worked all right. Once the receiver had cooled down I tested it again (as you all do, I'm sure) before returning it to the customer. The darned picture was just a mess of coloured

lines! It was a strange effect: looked as if there was a decoder fault, but there wasn't a decoder. It was as if each line had been chopped into two or three sections then shifted left or right (not rotated). It's hard to describe a mess of coloured lines in words

The effect would clear after a minute or so, but the picture would now and again jump or show horizontal pulling or cogging, like one-dimensional pincushion distortion. These are all signs of sync problems of course. It took a lot of freezer and patience to trace the cause of the fault to C184 (100µF, 16V), which is next to the TEA2029C sync separator chip.

Fidelity SRD750

"Have a look at this?"

The speaker was about seven foot tall. In his huge fingers he held what might have been an Amstrad satellite receiver. I say might have been because the cover showed signs of distortion – melted might be a more accurate description.

"What was it - I mean what model is it?"

"Fidelity SRD750 - Chernobyl class" he replied.

"Hmm. I see what you mean. Got it in a nice warm Hi-Fi cabinet?"

"Yep."

"On top of a video?"

"Yep."

"It's pizzafied."

"Yep. Thought so. Thanks." He turned towards the door.

"Just a moment! Can I interest you in a nice, reliable, refurbished Pace PRD800?"

"Nah. I can get Sky to install a complete new system for fifty quid."

"New, eh! What model?"
"Not sure. SVS-something or other maybe?"

"Ah well, see you in thirteen months. 'Bye."

I confess that our environmentally-concerned society puzzles me. On the one hand we sort through bottles, cans and newspapers for recycling. On the other we dispose of electronic equipment every year or two in favour of newer units that are generally even less reliable than the previous ones.

I can see this going even further with digital TV. Unless it's a simple power supply fault, we will have to discard the mother board 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.

and replace it with another one. The possibility of repair will not be an option unless you are one of those well-funded workshops that can afford specialised equipment.

On second thoughts, it could actually work out all right for us. Digital satellite receivers are expected to have a production cost of some £400. They will be sold at a subsidised £200. But the replacement cost could be a lot higher. It will be interesting to see if Sky can come up with "fifty quid" replacements.

Test Case 428

For the umpteenth time that day the Sharp VCM24 VCR on the soak test bench auto-rewound the short test tape, having reached the end of the programme. For the umpteenth time Sage started the play cycle again. It was the machine's third visit to the workshop: on the two previous occasions it had been returned to Mrs Potts, its owner, after running faultlessly for several days. Sage and Mrs Potts were getting irritable with each other. In Mrs Potts' lounge the machine would often stop after running for a few minutes in record or play, but in Sage's workshop its behaviour had been impeccable.

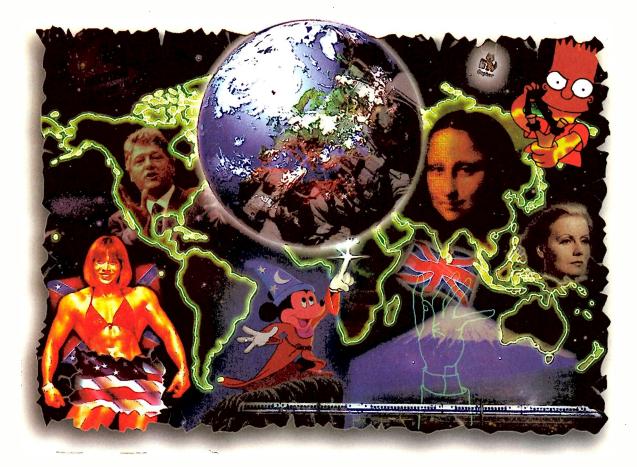
Then, to Sage's surprise, the machine clicked, whirred and shut down – a couple of minutes into the tape. Sage pressed the play key. The Sharp threaded up, played for about five seconds, then stopped again. Blimey, here it was actually doing its thing and there was no test equipment hooked up to it! It's a midmount machine, which is a more difficult type to work on than the older types, especially when there's a fault like this: the deck cannot be run while physically separated from the electronics, and there's only limited access to the underside of the one-piece PCB through the holes in the bottom of the cabinet.

Sage removed the bottom screening plate and connected an oscilloscope to the one relevant point where access was possible, the take-up reel sensor. Naturally the machine now behaved itself again. Sage watched the AC-coupled pulses bounce up and down on the spare scope's screen for three more days before the fault put in another appearance. Two things were then noted: that the reel-sensor pulses were present right up to the moment when the deck shut down, and that rewind was not affected, only the forward modes were.

The next step was to remove the deck and PCB from the cabinet, bolt them back together, fit solder stubs to relevant test points then, somehow, get the outfit to remain physically stable while at right-angles to the bench, so that it could be monitored while running. Bring back the older designs, all is forgiven! This was somehow managed without getting a shock from the now-exposed power supply section and without the whole assembly toppling over.

It took several days of further testing to establish that the supply voltages were all present when the fault occurred, and that the drum flip-flop (SW25), the FG feeds (drum and capstan) and the supply-reel rotation pulses were all present at the microcontroller chip's input pins. This chip is responsible for the servo and timer functions as well as the syscon operation. What was certain was that the microcontroller chip was issuing the shutdown command. Its oscillators ran normally at all times, and voltages at its supply and reset pins 63, 74 and 20 remained stable at 5V. A second, ancient scope was brought into action to prove that the tape-end sensors were playing no part in the mischief. They weren't: their lines, checked at pins 71 and 72 of the microcontroller chip, remained high before, during and after the mystery shutdowns.

The microcontroller chip wasn't the culprit: this was proved by further checking. In retrospect the two factors noted when the fault put in its second appearance were the most significant. It's a pity that Sage didn't know the machine and its design better! Where did the actual cause of this horribly intermittent fault lie? On the deck, or in the electronics? For the solution, turn to page



It's internet this, internet that wherever you look. So what's in it for you, what equipment do you need and how do you get started?

Peter Marlow explains it all

Using the Internet

he internet is a phenomenon: who would have predicted that a system which started as a network of US military computers in the Sixties would take the world by storm in the late Nineties? Not a day goes by without the media containing some story or other about 'cyberspace', the world wide web or the internet. So you can't fail to ask yourself whether there is anything in it for you?

The internet is now a huge, interlinked network of millions of computers in different countries across the world. Hence the word internet. The connections are akin to a spider's web, hence world wide web, though it has to be said that a spider's web is actually more organised! You can access the internet through an Internet Service

Provider (ISP) which you can dial up from your own PC over the telephone. More about ISPs later.

Web Sites

The computers linked by the internet are called web sites. They can store massive amounts of information, ranging from academic data to government papers, the BBC news, airline timetables and Tesco's stock range – almost anything in fact. Rather more than teletext! And it's mostly free except for a modest monthly charge from your ISP and the cost of local calls.

To help you through the maze of information there are powerful but easy to use search sites, to which you can direct your queries. Almost all web sites contain links to other ones. You can be consulting a UK

site then click on a link to a US site, getting a more or less instantaneous response. There are no passwords to worry about, just the occasional visitor's book to 'sign'.

You can send electronic mail (e-mail) to anyone in the world. If they don't have an e-mail address you can e-mail their local post office and pay a small fee for a letter to be delivered by 'snail mail'. You can even make voice phone calls abroad for the price of a local call. You can order software, books and CDs over the internet, even make flight and holiday bookings.

You can join a special interest newsgroup or play some on-line games. It all sounds too good to be true, doesn't it? There is a down side as well, as we shall see later, but not much of one.

Addresses

Web sites have their own unique address or 'uniform resource locator' (URL). It starts http:// to indicate to the network the kind of connection you want to make. You will then see www which means world wide web, followed by a dot and a company name. Then there's another dot and, for a UK commercial organisation, co.uk, or com for an international or US company. There are other postscripts such as org for a non profit-making organisation and net for an ISP. New ones are constantly being created to satisfy the insatiable demand - quite a trade in names is developing.

This address is usually enough to get you in the 'front door', to the home page or index. Notice that the internet uses front slashes (/) rather than the backslash (\) we are used to with MS-DOS – this is because of the internet's origin in the world of Unix computing. Internet URLs can be very long and almost impossible to remember, but there is a move to simplify names.

E-mail addresses are even simpler. It could simply be peter@tvnet.com, as long as this is unique. The @ symbol is important: it defines the computer (called the domain) where the e-mail letter box exists. But unlike letter post you don't get your mail delivered to your home — you have to go on-line and fetch it from your 'post box'. It is nevertheless so quick and easy that e-mail could replace the conventional answerphone.

You can attach documents or pictures to your e-mail, and many people think that this will eventually kill off the fax machine. Meanwhile there are 'gateways' that enable you to send e-mail to a fax machine, a pager or even a mobile telephone.

How it can help you

OK I hear you say, it all sounds very interesting – a bit like amateur radio – but how can it help my business? The first thing to remember is that the internet is very dynamic. Many companies already have an internet presence, and many more are joining daily. Web sites can change dramatically over time, usually for the good, providing increased content.

Company web sites tend, at present, to be used for marketing rather than support – after all, it's a cheap way of advertising. Examples are Hitachi (http://www.hitachi-eu.com) and Toshiba

(http://www.toshiba. co.uk), whose sites do nevertheless contain useful information on new products. The Philips site (http://www-us2.philips.com/audiovideo/) is much better: it contains much useful technical information and component data sheets (http://wwwus2.semiconductors.philips.com/). Texas Instruments also offers a semiconductor data search (http://www.ti.com): it allows you to download the data sheets in their original format, using Adobe Acrobat Reader. This software is available free of charge from http://adobe.com.

Some companies are harder to find, and don't seem to follow the standard format of company name followed by .co.uk or .com. They have to be looked for at a search site such as http://www.yahoo.co.uk, using the resident 'search engine'. These include Bang and Olufsen at http://www.xs4all.nl/~beoschip/ind ex.html, which is well worth a look, and Amstrad which is now at http://web.ukonline.co.uk/cliff.laws on/manuals. This site appears to be privately run, but contains useful links to other sites.

Ordering

Some sites have sophisticated online ordering facilities, such as Satellite Solutions at http://www.satsol.co.uk. The large suppliers are represented by RS Components at http://www.rscomponents.co.uk (the on-line catalogue is actually at http://rswww.com). This site offers secure ordering, and you have to register even to browse Incidentally the expected site address (rs.com) did not produce the right results. Farnell has a site at http://www.farnell.com/uk/index.ht ml with a rapid order facility Another site to look at is SatCure at http://www.netcentral.co.uk/satcure/, which is refreshingly simple and straightforward and enables satellite and other spare parts to be ordered. CPC has a site at http://www.cpc.co.uk, with an online catalogue and part finder to be made available soon.

Selling over the internet is a growth industry, but people are often reluctant to give their credit card number for fear of interception and unauthorised use. I believe that it's no worse, probably better, than giving your card number over the telephone. Some sites are now offering secure ordering however – as mentioned above – where the card details are encrypted.

Incidentally some e-mail systems can offer what's called Pretty Good Privacy.

Varied Information

For reference purposes UK
Electrical Direct's site at
http://www.uked.com offers an online directory of supply companies
with links to their web sites. For a
full list of Reed Business
Information magazines look at
http://www.reedbusiness.com.
Electronics Weekly has its own web
site at
http://www.electronicsweekly.
co.uk/. It offers a 'mail-back'
headline service called Hyperactive.
The SoftCopy website offers a tenyear on-line index to Television and
Electronics World, with Electronics

http://www.softcopy.co.uk.
A useful e-mail facility is listed in Satellite Workshop each month:
Jack Armstrong offers to diagnose satellite receiver faults for free at jack@netcentral.co.uk.

World at

The above has been just a snapshot of what's already out there. Go looking and you'll find lots more. There is also some dubious material, but software is available to plug into a browser to protect young web surfers.

Equipment Required

So how do you get connected to the internet? You will need an Apple Mac 68040 or a PC with a 486 processor running windows 3.1, Windows 95 or NT, also a modem. This should operate at 33kbits/sec, though 56kbits/sec units are available. In practice, because of the quality of the phone lines, you will not connect at greater than 28.8kbits/sec unless you are close to an exchange.

Once you get on the internet you will soon find that you need a second telephone line. BT and Cable & Wireless have special ISDN line offers which a small business might find worth considering. ISDN is a digital service that provides operation at 128kbits/sec and allows several machines to share the same line. A satellite link is also available, but is quite expensive to start up. It does however claim to give four times the speed of ISDN - call DirectPC on 0800 731 9302 or look at the company's web site at http://www.easat.co.uk. There are even plans to provide an internet service via the domestic electricity supply lines.

The ISP

Once you have a PC and a modem you will have to sign up with an internet service provider. There are over 200 to choose from. It's such a competitive field that most of them will give you a month free.

Buy a copy of one of the computer magazines and load one of the free discs. You will get an email address and software, plus an internet browser. Some space will be allocated for you to set up your own web site.

You could hop from ISP to ISP and get free access for many months, but your e-mail address and web URL would change with every move.

The internet browser will be either Microsoft Internet Explorer or Netscape. Browsers are like a wordprocessor without the input capability. You enter the address or URL of the site you want to go to in a box at the top of the screen. The browser allows you to record bookmarks and favourite sites.

E-mail software may be integrated with the browser, but will have an inbox and an outbox and a text editor to create new e-mail. It will also tell you if you have any new mail to collect.

World Wide Wait

Once you are on the internet you will find out why the web is sometimes referred to as the world wide wait. Congestion occurs at times, particularly during the evenings after 7pm and at the weekends. It seems to take ages to find sites, let alone download any software. Sites that use lots of graphics take a long time to download and are particularly frustrating.

Things are gradually improving, but remember that you are not paying for any of the long-distance connections, only the local end, so

don't complaint too loudly. There are ways of keeping your on-line costs at a minimum. You can for example prepare your e-mails offline, then dial up your ISP to send them and receive any that are waiting for you all in one go.

Some web sites send little programmes called "applets" to your computer. They are written in a much-hyped language called Java. Most are harmless, producing just animated graphics or allowing the user to feed in data. They disappear when you move to the next site. Some stay on your computer however, supposedly to record your preferences next time you visit the site. They are called 'cookies', and represent an insidious and intrusive aspect of the web. It could also be a viruswriter's paradise. Fortunately the latest web browsers warn you when this is about to happen.

Your Own Web Site

You can set up your own web site to advertise - a number of Television advertisers already do. You could also use it to pass on up-to-date information and offer customer support. This would, I imagine, be particularly useful for say satellite TV dealers. The web space provided by your ISP can be used, or you can register a name and have a company act as host for you. You could even set up your own server, with 24-hour internet connection, but this means serious money.

Most ISPs provide basic software to enable you to design and upload web pages. Very good commercial packages exist, such as Hot Metal Pro and Microsoft Front Page 98. Check with your ISP or host company which of these are compatible with their computer. The beauty of web advertising is that it is instant: once you have uploaded your page it's there for the world to see! You can add counters to see how many people have visited your site.

Web Watch

We plan to provide periodic 'webwatch' updates on items of interest to readers. The sites listed in this article all have links at the SoftCopy web site http:// www.softcopy.co.uk. Readers are invited to send details of any interesting web sites they come across to the author peter.marlow@softcopy.co.uk. Table 1 lists web sites relevant to this article and Televison.

Table 1: Some relevant web sites

Company Address

Adobe http://www.adobe.com

Amstrad http://web.ukonline.co.uk/cliff.lawson/manuals

Bang and Olufsen http://www.xs4all.nl/~beoschip/index.html

CPC http://www.cpc.co.uk

Electronics Weekly http://www.electronicsweekly.co.uk/

E-mail address for new sightings peter.marlow@softcopy.co.uk

Farnell http://www.farnell.com/uk/index.html

Hitachi http://www.hitachi-eu.com

Jack Armstrong (Satellite Workshop) jack@netcentral.co.uk

http://www-us2.philips.com/audiovideo/

Philips Semiconductors http://www-us2.semiconductors.philips.com/

Reed Business Information http://www.reedbusiness.com

http://www.rs-components.co.uk

http://rswww.com

http://www.satsol.co.uk

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

http://www.softcopy.co.uk

http://www.ti.com

http://www.toshiba.co.uk

http://www.uked.com

http://www.yahoo.co.uk

Philips

RS Components

RS Components catalogue

Satellite Solutions

SatCure

SoftCopy

Texas Instruments

Toshiba

UK Electrical Direct

Yahoo search engine

WIND GENERATORS 380 WATT

1.14 metre dia blades, carbon matrix blades, 3 year warranty, 12vdc output, 24v version available, control electronics included, brushless neodymium cubic curve afternation, only two moving parts, maintenance free, simple roof top installation, start up speed 7mph, max output (30mph) 380w £499 ref AIR1

HYDROPONICS

DO YOU GROW YOUR OWN?

We have a full colour hydroponics catalogue available containing nutrients, pumps, fittings, environmental control, light fittings, plants, test equipment etc

Ring for your free copy.

PORTABLE X RAY MACHINE PLANS Easy to construct plans on a simple and cheap way to build a home X-ray machine! Effective device, X-ray sealed assemblies. can be used for experimental purposes. Not a toy or for minors! £6/set. Ref FXP1.

purposes. Not a toy or for minous cores. The control of TELEKINETIC ENHANCER PLANS Mystify and amaze your friends by creating motion with no known apparent means or cause. Uses no electrical or mechanical connections, no special gimmicks yet produces positive motion and effect. Excellent for science projects, magic shows, party demonstrations or serious research & development of this strange and amazing phychic phenomenon.
£4/set Ref F/TKE1.

ELECTRONIC HYPNOSIS PLANS & DATA This data shows several ways to put subjects under your control. Included is a full volume reference text and several construction plans that when assembled can produce highly effective stimuli. This material must be used cautiously. It is for use as entertainment at parties etc only, by those experienced in its use. £15/set. Ref F/EH2.

GRAVITY GENERATOR PLANS This unique plan demonstrates a simple electrical phenomena that produces an anti-gravity effect. You can actually build a small mock spaceship out of simple materials and without any visible means- cause it to levitate. £10/set Ref F/GRA1.
WORLDS SMALLEST TESLA COIL/LIGHTENING

DISPLAY GLOBE PLANS Produces up to 750,000 volts or discharge, experiment with extraordinary HV effects, 'Plasma in a jar' St Elmo's fire, Corona, excellent science project or conversation piece. Ed/set Ref F/BTC1/LG5.

COPPER VAPOUR LASER PLANS Produces 100mw of visible green light. High coherency and spectral quality similar to Argon laser but easier and less costly to build yet far more efficient. This particular design was developed at the Atomic Energy Commission of NFGFV in Israel £10/set Ref F/CVI.1

VOICE SCRAMBLER PLANS Minature solid state system turns speech sound into indecipherable noise that cannot be understood without a second matching unit. Use on telephone to prevent third party listening and bugging. £6/set Ref F/VS9.

PULSED TV JOKER PLANS Little hand held device utilises pulse techniques that will completely disrupt TV picture and sound! works on FM too! DISCRETION ADVISED. £8/set Ref F/TJ5.

BODYHEAT TELESCOPE PLANS Highly directional long range device uses recent technology to detect the presence of living bodies, warm and hot spots, heat leaks etc. Intended for security, law enforcement, research and development, etc. Excellent security device or very interesting science project. £8/set Ref. F/BHT1.

BURNING, CUTTING CO2 LASER PLANS Projects an

BURNING, CUTTING CO2 LASER PLANS Projects an invisible beam of heat capable of burning and melting materials over a considerable distance. This laser is one of the most efficient, converting 10% input power into useful output. Not only is this device a workhorse in welding, cutting and heat processing materials but it is also a likely candidate as an effective directed energy beam weapon against missiles, aircraft, ground-to-ground, etc. Particle beams may very well wilize a laser of this type to blast a channel in the atmosphere for a high energy stream of neutrons or other particles. The device is easily applicable to burning and etching wood, cutting, plastics, textiles etc £12/set Ref F/LC7.

DYNAMO FLASHLIGHT Interesting concept, no batteries needed just squeeze the trigger for instant light apparently even works under water in an emergency although we haven't tried it yet! £6,99 ref SC152

ULTRASONIC BLASTER PLANS Laboratory source of sonic shock waves. Blow holes in metal, produce 'cold' steam, atomize liquides. Many cleaning uses for PC boards, jewliery, coins, small parts etc. £6/ket Ref FA/II.BJ.

ANTI DOG FORCE FIELD PLANS Highly effective circuit produces time variable pulses of accoustical energy that dogs cannot tolerate 55(set Ref F/DOG).

LASER BOUNCE LISTENER SYSTEM PLANS Allows you to hear sounds from a premises without gaining access. £12/set Ref F.

PHASOR BLAST WAVE PISTOL SERIES PLANS
Handheld, has large transducer and battery capacity with external
controls Folget Ref F/PSPA

INFINITY TRANSMITTER PLANS Telephone line grabber/
room monitor. The ultimate in home/office security and safetyl simple to usel Call your home or office phone, push a secret tone on your telephone to access either. A) On premises sound and voices or B) Existing conversation with break-in capability for emergency messages. £7 Ref FrELEGRAB.

BUG DETECTOR PLANS is that someone getting the goods on you? Easy to construct device locates any hidden source of radio energyl Sniffs out and finds bugs and other sources of bothersome interference. Detects low, high and UHF frequencies. £5/set Ref F/

ELECTROMAGNETIC GUN PLANS Projects a metal object a considerable distance-requires adult supervision £5 ref F/EML2. ELECTRIC MAN PLANS, SHOCK PEOPLE WITH THE TOUCH OF YOUR HAND! £5/set Ref F/EMA1.

SOLAR POWERED WIND UP RADIOS BACK IN! These FM/AM radio's have a solar panel and a hand operated charger! £17.95 ref SOLRAD

PARABOLIC DISH MICROPHONE PLANS Listen to distant sounds and voices, open windows, sound sources in 'hard to get' or

hostile premises. Uses satellite technology to gather distant sounds and focus them to our uttra sensitive electronics. Plans also show an optional wireless link system. £8/ser ter F/PMS 2 FOR 1 MULTIFUNCTIONAL HIGH FREQUENCY

2 FOR 1 MULTIFUNCTIONAL HIGH FREQUENCY AND HIGH DC VOLTAGE, SOLID STATE TESLA COIL AND VARIABLE 100,000 VDC OUTPUT GENERATOR PLANS Operates on 9-12vdc, many possible experiments. £10 Ref



COLOUR CCTV VIDEO CAMERAS.

BRAND NEW AND, CASED, 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 ea 100+ £99 CIRCUIT PACKS Packs of 35 circuit diagrams covering lasers,

CIRCUIT PACKS Packs of 35 circuit diagrams covering lasers, SW radios, geigers, bugs, char etc. Pack1, Pack2, Pack3 £4.99 each. SMOKE ALARMS Mains powered, made by the famous Gent company, easy fit next to light fittings, power point. £4.99 ref SMIXX CONVERT YOUR TV INTO A VGA MONITOR FOR £25! Converts a colour TV into a basic VGA screen. Complete with built in psu, lead and sware. Ideal for laptops or a cheap upgrade. Supplied in kit form for home assembly, SALE PRICE £25 REF SA34
*15 WATT FM TRANSMITTER Aiready assembled but some

*15 WATT FM TRANSMITTER Already assembled but some RF knowledge will be useful for setting up. Preamp reg'd, 4 stage 80-108mbz, 12-18vdc, can use ground plane, yagi or dipole £59 ref 1021 *4 WATT FM TRANSMITTER KIT Small but powerful FM transmitter kit 3 RF stages, mic & audio preamp included £24 ref

YUASHA SEALED LEAD ACID BATTERIES 12v 15AH at £18 ref LOT8 and below spec 6v 10AH at £5 a pair

ELECTRIC CAR WINDOW DE-ICERS Complete with cable plug etc SALE PRICE JUST £4.99 REF SA28

AUTO SUNCHARGER 155x300mm solar panel with diode and 3 metre lead fitted with a cigar plug. 12v 2watt. £12.99 REF AUG10P3 SOLAR POWER LAB SPECIAL You get 2 6*x6" 6v 130m² cells, 4 LED's, wire, buzzer, switch + 1 relay or motor. £7.99 REF 427

SOLAR NICAD CHARGERS 4 x AA size £9,99 ref 6P476, 2 x C size £9,99 ref 6P477

GIANT HOT AIR BALLOON KIT Build a 4.5m circumfrence, fully functioning balloon, can be launched with home made burner etc. Reusable (until you loose it!) £12.50 ref HA1

AIR RIFLES .22 As used by the Chinese army for training puposes, so there is a lot about! £39.95 Ref EF78. 500 pellets £4.50 ref EF80.

REGISTER FOR OUR ELECTRONIC NEWSLETTERS BULL-ELECTRICAL.COM

BULL ELECTRICAL

250 PORTLAND ROAD, HOVE, SUSSEX . BN3 5QT. (ESTABLISHED 50 YEARS). MAIL ORDER TERMS: CASH, PO OR CHEQUE WITH ORDER PLUS £3.50 P&P PLUS VAT.

24 HOUR SERVICE £5.00 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

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

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

STIRLING ENGINE PLANS Interesting information pack covering all aspects of Stirling engines, pictures of home made engines made from an aerosol can running on a candlel £12 ref STIR2 12V OPERATED SMOKE BOMBS Type 3 is a 12v trigger and 3 smoke cannisters, each cannister will fill a room in a very short space of timel £14.99 ref SB3. Type 2 is 20 smaller cannisters (suitable for simulated equipment fires etc) and 1 trigger module for £29 ref SB2 Type 1 is a 12v trigger and 20 large cannisters £49 ref SB1

HI POWER ZENON VARIABLE STROBES Useful 12v PC8 fitted with hi power strobe tube and control electronics and speed control potentiometer. Perfect for interesting projects etc 70x55mm 12vdc operation, £6 ea ref FLS1, pack of 10 £49 ref FLS2

RUSSIAN BORDER GUARD BINOCULARS £1799
Probably the best binoculars in the world! ring for colour brochure.
NEW LASER POINTERS 4.5mw, 75 metre range, hand held unit
runs on two AA batteries (supplied) 670nm. £29 ref DEC49

HOW TO PRODUCE 35 BOTTLES OF WHISKY FROM A SACK OF POTATOES Comprehensive 270 page book covers all aspects of spirit production from everyday materials. Includes construction details of simple stills etc. £12 ref MS3

NEW HIGH POWER MINI BUG With a range of up to 800 metres and a 3 days use from a PP3 this is our top selling bug! less than 1" square and a 10m voice pickup range. £28 Ref LOT102.

BUILD YOU 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

NEW LOW COST VEHICLE TRACKING TRANSMITTER KIT £29 range 1.5-5 miles, 5,000 hours on AA batteries, transmits info on car direction, left and right turns, start and stop information. Works with any good FM radio. £29 ref LOT101a

CCTV CAMERA MODULES 46X70X29mm, 30 grams, 12v 100mA auto electronic shutter, 3.6mm F2 lens, CCIR, 512x492 pixels, video output is 1v p-p (75 ohm). Works directly into a scart or video input on a tv or video. IR sensitive. £79.95 ref EF137.

IR LAMP KIT Suitable for the above camera, enables the camera to be used in total darkness! £6 ref EF138

UK SCANNING DIRECTORY As supplied to Police, MOD,M15 and GCHQI coverers everything from secret government frequencies, eve in the sky. orisons, military aviation etc £18.50 ref SCANB

INFRA RED POWERBEAM Handheld battery powered lamp, 4 inch reflector, gives out powerful pure infrared light! perfect for CCTV use, nightsights etc. £29 ref PB1.

SUPER WIDEBAND RADAR DETECTOR Detects both radar and laser, X K and KA bands, speed cameras, and all known speed detection systems. 360 degree coverage, front

&earwaveguides, 1.1"x2.7"x4.6" fits on sun visor or dash £149 ref

CHIEFTAN TANK DOUBLE LASERS 9 WATT+3 WATT+LASER OPTICS

Could be adapted for laser listener, long range communications etc. Double beam units designed to fit in the gun barrel of a tank, each unit has two semi conductor lasers and motor drive units for alignement. 7 mile range, no circuit diagrams due to MOD, new price £50,0007 us? £199. Each unit has two gallium Arsenide injection lasers, 1 x 9 watt, 1 x 3 watt, 900nm wavelength, 28vdc, 600hz pulse frequency. The units also contain an electronic receiver to detect reflected signals from targets. £199 for one. Ref LOT4.

NEW LOW PRICED COMPUTER/WORKSHOP/HI-FI

NEW LOW PRICED COMPUTER/WORKSHOP/HI-FI RCB UNITS. Complete protection from faulty equipment for everybody! Inline unit fits in standard IEC lead (extends it by 750mm), fitted in less than 10 seconds, reset/test button, 10A rating. £6.99 each ref LOTS. Or a pack of 10 at £49,90 ref LOT6. If you want a box of 100 you can have one for £250!

DIGITAL PROPORTIONAL B GRADE RADIO CONTROLLED CARS From World famous manufacturer these are returns so they will need attention (usually physical damage) cheap way of buying TX and RX plus servos etc for new projects etc. £20 each sold as seen ref LOT2DP.

MAGNETIC CREDIT CARD READERS AND ENCODING
MANUAL £9.95 Cased with flyleads, designed to read standard
credit cards! complete with control eletronics PCB and manual
covering everything you could want to know about whats hidden in that
magnetic strip on your card! just £9.95 ref BAR31

WANT TO MAKE SOME MONEY? STUCK FOR AN IDEA? We have collated 140 business manuals that give you information on setting up different businesses, you peruse these at your leisure using the text editor on your PC. Also included is the certificate enabling you to reproduce (and self) the manuals as much as you like [214 er EP74].

HIGH POWER DC MOTORS, PERMANENT
MAGNET

12 - 24v operation, probably about 1/4 horse power, body measures 100m x 75mm with a 60mm x 5mm output shaft with a machined flat on it. Fixing is simple using the two threaded bolts protruding from the front



£22ea REF mot4

What a Life!

"'Ello Mr Bullneck' said a gravelly voice. I turned round and saw an odd cove who looked like Les Dawson in drag. He placed a Matsui 20T1 on the counter.

"Things ain't quite what they seem, dear" he rasped.

"Aren't they then" I said, giving him a sidelong look.

"This thing here keeps ticking" he went on.

"Not a bomb, surely!" I exclaimed.

"Nah, nah. 'E's a telly all right dear. But 'e's a Grundig in hysguise." "Right" I said, reaching for a job

card. "Name please."

"Lotus" he growled. I wrote down Dawson.

When he'd departed I took the set to the bench, removed the back and found a Grundig G1000 chassis inside. When power was applied there was no standby light, in fact there were no signs of life apart from a faint ticking. I switched off and scanned the chassis, looking for dryjoints, but couldn't see any. So I disconnected the line output transistor's collector connection and connected a 100W bulb between this point and chassis. When I switched on again the bulb lit. So the power supply was OK and the line output stage suspect. Time to switch off and carry out cold checks on the semiconductor devices in the stage.

As the line output transistor tested OK I began to check the diodes, starting with the larger ones – they can usually be reckoned to live more dangerous lives. When I got to the BY133 efficiency diode D304 there was a dead short. We didn't have one in stock, so I tried a BY127. When I switched on again the set sprang to life.

Brother Terry

Then Brother Terry came in with an old toaster. "Can you fix this for poor old Doris Prattle?" he asked.

"Sorry, no can do" I replied.

"Oh. Well, I've brought along my neighbour's Sony television too. It's gone mental" he said.

The set was a KVC2122U, which is fitted with the AE1C chassis. Steven put it on the bench and we soon discovered that Terry was right. After working normally for a moment the sound blasted loudly then cut out. The picture flickered, the field cramped and then the picture disappeared, leaving a brilliant raster. Next it reappeared, expanded away and the field scanning collapsed. Finally the set grunted and died.

When we opened up the set we saw that there were dry-joints in all sections of the chassis. Steven undertook the resoldering. He had to attend to poor joints on the vertically-mounted sub-panels as well as the main PCB. This restored operation, but there was signal instability. So Steven removed the tuner and IF cans and

did some resoldering in these as well. When he'd finally finished the set produced excellent results.

Incidentally whenever you get one of these sets it's advisable to check R522, which is in the HT preset (RV501) network. It's a tiny $100k\Omega$, 0.25W resistor that tends to go high in value. When this happens the HT rises. The power supply is quite complex, using a master-slave IC control system. The master regulation part is contained in the TEA2028B chip IC501, along with the line and field generator circuits.

Davey Ruggles

An ancient lony full of junk rolled up. Davey Ruggles jumped out, oozing contentment. He's a grafting Romany who always seems to be on the losing end of things.

"My luck's in this time Don, I think." He had with him an immaculate colour set the like of which I'd never seen before. It claimed to be a Beko Model 19221 and was dead.

"Given to me by number 36" he said. "Nice people. Said there wasn't much wrong but wouldn't take a penny for it. The kids would like a telly again. Our set blew up just before Christmas." He left the Beko with us and went over to the Co-op.

When we opened the set up we found that the mains fuse, FU101, had blown. So did a replacement. When we investigated further we saw some very bad dry-joints in the power supply section. Resoldering them cured the trouble. The results were good too.

"Poor fellow" I said. "Let's put the set back in his cab and say it was nothing." Steven took it out, along with a few tapes from his video library which he closed down a while back.

Mr Ng's Bush

Our next caller was Mr Ng. He's one who never looses.

"I'm owning a television set which is very, very bad to me" he said soft-



"Things ain't quite what they seem, dear" he rasped.

ly. He smiled, showing us two dozen front teeth.

"Goodness gracious me, what is being the trouble?" I asked.

He got a passer-by to bring in the set, which was a Bush 2714 (11AK03 chassis). It was stuck in standby.

Paul had a go at this one. He first checked the print side of the chassis to see if any of the fusible resistor leads – they are long and untrimmed – were shorting to the rectifier diodes. They weren't. So he checked the BU506D line output transistor which was very leaky. "That'll be it" he said after fitting a replacement. But the set was still stuck in standby. His smile faded. Then he moved over to the line driver stage, where the $3.9 \mathrm{k}\Omega$, 4W feed resistor R603 was open-circuit.

Steven suggested checking the BC639 driver transistor TR601 as well. "It was the cause of the trouble last time I had one of these sets in – the transistor was dead short."

Paul found that the same thing had happened with this set. Once replacements had been fitted the set worked well enough.

"Oh dear oh dear" said Mr Ng when he called for his set. "It is being my unlucky day. My car was having a puncture and the man was wanting two pounds to mend it. And a very, very nasty traffic warden is reporting me for parking it. Everybody is wanting my money, and I'm not liking it." He showed us his teeth again.

"Well, the set won't cost you much" smiled Steven. "Fifteen pounds."

Mr Ng gasped and his teeth disappeared. "Can't you be taking ten?" he asked.

"Fifteen" smiled Steven.
"Twelve?" asked Mr Ng.

"Fifteen" said Steven, still smiling. "Shall we be saying fourteen?"

Steven smiled even more sweetly. "Fifteen" he breathed.

Mr Ng took out a huge, embossed wallet and peeled three fivers from a fat wad of notes.

"I am paying you very, very much, and this is not good. I should be paying you only five pounds" Mr Ng concluded.

Mrs Runner

Mrs Runner came in with her son Clarence, who is of slight build. "Hello, Mr Billhook" she trilled, "Clarence's camera won't work, will it Clarence?"

Clarence began to open his mouth. "The cassette housing won't shut, will it Clarence?" she piped. Clarence raised his face ready to speak, but she cut in again. "It switches on all right, and he sees a picture in the viewfind-

er, don't you Clarence?" The boy managed a silent gasp of air.

"I don't know why he won't speak up, Mr Billhook, "just like his father, I'm sure."

When they'd gone Steven opened the camcorder, a Sharp VLC790H. There was no mechanical operation. It's one of the best for ease of servicing. The deck and lens assembly are simple to remove. You then see a pair of double-sided PCBs sandwiched together and secured to the bottom of the deck.

The cause of the trouble was quite obvious once the boards had been separated. C951 (220µF, 6·3V) had leaked badly over the PCB, corroding a section of the print. Steven cleaned off the corrosion, fitted a new capacitor and bridged the print. Then he noticed that another electrolytic, C3302 (10µF, 16V), was also leaking. Fortunately no damage had occurred this time. So he did some more cleaning up and fitted a replacement. On test the camcorder now worked well.

They came to collect it shortly after. "We're ever so grateful to you for doing it so quickly Mr Billhook, aren't we Clarence?" she sang. Clarence raised his chin. "Tell Mr. Billhook how pleased you are, Clarence." This time Clarence managed a tiny squeak before she cut in again.

"I dunno. He's very a very disappointing boy, Mr Billhook. Just won't say a word. Can't understand him. Come on, Clarence."

Another Sony

Mrs Ruff came in with her lodger, Old Pukey. "It's me telly, Mr Bugbear" she rasped. "Seems to be doing whatever 'e likes. Go an' bring 'im in, you" she said, jerking her thumb at Old Pukey.

He staggered in with a Sony KVD2512U. When they'd gone we pulled it on to the bench and tried it. The problems were intermittent: sometimes the picture disappeared; sometimes the on-screen graphics went as well; at other times all we would see were a lot of peculiar on-screen display symbols.

When we opened it up we found that the troubles could be instigated by tapping the tuner/IF PCB (board A). It often suffers from dry-joints, but this time we couldn't see any. So we concentrated on the tuner, and found that even the gentlest of taps had a dramatic effect. Steven opened it and carefully resoldered every joint. That cleared the problems.

Though expensive, the models that use the AE1 series chassis seem to give poor results. Grainy pictures,

poor convergence and poor picture geometry are often seen with the ones we come across, and readjustment doesn't help much.

Mitsubishi Problem

Mr McTurdey had a problem with his Mitsubishi Model CT2525. "Tis habsolutely dead, Sorr. Hardly works at all."

I looked at him, then at the set. After taking details I waved him out.

When I looked inside I found that the 2SD1887 chopper transistor Q901 was short-circuit. D909, a 3V zener diode (type RD3·0FB2) that's in series with it, was open-circuit. R910, which is in parallel with D909, and the $4\cdot7\Omega$ surge limiter resistor R902 were also open-circuit.

I noticed a crop of dry-joints in the power supply, and surmised that they could well have been the basic cause of the blow-up – Mr McTurdey mentioned that there had been intermittent operation for some months before the final failure.

Back in Spain

It was when we returned to Spain that Greeneyes became a car thief. We had a call from Maisie who lives over her restaurant-bar in a nearby town. Her huge Hitachi set, Model C2846N, was operating intermittently.

Like so many in Spain we use an old Panda car as a runabout. I scooped a few tools into it and Greeneyes drove us to Maisie's place.

After a few minutes her set cut out and went to standby. Then it came on again, popped, flashed the Nicam signal and died again. I soon found that the 12V regulator chip was dry-jointed. Resoldering it cured the trouble.

On the way back we parked at a shopping parade to make a couple of purchases. Then we jumped back into the car and started it up. A drunken Englishman tottered from a bar and started shouting and waving his arms. "Let's get going" Greeneyes said, "he's paralytic."

Then Greeneyes noticed that the steering wheel was without its glove thing, and I noticed that the car was even untidier than usual. Suddenly we both realised that it wasn't our car at all. It was the drunk's. It was the same, sun-faded colour as ours, and as old and worn. But it was his, not ours!

Greeneyes drove back and we clambered out. I forced a laugh. "Ha ha ha, thought it was ours, mix up, sorry, that's ours there."

"They're shtealing my car" the drunk continued to shout.

Awkward. Everyone else, apart from the drunk, thought it a great joke.



Reports from
Philip Blundell, AMIIEelec
Ian Field
Stephen Leatherbarrow
Mike Leach
C.J. Guy
A.J. Roberts
Pete Gurney, LCGI and
Michael Maurice

Ferguson ICC9 Chassis

One of these sets (Model D59F) was stuck in standby. Use of the remote control unit had no effect, neither did temporarily disconnecting the bubble keypad. The power supply voltages were all correct.

Attention was therefore turned to the microcontroller chip IR01. It's supply voltage was correct and its oscillator was running. But the reset pin was permanently at 2V instead of the 4-9V quoted in the manual. Transistor TR90 was conducting when it should have been off, while the latching pair TR85/87 should have been switched on but wasn't. Cold checks showed that TR85 was faulty – it had a 50Ω base-emitter leak. To be on the safe side I fitted a new BC848B (TR85) and BC858B (TR87). **P.B.**

Philips 52ZY3535/25G (Anubis B AA Chassis)

This set was in the shop demo mode. For those of you who have not seen this, the word "demo" is displayed and the set displays all the menus and features in sequence. I couldn't find his feature in the service manual, but a few minutes spent playing with the front controls revealed the way to remove it. Switch on the mains supply with the volume – and the programme + buttons held down. Repeat this procedure to bring the mode on again. **P.B.**

Hitachi C28-P745VT

After a couple of hours this set,

TV Fault Finding

which is fitted with a Salora chassis, developed a field fault. The lower half of the field scan remained OK, but the upper half was squashed up into a one-inch band just above the centre of the screen. Scope checks showed that the drive to the TDA8172 field output chip was OK, but the output was very odd. The waveform at pin 6 (flyback boost supply) was also wrong. The flyback boost diode D571 had developed high forward resistance. **P.B.**

Ferguson ICC9 Chassis

After ten minutes or so the vision and sound went off, leaving a blank raster. The menus still appeared if, for example, the volume was adjusted. There was a video output at pin 6 of the IF module. It went as far as transistor TX16, where it was lost. TX16's emitter voltage was low but the path to the positive rail (it's a pnp transistor) is rather involved. It includes the 4052 switching chip IX01, where pins 3 and 4 should be at 2.4V DC but were low in the fault condition.

Several components could have been the cause of this low voltage. Replacing TX09 (BC858B) restored the voltage and brought back the picture. **P.B.**

Goodmans 1450T (Onwa Chassis)

The cause of no results was a small, 4.7nF, 500V disc ceramic capacitor that's connected in parallel with the mains bridge rectifier's reservoir capacitor. It had been arcing and had begun to disintegrate. The 4.7Ω , 5W surge limiter resistor provided circuit protection, not the mains fuse. There are two more of these tiny disc ceramics, on the AC side of the bridge rectifier.

These capacitors are a fraction of the size of Y-rated equivalents, and have no markings other than

value and voltage. It would be best, from the safety point of view, to replace all three with a more suitable type whenever one of these sets comes in for service.

Don't forget to check the two small electrolytics in the chopper circuit. There are numerous versions of this basic design, with different value capacitors in these positions. There have been references to this problem before in these pages. Suffice it to say that the replacements should have the same capacitance value as the ones removed. The helpline engineers suggest the use of capacitors rated at 105°C and also an upgraded the voltage rating. **I.F.**

Philips G90AE Chassis

The symptoms were no sound and F7 in the display. The picture was normal, and the fault corrected itself after about fifteen minutes. I've seen this many times before and have previously been able to cure it by replacing the TMP47C434N-3555 microcontroller chip IC7720 and/or the EEP-ROM. Not this time however.

Localised heating and freezing would instigate or clear the fault, but a particular cause couldn't be established. A check on the 5V supply produced a reading of 4.85V. I traced the supply back to a point near its source, where the reading was 5.05V. Linking these two points provided a 'cure'.

The actual source is the 5V regulator in the chopper circuit. There's a 22µF smoothing capacitor here, C2661. A replacement boosted the supply to the micro, providing a final cure. S.L.

Panasonic Euro 1 Chassis

Compression of the top two inches of the field scan was the symptom displayed by this set. Failure of the TDA8175 field output chip IC561

was the cause and is not uncommon. Panasonic has produced a kit to deal with the problem, part no. TZS5EK001. It consists of the chip and an MA2100 diode (D568). Remove link B51 and fit the diode in this position, with its cathode to the left as you look into the back of the set. S.L.

BPL KLR9402-01

This set produced only a standby light. I didn't have a service manual, so it was going to be a print-following foray. There were outputs at all the rectifiers in the chopper circuit, but there was no supply at the line driver stage. This supply appears to be switched via Q551A and Q552. I found that the set worked when this latter transistor was switched on by artificial means. Its base feed comes from the microcontroller chip via R793 (4-7k Ω), which was open-circuit.

Ferguson TX98 Chassis

There was no control of the analogue functions (volume, contrast, colour, brightness) either via the remote control handset or the front panel controls. The cause was the MC14411P DA converter chip IC9. S.L.

Ferguson ICC5 Chassis

This chassis has an unusual thyristor field output circuit. The symptom with one of these sets was compression of the first four inches or so of the field scan. In addition the verticals in this area were horizontally displaced in sympathy with the video signal.

In the past we've come across unusual effects that were caused by CL22 and RL22, but they were blameless on this occasion. Use of freezer almost anywhere in the field/line output stage would temporarily clear the symptoms. The cause turned out to be CL52 (1,000µF), which is the reservoir capacitor for the 23V supply. S.L.

Amstrad CTV2200

Field collapse was the not unusual fault with this set. Probably a simple case of fitting a TDA3654 field output chip and a modification kit and all would be well. As many engineers know however, this is not a perfect solution: you tend to find that the height, bias and added potentiometer require delicate adjustment.

But I digress. The cause of this particular horizontal white line was failure of R838 (10Ω safety). It

feeds pin 12 of the LA7800 timebase generator chip, which produces the field drive signal at pin 6. This can be a misleading fault. If there's no feedback from the field output stage the chip won't produce a field drive output, leading to a chicken-and-egg situation. S.L.

Hitachi C28300

The symptoms produced by this widescreen set were very confusing. If the set was switched on from cold it would run indefinitely with no problems. If it was switched on when warm it was still OK. But if it was switched on from cold, allowed to warm up for twenty minutes, put into standby via the remote control unit for twenty minutes, then powered up again using the remote control unit the set would come on with no luminance. I tried the whole process on two successive days and each time the same thing happened.

Scope checks carried out along the rather complex luminance signal path narrowed down the source of the trouble to the 16:9 compression circuit, which is a sub-panel on the main chassis. The culprit turned out to be the SAA4981 chip IC1300. After fitting the replacement I tested the set for several days and all was well. M.L.

Hitachi C1410R

This set suffered from slight tuning drift. After a while the station would drift a bit, as if the set needed fine tuning for an optimum picture. It was sensitive to heat around the ZTK33 tuning voltage stabiliser, and also capacitors CF16/17/18, but replacing these items made little difference to the symptom. After some head-scratching and a few more squirts from the freezer can the cause of the trouble was pinpointed: the BC858C transistor VL08 in the AFC circuitry. It's a surface-mounted device. M.L.

Samsung CI5070AN

Talk about missing the obvious! That's just what I did however—even telly men are human! This set produced only a high-pitched whistle (pulsing) that came from the line output stage. But almost everything seemed to be OK. The 17V and 5V supplies were correct, and the HT measured 123.5V (it should be 125V). So I assumed that the power supply was OK and spent a lot of time replacing items in the line output stage, all to no avail.

Eventually I started all over again, at the power supply, and dis-

covered that there was only 241V across the mains bridge rectifier's reservoir capacitor instead of the 330V or so one would expect. Yes, the capacitor was duff. It's back to batteries and bulbs for me for a while! M.L.

Hitachi C2118T

After carrying out a power supply repair I found that the HT was very low at only 26V. With the line output stage disconnected the HT rose to 148V. When a 60W bulb was connected across the power supply's HT output as a dummy load the voltage again fell to 26V. To cut a long story short, the culprit turned out to be D905 (MPG06J) which, when checked with a meter, proved to be leaky. It provides, with C906, the feedback voltage for the error detector stage. When a replacement had been fitted I had the full 110V on load. M.L.

Boots 1417R

Flyback and teletext lines were visible at the top of the picture. The culprit was R307 (10Ω , 2W) which had risen in value to about 50Ω . I have also had this fault with some **Matsui** models that use a similar chassis. **C.J.G.**

Philips CP90 Chassis

"Picture takes a long time to appear" the report said. Easy I thought, it's the HT electrolytics. But no, not this time. In fact a blank raster was visible when the setting of the first anode preset was advanced, and after about five minutes the picture would suddenly appear.

A lot of searching eventually led us to the culprit, which was C2265 $(0.1\mu F)$. It decouples pin 24 of the TDA3561A colour decoder chip IC7260. When checked it produced a reading of about $5k\Omega$. Pin 24 of the chip is connected to the burst detector circuit. **C.J.G.**

Thomson TX80 Chassis

This set came to us from another dealer who said it destroyed the S2000 line output transistor about once a month. A replacement brought the set back to life, but after a few minutes it became quite hot. The problem was cured by replacing its $100\mu F$, 35V base drive coupling capacitor CP08. C.J.G.

Pye 25KX1201

This 10in. portable produced a terrible picture with green streaks all over it. I found that the green gun's cut-off preset on the CRT base

panel was open-circuit. An excellent picture was present once a replacement had been fitted and set up. It's worth resoldering all the earthing links on the component side of the PCB, as these can cause some very odd intermittent faults, C.J.G.

Panasonic Alpha 2W Chassis

The red content of the picture was smeary and the setting of the red cut-off and drive controls was critical. The cause was very unusual: the peaking coil in the red output transistor's load circuit had become a resistor with a value of around $50k\Omega!$ It's on the tube base panel. **C.J.G.**

Amstrad CTV1410

The volume was at maximum, the graphics remained on-screen permanently and the set wouldn't tune; though it would select channels that had already been tuned in. All this was caused, not unexpectedly, by the MN1220 EEPROM. When we checked we found that the Amstrad version costs about £30 while the Alba version, which has exactly the same program in it, costs around £14. Guess which one we ordered! C.J.G.

Ferguson ICC5 Chassis

This set tripped three times then died. It wasn't for any of the usual reasons however. We tried many things, including the line output transformer. TL17 (BC548B) in the trip circuit turned out to be leaky emitter-to-base. C.J.G.

Panasonic TX2482

This saga started off with line foldover. I went to the customer's house where, as usual, the set was in a dark corner with difficult access. I nevertheless managed to resolder a few dry-joints, after which the set seemed to be OK.

A few days later I received a call to say that the set had produced the same symptom and was now making a squealing noise. The obvious thing to do was to take it back to the workshop, where I found that there were dry-joints around the line driver transformer.

I removed it, cleaned its pins then refitted it, expecting the set to work. But the 2SD1441 line output transistor had suffered. When I fitted a replacement the EHT rustled up then immediately died with a squeal. The new transistor had failed. After carrying out more checks I decided that the line output transformer was suspect. A new line output transistor

and transformer at last restored normal operation. A.J.R.

Minoka MK1498N

I'd never seen one of these sets before. It's a 14in. portable with Nicam, Fastext, a full scart facility and phono connections as well. The set was dead apart from a buzz at switch-on. Some checks revealed that there was no line drive, but without a circuit diagram I had to do things the hard way.

It soon became apparent that all the important things are performed on a daughter board which is edgemounted on the main panel and has three large ITT chips on it. Akura provide an excellent technical backup on Minoka models, so I made a call to the company. A very helpful man (thanks Donald!) suggested a few key points to check. The 5V supply was correct but the voltage at pin R (reset) on the daughter board was low at about 2.8V instead of 5V. When pin R was disconnected the voltage returned to 5V, so the fault was on the daughter board. I found that pin R is connected to all the chips on the board. When pin 23 of IC701 (video processing) was unsoldered the set started up (without video), proving where the fault lay.

Akura provides a board exchange service at a reasonable cost. When I obtained and fitted a replacement board there was an excellent picture. **A.J.R.**

Philips 22CE2267 (2A Chassis)

There had been a power supply blow up. After repairing this I found that the back-up battery had also failed. Once this had been replaced and everything had been set up all seemed to be well. When I gave the customer a call he asked whether I'd found the cause of the brightness fault. So I put the set on soak test and after some hours the brightness went down.

It couldn't be restored using the remote control unit, but use of the front button brought it back. When I removed my finger from the button however the brightness went back down again. It's not uncommon for the front keyboard to cause this trouble: you can prove it by disconnecting the flexi-cable. The set then worked perfectly, with remote control. A new keyboard completed the repair. **A.J.R.**

Osaki CTV20T (Fidelity ZX3000 Chassis)

This set had a blank raster with flyback lines. Sound was normal. A scope check at pin 7 of the TDA3562 colour decoder chip showed that the sandcastle pulses were missing. The cause turned out to be R406 (100k Ω) which was open-circuit. It supplies feedback pulses from the line output stage. A.J.R.

Philips G90AE Chassis

There was a cogging effect down the sides of the picture. This made viewing a strain, and subtitles almost impossible to make out. The $47\mu F$, 160V HT reservoir capacitor C2630 was the cause – it was opencircuit. I find it advisable to replace the $47\mu F$, 160V smoothing capacitor C2631 as well. It runs quite hot, being mounted against a heatsink. **A.J.R.**

Grundig ST70-400

The complaint was intermittent failure to start up and no remote control operation. Initially it seemed that there might be a microcontroller problem. But the cause turned out to be much more simple. I noticed that when the fault occurred the standby light went out. Checking around in this area I found two 7W resistors, R617 (10.7k Ω) and R616 (6.8k Ω), which were both dry-jointed. They feed the remote control IR block and the standby circuit respectively. Resoldering cured the faults. **P.G.**

Thorn CT5122 (Samsung Chassis)

The customer's complaint was "no volume". In fact the sound could be turned up, but only for about a quarter of the range. I suspected a software lock, which turned out to be the case.

The chassis used in this set is a variation of a Samsung one. The same procedure is good for both. To remove the lock you need the original remote control unit — many pattern one's don't have the required buttons. Select either volume up or down at the receiver and, while the on-screen bar graph is being displayed, press the remote control unit's -/- - key. I assume that either the customer had inadvertently locked the set or the settings had become corrupted. **P.G.**

Tatung D Chassis

One of these sets produced sound and a bright green raster. A check at the green cathode showed that the voltage was low, as expected.

TR931 (BC547) in the green output stage was then found to be open-circuit at every pin. But the fault was still present when a replacement had

been fitted, and the new transistor was getting hot. A check on its $100k\Omega$ bias resistor R932 produced a reading of almost $850k\Omega$. A new resistor (0.6W, 2%) cured the fault, and for good measure the bias resistors (R912 and R922) in the red and blue output stages were also replaced — checks showed that they were going high in value. **P.G.**

Sanyo CBP2145

The line output transistor had gone short-circuit because the output transformer was faulty. Once replacements had been fitted the set performed reasonably well despite its age. When the set was switched on from cold however the power supply refused to start up. There was HT at the chopper transistor but little else. The usual causes of this are C307 (4.7µF) and the start-up resistors R308/9 (180k Ω). They were all OK, though the start-up voltage was less than one would expect. Voltage checks anywhere in the control circuit would get the set going until the following day.

The cause of the fault was eventually traced, by substitution, to an unmeasurable leak within the power

supply optocoupler D331. It's used for standby control, and the leak was just enough to prevent start-up. **P.G.**

Orion 14VT

Intermittent sound, flashing on the picture and crackle were the complaints with this portable. It took several hours on soak test for the fault to appear. The symptoms were all related, the cause being poor soldering at the audio output transformer T351. As the audio output stage is fed from the HT line, there was interference because of arcing.

On inspection, the pins of the transformer were found to have traces of lacquer on them. A good clean and resolder cured the problem. **P.G.**

Philips GR2.1 Chassis

This set produced a raster of sorts and the green LED was flashing. The manual says that a flashing green LED indicates a microcontroller fault. This was a red herring however. The HT was low when connected to the line output stage, but correct when a bulb was connected as a substitute load. So you might have expected a line output

stage fault, and the transformer looked to be the most likely suspect. But a replacement made no difference. I then did what I should have done in the first place and checked the protection circuit in the power supply. As it was in operation, I decided to try disabling it. The result was smoke from the audio output chip. When this item had been replaced the set worked normally. M.M.

Hitachi C2848TN

This Dolby Surround set produced a picture but no sound. Checks showed that the separate audio power supply was tripping. The tripping continued when both audio output chips had been removed. Further checks brought me to D9112 which was short-circuit. M.M.

Sony AE1A-C Chassis

The field scan coupling capacitor C531 (680µF, 25V) is the cause of many field faults with these sets. Non-linearity is usually the first symptom. Sony now supplies a 680µF replacement rated at 50V, 105°, part no. 1-111-123-11. M.M.

THE NEW UNI-REMOTES FROM PHILEX

The NEW uni-range of Universal Pre-Programmed Remote Control covering the leading brands of television:

* BRANDS CURRENTLY AVAILABLE FROM STOCK *

PANASONIC - SONY - PHILIPS - HITACHI - MITSUBISHI - NOKIA - SAMSUNG

- BRAND FOR BRAND REPLACEMENTS. EACH UNI REMOTE COVERS THE MAJOR FUNCTIONS FOR TVs FROM ONE MAJOR MANUFACTURER AS WELL AS MANY OTHERS
- CODELESS SET-UP: READY TO USE IN SECONDS JUST FOLLOW SIMPLE INSTRUCTIONS AND THE UNI-REMOTES
 ARE FULLY OPERATIONAL
- TELETEXT AND FASTEXT: UNI-REMOTES SUPPORT FASTEXT AND A WIDE RANGE OF THE OTHER TELETEXT FUNCTIONS AS LONG AS THE ORIGINAL TV SUPPORTS THESE FUNCTIONS
- PRE-PROGRAMMED FOR THE LATEST MODELS: AS WELL AS OPERATING CURRENT AND EARLIER MODELS THE UNI-REMOTES ALSO CONTAIN PRELIMINARY INFORMATION FOR OPERATING NEW TV MODELS
- REPLACES BROKEN OR LOST REMOTES
- CUSTOMER CARELINE AVAILABLE FOR ALL UK CUSTOMERS
- ATTRACTIVE CLAM PACKAGING IDEAL FOR RETAIL DISPLAY

FOR PRICE: PLEASE RING

- BARGAIN - THIS MONTH

PHILIPS
2.4 VOLTS
BATTERY B/U
10 PCS FOR
£10.00 ONLY
+ P/P + VAT
OR
5 PCS FOR
£5.50

JVC/
FERGUSON
VIDEO-HEAD
JJC: ORDER CODEVH 8107
£10.00

(See our catalogue for cross reference or please ring) SONY CD PICK UP KSS 210A KSS 150A (NON-ORIGINAL) ORDER CODE: CDL 1200

ONLY **£15.00** each + P&P + VAT



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

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

J.J. COMPONENTS

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

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: Original stand for a Thomson 81DXC69DLU 32in. widescreen TV, new or secondhand. Phone 01634 832 526 daytime or 01322 559 157 evenings (Dartford, Kent) and ask for Andy.

Wanted: Video drum for the Philips VR2324/Pye 23VR33 or a complete V2000 type VCR with good head. Brian Nockolds, Moorlands South, Belstone, Okehampton, Devon EX20 1QZ. 01837 840 184, fax 01837 840 884.

Wanted: Circuit diagram for the Cambridge Audio P40 amplifier; circuit diagram and tuning data for the Mende S216W table radio; floppy disc drive for the Dell NL25 lap-top PC – prepared to break complete one for spares but FDD must be working. W. Milne, 20 Graham Road, Wimbledon, London SW19 3SR. 0181 543 9542.

Wanted: Focus potentiometer for the ITT Model CB9504T – or a potentiometer with $20M\Omega$ resistance and ability to handle high voltage. Colin Willmott, 18 Lime Grove, Alton, Hants GU34 2AF. 01420 87 193.

Wanted: Service sheets/manuals for the following radio cassette recorders: Triumph RR3010, Philips 22AR584/15. F.R. Moss, 6 Rosemary Lane, Leintwardine, Craven Arms, Shropshire SY7 0LP. 01547 540 465.

Wanted: Circuit diagram for the Sharp R-8H50(B)T microwave oven, including the control panel PCB (FA203DR). Brian Long, Longster, Smerral, Latheron, Caithness KW5 6DW. 01593 741 249.

Wanted: MAC PCB for the Amstrad SRD600 PAL/MAC satellite receiver. Geoff Upton, 10 Sycamore Close, Hull HU5 5FD. Wanted: User instructions for the Sharp VCA5011HM and Matsui VX990 VCRs. Also circuit diagram and/or manual for the Toshiba SAV10 stereo receiver. Photocopies OK. T. Steel, 185 Charter Road, Chippenham, Wilts SN15 2RF.

Wanted: Any circuit diagrams/*Trader* service sheets for valve and transistor radios. Also help with standards conversion for a Bush Model T76C. Thomas McGhee, 8 Linlithgow Place, Kingoodie, Dundee DD2 5DG. 01382 562 796.

Wanted: Control panel assembly, working or faulty, for the Ferguson TV Models

51/59/66H5. Also a control flap for the Panasonic NVG10 VCR. Allan Crathorne, 2 Harden Close, Walsall WS3 1BU. 01922 492 088 (between 2100-2300).

Wanted/for disposal: Need teletext board for the Ferguson ICC9 chassis. Have for disposal a number of LOPTs. W. Simmons, 24 Standhill Crescent, New Lodge, Barnsley, S. Yorkshire S71 1SU. 01226 238 204.

Wanted: SN76730N chip or equivalent for the Panasonic Model TC2031, also a mains transformer (QLP0722A or QLP0564A) for the Panasonic RS260US cassette deck. H. Mode, 24 Steven Court, Egerton Road South, Manchester M21 0XH.

Wanted: Service manual or circuit diagram for the BT 202B answering machine (also known as the Robin). B.C. Polkinghorne, 92 Maplefield, Park Street, St. Albans, Herts AL2 2BH. 01727 872 983.

Wanted: Service manual or circuit diagram for the Epson VP100PS LC video projector Model E1001, or layout showing and identifying the presets. T. Bamford, 42 Heanor Road, Smalley, Derbyshire DE7 6DW. Fax 01332 882 324

Wanted: Service manual, circuit diagram and user's manual for the 5001 counter-timer made by Continental Specialists, and the same items for the Philips V6150 stereo video tuner. Photocopies OK. B.R. McLeod, 8 Cunningham Road, Horndean, Portsmouth PO8 9LT. 01705 597 941.

Wanted: Circuit diagrams for the following computer monitors: Philips 3CM980/05T; Elonex CDS4586; Dell VC2E (manufactured Nov. 1991); ICL 14814/001 (July 1992). F.O. Tester, 31 Longsands Road, St. Neots, Cambridgeshire PE19 1SS.

For sale: Newnes Radio and TV Servicing volumes dated 1953-54, 1965-66, 1967 to 1970 (three volumes), 1971-72, 1975-76 and 1982-83. Offers please about £4 each plus carriage. David Forfar, 65 Ormskirk Road, Old Skelmersdale, Lancs WN8 8TR. 01695 735 132

Wanted: H-Stat unit, part no. 1.228.11, for the Sony Model KV27XRU. This item is mounted on the CRT shield. A.G. Chamberlain, 62 St. Lukes Road, Bournemouth BH3 7LU. 01202 521 990

Wanted: Complete capstan drive motor or M52440ASP chip for the Saisho VR3400/Matsui VX3000. Also SA2006AE capstan drive chip for the Hitachi VT520E. Robert McCormack, 21 Knockenagh Walk, Newtownabbey, Co. Antrim, N. Ireland. 01232 854 792. Or e-mail robert@soundservice.demon.co.uk

Wanted: Any Philips test equipment, spares or whole instruments, in particular spares for the PM3267 100MHz oscilloscope. Laurence Cope, 69 Corondale Road, Weston-super-Mare, Somerset BS22 8PY. 01934 415 441 (evenings).

Wanted: Circuit diagram for the Grundig Como radiogram (made about 1968). Photocopy OK. W. Hamilton, The Riggs, Whiting Bay, Isle of Arran KA27 8QL. 01770 700 296.

Wanted: User manual for the JVC GX78E camera, also a circuit diagram if possible. P.M. Rae, 158 Blackberry Lane, Four Oaks, Sutton Coldfield B74 4JJ. 0121 303 1953. Wanted: VCU2100A chip for the digiboard

in an ITT Digivision TV. Ray Dolphin, 30 Golden Cross Road, Rochford, Essex SS4 3DG. 01702 545 984.

Wanted: Loan of manual for the Aiwa ADR650 three-head cassette deck. Mechanism is inoperative. No click from the degaussing relay, some LEDs dim, nothing obviously amiss with the power supply. Any suggestions? Nicholas Arnold, 17 Fairway, Merrow, Guildford GUI 2XQ. 01483 573 491.

Wanted: Loan of service manual for the Barco Vision II CRT projector. Clive Patey, 44 Crandley Court, Deptford, London SE8 5SA. 0181 692 8129.

Wanted: Photographs, information, drawings, recollections etc. on the BBC Children's Television caravan (large enclosed vehicle), circa late Fifties, also Lime Grove Studios, Shepherds Bush, including demolition in the Nineties. For research projects. Richard Hawkins, Fox Cottage, 19B Brodrick Avenue, Gosport, Hants PO12 2EN.

Wanted: Where can I obtain a 64µsec PAL delay line suitable for use with the V7021 PAL-RGB decoder chip (manufactured by Sony)? Jim Anderson, 35 Orchard Way,

Continued on page 731



Grandata Ltd

distributor of electronic components

					Щ.							dis	trib	utor o	fele	ctroni	c co	mpone	nts
			T	RA	11	IS	S	TO	R	S/I		NE	A	R	IC	S			
Part	Price	Part		Part	Price	Part	Price		Price		Price	Part	Price	_		Part	Price	Part	Price
BC107 BC108 BC109 BC109C BC140 BC142	8p 8p 8p 10p 20p 20p	BD434 BD435 BD436 BD437 BD438 BD439	30p 31p 30p 28p 36p 40p	BU126 BU128 BU133 BU137 BU180 BU184	65p 125p 125p 150p 100p 100p	BUV48AF BUV48C BUV50 BUV61 BUV70 BUV90 BUV93	325p 250p 425p 1000p 200p 175p 375p	MJ4502 MJ10012 MJ11015 MJ11016 MJ11032 MJ11033 MJ15003	300p 300p 250p 300p 800p 800p 250p	AN35 RECTIFIER DIODES BY127	50p	AN203 AN210 AN211 AN2140 AN217P	210p 165p 150p 170p 95p	AN6340 AN6341 AN6342 AN6344 AN6345 AN6346 AN6350	600p 200p 325p 440p 400p 350p 610p	BA335 BA338 BA340 BA343 BA336 BA401 BA402	55p 80p 75p 60p 175p 60p 50p	BA7004 BA7007 BA7021 BA7022 BA7025L BA7107 BA7212S	200p 200p 180p 350p 100p 475p 200p
BC143 BC147 BC149 BC159 BC160 BC171 BC172	20p 8p 8p 30p 10p	BD440 BD441 BD533 BD534 BD535 BD536 BD537	40p 50p 38p 38p 38p 40p	BU204 BU205 BU206 BU207 BU208 BU208A BU208AT BU208B	65p 70p 100p 150p 70p 75p 200p 200p	BUW11A BUW11AF BUW12 BUW12A BUW12F BUW13A BUW32A	200p 225p 125p 150p 250p 200p 500p	MJ 15004 MJ 15004 MJ 15015 MJ 15016 MJ 15022 MJ 15023 MJ 15024 MJ 15025	300p 250p 350p 400p 400p 400p 700p	BY133 BY164 BY179 BY184 BY206 BY207 BY227	8p 40p 35p 32p 11p 20p	AN228 AN252 AN259 AN262 AN271 AN274 AN277B	280p 150p 250p 140p 230p 250p 400p	AN6352 AN6356 AN6359 AN6360 AN6362 AN6363 AN6367NK	450p 300p 500p 320p 400p 375p 400p	BA511 BA514 BA516 BA518 BA521 BA524 BA526	145p 160p 150p 150p 100p 240p 180p	BA7252S BA7604N BA7751LS BA7752 BA7755 BA7767AS BA8504	150p 100p 150p 250p 150p 155p 350p
BC177 BC178 BC179 BC182 BC182L BC183 BC183L BC184	14p 14p 14p 7p 7p 7p 7p	BD538 BD643 BD645 BD647 BD649 BD675 BD676 BD677	50p 50p 50p 50p 40p 40p	BU208D BU208D BU209 BU225 BU226 BU312 BU325 BU326A	130p 90p 120p 120p 120p 55p 75p	BUW48 BUW49 BUW50 BUW81A BUW84 BUW85 BUX10	550p 550p 550p 400p 150p 75p 85p 150p	MJE340 MJE350 MJE520 MJE2955T MJE3055T MJE13004 MJE13005	25p 80p 30p 65p 65p 100p 60p	BY228 BY298 BY299 BY329-1200 BY448 BYT11 BYT13-1000 BYV96E	28p 15p 18p 150p 20p 25p 30p 25p	AN278 AN301 AN302 AN303 AN304 AN315 AN316	60p 330p 650p 250p 360p 210p 350p	AN6368 AN6371 AN6387 AN6550 AN6551 AN6552 AN6554	275p 350p 480p 100p 50p 45p 80p	BA527 BA532 BA534 BA536 BA546 BA612 BA614	95p 100p 220p 150p 160p 120p 70p	BA15218 CA3140E CNX62A CNX82A CNX83A CX136 CX139A	60p 50p 60p 80p 600p 750p
BC184L BC212 BC212L BC213 BC213L BC214	7p 7p 7p 7p 7p 7p 7p	BD678 BD679 BD680 BD681 BD682 BD705 BD707	40p 40p 40p 45p 45p 50p	BU406 BU406D BU407 BU407D BU408 BU408D BU409	60p 85p 55p 75p 60p 75p 85p	BUX11 BUX12 BUX20 BUX21 BUX22 BUX23 BUX37	200p 150p 350p 450p 450p 900p 220p	MJE13007 MJE13009 MJE15028 MJE15029 MJE15030 MJE15031 MJE18004	100p 100p 200p 200p 250p 400p 125p	BYW96E BYX10 BYX55/600 IN4001 IN4002 IN4003 IN4004	36p 15p 25p 3p 3p 3p 3p	AN337 AN360 AN362 AN363 AN366 AN610 AN3211K	600p 100p 140p 150p 150p 160p 375p	AN6555 AN6605 AN6612 AN6650 AN6651 AN6652 AN6671K	50p 35p 60p 45p 45p 45p 425p	BA618 BA631 BA656 BA658 BA681A BA682A BA683A	55p 280p 110p 350p 350p 300p 300p	CX141 CX145 CX150B CX175 CX187 CX804A CX867	750p 725p 325p 325p 825p 775p 575p
BC214L BC237 BC238 BC239 BC300 BC301 BC302	7p 7p 7p 20p 20p 20p 20p	BD707 BD709 BD711 BD736 BD826 BD828 BD839 BD839	50p 50p 50p 50p 50p 55p 55p	BU412 BU413 BU414B BU415A BU426A BU4233 BU500	175p 175p 250p 170p 70p 120p 100p	BUX39 BUX40 BUX41 BUX42 BUX47A BUX48A BUX55	450p 210p 200p 200p 220p 150p 800p	MJF18004 MJF18204 OC28 OC29 OC35 OC36 S2000A3	175p 350p 350p 250p 350p 250p 250p 175p	IN4004 IN4005 IN4006 IN4007 IN4148 IN5400 IN5401 IN5402	3p 3p 4p 2p 9p 8p	AN3215K AN3231K AN3236K AN3310K AN3312 AN3313 AN3320K	350p 300p 450p 325p 350p 300p 450p	AN6676 AN6780S AN6870 AN6875 AN6878 AN6879 AN6880	600p 80p 450p 150p 65p 225p 75p	BA684 BA685 BA715 BA718 BA728 BA806 BA843	400p 400p 45p 45p 55p 220p 130p	CX868 CX877 CX7925B CX20015A CX20106A CX20109 CX20187	525p 300p 550p 600p 75p 140p 700p
BC303 BC304 BC327 BC328 BC337 BC338 BC441 BC446	25p 7p 7p 7p 7p 28p 8p	BD899 BD977 BDX33 BDX37 BDX44 BDX47 BDX54C	50p 50p 60p 100p 100p 60p 75p	BU500D BU505 BU505D BU505DF BU506 BU506D BU506DF	225p 90p 90p 90p 100p 70p 100p	BUX80 BUX81 BUX84 BUX85 BUX86 BUX87 BUX98A	180p 160p 50p 50p 50p 50p 350p	\$2000AF \$2055A \$2055AF \$2530A TIP29 TIP29A TIP29C TIP29E	90p 175p 175p 100p 15p 22p 25p 40p	IN5403 IN5404 IN5405 IN5406 IN5407 IN5408 RGP10	8p 11p 12p 12p 12p 12p 25p	AN3331K AN3792 AN3794 AN3814K AN3821K AN3822K AN3830K AN3990K	450p 300p 325p 450p 600p 600p 800p 300p	AN6882 AN6884 AN6888 AN6889 AN6913 AN700 AN7010K AN7025K	300p 200p 150p 100p 60p 650p 250p 90p	BA1310 BA1320 BA1330 BA1332 BA1350 BA1355 BA1356 BA1360	160p 75p 120p 60p 130p 125p 100p	CXA1001AP CXA1019P CXA1019S CXA1044P CXA1044BP CXA1081 CXA1081M CXA1081S	1600p 150p 225p 550p 475p 275p 250p 300p
BC477 BC516 BC537 BC546 BC547 BC548 BC549 BC550	18p 22p 25p 8p 8p 8p 8p	BDX62C BDX63C BDX64C BDX65 BDX66C BDX67C BDX71 BDX71 BDX77	150p 175p 175p 80p 175p 275p 70p 175p	BU508A BU508AF BU508APH BU508D BU508DF BU508DR BU508V BU508VF	60p 60p 60p 75p 85p 130p 110p	BUZ71 BUZ71AF BUZ72A BUZ72AF BUZ73A BUZ73AF BUZ76A BUZ80	75p 100p 100p 100p 150p 60p 110p 135p	TIP30 TIP30C TIP31A TIP31C TIP32 TIP32A TIP32C	25p 25p 22p 27p 24p 21p 28p	RGP15 RGP30 SR2M I.C. SOCKE 8 PIN 14 PIN	25p 16p 50p 7S 4p 5p	AN3991K AN5010 AN5011 AN5020 AN5025 AN5033 AN5034 AN5070	400p 250p 225p 80p 250p 400p 400p 125p	AN7060 AN7062 AN7072 AN7081K AN7105 AN7106K AN7110	175p 300p 250p 200p 170p 135p 75p	BA1404 BA1604 BA2266A BA3306 BA3308 BA3312 BA3402	120p 125p 250p 60p 70p 60p 90p	CXA1191M CSA1209P FT5754M FT5764M HA1124 HA1125	1000p 250p 400p 600p 250p 125p 120p
BC556 BC557 BC558 BC559 BC560 BC637 BC639	8p 8p 8p 8p 20p 20p	BDX87C BDX88C BDW24 BDW93 BDW94 BDY29 BDY56	175p 150p 55p 50p 50p 225p 225p 500p	BU526 BU536 BU546 BU603 BU606D BU608D BU626 BU705	75p 100p 125p 125p 225p 120p 120p 130p	BUZ80AF BUZ83 BUZ90A BUZ91A BY448 BYT11 IRF120 IRF130	200p 200p 180p 260p 20p 25p 225p 475p	TIP33 TIP33C TIP34 TIP34C TIP35C TIP36C TIP41A TIP41C	50p 60p 65p 60p 65p 65p 20p 22p	16 PIN 18 PIN 20 PIN 22 PIN 24 PIN 28 PIN 40 PIN	6p 9p 10p 12p 13p 13p	AN5071 AN5111 AN5132 AN5135NK AN5138NK AN5150 AN5151	100p 450p 250p 400p 350p 400p 200p	AN7111 AN7112 AN7114 AN7115 AN7116 AN7117 AN7120 AN7130	100p 45p 120p 110p 90p 65p 100p 75p	BA3406AL BA3416BL BA3422 BA3505F BA3506A BA3516 BA3520 BA3521	120p 80p 350p 140p 70p 120p 130p 225p	HA1137W HA1151 HA1197 HA1199 HA1201 HA1202 HA1319 HA1338	150p 175p 130p 130p 225p 125p 200p 300p
BC640 BCY33 BCY34 BCY70 BCY71 BCY72 BD115 BD124P	20p 200p 200p 16p 16p 16p 30p 50p	BDY58 BDY90 BDY92 BF137 BF167 BF181 BF183 BF195	125p 100p 35p 30p 18p 20p	BU706DF BU706F BU724A BU801 BU806 BU807 BU807F	175p 150p 100p 70p 70p 60p 75p	IRF140 IRF230 IRF240 IRF250 IRF330 IRF340 IRF350	550p 550p 425p 375p 600p 325p 750p	TIP42A TIP42C TIP47 TIP48 TIP50 TIP51 TIP52	20p 22p 40p 40p 60p 80p 80p	ZENER DIO 400 mWatts 2V7 to 39V 1.3 Watts 2V7 to 39V		AN5210 AN5215 AN5222 AN5250 AN5256 AN5260 AN5262 AN5265	675p 100p 200p 160p 150p 300p 175p 80p	AN7131 AN7133N AN7134 AN7140 AN7141 AN7142 AN7145	90p 325p 300p 170p 70p 80p 195p	BA3704 BA3706 BA3812L BA3822LS BA3824LS BA3920 BA4110	200p 75p 80p 80p 75p 300p 75p	HA1339A HA1367 HA1377 HA1384 HA1388 HA1389 HA1392 HA1394	350p 300p 120p 600p 320p 210p 120p
BD131 BD132 BD133 BD135 BD136 BD137 BD138	25p 25p 50p 20p 20p 20p 20p	BF199 BF200 BF225 BF240 BF245 BF254 BF255	8p 16p 30p 16p 25p 15p	BU808DF BU810 BU824 BU826 BU826A BU902 BU903	210p 110p 60p 120p 160p 110p 110p	IRF450 IRF510 IRF520 IRF530 IRF540 IRF611	650p 110p 110p 120p 120p 120p 120p	TIP54 TIP102 TIP105 TIP106 TIP107 TIP110 TIP111	85p 70p 65p 65p 65p 40p 40p 35p	VOLTAGE REGULATO 7805 7806 7808	18p 18p 25p	AN5315 AN5315 AN5421 AN5421 AN5429 AN5431 AN5435	600p 600p 450p 150p 420p 275p 125p	AN7146 AN7147 AN7148 AN7149 AN7154 AN7156 AN7158 AN7160	210p 180p 140p 160p 180p 240p 310p 350p	BA4210 BA4220 BA4234L BA4236L BA4402 BA4403 BA4405 BA4412	85p 60p 70p 110p 45p 220p 80p 50p	HA1396 HA1397 HA1398 HA1406 HA11123 HA11211 HA11215	650p 200p 175p 120p 350p 170p 350p
BD139 BD140 BD144 BD157 BD166 BD175 BD177 BD179	20p 20p 90p 38p 30p 30p 30p 32p	BF256 BF257 BF259 BF262 BF270 BF273 BF311 BF336	18p 18p 18p 25p 18p 15p 21p 20p	BU910 BU912 BU920 BU922 BU930 BU932 BU941 BU2508A	80p 100p 100p 110p 130p 175p 250p 100p	IRF620 IRF630 IRF640 IRF642 IRF650 IRF710 IRF720 IRF730	110p 300p 200p 200p 150p 150p 125p	TIP112H TIP115 TIP116 TIP117 TIP120 TIP121 TIP122	50p 30p 30p 30p 37p 35p 35p	7812 7815 7818 7824 7905 7906 7908 7912	18p 25p 25p 25p 25p 30p 30p 30p	AN5436N AN5512 AN5515 AN5520 AN5521 AN5560 AN5601K	160p 160p 160p 550p 100p 350p 750p	AN7161N AN7163 AN7166 AN7168 AN7169 AN7170 AN7171K	375p 175p 350p 200p 225p 260p 400p	BA5101 BA5102 BA5115 BA5115L BA5204 BA5208AF BA5402	350p 140p 75p 75p 200p 110p 180p	HA11219 HA11221 HA11225 HA11235 HA11244 HA11247	280p 180p 130p 100p 375p 375p 120p
BD181 BD182 BD184 BD187 BD201 BD202 BD203	45p 60p 60p 30p 33p 38p 42p	BF337 BF338 BF362 BF367 BF371 BF421 BF422	20p 20p 30p 13p 17p 18p 21p	BU2508AF BU2508D BU2508DF BU2520AF BU2520DF BU2525A BU2525AF	110p 130p 120p 170p 225p 325p 220p 400p	IRF740 IRF820 IRF830 IRF840 IRF9140 IRF9510 IRF9511	125p 110p 110p 110p 150p 150p 150p	TIP125 TIP126 TIP127 TIP130 TIP131 TIP132 TIP136 TIP137	30p 40p 35p 30p 30p 30p 40p 65p	7915 7918 7924 78L05 78L08 78L12 78L15	30p 30p 30p 24p 24p 24p 24p 24p	AN5612 AN5613 AN5615 AN5620 AN5622 AN5625 AN5630 AN5633	200p 200p 300p 250p 275p 400p 375p 350p	AN7173K AN7177 AN7178 AN7205 AN7213 AN7216 AN7218	325p 450p 375p 180p 35p 40p 175p 60p	BA5406 BA5408 BA5413 BA6104 BA6109 BA6110 BA6125 BA6137	180p 180p 225p 250p 110p 225p 75p 55p	HA11412 HA11414 HA11423 HA11440 HA11485BN HA11702 HA11703 HA11706	330p 400p 280p
BD204 BD222 BD225 BD232 BD233 BD234 BD235 BD236	42p 31p 31p 31p 30p 32p 28p 30p	BF423 BF455 BF458 BF462 BF471 BF472 BF479 BF494	26p 12p 19p 50p 28p 28p 30p	BU2527AF BUF405A BUH315 BUH315D BUH515 BUH515D BUH517 BUH517D	200p 200p 175p 200p 250p 275p 175p	IRF9530 IRF9531 IRF9540 IRF9541 IRF9610 IRF9620 IRF9622	200p 200p 240p 200p 120p 110p 200p	TIP162 TIP141 TIP142 TIP145 TIP146 TIP147 TIP150	110p 65p 75p 50p 70p 80p 90p	78L18 78L24 79L05 79L08 79L12 79L15 LM309K LM317T	24p 35p 35p 35p 35p 100p 100p	AN5635N AN5640 AN5700 AN5701 AN5710 AN5712 AN5720	330p 500p 90p 150p 100p 180p 70p	AN7220 AN7222 AN7223 AN7224 AN7225 AN7254 AN7256	85p 75p 105p 75p 175p 160p 250p	BA6138 BA6146 BA6149LS BA6154 BA6208 BA6209 BA6218	130p 150p 700p 60p 175p 85p 85p	HA11710 HA11713 HA11715 HA11716 HA11718 HA11724 HA11741NT	
BD237 BD238 BD239 BD240 BD241A BD243A BD244	21p 24p 30p 40p 40p 50p 50p	BF495 BF595 BF596 BF615 BF617 BF760 BF763	16p 16p 16p 30p 30p 40p 40p	BUH715 BUT11A BUT11AF BUT12 BUT13 BUT18 BUT18AF	425p 35p 35p 80p 310p 80p 65p	IRF9630 IRF9640 IRFD9220 IRFBC30 IRFBC40 IRFP140 IRFP150	180p 280p 100p 150p 250p 250p 300p	TIP3055 TIPL760 TIPL762A TIPL763A TIPL791A	60p 50p 50p 100p 200p 200p 80p	LM323K 78H08KC 79H12KC 79HGKC	350p 800p 700p 800p	AN5722 AN5730 AN5732 AN5750 AN5753 AN5763 AN5790 AN5791	140p 160p 120p 75p 130p 250p 240p 225p	AN7310 AN7311 AN7312 AN7315 AN7330 AN7362	75p 60p 90p 70p 40p 110p 200p 225p	BA6220 BA6222 BA6227 BA6229 BA6235 BA6238A BA6239A BA6247	55p 130p 50p 130p 50p 130p 130p 150p	HA11744 HA11745 HA11749 HA11751 HA11752 HA11839NT HA11847 HA12002	330p 330p 350p 1500p 325p 375p 700p
BD245 BD246A BD265 BD267 BD269 BD278 BD311	50p 50p 45p 45p 45p 50p 100p	BF870 BF871 BF960 BF961 BF964 BFQ232 BFQ252A	22p 22p 38p 35p 38p 75p 60p	BUT30V BUT56A BUT76A BUT90 BUT92 BUV18 BUV20	1700p 65p 80p 1300p 1200p 650p 650p 400p	IRFP240 IRFP250 IRFP350 IRFP450 IRFP460 IRFP9140 IRFP9240 IRFPC50	300p 280p 325p 325p 775p 1450p 350p 600p	2N2369 2N2646 2N2904 2N2905 2N2906 2N2907 2N3019	15p 40p 20p 20p 18p 18p 28p 18p	3mm RED YELLOW GREEN 5mm RED YELLOW	5p 8p 8p 5p 8p	AN5/91 AN5836 AN5862K AN5900 AN608P AN620 AN6130 AN6135	225p 450p 225p 130p 125p 250p 130p 120p	AN7410 AN7411 AN7414 AN7415 AN7470 AN8053	150p 50p 275p 70p 100p 200p 250p	BA6247 BA6248 BA6259 BA6280AF BA6290A BA6294 BA6302A BA6304	140p 170p 300p 200p 250p 150p 120p	HA12003 HA12005 HA12010 HA12016 HA12017 HA12026 HA12038NT	150p 180p 300p 120p 100p 125p
BD314 BD315 BD317 BD331 BD332 BD361 BD362 BD370	100p 150p 150p 40p 40p 60p 60p 30p	BFR90 BFR91 BR100 BR103 BR303 BU105 BU108 BU109	85p 99p 14p 37p 85p 80p 100p 80p	BUV21 BUV23 BUV24 BUV25 BUV26 BUV27 BUV28 BUV37	475p 350p 110p 150p 125p 110p 175p	IRFRC20 IRFZ20 IRFZ42 IRFZ44 MJ2501 MJ2955 MJ3000	250p 65p 275p 160p 100p 55p 100p	2N3054 2N3055 2N3055H 2N3440 2N3441 2N3442 2N3771	40p 38p 50p 45p 175p 85p 85p	RECTANGU LEDs	8p JLAR mm	AN6209 AN6250 AN6247 AN6270 AN6300 AN6306 AN6310	350p 50p 200p 400p 600p 380p 200p	AN8370 AN8377 AN8387 BA222 BA225 BA314 BA301	1000p 400p 350p 65p 100p 40p 55p	BA6305 BA6321 BA6328 BA6334 BA6410 BA6411 BA6418N	140p 250p 250p 75p 220p 250p 100p	HA12044 HA12045 HA12047 HA12058 HA12088 HA12116 HA12411	350p 280p 450p 320p 375p 130p 175p
BD370 BD371 BD410 BD433	30p 50p 28p	BU110 BU111 BU124	90p 100p 60p	BUV46A BUV47 BUV48A	75p 120p 175p	MJ3001 MJ4032	100p 175p 175p	2N3772 2N3773	90p 100p 29p	RED YELLOW GREEN	5p 8p 8p	AN6320 AN6326N	180p 250p 320p	BA311 BA313	80p 60p 80p	BA6435S BA6993 BA7001	425p 150p 150p	HA12412 HA12413 HA12430	175p 70p 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



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



. 4							L	IN	E/	\R	10	Cs							
Part	Price	Part	Price	Part	Price	Part	Price		Price	Part	Price	-	Price	Part	Price	Part	Price	Part	Price
HA13001 HA13002	650p 200p	LA2800 LA3120	350p 200p	LA7096 LA7113	200p 275p	LF353 LF355	48p 60p	MC3302 MC3401	50p 45p	SAB3029 SAB3035	525p 275p				380p 300p	STR16006 STR17006	500p	TA7281	200p
HA13006 HA13007	400p 300p	LA3150 LA3160	200p 120p	LA7116 LA7123	125p 1300p	LF357 LF398	70p 300p	MC3423P MC3488AP	100p	SAB3036 SAB3037	725p 700p	STK3122 II STK3152 II	II 725p	STK5481 STK5482	470p 285p	STR20005 STR20012	500p 450p	TA7282 TA7210	160p 200p
HA13108 HA13117	280p 175p	LA3161 LA3210	40p 65p	LA7210 LA7212	60p 150p	LH2426S LM301	600p 26p	MC34063A MN1220T	P 300p 600p	SAB3042 SAB3064	825p 130p	STK3156 STK4017	500p 400p	STK5483 STK5486	440p 450p	STR20012 STR20015 STR30110	450p 450p 330p	TA7283 TA7284P	200p 400p
HA13118 HA13119	140p 140p	LA3226 LA3246	60p 75p	LA7214 LA7220	150p 125p	LM311 LM319	35p 165p	MN1226 MN1228	450p 600p	SAB3209 SAB3210	225p 250p	STK4019 STK4021	480p 380p	STK5487	525p 480p	STR30115 STR30120	275p 400p	TA7288 TA7291P	220p 200p
HA13127 HA13128	350p 400p	LA3300 LA3301	140p 110p	LA7222 LA7224	110p 150p	LM324 LM335Z	30p 120p	MN1276 MN1280	1300p 70p	SAB6456 SAB8048	125p 225p	STK4024 II STK4025		STK5490 STK5632	450p 450p	STR30123 STR30125	450p 550p	TA7292P TA7294P	325p 450p
HA13130 HA13135 HA13139	450p 500p	LA3361 LA3365	100p 70p	LA7225 LA7292	250p 275p	LM339 LM348	35p 50p	MN3004 MN3005	600p 2000p	SAB8051/ SDA2003	450p	STK4026 STK4028	480p 550p	STK5720 STK5725	400p 450p	STR30130 STR40090	250p 350p	TA7299 TA7302P	200p 75p
HA13150A HA13151	600p 1150p 875p	LA3370 LA3373 LA3375	70p 70p 300p	LA7294 LA7295 LA7297	200p 160p 120p	LM358 LM380 LM381	45p 80p	MN3011 MN3101 MN3102	4000p 110p	SDA2004 SDA2005	325p 700p	STK4032 II STK4034 X	925p	STK5730 STK6316	450p 300p	STR40115 STR41090	600p 330p	TA7303 TA7307	70p 100p
HA13403 HA13406W	400p 400p	LA3376 LA3380	80p 300p	LA7305A LA7308	350p 70p	LM382 LM386	150p 130p 60p	MN3207 MN3208	110p 375p 950p	SDA2007 SDA2008 SDA2112	300p 400p	STK4036 STK4038	470p 680p	STK6324B STK6327	1200p	STR43111 STR44115	950p 475p	TA7310 TA7312	100p 120p
HA13408 HA13412	350p 600p	LA3390 LA3400	250p 250p	LA7311 LA7320	200p 120p	LM387 LM389N	100p 105p	MN6030B MN6163A	350p 700p	SDA21120 SDA2131	450p 200p 225p	STK4040 II STK4042 II STK4044	800p	STK6328A STK6431	850p	STR45111 STR50020	550p 350p	TA7313 TA7314	70p 175p
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 STK4048	950p 950p 1280p	STK6607 STK6722 STK6732	400p 725p 1000p	STR50092 STR50103A STR50113		TA7315 TA7317P	200p 120p
HA13441 HA17524	450p 250p	LA3430 LA3600	135p 60p	LA7331 LA7332	250p 225p	LM710 LM723	45p 40p	NE556 NE558	40p 80p	SDA5241 SDA5243-	725p	STK4050 II STK4060		STK6822	900p 1000p	STR50115 STR51041	500p 500p 500p	TA7320P TA7322	200p 130p
KA2102 KA2130 KA2131	100p	LA3605 LA3607	100p 126p	LA7340 LA7376	300p 150p	LM741DIL LM741MET		NE565 NE567	110p 115p	SDA5343 SDA5640	1450p 200p	STK4065 STK4101	650p 500p	STK6932 STK6962	525p 275p	STR50213 STR53041	500p 400p	TA7323 TA7234	80p 75p
KA2206 KA2209	110p 150p 125p	LA4030 LA4031 LA4032	180p 140p 140p	LA7391 LA7520 LA7530	650p 200p	LM747 LM1017	55p 200p	NE571 NE592	290p 85p	SDA5642 SGSF444	450p 500p	STK4111 STK4112	500p 500p	STK6972 STK6981B	490p 600p	STR54041 STR55041	320p 450p	TA7325 TA7326	90p 200p
KA2210 KA2212	230p 65p	LA4051 LA4100	160p 85p	LA7535 LA7545	200p 175p 160p	LM1035N LM1040N LM1203	350p 650p 225p	NE5532P SAA1000 SAA1004	140p 350p	SGFS465 SLA4031	500p 750p	STK4121 STK4122	480p 560p	STK6982 STK6982H	600p 600p	STR56041 STR58041	550p 250p	TA7328 TA7330P	110p 80p
KA2213 KA2214	130p 100p	LA4101 LA4102	80p	LA7550 LA7555	275p 150p	LM1203AN LM1875T	225p 330p	SAA1005 SAA1006	650p 325p 300p	SLA7020N STA301A STA341M	200p	STK4131 STK4132 II	480p 600p	STK7216 STK7217	420p 400p	STR59041 STR60001	300p 525p	TA7331P TA7333	80p 100p
KA2224 KA2244	50p 75p	LA4110 LA4120	120p 270p	LA7620 LA7680	500p 675p	LM1881N LM1886	375p 250p	SAA1008 SAA1010	450p 400p	STA401A STA403A	180p 220p 270p	STK4133 II STK4141 II STK4142		STK7225 STK7226 STK7251	500p 600p 500p	STR80145 STR81145	475p 375p	TA7335 TA7336	85p 180p
KA2261 KA2263	100p 100p	LA4138 LA4140	105p 60p	LA7681 LA7710	650p 250p	LM1889 LM1894N	300p 200p	SAA1024 SAA1025	250p 250p	STA405A STA431A	280p 250p	STK4147 II STK4151		STK7253 STK7308	450p 350p	STR90120 STRD1206 STRD1406	425p 500p 600p	TA7337P TA7339P	175p 175p
KA2264 KA2284 KA2309	100p 75p	LA4142 LA4145	65p 65p	LA7800 LA7801	90p 100p	LM1895N LM2901N	275p 35p	SAA1026 SAA1027	400p 400p	STA432A STA434A	220p 270p	STK4152 STK4161	650p 650p	STK7309 STK7310	400p 470p	STRD1706 STRD1806	360p 360p	TA7341 TA7342P	250p 70p
KA2401 KA2412	175p 150p 225p	LA4160 LA4162 LA4178	100p 110p 150p	LA7802 LA7806 LA7808	300p 260p 250p	LM2902N LM2903N	40p 40p	SAA1029 SAA1042	150p 325p	STA435A STA441C	270p 220p	STK4162 STK4164 II	550p 1175p	STK7348 STK7356	400p 425p	STRD1816 STRD1906	350p 550p	TA7343 TA7347P	120p 120p
KA2912 KA2913A	125p 175p	LA4180 LA4182	150p 180p	LA 7820 LA7823	100p 200p	LM3900 LM3909 LM3911N	40p 100p 200p	SAA1043P SAA1044 SAA1056	675p 400p	STA451C STA456C	280p 240p	STK4171 STK4172 II	900p 680p	STK7358 STK7402	440p 560p	STRD3035 STRD4412	300p 500p	TA7348P TA7349P	125p 175p
KA2914A KA22427	200p 100p	LA4190 LA4192	300p	LA7824 LA7830	130p 90p	LM3914 LM3915	160p 160p	SAA 1057 SAA 1058	300p 375p 225p	STA471 STA901M STK0025	210p 280p 420p	STK4181 STK4182 II STK4191	680p 760p 700p	STK7404 STK7406	600p 650p	STRD4420 STRD4512	550p 400p	TA7354P TA7357	65p 340p
KIA6213S KIA6210AH	60p 400p	LA4200 LA4201	130p 120p	LA7831 LA7832	85p 130p	LM3916 LM8363	270p 320p	SAA 1060 SAA 1061	375p 250p	STK0029 STK0039	1000p 600p	STK4192 STK4211 II	700p 1000p	STK7408 STK7410 STK7458	675p 1500p 1250p	STRD5441 STRD5541 STRD6008	475p 450p 575p	TA7358 TA7359P	85p 90p
KIA6281H KIA6283K	250p 150p	LA4260 LA4261	230p 300p	LA7835 LA7837	150p 150p	LM8560 LM13600	175p	SAA1062 SAA1063	250p 250p	STK0040 STK0049	520p 510p	STK4211 V STK4221 II	800p	STK7554 STK7561	600p 650p	STRD6009E STRD6018	450p 450p	TA7361 TA7362	125p 150p
KIA6299H KIA7227CP KIA7313	210p 200p 45p	LA4265 LA4270 LA4282	125p 300p 350p	LA7838 LA7850	200p 225p	LM13700 LM18293	125p 500p	SAA 1064 SAA 1070	275p 550p	STK0050 STK0059	440p 620p	STK4231 II STK4241	1050p 1050p	STK7562 STK7563	1000p 800p	STRD6602 STRD6601	475p 650p	TA7364P TA7366P	175p 65p
L149V L165V	300p 250p	LA4420 LA4422	140p 130p	LA7851 LA7910 LA7913	200p 150p 90p	M491BB1 M494B1 M5265P	800p 700p 200p	SAA 1073 SAA 1075	325p 350p	STK0060 STK0070	820p 1100p	STK4241 V STK4272	500p	STK7573 STK7576	400p 1500p	STRM6545 STRM6546	900p 900p	TA7368P TA7373F	35p 150p
L200 L272	200p 200p	LM4425A LA4430	200p 130p	LA7930 LA7940	350p 200p	M50115P M50117P	320p 500p	SAA1086 SAA1089 SAA1101	175p 325p 700p	STK0080 STK011 STK015	1000p 330p 440p	STK4273 STK4301 STK4311	550p 500p 650p	STK7703 STK8050 STK8250	1000p 1600p	STRM6549 STRS5741	500p 800p	TA7374 TA7376P	175p 100p
L272M L290B	110p 225p	LA4440 LA4445	200p 200p	LA7953 LA9200	300p 300p	M50119P M50422P	525p 750p	SAA1124 SAA1130	200p 550p	STK016 STK025	760p 650p	STK4332 STK4352	365p 500p	STK8260 STK8280	500p 1200p 1850p	STRS5941 STRS6307 STRS6308	750p 600p 600p	TA7378P TA7401	60p 250p
L2918 L292 L293B	300p 750p	LA4446 LA4460	170p 120p	LB1205 LB1216	170p 150p	M50461 M50784	350p 300p	SAA1250 SAA1251	280p	STK050 STK077	1600p 520p	STK4362 STK4372	450p 600p	STK73405 I STK73410	350p	STRS6309 STRS6707	600p	TA7402P TA7403	200p 325p
L293C L293D	225p 325p 225p	LA4461 LA4466 LA4470	120p 225p 300p	LB1258 LB1268 LB1274	100p 70p	M50786 M50790	500p 600p	SAA1271 SAA1274	400p 280p	STK078 STK080	1800p 550p	STK4392 STK4412	500p 450p	STK7340 II STK73605	500p 375p	STRS6708 TA7054	575p 190p	TA7404 TA7405P	150p 200p
L293E L294	250p 475p	LA 4475 LA 4476	225p 225p	LB1290 LB1292	85p 120p 110p	M51014L M51143AL M51161	120p 110p 300p	SAA 1290 SAA 1293 SAA 1294	750p 550p 800p	STK082 STK084 STK085	2000p 600p 900p	STK4432 STK4773	600p 820p	STK73907 STK78617	700p 2400p	TA7061 TA7062	115p 200p	TA7411AP TA7415P	150p 350p
L295 L297	450p 525p	LA4480 LA4485	225p 300p	LB1405 LB1407	70p 130p	M51161P M51162P	250p 250p	SAA1300 SAA1310	200p 200p	STK086 STK0100	1000p 900p	STK 4793 STK 4803 STK 4813	800p 1000p 800p	STR370 STR371 STR380	300p 400p 350p	TA7066 TA7075P TA7089	120p 300p	TA7417AP TA7521P	225p 350p
L298 L465A		LA4495 LA4496	260p 250p	LB1409 LB1412	200p 300p	M51164AL M51166P	80p 300p	SAA1350 SAA1351	275p 750p	STK0100II STK420	1200p	STK4833 STK4843	850p 720p	STR381 STR383	390p 410p	TA7102P TA7119	300p 500p 150p	TA7607 TA7608	200p 360p
L482 L497B L702B	525p	LA4498 LA4500 LA4505	275p 200p 220p	LB1415 LB1416	100p 85p	M51182L M51191L	110p 85p	SAA 1900S SAA 3004	475p 400p	STK430 STK433	500p 400p	STK4853 STK4863	1700p 700p	STR384 STR440	350p 800p	TA7120 TA7124	55p 250p	TA7609 TA7611	170p
L702N L2720	325p	LA4508 LA4510	200p	LB1426 LB1450 LB1615	125p 110p 270p	M51231P M51308SP M51310AP	200p 550p 900p	SAA3006P SAA3007P SAA3008P	225p 130p	STK435 STK436	375p 430p	STK4873 STK4893	1100p 1000p	STR441 STR442	950p 1600p	TA7130P TA7137	85p 60p	TA7612 TA7613AP	300p 90p
L2722 L4960		LA4520 LA4550	170p 200p	L81620 LB1622	210p 220p	M51316P M51320	300p 200p	SAA3010P SAA3027P	200p 300p 375p	STK437 STK439 STK441	600p 500p 680p	STK4913 STK5314 STK5315	900p 475p 500p	STR450A STR451	700p 800p	TA7140 TA7141	100p 825p	TA7614 TA7616	170p 300p
L6203 L6210	250p	LA4555 LA4557	120p 150p	LB 1630 LB 1639	80p 300p	M51356P M51358P	400p 150p	SAA3049P SAA4700	550p 425p	STK443 STK457	700p 470p	STK5322 STK5323	500p 600p	STR452 STR453 STR454	600p 600p 1300p	TA7150P TA7157 TA7172P	250p 100p 150p	TA7621 TA7622	300p 420p
L6221AS L6506 LA1130	300p	LA4558 LA4570	130p	LB1640 LB1641	150p 75p	M51365P M51366P	350p 360p	SAA5000 SAA5010	200p 220p	STK459 STK460	560p 660p	STK5324 STK5325	450p 370p	STR455 STR456	550p 470p	TA7193 TA7200	320p 200p	TA7628 TA7629	110p 220p
LA1135 LA1145	120p	LA 4571 LA 4581 LA 4597	175p	LB1642 LB1645	150p 100p	M51381P M51384AP	750p	SAA5012 SAA5020	350p	STK461 STK463	600p 950p	STK5326 STK5330	750p 850p	STR457 STR470	600p	TA7205 TA7207	1200p 150p	TA7630 TA7632	200p 400p
LA1150 LA1170	150p	LA4620 LA4630	400p	LB1648 LB1649 LB3500	200p 190p 125p	M51387P M51392P M51393AP	600p 300p 350p	SAA5040A SAA5040B	280p	STK465 STK501 STK561	900p 650p	STK5331 STK5332	300p 180p	STR1096 STR1195	275p 350p	TA7208 TA7210	125p 200p	TA7640 TA7641	90p 140p
LA1177 LA1180	130p 75p	LA4700 LA4705	350p	LC4966 LC7011	65p 500p	M51395AP M51397AP	450p 425p	SAA5040B SAA5041 SAA5042	550p 425p	STK563 STK583	450p 415p 500p	STK5333 STK5335 STK5336	650p 350p 360p	STR1229 STR2005 STR2012	325p 400p 400p	TA7214 TA7217 TA7220	220p 145p	TA7644BP TA76545P	480p 65p
LA1185 LA1186	150p 35p	LA5005 LA5112	90p 200p	LC7060 LC7120	600p	M51436P M51496P	350p 275p	SAA5050 SAA5051	650p 400p	STK760 STK770	600p 400p	STK5337 STK5338	500p 295p	STR2012 STR2013 STR2015	300p 650p	TA7222 TA7223	220p 90p 210p	TA7658 TA7659P	100p 400p
LA1201 LA1205 LA1207	75p	LA5511 LA5512 LA5522	50p	LC7130 LC7131	300p 260p	M51533 M51544	150p	SAA5052 SAA5054	600p 500p	STK772 STK772B	650p 480p	STK5339 STK5340	400p	STR2024 STR2105	675p	TA7225 TA7226	300p	TA7660P TA7666P	325p 100p
LA 1210 LA 1222	140p	LA5522 LA5523 LA5524	160p	LC7132 LC7137 LC7181	400p 450p 350p	M51848 M54523P M54563P	200p i	SAA5230 SAA5231 SAA5240PA	850p 170p	STK780 STK795	575p 450p	STK5342 STK5343	245p	STR2124 STR3105	675p 525p	TA7227 TA7230	700p	TA7668 TA7672	100p 400p
LA1230 LA1235	130p	LA5527 LA5530	150p 65p	LC7185 LC7191	350p 300p	M58484 M51516	500p 260p	SAA5240PA SAA5243PE SAA5244AP	360p	STK1039 STK1040 STK1049	460p 640p 700p	STK5353 STK5361 STK5362	400p 375p 400p	STR3113 STR3115 STR3123	225p 400p	TA7232 TA7233	95p 120p	TA7676AP TA7679	450p 475p
LA1240 LA1245	80p 110p	LA5531 LA5537	65p 45p	LC7207 LC7215	275p 160p	M51518 M51995P	200p 250p	SAA5246AP SAA5246P	380p 750p	STK1050 STK1060	650p 700p	STK5372 STK5373	260p 375p	STR3123 STR3125 STR3130 STR3135	400p 480p 500p	TA7237 TA7238 TA7240	300p 400p 160p	TA7680AP TA7681AP	200p 425p
LA1260 LA1261	76p	LA5655 LA5658	225p	LC7217 LC7218	350p	M51977P M52307P	300p	SAA5250P SAA5351 SAA7000	750p 375p	STK1070 STK1080	850p 940p	STK5391 STK5392	375p 500p	STR3135 STR3212	250p 275p	TA7241 TA7242	165p 190p	TA7687AP TA7688 TA7698	100p 150p
LA 1265 LA 1266 LA 1267	130p	LA5665 LA5667 LA5700	200p	LC7230 LC7267 LC7351	700p 650p 200p	M54646AP MB3708 MB3712	400p 275p 600p	SAA7020	550p 600p	STK2025 STK2028	620p 500p	STK5421 STK5422	450p 375p	STR3212 STR3214 STR3215	275p 275p	TA7243 TA7245	320p 225p	TA7699 TA7705	400p 600p
LA 1354 LA 1363	225p	LA6339 LA6355	35p	LC7364 LC7432	200p 425p	MB3713 MB3714	130p 225p	SAA7210P SAA7220PA SAA7274P	550p	STK2029 STK2030 STK2038	480p 1000p 700p	STK5431 STK5434	550p 570p	STR3315 STR4090A	650p	TA7245BPO TA7248P	200p 675p	TA7709P TA7719P	300p 150p 200p
LA 1364 LA 1365	200p	LA6510 LA6515	150p 150p	LC7522 LC7535	350p 300p	MB3715 MB3722	250p 200p	SAA7280P SAA9050	1450p 450p	STK2048 STK2058IV	950p 1600p	STK5436 STK5441 STK5443	500p 400p 575p	STR4142 STR4211 STR4512	315p	TA7250B TA7251BP TA7256P	325p 325p 225p	TA7727P TA7750	125p 200p
LA1368 LA1369	200p 1	LA6520 LA6531	175p 250p	LC7537AN LC7537N	400p 450p	MB3730 MB3731	900p	SAA9057 SAB0600 SAB0601	475p 600p	STK2101 STK2110	1050p 550p	STK5446 STK5451	350p 390p	STR5015 STR5100	500p 550p	TA7259P TA7262P	225p 225p 400p	TA7757 · TA7769	200p 200p 130p
LA 1385 LA 1503 LA 1805	120p	LA7007 LA7011 LA7016	220p	LC7560 LC7565 LC7582E	750p 300p 300p	MB3732 MB3735	240p 400p	SAB0601 SAB0602 SAB1009BP	525p 625p	STK2125 STK2129	580p 750p	STK5461 STK5462	500p 500p	STR5214 STR5315	475p 575p	TA7263P TA7265AP	325p 300p	TA7772P TA77784	150p 260p
LA1810 LA1851	130p 1	LA7018 LA7019	100p	LC7800 LC7815H	175p 175p	MB3756 MB3759 MB3771	200n I	SABIOIR	600p	STK2139 STK2155 STK2220	675p 900p	STK5464 STK5466	300p 500p	STR5412 STR6020	280p 270p	TA7267 TA7267BP	220p 120p	TA7792P TA7796P	250p 75p
LA2000 LA2001	150p l	LA7033 LA7042	400p I 280p I	LC7818 LC7820	280p 325p	MB3773 MB8719	110p 360p	SAB1046P SAB2015P SAB2016P	525p	STK2230 STK2240 STK2250	470p 740p 650p	STK5467 STK5468 STK5471	400p 300p 900p	STR7001 STR9005 STR9012	400p	TA7269 TA7270 TA7271	260p 170p	TA8101N TA8105N	230p
LA2101 LA2110	150p l	LA7046 LA7051	300p 1	LC7821N LC7822N	250p 160p	MC1391 MC1455	120p 45p	SAB2022P SAB3012	525p	STK3041 STK3042	370p 375p	STK5472 STK5473	375p 480p	STR10006 STR11006	450p	TA7272 TA7272 TA7273	300p	TA8110AP TA8119P	110p 70p
LA2200 LA2205 LA2211	150p l	LA7053 LA7054 LA7060	350p	LC7881B LC7881M LF347	325p	MC1488 MC1489	35p 35p	SAB3013 SAB3017	200p 320p	STK3044 STK3062	950p 500p	STK5474 STK5476	500p 350p	STR12006 STR13006	450p 500p	TA7274 TA7279P	210p 325p	TA8122AN TA8127N	250p 100p
	Joop [.55p	-, 347	1 10p	MC1496	65p	SAB3021	450p	STK3082	550p	STK5477	450p	STR15006		TA7280		TA8132AN	200p

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

				LIN	IE/	RI	Cs/.	JAP	AN	ESE	TK	RAN	SIS	TOF	RS				
Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part 2SB561	Price 30p	Part 2SC738	Price 15p
TA8164P TA8184P	100p 350p	TDA1180 TDA1185A	120p 190p	TDA2760 TDA2780	400p 600p 275p	TDA4661 TDA4670 TDA4680	225p 475p 350p	TDA8391 TDA8395 TDA8405	675p 360p 550p	UPC1004C UPC1009 UPC1018	130p 950p 170p	2SA771 2SA773 2SA777	90p 50p 35p	2SA1177 2SA1179 2SA1182	25p 20p 20p	2SB562 2SB564	20p 15p	2SC739 2SC761	150p 110p
TA8189P TA8200AH TA8201AK	130p 325p 300p	TD A1190 TD A1200B TD A1220	80p 80p 50p	TDA2791 TDA2795 TDA2822M	150p 60p	TDA4685 TDA4700A	275p 750p	TDA8415 TDA8416	650p 625p	UPC 1020 UPC 1023	200p 60p	2SA778 2SA781	100p 150p	2SA1184 2SA1185	120p 200p 500p	2SB566 2SB596 2SB598	90p 50p 30p	2SC762 2SC783 2SC790	150p 85p 50p
TA8205 TA8207K	220p 175p	TDA1235 TDA1236	300p 240p	TD A2824 TD A2840	85p 200p	TDA4714C TDA4716C TDA4718A	350p 450p 250p	TDA8417 TDA8421 TDA8425	550p 300p 500p	UPC1024H 2 UPC1025 UPC1026	75p 230p 95p	2S A786 2S A794 2S A798	25p 50p 30p	2SA1186 2SA1198 2SA1201	40p 40p	2SB600 2SB601	500p 60p	2SC792 2SC805	380p
TA8210 TA8211AH TA8214K	260p 200p 260p	TDA1251 TDA1270 TDA1327	150p 150p 200p	TDA3047 TDA3048 TDA3082	100p 130p 200p	TDA4725 TDA4800	750p 300p	TDA8432 TDA8433	550p 600p	UPC1028 UPC1031H	90p 150p	2SA812 2SA814	15p 60p	2SA1202 2SA1204 2SA1206	25p 225p 60p	2SB605 2SB631 2SB632	25p 40p 45p	2SC828 2SC829 2SC839	20p 15p 20p
TA8215 TA8216H	300p 300p	TDA1405 TDA1410	50p 220p	TD A3083 TD A3190	200p 100p	TDA4810 TDA4814A TDA4850	500p 300p 475p	TDA8440 TDA8442 TDA8443	300p 200p 350p	UPC1032 UPC1035C UPC1043C	60p 110p 125p	2SA816 2SA817 2SA825	70p 20p 20p	2S A1207 2S A1208	25p 70p	2SB633 2SB641	80p 12p	2SC867 2SC870	900p 100p
TA8217P TA8220AH TA8221AH	120p 500p 600p	TDA1412 TDA1506 TDA1508	35p 275p 175p	TDA3301B TDA3310 TDA3410	1600p 120p 150p	TDA4851 TDA4852	325p	TDA8444 TDA8451	200p 325p	UPC1158H UPC1161	70p 110p	2SA836 2SA837 2SA839	20p 200p 110p	2SA1209 2SA1210 2SA1215	100p 120p 600p	2SB647 2SB648 2SB649	20p 45p 35p	2SC897 2SC900B 2SC930	175p 30p 15p
TA8225H TA8225L	475p 475p	TDA1510 TDA1512	170p 140p	TDA3420 TDA3501	200p 300p 360p	TDA4860 TDA4866 TDA4881	200p 275p 200p	TDA8452 TDA8453 TDA8461	200p 350p 950p	UPC1167 UPC1170 UPC1173	125p 150p 200p	2SA841 2SA844	20p 20p	2SA1216 2SA1217	550p 100p	2SB673 2SB676	100p 85p	2SC936 2SC941	300p 15p
TA8227 TA8229K TA8400P	250p 200p 200p	TDA1514A TDA1515A TDA1516Q	325p 200p 350p	TDA3502 TDA3504 TDA3505	300p 275p	TDA4935 TDA4940	300p 200p	TDA8490 TDA8540	225p 250p	UPC1176C UPC1178H	120p 250p	2\$A847 2\$A854 2\$A861	25p 30p 45p	2SA1220 2SA1221 2SA1222	75p 70p 50p	2SB688 2SB703 2SB705	90p 90p 200p	2SC944 2SC945 2SC950	140p 10p 40p
TA8410K TA8410P	200p 200p	TDA1517 TDA1519	150p 200p 200p	TDA3506 TDA3507 TDA3510	260p 450p 200p	TDA4942 TDA4944 TDA4950	200p 175p 100p	TDA8702 TDA8703 TDA8708	275p 500p 600p	UPC1180C UPC185H2 UPC1186	200p 400p 80p	2SA872 2SA872A	25p 50p	2SA1226 2SA1227	25p 250p	2SB707 2SB716	200p 20p	2SC959 2SC980	225p 40p 20p
TA8432 TA8605N TA8606N	200p 350p 350p	TDA1519A TDA1520 TDA1521	275p 210p	TDA3520 TDA3530	250p 250p	TDA5030A TDA5140A	100p 200p	TDA8730 TDA8732	225p 300p	UPC1187 UPC1188H	150p 350p 300p	2S A879 2S A884 2S A885	30p 100p 35p	2SA1232 2SA1237 2SA1238	180p 25p 30p	2SB718 2SB727 2SB733	60p 100p 75p	2SC982 2SC983 2SC1000	120p
TA8607P TA8611AN	320p 250p 480p	TDA1522 TDA1524 TDA1526	110p 200p 225p	TDA3540 TDA3541 TDA3560	200p 175p 260p	TDA5330T TDA5331T TDA5332T	300p 200p 150p	TDA8735 TDA8740 TDA8741	175p 625p 550p	UPC1191 UPC1197 UPC1198H	140p 200p	2SA886 2SA887	45p 20p	2SA1239 2SA1240	30p 45p	2SB734 2SB737	35p 20p 22p	2SC1001 2SC1008 2SC1010	950p 20p 225p
TA8615N TA8628N TA8631	350p 500p	TDA1534 TDA1540	2000p 420p	TDA3561 TDA3561A	300p	TDA5500 TDA5600	400p 450p 250p	TDA8808T TDA8809T TDA9045	325p 350p 300p	UPC1210 UPC1215V UPC1222	150p 125p 130p	2S A893 2S A896 2S A899	15p 25p 40p	2SA1242 2SA1244 2SA1245	80p 120p 55p	2SB739 2SB744 2SB750	55p 60p	2SC1012 2SC1013	75p 170p
TA8632N TA8644N TA8646	550p 425p 375p	TDA1541 TDA1542 TDA1543	500p 250p 200p	TDA3562 TDA3562TF TDA3563	260p 300p 350p	TDA5660P TDA5700 TDA5701	200p 200p	TDA9080 TDA9102C	400p 250p	UPC1225H UPC1227V	220p 225p	2SA900 2SA904	45p 20p	2SA1246 2SA1248	80p 35p 100p	2SB753 2SB754 2SB764	100p 80p 30p	2SC1014 2SC1030 2SC1046	140p 150p 250p
TA8653N TA8659AN	1500p 900p	TDA1552Q TDA1553AQ	350p 325p	TDA3564 TDA3565	325p 220p 280p	TDA5708 TDA5709 TDA5800	275p 375p 850p	TDA9403 TDA9500 TDA9503	130p 750p 550p	UPC1228HA UPC1230 UPC1237HA	45p 200p 70p	2SA907 2SA909 2SA912	650p 500p 70p	2SA1249 2SA1252 2SA1253	20p 30p	2SB765 2SB772	70p 25p	2SC1047 2SC1050	20p 280p
TA8690N TA8691N TA8701AN	700p 450p 275p	TDA1555Q TDA1557Q TDA1558Q	375p 300p 300p	TDA3566 TDA3567 TDA3569	350p 300p	TDA5820 TDA5832	370p 125p	TDA9513 TDA9800	225p 225p	UPC1238 UPC1241H	120p 150p	2SA913 2SA914	100p 90p 30p	2SA1256 2SA1257 2SA1258	30p 30p 70p	2SB774 2SB775 2SB776	50p 100p 110p	2SC1051 2SC1061 2SC1069	250p 85p 175p
TA8718N TA8720	550p 525p	TDA1560Q TDA1571	675p 300p	TDA3570 TDA3580	375p 300p 750p	TDA5850 TDA5930 TDA6100Q	175p 225p 150p	TDA9821 TEA0652 TEA0653T	200p 150p 80p	UPC1242H UPC1245V UPC1270H	150p 130p 250p	2SA915 2SA916 2SA921	30p 40p	2SA1261 2SA1262	150p 110p	2SB788 2SB791	35p 130p	2SC1070 2SC1079	65p 300p
TA8739P TA8872N TAA550	450p 450p 25p	TDA1572 TDA1574 TDA1576	175p 125p 170p	TDA3586 TDA3590 TDA3591	250p 360p	TDA6101Q TDA6111Q	120p 225p	TEA0655 TEA0665	300p	UPC1274V UPC1277	250p 240p	2SA928A 2SA933 2SA934	25p 30p 30p	2SA1263 2SA1264 2SA1265	280p 280p 200p	2SB794 2SB795 2SB810	40p 45p 15p	2SC1080 2SC1096 2SC1098	225p 40p 120p
TBA120S TBA396 TBA520	40p 70p 120p	TDA1578A TDA1579 TDA1589	210p 130p 275p	TDA3592A TDA3601Q TDA3602	300p 375p 225p	TDA6200 TDA6600-2 TDA6610-2	750p 700p 1100p	TEA1002 TEA1007 TEA1009	650p 120p 100p	UPC1278 UPC1288V UPC1297CA		2SA935 2SA937	40p 20p	2SA1283 2SA1284	50p 60p	2SB816 2SB817	160p 175p 60p	2SC1106 2SC1114 2SC1115	180p 415p 280p
TBA530 TBA540	100p 90p	TDA1591 TDA1596	275p 200p	TDA3611 TDA3640	450p	TDA6612-2 TDA7000	900p 170p	TEA1015P TEA1017	110p 280p	UPC1298 UPC1313H / UPC1316C	320p 100p 70p	2SA939 2SA940 2SA942	140p 50p 60p	2SA1286 2SA1289 2SA1290	60p 50p 150p	2SB819 2SB822 2SB824	40p 60p	2SC1116 2SC1124	290p 270p
TBA560 TBA800 TBA810AS	90p 40p 40p	TDA1598 TDA1600 TDA1602A	160p 200p 400p	TDA3645 TDA3651 TDA3652	400p 200p 500p	TDA7010T TDA7020T TDA7021T	120p 175p 200p	TEA1019 TEA1024 TEA1035	130p 150p 200p	UPC1318 UPC1330HA	300p	2S A949 2S A950	70p 18p	25A1293 25A1294	110p 450p 500p	2SB825 2SB826 2SB827	135p 75p 200p	2SC1161 2SC1162 2SC1164	110p 30p 600p
TBA820 TBA820M	55p 35p	TDA1670A TDA1675	200p 200p	TDA3652-TX TDA3653	(10 800p 85p	TDA7050 TDA7052 TDA7053	100p 120p 200p	TEA1039 TEA1045 TEA1060	150p 300p 225p	UPC1335V UPC1350 UPC1352C	320p 115p 450p	2SA951 2SA952 2SA953	60p 30p 60p	2SA1295 2SA1301 2SA1302	260p 300p	2SB828 2SB829	200p 200p	2SC1165 2SC1166	750p 100p
TBA920 TBA950 TBA990	100p 100p 60p	TDA1701 TDA1771 TDA1870A	500p 200p 200p	TDA3654 TDA3654Q TDA3710	80p 85p 300p	TDA7056 TDA7057Q	200p 225p	TEA1061 TEA1062	175p 250p	UPC1360C UPC1362C	200p 250p	2SA954 2SA957	30p 185p	2SA1303 2SA1304 2SA1306	400p 110p 110p	2SB835 2SB857 2SB861	75p 80p 110p	2SC1170 2SC1172 2SC1173	180p 150p 33p
TC5020 TC5081AP	200p 80p	TDA1872A TDA1904	275p 80p	TDA3720 TDA3724 TDA3725	175p 300p 300p	TDA7072 TDA7077 TDA7211	100p 175p 100p	TEA1064 TEA1067 TEA1068	250p 150p 350p	UPC1363 UPC1363C UPC1364C	190p 300p 350p	2SA958 2S A963 2S A965	60p 120p 30p	2SA1307 2SA1309	100p 50p	2SB863 2SB865	220p 25p	2SC1195 2SC1212	210p 35p
TC5082P TC5090 A TC9125BP	170p 230p 410p	TDA1905 TDA1908A TDA1910	80p 90p 160p	TDA3730 TDA3740	400p 400p	TDA7220 TDA7222	65p 100p	TEA1080P TEA1087	170p 40p	UPC1365 UPC1366C	250p 130p	2SA966 2SA968	25p 55p	2SA1315 2SA1317 2SA1318	100p 30p 20p	2SB882 2SB885 2SB891	180p 45p 35p	2SC1213 2SC1214 2SC1215	10p 15p 25p
TC9130P TC9134	150p 750p	TDA1940 TDA1941	180p 300p	TDA3750 TDA3755 TDA3760	400p 425p 350p	TDA7230A TDA7231A TDA7233	150p 80p 60p	TEA1101 TEA1330 TEA1511	425p 65p 150p	UPC1370C UPC1373 UPC1377C	300p 85p 200p	2SA979	25p 35p 25p	2SA1319 2SA1320	25p 45p	2SB892 2SB895	25p 60p	2SC1216 2SC1222	200p 15p
TC9135P TC9137P TC9138AP	125p 500p 150p	TDA1950 TDA2002 TDA2003	175p 50p 65p	TDA3765V TDA3771	225p 460p	TDA7240 TDA7241	175p 250p	TEA2000 TEA2014A	500p 80p	UPC1378 UPC1379C	1000p 170p 110p	2SA985 2SA988	60p 25p 30p	2SA1321 2SA1327 2SA1329	80p 130p 200p	2SB908 2SB926 2SB941	70p 30p 60p	2SC1226 2SC1237 2SC1247A	75p 250p 35p
TC9142 TC9143	320p 300p 150p	TDA2004 TDA2005 TDA2006	150p 150p 70p	TDA3780 TDA3791 TDA3800	400p 200p 250p	TDA7245 TDA7250 TDA7255	225p 400p 400p	TEA2018A TEA2019 TEA2025B	600p	UPC1382 UPC1384 UPC1387C	425p 250p	2SA992 2SA993	30p 50p	2SA1346 2SA1348	20p 45p	2SB950 2SB951	180p 190p 90p	2SC1252 2SC1278 2SC1279	850p 110p 30p
TC9145 TC9148 TC9149	200p 225p	TDA2007 TDA2008	120p 100p	TDA3803A TDA3810	500p 200p	TDA7256 TDA7262	400p 325p	TEA2028 TEA2028B TEA2029A	325p 375p	UPC1394 UPC1397 UPC1403CA	120p 350p 650p	2SA999	60p 30p 25p	2SA1352 2SA1353 2SA1356	100p 100p 100p	2SB953 2SB975 2SB985	100p 30p	2SC1308K 2SC1312	350p 40p
TC9150 TC9151P TC9152	425p 425p 425p	TDA2009 TDA2010 TDA2020	160p 150p 120p	TDA3825 TDA3827 TDA3840	150p 110p 200p	TDA7272 TDA7273 TDA7274	170p 80p 45p	TEA2029C	270p	UPC1406HA	4 70p	2SA1006 2SA1008	90p 125p	2SA1357 2SA1358	65p 130p	2SB986 2SB1009	40p 110p 25p	2SC1318 2SC1325 2SC1327	10p 400p 20p
TC9153 TC9154AP	300p 225p	TDA2030 TDA2030H	80p 100p	TDA3842 TDA3843 TDA3845	200p 200p	TDA7275 TDA7282	76p 50p 100p	TEA2037 TEA2114 TEA2117	200p 200p 450p	UPC1421CA UPC1423CA UPC1470	650p 550p 200p	2SA1010	200p 225p 80p	2SA1359 2SA1360 2SA1362	45p 45p 25p	2SB1012 2SB1015	55p 60p	2SC1328 2SC1342	15p 15p
TC9156 TC9158P TC9162	300p 450p 275p	TDA2048 TDA2051V	140p 600p 450p	TDA3845 TDA3856 TDA3857	225p 300p 200p	TDA7302	450p 800p	TEA2130 TEA2164	350p 160p	UPC1474H/	300p	2SA1012 2SA1013	85p 100p	2SA1371	50p 100p 30p		130p 40p 130p	2SC1343 2SC1345 2SC1346	200p 15p 100p
TC9163 TC9164	375p 400p	TDA2052V TDA2054M	525p	TDA4001	225p 250p	TDA7313 TDA7318 TDA7330A	650p 550p 700p	TEA2260 TEA2261 TEA2262	225p 185p 275p	UPC1488H UPC1498H UPC1505C	115p 500p 400p	2SA1016 2SA1018	10p 30p 100p	2SA1380 2SA1381	75p 100p	2SB1020 2SB1039	120p 65p	2SC1358 2SC1359	270p 15p
TC9167P TC9172P TC9174P	100p 300p 325p	TDA2107 TDA2148 TDA2151	250p 325p 375p	TDA4050 TDA4052 TDA4060 TDA4092	150p 500p 500p	TDA7350 TDA7359	300p 300p	TEA37170	P 160p	LIPC1513H	4 70r	L 2SA1020	30p 35p 60p	2SA1385	120p 180p 400p	2SB1068	40p 160p 180p	2SC1360 2SC1364 2SC1368	70p 25p 75p
TC9176P TC9177P	500p 225p	TDA2170 TDA2220	1300p 200p	TDA4092 TDA4100 TDA4173A	250p 150p F 325p	TDA7361	700p 175p 325p	TEA5040	135p 650p 175p	UPC1514CA UPC1515CA UPC1520CA UPC1521HA	4 250; 4 250; 4 120;	25A1029	90p 60p	2SA1387 2SA1396	75p 120p	2SB1098 2SB1099	80p 75p	2SC1382 2SC1383	40p 25p
TCA9940 TCEP100 TD62308A	100p 100p P 200p	TDA2270 TDA2320 TDA2501	250p 80p 300p	TDA4180 TDA4190	145p 180p	TDA7374V	350p 140p 225p	TEA5110	175p	UPC1536C 2SA329 2SA467	550; 76; 40;	2SA1037	60p 50p 40p	2\$A1400	25p 150p 30p	25B1123	40p 50p 50p	2SC1384 2SC1393 2SC1394 2SC1398	20p 20p 15p
TD62382 TD62506 TD62705	200p 200p 250p	TDA2502 TDA2503 TDA2504	175p 200p 200p	TDA4200 TDA4210 TDA4260 TDA4280	300p 160p 250p	TDA8116	200p 350p	TEA5116 TEA5170	220p 200p	2SA473 2SA483	29p 90p	2SA1048 2SA1051	25p 300p	2SA1428 2SA1441	35p 110p 110p	2SB1134 2SB1135	65p 60p 45p	25C1399	55p 100p 50p
TD6304AP TD6306P	300p 350p	TDA2505 TDA2506	220p 400p	TDA4280 TDA4282 TDA4283	320p 360p 450p	TDA8124	400p 250p 225p		325p 225p 150p	2SA484 2SA489 2SA490	80 50 45	2SA1060 2SA1061	300p	2SA1443 2SA1450	130p 30p	2SB1143 2SB1151	40p 75p	2SC1403 2SC1407	500p 50p
TD6350P TD6359P TDA1001	200p 300p 200p	TDA2507 TDA2507T TDA2510	450p 450p 450p	TDA4290 TDA4400	125p	TDA8135 TDA8136	225p 225p	TEA5560 TEA5570	130p 85p	2SA493 2SA495 2SA496	25 40 30	2SA1069 2SA1073		2SA1462	40p 25p 100p	2SB1163	400p 370p 60p	1 2SC1419	150p 50p 700p
TDA 1002 TDA 1003 TDA 1005A	200p 150p 175p	TDA2514A TDA2515 TDA2530	500p 450p 300p	TDA4420 TDA4421 TDA4426	120p 300p 170p	TDA8138	200p 200p 130p	TEA5581	165p 200p 200p	2SA505 2SA509	120 35	2SA1077 2SA1080	300p	2SA1475 2SA1488	95p 150p	2SB1182 2SB1185	40p 60p 45p	2SC1431	50p 400p 275p
TDA1010A	80p 75p	TDA2532 TDA2540	100p 150p	TDA4427	200p	TDA81386		TEA5620 TEA5630	300p 225p 750p	2SA539	170; 20; 650	p 2SA 1082		2SA1490	300p 225p 300p	2SB1203 2SB1204	45p 45p	2SC1445 2SC1446	350p 55p
TDA 1012 TDA 1013A TDA 1015	120p 110p 85p	TDA2542	70p 110p 210p	TDA4437	100p 125p 220p	TDA8143	160p	TEA5701 TEA6000	650p	2SA550 2SA562	150 30	2SA1084 2SA1085	100p	2SA1492 2SA1493		2SB1223	40p 60p 40p	2SC1449	70p 120p 200p
TDA1016 TDA1020	140p 110p	TDA2544 TDA2545	200p	TDA4440 TDA4442	180 240 250	TDA8146 TDA8160	200p 125p 170p	TEA6200	350p 225p 500p	2SA571	15 650 100	p 2SA1093		2SA1516 2SA1519	280p	2SB1274 2SB1282	40p 300p	2SC1454 2SC1470	250p
TDA 1022 TDA 1023 TDA 1024	330p 130p 150p	TDA2548 TDA2549	200p 300p	TDA4445 TDA4450	220p 225p	TDA8172 TDA8173	200p	TEA6310	T 425p	2SA606 2SA608	200 15	p 2SA1095 p 2SA1096	300p) 2SA1535	175	2SB1375	40p 45p 350p	2SC1473	40 15 45
TDA1025 TDA1028	320p 175p	TDA2555 TDA2556	175p 230p	TDA4452 TDA4453	250; 275; 280;	TDA8175	200p 300p 650p	TEA6420	B 525p 360p 125p	2SA628	150 20 50	p 2SA1103 p 2SA1104	130	2SA1540 2SA1598	50 ₁ 220 ₁	2SB1468	100p	2SC1501 2SC1505	70; 55;
TDA1029 TDA1035 TDA1038	200p 160p 500p	TDA2558 TDA2574V	225p 400p 350p	TDA4481	215 200	TDA81799 TDA8185	5 750p	TL431	45 100 40	2SA636 2SA639	50 60 60	p 2SA1105 p 2SA1106	250 ₁	2SA1600	250	2SC380 2SC388A	25p 10p 25p	2SC1509 2SC1514	45 ₁ 35 ₁ 35 ₁
TDA1041E TDA1041F TDA1044	250p	TDA2575A TDA2577A	100p	DA4501	300 280 400	1 TDA8191	200; 425; 200;	TLO64	80p 38p	2SA642 2SA643	· 50 25	p 2SA1112 p 2SA1115	150 ₁	2SA1625 2SA1626	40i 90i	2SC394 2SC403	60 25 15	2SC1515 2SC1520	60 45 110
TDA1047 TDA1048	200p	TDA2579A	210p	TDA4503	325 ₁ A 300 ₁	TDA8196	120p	TLO74	80 55 70	2SA673 2SA677	15 35 26	p 2SA1123	40 ₁	2SA1652 2SA1667	70 175	2SC458 2SC460	10p 10p	2SC1545 2SC1567	120 40
TDA 1053 TDA 1054 TDA 1057	300p 180p 60p	TDA2591	170; 110; 150;	TDA4505	K 450 ₁ M 1000	TDA8214 TDA8215	B 225	TMP47C-4	34N 1250 800	2SA683 2SA684	25 25	p 2SA1127 p 2SA1133	50) 120)	2SA1668 2SA1671	180 310	25C495	15) 45) 25)	2SC1569	35 55 40
TDA10598	B 40p	TDA2593	80; 300;	TDA4510 TDA4532	200 200	TDA8217	225 250 400	TPU2735 UC3524	500	2SA705 2SA706	100 70 140	p 2SA114	200	2SA1680 2SA1706	40 25	2SC497 2SC515	85i 100i	2SC1571 2SC1573	50 25
TDA1062 TDA1068 TDA1072	140p 75p 150p	TDA2595 TDA2600	200; 400; 100;	TDA4556	370 200	D TDA8305 D TDA8340	500 150	UC3843	125 ₁	2SA708 2SA711	50 280	p 2SA1143 p 2SA1145	15 40	2SB175 2SB324	45 40	2SC535 2SC536	30) 20) 100)	2SC1576 2SC1580	550 600 25
TDA1074 TDA1077	280p 250p	TDA2616 TDA2630	250 300	TDA4560	270 150	TDA8341 TDA8349	250 A 350	UPC20C	220 130 60	2SA715 2SA719	50 50 20	p 2SA115	1 30	p 2SB474 p 2SB492	150 250 80	2SC619 2SC641	100	2SC1586 2SC1617	540 340
TDA1082 TDA1083 TDA1085	275; 95; 170;	DA2653A	350 350 200	DA4568	225 200	D TDA8351 D TDA8360	200 N3 800	DPC556F DPC571	1 80 220	2SA725 2SA726	80 20	p 2SA115	3 30 4 22	p 2SB511 p 2SB525	55 65 130	p 2SC647	10 300 250	2SC1623	50
TDA1087 TDA1092	60; 100;	TDA2658	300; 150;	TDA4580	400 200	p TDA8361 p TDA8362A	N3 900 N 1200	DPC574	2 90 64	2SA740 2SA742	16 90 450	p 2SA116	2 30 3 15	p 2SB531 p 2SB536	400 80	p 2SC683 p 2SC708	35 100	p 2SC1626 p 2SC1627	55 15
TDA1097 TDA1151 TDA1154	475 40 50	D TDA2710-	200	D TDA4601	120 190	D TDA8366N	12 1500 A 1650	D UPC592 D UPC595	95 190	2SA747A 2SA748	425 60	p 2SA116	9 500 0 500	2SB537 2SB544	90 22 45	p 2SC711	15 15 350	p 2SC1634 p 2SC1667	50 450
	85		200	TDA4610					190	2SA764	200	p 2SA117 p 2SA117			50	- 1200730	40		100

GRANDATA LTD

Tel: 0181 900 2329 Fax: 0181 903 6126

						JA	PAI	NESI	ET	RA	NSI	STO	DRS						
Part	Price		Price	Part	Price		Price		Price		Price	17	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	150p 60p			2SK312	750p
2SC1683 2SC1684	100p 30p	2SC2270 2SC2271	60p 25p	2SC2724 2SC2738	15p 200p	2SC3269 2SC3270	50p 50p	2SC3808	70p 80p	2SD291 2SD313	250p 25p	2SD889 2SD892A	35p 75p	2SD1330	50p 70p	2SD1765 2SD1769	70p 110p	2SK315 2SK320	70p 120p
2SC1685 2SC1729	30p 900p	2SC2274 2SC2275	15p 50p	2SC2749 2SC2750	350p 300p	2SC3271 2SC3277	75p 280p	2SC3831 2SC3832	250p 135p	2SD315 2SD325	75p 30p	2SD894 2SD895	35p 100p	2SD1348 2SD1350	65p 150p	2SD1773 2SD1776	100p 100p 70p	2SK323 2SK332	130p 175p
2SC1730 2SC1735	10p 70p	2SC2278 2SC2283	70p 700p	2SC2751 2SC2752	270p 75p	2SC3279 2SC3280	30p 200p	2SC3833 2SC3851	250p 100p	2SD330 2SD348	65p 300p	2SD896 2SD898B	200p 225p	2SD1376 2SD1378	60p 60p	2SD1783 2SD1785	70p 160p	2SK359 2SK363	40р 50р
2SC1740 2SC1741	10p 35p	2SC2290 2SC2291	1800p 40p	2SC2767 2SC2769	300p 400p	2SC3281 2SC3284	200p 600p	2SC3852 2SC3853	80p 220p	2SD350 2SD357	320p 40p	2SD900 2SD905	400p 450p	2SD1379 2SD1380	100p	2SD1789 2SD1796	210p 120p	2SK364 2SK367	40p 40p
2SC1755 2SC1756	90p 35p	2SC2298 2SC2307	35p 300p	2SC2773 2SC2774	700p 500p	2SC3293 2SC3298	85p 50p	2SC3855 2SC3857	220p 500p	2SD358 2SD359	40p 50p	2SD916 2SD917	130p 300p	2SD1382 2SD1384	60p 50p	2SD1798 2SD1802 2SD1806	75p 75p	2SK369	30p
2SC1758 2SC1760	30p 70p	2SC2308 2SC2312	10p 300p	2SC2785 2SC2786	40p 20p	2SC3299 2SC3300	120p 400p	2SC3858 2SC3866	550p 275p	2SD361 2SD362	100p 100p	2SD921 2SD923	320p 360p	2SD1390 2SD1391	350p 250p	2SD1812 2SD1815	45p 50p	2SK373 2SK374	40p 45p
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	2SK386 2SK389	600p 115p
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	2SK400 2SK405	700p 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
2SC1819 2SC1826	70p 60p	2SC2315 2SC2329	175p 480p	2SC2812 2SC2814	40p 40p	2SC3317 2SC3326	350p 50p	2SC3885A 2SC3886A	290p 275p	2SD389 2SD400	60p 14p	2SD965 2SD970	35p 170p	2SD1400 2SD1402	280p 120p	2SD1850 2SD1853	325p 40p	2SK423	500p 75p
2SC1827 2SC1829	60p 500p	2SC2230 2SC2331	300p 50p	2SC2824 2SC2825	75p 900p	2SC3327 2SC3328	60p 50p	2SC3890 2SC3892A	150p 250p	2SD401 2SD402	50p 120p	2SD972 2SD973	40p 60p	2SD1403 2SD1405	225p 80p	2SD1856 2SD1857	40p 75p	2SK427 2SK430	50p 200p
2SC1833 2SC1834	27p 50p	2SC2333 2SC2334	200р 80р	2SC2826 2SC2827	200p 130p	2SC3330 2SC3331	20p 25p	2SC3893 2SC3895	225p 325p	2SD414 2SD415	45p 55p	2SD973A 2SD982	70p 90p	2SD1406 2SD1407	60p 60p	2SD1858 2SD1863	40p 35p	2SK511 2SK513	450p 325p
2SC1841 2SC1844	12p 50p	2SC2335 2SC2336A		2SC2832 2SC2834	300p 280p	2SC3333 2SC3345	120p 100p	2SC3896 2SC3897	400p 400p	2SD424 2SD426	350p 150p	2SD985 2SD986	120p 120p	2SD1408 2SD1409	125p 170p	2SD1864 2SD1877	85p 175p	2SK526 2SK531	160p 350p
2SC1845 2SC1846	15p 35p	2SC2344 2SC2347	150p 35p	2SC2837 2SC2839	250p 40p	2SC3346 2SC3352	130p 200p	2SC3907 2SC3927	250p 250p	2SD427 2SD438	350p 35p	2SD998 2SD1010	70p 40p	2SD1411 2SD1412	85p 75p	2SD1878 2SD1879	160p 275p	2SK534 2SK537	700p 900p
2SC1847 2SC1855	45p 85p	2SC2353 2SC2360	120p 120p	2SC2853 2SC2873	70p 60p	2SC3353 2SC3355	280p 50p	2SC3940 2SC3943	40p 75p	2SD467 2SD468	15p 15p	2SD1012 2SD1020	40p 40p	2SD1413 2SD1415	60р 190р	2SD1880 2SD1881	360p 350p	2SK538	350p
2SC1856 2SC1865	25p 700p	2SC2361 2SC2362	150p 50p	2SC2877 2SC2878	120p 20p	2SC3356 2SC3358	120p 50p	2SC3944 2SC3950	80p 120p	2SD471 2SD476	20p 100p	2SD1021 2SD1022	120p 250p	2SD1417 2SD1425	75p 260p	2SD1884 2SD1886	300p 300p	2SK539 2SK544	1100p 30p
2SC1870 2SC1871	700p 425p	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	2SK552 2SK553	250p 225p
2SC1875 2SC1881	220p 70p	2SC2371 2SC2373	25p 210p	2SC2883 2SC2898	60p 200p	2SC3378 2SC3379	120p 1200p	2SC3964 2SC3972	100p 250p	2SD545 2SD549	18p 120p	2SD1027 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	2SD1910 2SD1911 2SD1913	300p 50p	2SK557	400p
2SC1904 2SC1906	125p 15p	2SC2407 2SC2408	110p 120p	2SC2910 2SC2911	25p 80p	2SC3393 2SC3397	80p 20p	2SC3987 2SC3996	160p 600p	2SD555 2SD556	500p 225p	2SD1046 2SD1047 2SD1051	180p 130p	2SD1433 2SD1438	300p 60p	2SD1913 2SD1929 2SD1930	50p 50p	2SK559 2SK560	600p 580p
2SC1907 2SC1909	20p 250p	2SC2412K 2SC2440		2SC2912 2SC2921	120p 650p	2SC3399 2SC3400	50p 35p	2SC3997 2SC3998	1250p 800p	2SD558 2SD560	200p 50p	2SD1051 2SD1055 2SD1060	60p 130p	2SD1439 2SD1441	165p 220p	2SD1930 2SD1933 2SD1939	45p 60p	2SK566 2SK606	475p 70p
2SC1913 2SC1914	90p 30p	2SC2458 2SC2459	10p 50p	2SC2922 2SC2923	480p 75p	2SC3401 2SC3402	50p 40p	2SC4006 2SC4020	100p 150p	2SD571 2SD575	20p 530p	2SD1062 2SD1063	150p 200p	2SD1442 2SD1445	80p 200p	2SD1941 2SD1944	350p 50p	2SK612 2SK684	80p 950p
2SC1921 2SC1922	15p 175p	2SC2466 2SC2486	55p 275p	2SC2928 2SC2929	550p 280p	2SC3405 2SC3409	130p 400p	2SC4023 2SC4029	325p 350p	2SD592 2SD596	25p 25p	2SD1064 2SD1065	250p 160p	2SD1446 2SD1450	300p 60p	2SD1958 2SD1959	80p 210p	2SK685 2SK699	1150p 100p
2SC1923 2SC1929	10p 180p	2SC2492 2SC2470	50p 65p	2SC2934 2SC2937	75p 250p	2SC3416 2SC3417	30p 90p	2SC4043 2SC4046	45p 40p	2SD600 2SD601	30p 40p	2SD1069 2SD1073	150p 350p	2SD1451 2SD1452	200p 275p	2SD1978 2SD1984	50p 60p	2SK719	300p
2SC1940 2SC1941	110p 27p	2SC2481 2SC2482	120p 20p	2SC2939 2SC2944	400p 300p	2SC3419 2SC3420	120p 80p	2SC4056 2SC4059	200p 400p	2SD602 2SD612	60p 50p	2SD1088 2SD1094	150p 375p	2SD1453 2SD1455	140p 250p	2SD1991 2SD1994	50p 200p	2SK724 2SK725	500p 550p
2SC1942 2SC1944	350p 350p	2SC2483 2SC2484	120p 185p	2SC2958 2SC2962	50p 800p	2SC3421 2SC3422	45p 75p	2SC4064 2SC4106	140p 150p	2SD613 2SD617	70p 300p	2SD1110 2SD1111	225p 20p	2SD1457 2SD1458	165p 50p	2SD1996 2SD2006	45p 75p	2SK726 2SK727	425p 475p
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	2SK739 2SK758	400p 300p
2SC1947 2SC1953	450p 45p	2SC2498 2SC2500	50p 25p	2SC2988 2SC2995	150p 60p	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	800p
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	2SK791 2SK792	225p 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 2SC1972	400p 600p	2SC2534 2SC2535	150p 300p	2SC3026 2SC3030	450p 300p	2SC3468 2SC3481	70p 300p	2SC4199 2SC4204	400p 60p	2SD669 2SD673	35p 350p	2SD1159 2SD1160	65p 150p	2SD1509 2SD1511	100p 75p	2SD2151 2SD2255	175p 175p	2SK796 2SK809	600p 850p
2SC1973 2SC1975	150p 120p	2SC2538 2SC2540	100p 1900p	2SC3037 2SC3038	125p 125p	2SC3482 2SC3486	275p 275p	2SC4231 2SC4235	250p 300p	2SD676 2SD717	250p 180p	2SD1163A 2SD1164		2SD1519 2SD1521	250p 70p	2SD2331 2SD2333	250p 150p	2SK812 2SK817	150p 325p
2SC1980 2SC1983	30p 75p	2SC2542 2SC2545	300p 55p	2SC3039 2SC3040	80p 260p	2SC3502 2SC3503	50p 50p	2SC4236 2SC4237	450p 500p	2SD718 2SD722	85p 240p	2SD1168 2SD1169	270p 280p	2SD1525 2SD1526	450p 100p	2SD2340 2SJ48	225p 425p	2SK851	550p
2SC1984 2SC1985	150p 100p	2SC2546 2SC2547	25p 65p	2SC3042 2SC3052	300p 30p	2SC3504 2SC3505	120p 240p	2SC4242 2SC4278	120p 175p	2SD725 2SD726	200p 275p	2SD1173 2SD1185	350p 280p	2SD1541 2SD1545	350p 275p	2SJ56 2SJ74	700p 60p	2SK872 2SK875	650p 475p
2SC1986 2SC2001	100p 15p	2SC2550 2SC2551	50р 70р	2SC3057 2SC3068	150p 60p	2SC3506 2SC3507	250p 650p	2SC4288A 2SC4300	650p 200p	2SD731 2SD732	250p 250p	2SD1186 2SD1189	400p 55p	2SD1546 2SD1548	350p 400p	2SJ76 2SJ77	220p 350p	2SK903 2SK904	500p 500p
2SC2002 2SC2003	20p	2SC2552 2SC2553	60p 200p	2SC3070 2SC3071	35p 25p	2SC3509 2SC3514	750p 170p	2SC4301 2SC4304	300p 225p	2SD734 2SD741	15p 120p	2SD1191 2SD1192	120p 90p	2SD1554 2SD1555	170p 150p	2SJ79 2SJ103	225p 75p	2SK951 2SK952	275p 275p
2SC2004 2SC2022	20p 110p	2SC2555 2SC2562	120p 90p	2SC3073 2SC3074	100p 200p	2SC3518 2SC3519	120p 250p	2SC4313 2SC4381	600p 150p	2SD743 2SD757	130p 120p	2SD1196 2SD1197	150p 150p	2SD1556 2SD1565	225p 75p	2SJ109 2SJ113	200p 1050p	2SK955 2SK956	450p 400p
2SC2023 2SC2026	30p	2SC2568	200p 120p	2SC3075 2SC3077	150p 120p	2SC3526 2SC3528	45p 750p	2SC4382 2SC4386	200p 275p	2SD760 2SD762	70p 100p	2SD1198 2SD1207	60p 40p	2SD1571 2SD1572	170p 100p	2SJ114 2SJ116	1150p 1200p	2SK962	700p
2SC2027 2SC2036	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	2SK1023 2SK1036	550p 450p
2SC2037 2SC2053 2SC2055		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
2SC2058 2SC2060	20p	2SC2579 2SC2580 2SC2581	110p 175p 225p	2SC3114 2SC3116 2SC3117	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 450p
2SC2060 2SC2061 2SC2068	75p	2SC2588 2SC2588 2SC2590	600p 40p	2SC3117 2SC3122 2SC3148	120p 50p	2SC3591 2SC3595 2SC3597		2SC4468 2SC4517	250p 200p	2SD784 2SD786	650p 100p	2SD1227 2SD1229	40p 250p	2SD1591 2SD1593	310p 125p	2SJ307 2SK19	175p 45p	2SK1102 2SK1117	375p 250p
2SC2071 2SC2073	140p	2SC2591 2SC2592	50p	2SC3149	145p 180p	2SC3599		2SC4517A 2SC4531	225p 450p	2SD787 2SD788	20p 30p	2SD1237 2SD1238	300p 300p	2SD1595 2SD1608	70p 210p	2SK33 2SK40	40p 50p	2SK1118 2SK1120	225p
2SC2075 2SC2078	60p	2SC2603 2SC2610	10p	2SC3150 2SC3151 2SC3152	100p 175p	2SC3600 2SC3606	100p	2SC4532 2SC4542	1000p 400p	2SD789 2SD792	20p 400p	2SD1244 2SD1246	25p 20p	2SD1609 2SD1632	45p 320p	2SK55 2SK68	100p 100p	2SK1190	550p 350p
2SC2078 2SC2085 2SC2086	100p	2SC2611 2SC2611 2SC2621	30p	2SC3152 2SC3153 2SC3156	130p 175p	2SC3607 2SC3608	150p 65p	2SC4742 2SC4744	275p 350p	2SD794 2SD795A	33p 140p	2SD1247 2SD1251	40p 180p	2SD1637 2SD1647	50p 40p	2SK73 2SK97	75p 200p	2SK1191 2SK1217	800p 700p
2SC2092 2SC2094	100p	2SC2625 2SC2626	190p	2SC3156 2SC3157 2SC3158	350p 200p	2SC3616 2SC3636	280р	2SC4745 2SC4747	550p 375p	2SD798 2SD799	175p 150p	2SD1254 2SD1263		2SD1649 2SD1650	260p 150p	2SK106 2SK107	40p 40p	2SK1221 2SK1275	200p 275p
2SC2097 2SC2099	2300p	2SC2630 2SC2631	1800p	2SC3158 2SC3159 2SC3164	200p	2SC3642 2SC3657 2SC3659		2SC4757 2SC4762	200p 300p	2SD809 2SD811	45p 450p	2SD1264 2SD1265	55p 75p	2SD1651 2SD1656	150p 250p	2SK109 2SK117	150p 50p	2SK1296 2SK1299	350p 450p
2SC2118 2SC2120	1100p	2SC2632 2SC2634	35p	2SC3169 2SC3170	150p	2SC3659 2SC3668 2SC3675	120p	2SC4769 2SC4770 2SC4820	220p 250p	2SD819 2SD820	300p 250p	2SD1266 2SD1267	180p 55p	2SD1663 2SD1666	350p 50p	2SK118 2SK125	50p 100p	2SK1317 2SK1338	900p 250p
2SC2122A 2SC2131	300p	2SC2636 2SC2637	40p	2SC3170 2SC3173 2SC3175	180p	2SC3678 2SC3679	280p 140p	2SC4820 2SC4826 2SC4891	225p 70p 800p	2SD821 2SD822 2SD826	550p 290p	2SD1271 2SD1271A	55p 225p	2SD1667 2SD1668	120p 90p	2SK133 2SK147	650p 160p	2SK1341	500p
2SC2141 2SC2153	60p	2SC2640 2SC2653	1800p	2SC3178 2SC3179	125p	2SC3680 2SC3685	380p	2SC4923 2SC4924	400p	2SD826 2SD829 2SD826	30p 375p	2SD1272 2SD1273	200p 50p	2SD1669 2SD1677	85p 200p	2SK152 2SK161	40p 30p	2SK1342 2SK1350	500p 200p
2SC2166 2SC2168	80p	2SC2654 2SC2655	180p	2SC3180 2SC3181	175p	2SC3687 2SC3688	300p	2SC4927 2SC5002	250p 500p 300p	2SD836 2SD836A 2SD837	50p 50p	2SD1274 2SD1275 2SD1276		2SD1680 2SD1683	225p 45p	2SK163 2SK168	40p 40p	2SK1356 2SK1357	225p 350p
2SC2188 2SC2200	70p	2SC2656 2SC2660	550p	2SC3182 2SC3198	120p	2SC3692 2SC3715	150p	2SC5002 2SC5003 2SC5027	350p 100p	2SD837 2SD838 2SD841	55p 500p	2SD1276 2SD1277	190p	2SD1684 2SD1706	70p 325p	2SK170 2SK184	50p 35p	2SK1358 2SK1377	400p 150p
2SC2209 2SC2216	50p	2SC2665 2SC2668	200p	2SC3199 2SC3202	40p	2SC3717 2SC3729	120p	2SC5048 2SC5044	300p 250p	2SD841 2SD844 2SD850	110p 200p	2SD1279 2SD1288	600p 175p	2SD1707 2SD1708	400p 375p	2SK192 2SK193	45p 40p	2SK1400 2SK1404	250p 290p
2SC2221 2SC2228A	650p	2SC26671 2SC2681	100p	2SC3209 2SC3210	120p	2SC3746 2SC3747	100p	2SC5086	250p	2SD850 2SD856	48p	2SD1289 2SD1291	250p 280p	2SD1710 2SD1718	200p 275p	2SK195 2SK197	150p 140p	2SK1461	220p
2SC2229 2SC2230	15p	2SC2682 2SC2688	70p	2SC3211 2SC3212	220p	2SC3748 2SC3752	100p	2SC5129 2SC5148 2SC5149	300p 300p	2SD858 2SD863	23p	2SD1292 2SD1293		2SD1729 2SD1730	230p 275p	2SK212 2SK214	35p 170p	2SK1462 2SK1487	425p 250p
2SC2233 2SC2235	100p	2SC2690 2SC2694	60p	2SC3212 2SC3225 2SC3242	50p	2SC3781 2SC3782	150p	2SC5149 2SC5250 2SD188	300p 300p	2SD864 2SD866	200p 120p	2SD1297 2SD1302	20p	2SD1732 2SD1739	250p 180p	2SK216 2SK223	50p	2SK1507 2SK1529	300p 700p
2SC2236 2SC2237	20p	2SC2705 2SC2706	40p	2SC3244 2SC3246	45p	2SC3783 2SC3787	300p	2SD188 2SD198 2SD199	350p 140p	2SD866A 2SD867 2SD868	350p	2SD1306 2SD1308		2SD1740 2SD1748	125p 90p	2SK240 2SK241	140p 30p	2SK1537 2SK1544	400p 900p
2SC2238 2SC2240	45p	2SC2710 2SC2712	50p	2SC3259 2SC3260	350p	2SC3788 2SC3789	60p	2SD200 2SD201	195p 180p 260p	2SD868 2SD869 2SD870	260p 150p 140p	2SD1309 2SD1310 2SD1311	140p	2SD1756 2SD1758	275p 60p	2SK246 2SK300	30p 25p	2SK1767 2SK2038	275p 295p
2SC2258 2SC2259	30p	2SC2714 2SC2716	20p	2SC3261 2SC3262	230p	2SC3790 2SC3795	120p	2SD213 2SD234	250p	2SD871 2SD879	260p	2SD1311 2SD1313 2SD1326	1000p	2SD1760 2SD1761	80p 60p	2SK301 2SK303	40p	2SK2039	750p
					-256				300	-05013	oop	2001020	200p	2SD1762	50p	2SK304	25p	2SK2134	225p

ينحني والمتاث	REPLACI	EMENT VIDE		
7001			Model Price NVFS 100 5000p	Model Prio
105, 112, 115, 116, 120, 125, 126, 201,	VHSAN3 800p VHSAY3 1200p	HRD750, HRD830, HRD860 3300p HRD250, HRD257 2300p 3V32, 8942, HR7655 2200p	NVFS1 4850p	VHR120, 130, 14, 141, 143G, 14SP, 151, 15, 16, 171, 220, 23, 244, 274, VHR310,
), 301, 303, 304, VSP8,	VHSBH1, VHSCH1 2100p VHSBP1 850p VHSBY3 2600p	3V32, 8942, HR7655 2200p HRD180, 190, 230, 610, 3V59, FV12L, FV20B, 26, 30, 32, 33, VC141L 2050p	N.E.C. N9011, 9012, 9013E, 9014E, 9014G, 9015,	330, 4100, 4105, 4200, 430, 4300, 4400, 4500, 5080, 5100.
7100, VS9300, VS9500 650p	VHSD52 1600p	HRD370, HRD430, HRD470, 3V58, FV13H	9016, 901A, 902A, 9033, N9034, 9040, 9053, 9054, 9055, 9056, 9063, 9065, 9066, 906, 9077.	VHR\$200, \$600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800,
1 1250p	VHSEH2, VHSDH2 1600p VHSEY1, VHSEY2 1400p VHSFS1, VHSFS2 1300p	HRD530, HRD700, HRD840, HRD870, HRD910, FV14T, FV57H 3100p	N9096, DX1000, 1600, PX1200 1150p N911A, 914C, 915A, 916A, 917, 9110, 9120	7810, 8000SP, 8801SP, VHRD4400, 4410, 4500, 4600,
1200p 3 1350p 10 1350p	VHSFG2, VHSFG4, VHSF63, VHSFB3 1300p	GRC1, GRC2, 3 V41 2800 p BR9060, HRD330, 337, 440, 441, 637, 641,	2400p PVC600, 740, 744, 754, 763E, 764,	VHRD4610, 6700, 4800 3100 TLS2000 4250
P1 2100p	VHSTJ1, VHSTJ2, VHSTJ3, VHSWJ3, VHSYJ2 700p	660, 670, 720, 730, 740, 820 HRFC100, SR3300MS, FV44L 2100p	PV2300, 2400, 760, 794, 770, 774 1650p	VHR5300, VHR6500, VHR7400 4500 VHR3500EX 2150
, 766, 767, 768, 865, 867, -30, 33, 4, 400, 410, 420, 430, 440, 441,	VHSVH4, VHSWH1, VHSXH1, VHSYH2 1600p	HRD950, HRD960, HRD980, FV46 5000p	N380, N381, N830, N831, N832, N833, N834, N835, N836 700p	VHR16, 235, 335E, 4150, 4160, 4350, 7250, 7260, 8250 195 VTC3000 140
), 455, 480, 490, 497, G51, 54, 55, VXS450,	VHSWJI VHSXJ3 700p	HRS5000, HRS5500, 5800, 9000, FV395.BRS600, SRS368E 5550p FV22L 1400p	82611AH1 (FOR MODEL DX3000), DX4000, N9610, NS7000 3000p	SHARP VC390, VC393, VC496 275
S470 2250p 512, VS515, VS516 2250p	VS410, 415, 435, 450, 456, 460, 500, 505, 510, 520, 521, 530, 546 1600p	FV22L 1400p FV42 2600p VR182LV, VR202LV 1950p	N895 3150p N9052, N9530, DX2000 3400p	VC488 420 VC779 180
OH, 300, 301, 310,	BARCELONA, MVS5400, 440, 500, 600, SE5100, 6100, 6110, 9100	FV67HV, FV68TX, FV77 3800p R2000 SERIES 4500p	VCP1 1700p PVC2300, 2400, 740, 744, 760, 764 1400p	VC789, VC790 290 VC200, 220, 300, 381, 383, 384, 385, 38
F320, 330, 340, 350, VSG30, 34, 35 11, VS12 2300p	TVR4500, 4510, 5510, VS400, 440, 441, 500, 505, 510, 518, 600, 610,	FV61LV, FV62LV, FV67HV 4000p FV42L £101.00p	DS6000 3500p D5600 3500p	387, 388, 471, 477, 481, 482, VC483, 48 3300, 8381, 9100, 9300, 9400, 9500, 960
	VS5180, VS6190, 700, 900, 901, 902, 9091, GV200, 201, 2092, SE2100, 5110 1400p	VP160L, VR172L 1950p HRJ200, HRJ205 3300p	VH3, VH555, VH600, VH700, VH844, VH900.	9700 110 VC108, 208, 382, 402, 405, 408, 500, 55
1100, 1110, 650, VSF500, 510, 550, , 580, 590, 600, 650,	MADRID, SE5140, VS540, VS5480 3000p	HRJ600EG, HRJ600EK, HRJ605EG, HRJ605UK, HRJ610EK 7100p	VH1000 (ALL MODELS) 1100p VH1, VH2A 700p	571, 573, 581, 582, 583, VC5W20E, 600 651, 674, 681, 684, 6V3, 750, 780, 781,
360, 64, 65, VSG70, 73, 74, 75, (560, 580 3600p	MVS550, 620, VS550, 620, 630, 640, 790, 930, 940 2400p	HRJ300, HRJ305, HRJ315, HRJ316EG,HRJ318E 3750p	D1000, D1100 1600p D1000X, D1500X, D4500, VPCD100,	683, 684, 402, VC500, 571, 573, 580, 584, 600, 682, 69
55, VS165	VS120 2300p VS680, GV280 4600p	HRJ615, HRJ715, HRJ815 9200p HRJ400, HRJ405, HRJ407MS, HRJ41 OEK, HRJ415, HRJ416 5850p	D1200, D2000X, D5000 1600p VR6460, VR6520, 64VR60,	700, 772, 7810, 782, 7822, VC783, 8481 8581, VCA10, 100, 102, 103, 1031, 103, 104, 105, 106,
, 485, VSF10, 11, 180, 190 200, 210, 220, 221, 222, 230, 240, 260,	VS160, VS740 4400p VS170 4600p	MATSUI	VR6420 725p VR6711 4 HEAD 1800p	VCA111, 113, 116, 131, 140, 202, 203, 211, 234, 244, 254, 255, 30, 35, VCA40
, 262, 265, 270, 275, 280, 290, 510, 550, VSG20, 204, 205, 206,	MVS660, SE6160, VERONA, VS660, VS6690 3500p	VX500E, 800A, 810A, 820, 80A, 770B, 773B 1200p VCRL3, VX730, VX750 1450p	VR6440 2500p VR6441, VR6540, VR6541, VR6640, VR6642 1300p	VCB311N, 320, VCD801, 802, VCM73, VCT212, 310, 410, VCT510, 72, VCT13
G21, 211, 212, 215, G217EOG , 23, 24, 25, 405, 411, 415, VSP 100, 100FM, 110.	GRUNDIG MVS710, 720, 910, SE7120, 9120, VS710,	VX735, VX755, VX990 1500p VX735A, VX765, VX850 1750p	VR6642 1300p DV761, VR512, 522, 5229, 63SB7, VR6760, VR6761, VR6762, VR63SB7 7172	VCTS313 VC6000, 6200, 6300, 7300,
VSP 100, 100EM, 110, 88, 88KC, 8111, VSP9, VSR100, EDG, 100EM, 110, VSX400 1250p	716, 720, 800, 810, 910, 920, VS922, 9291, GV210, 211, 220, 2292,	VX600 1100p VX900 2650p	7200p VR6920 2750p	7700, 7750, 8000, 8300 18 VC793 30
1300p 109, VS603, VS606, VS607 2500p	MV2105, 2115, SE2120 1700p HINARI	MITSUBISHI HS303, HS304, HS320, HS700 1400p	41DV2, 4SB11BVR412, 415, 6485, 6490, 6880 1600p	VC473, VC785, VC786 22 VC699, VCA501, VCA602 28
5 2500p 65, VC967 3450p	VXL2, 3, 4, 20, 25, 35 VXL5, V20H 1050p	HS306, HS318, HS710 1400p HS307 2300p	VR6948 4850p 20DV1, 20DV2, 20RW7, 21DVI, 21DV2,	VC585, VC685 20 VC90ET 39 VFH815 28
400, 410, 420, 430, 440, 441, 455, 480, 490, 497, VSX450	VXL6 1200p VXL7 1300p	HS319 1900p HS330 2300p	21DV3, 2SB01, 02, 11, 12, 30DV2, 31DVI, 31DV2, 31DV3, 3SB02, 03, 05, 11, 12, 13,	VC800, VCH851, VCH852,
2850p 620, 204, 204, 205, 206, 20, 21, 211,	VXL8, 9, 10, 11, 19, 90, VCR34H, VTV 100, 200 1100p	HS400 2800p HS349, HSE27, 31, 32, HSB27,	68SB4, 71SB4, 86SBI, 91SB2, 92SB2, DV186, 190, 291, 292, 468, 471, VR201,	VCH882 27 VCH80, VCH81, VFH815 28 VCA33, VCA36, VCA43, VCA44, VCA4
, 215, 217, 225, 23, 24, 25, 2100, 110, 88, VSR100, 110, VSX400	HITACHI VT11, 14, 15, 16, 30, 33, 34, 330, 340, 503,	31, 32, HSM33, 34, 35, 37G 2150p HS411 1900p	202, 203, 2115, 212, 213, 223, 231, 232, 302, 303, 305, 311, 312, VR313, 3210, 3219, 322, 3229, 323, 501, 6180, 6182,	VCA49 16 VCA55, VCA63 22
1950p 3415, VSG415EA, VSG425 2800p	640, 5030, VTP10, 30 1000p VT7, VT17, VT18, VT19 2000p	HSE30, HSB30 2000p HS338 1900p	6185, 6290, 6291, VR6293, 6362, 6367,	VC570 28
75, VSA77 3500p F1000, VSF1010, VSF1030 5800p	VT35, VT350, VT38, VT39 2300p VT100, 110, 111, 112, 113, 115, 118, 120,	HSE10, HSE11, HSE20, HSE21, HSE41, HSB10, HSB20 2100p	VR3260, 6349, 6442, 663, 6448, 6449,	SONY DSR-19R FOR SL-T 9ME 31 DSR-21 R FOR SLC 8-C9 26
BA R3000, VCR4000, VCR5000, VCR6000	125, 128, 220, 225, 400, 405, VT410, 413, 414, 415, 416, 418, 510, 515,	HS300, HS301, HS302, HS310, HS273, HS550Q 1350p	6542, 6643 1250p VR601 1800p 49SB6, VR6548, VR6648,	DSR-35R FORC20, C30, C40, SLF1UB SLF1E2 PIN, SLC24PS, 33E, 34, 44PS
/10 1000p	517, 518, 520, 525, 526, VTM625, 626, 725, 210, 211, 215, 726,	HS200 650p HS337, HS347 1400p	VR6843 2750p	SLF11, 30PF, 35, 60PS, SLK85, SLT20ME, 30ME, SL100 1E
37000, 7800, 8000, 8800 1100p	727, 728, 820, 821, 825, 920, 921 1400p VT3000 650p	HSB12, HSE12, HSE22, HSM16G, 18, 23, 25, 30, MX1 2100p HSA11F7, HS411GZ 2600p	SAISHO VR100, 605, 705, 805, 905, 1000, 1100, 1200, 1600 1200p	DSR-43R FOR SLC7 RANGE, SL5000, SL5100, SL3000 1 PIN, SLC6E, SL36E
R4500, VCR5200, VCR9000, R1 900p	VT4000, VT4200, VT5000, VT5500, VT5600 1100p	HS411EZ, HS411GZ	1200, 1600 1200p VR3300X, VR3600X, VR3650X, VR3800 1400p	SL37E SL3000, SL8000, SL8080, SLC5E, SLT
R7000 1000p R1000, 2000, 6000, 61000, 62000,	VT77, 680, 6500, 6700, 6800, 7000, 8000, 8030, 8040, 8100, 8300, 8500	55, 57, 58, 60 3300p HSE51 3000p	VR3200, VR3500 1400p VR2000, VR3300, VR3600 1400p	SLV201, SLV202 20
00, 8602, 8700, 9005, DD8900, DD8904, R4 1100p R2, TVR3, VCR4600, VCR4600 MKII,	VT8700, 9000, 9300, 9500, 9700, 9900 1000p	HS410 3250p HS412. HS421GZ 4000p	VR2500 VR55000X, VX6000A, VXL12X 1500p	SLK95, SLT50ME 25 SLV275, SLV373VB, SLV410,
R2, TVR3, VCR4600, VCR4600 MKII, R400 1100p R8800, VCR8804, VCR9340 2100p	VT8, 9, 56, 57, 570, 575, 576, 580, 585, 588	HS5300, HS5424, HS5600 3050p HSM20, HSM55 2250p	SALORA 6500, 6600 1600p	SLV412, SLV427, SLV474 22 DSR49R, SLHF100P,
R8603, VCR8604, VCR8704, VCR8714 1350p	VT65 2400p VT130, 135, 138, 145, 250, 255, 258, 420,	HSM40 2850p HSM59. HSM68E 6050p	SV7300, SV8200, SV8300, SV9200 1500p	SLHF100UB 38 SLV656, SLV715, 725, 727, 757, SLV7 SLV815, SLV825 46
R9140, VCR9142 2550p R9340 3650p	425, 426, 428, 430, 431, 435 VT438, 535, 536, VTL30, 301, VTM630,	NV300, 322, 332, 333, 340, 390, 2000, 2010, 3000, 7000, 7200.7500, NV7800, 7200.7500, 8510, 8620	SV7400, SV8400 1600p SV8100 1200p	SLV815, SLV825 26 SLV353UB 26 CCDF340E, CCDF500E, CCDV90E,
R9244 3450p 5020, 22, VCR3000, 3002,	635, 636 1900p VT52, VT60, VT61E, VT62E, VT63, VT64, VT640 1100p	7850, 8170, 8200, 8400, 8600, 8610, 8620 625p NV777, NV330 1150p	SV900, SV9900 3450p SV601, SV611, SV6910 1500p	CCDV95E, CCDSP5E 48 SLV801, SLV802 35
00 1750p	VT168, VT150, VT260, VT450, VT498 (4 HEAD) 2200p	NV8050, NV8051 2800p	SV800, SV810 2800p SV6700, SV8710, SV8750 1500p	SLV310, SLV315, SLV325, SLV335
HP420, 510, 520, 530, 615, 618, 620, 2, 710, 711, 715, 716, 720,	VT530 2050p VT522, VTM212, 620, 622, 720, 722, 822,	460 465 470 480 650 1600p	623N, SV6800, SV6900, SV8850, SV8870, SV8970 1750p	SLV210, SLV212, SLV270, SLV273, SLV285, SLV300 11
HP721, 722, 730, 830, 905, 906, 907, 3, 910, 911, 915, 916, 918,	922, 925 1650p VT660E 2600p	AG6010 AG6015 2500p	SV88110, SV8910 2650p 823N, SV8920 3500p 923N 4500p	SLV125, 213, 225, 252, 255, 262, 280, SLVX1, 20, 3
HP5000, 5001, 5005, 5050, 75 1100p	VT570, VT575, VT580, VT585, VT588, VTF70 3100p	NV100, NV200, NV370, NV380, NV630 725p	SV8600, SV8700 1550p SV8420 2400p	SLV363, SLV416, SLVX50, SLVX55 23 SLVX75, SLVX90, SLVX95 30
53500, 7100, 7500, 7600, 9900, VBR330 1800p 57000, VBS7100, VBS9000 2000p	VT540, 545, 546, 548, VTD660, 665, VTM598, 640, 645, 646,	NVD80, NVH65 3400p AG5150, AG5250, NVF65, NVH75, NVH77	SV8620 2100p SV9300 2500p	SLVX75, SLVX90, SLVX95 SLV282, SLVX30, SLVX35 SLHF100P, SLHF100UB
HP500, 711, 715, 721, 722, 730, 830, 00, FVHD720 1100p	VTM730, 731, 735, 736, 740, 745, 746, 748, 753, 754, 830, 831, 835, 838, 840, VTM841, 845, 830, 831, 835, 838, 840, VTM841, 845, 830, 831, 835, 838, 840, 845, 845, 845, 845, 845, 845, 845, 845	3200p NVF51 4200p	SV8830 2200p SV8720 2250p	SLVE7, SLVE8, SLVE9 5: SLVE90 5:
4P725, FVHP830, FVHP980 2500p 4P990 2700p	VTM841, 845, 930, 931, 935 VTF770, 774, 775, 860, 861, 865 2600p	NVGI9 2300p NVJ30, NVHJ33, NVL10, 20, NVL21,	SV8520 1900p SAMSUNG	SLVE90 SLVE15, SLVE25, SLVE600, SLVE700 SLVE800
HP975 2400p HD407, FVHD140, FVHP1, FVHP10,	VT85, VT86, VT88 2600p VTF780, VTF785 4800p	NVSD30, 10EE, 11, 2, 30, 35 1450p	SV8500 1500p SVX301, VB900, 910, VVT510, VT320,	TOSHIBA V63 1
HP20 1150p HD230, FVHP1100, 1200, 130, 1340,	VTF180, VTF185, VTF280 8500 p VTF350, VTF351 5150 p	NVM1, NVM3, NVM5 4200p	5600, VX510, 511, 520.616, VX626, 627 717, 614, 619, 629, 710, 712, 720, 730,	V9680 V8600, V8650, V8700
10, 2000, 200, 210, 300, HP310, 410, 420 1800p	VTM220, VTM220E, VTM220UK 5150p VTS390E 5150p	NV430, NV431, NV433, NVSD2, NVSD22, NVSD25, NVSD3	970, 971, 972, SV716, 717, SVX303, 305, VB510, 520, 610, 616, 617, 619, 620, 626,	V21, V31, V32, V33, V50, V51, V52, V V9600
HD250, 270, 370, FVHP1500, FVHP250 2700p	J.V.C. & FERGUSON HR2200, 3300, 3320, 3330, 3350, 3360,	NV730, NV730F, NV770	627, 629, 710, 971, V1520, 616, 621, 626, 900, 910, 1200p	V55, V57 V71, V73, V74, V75, V77, V80, V81, V
HP132, 1400, 1440, 320,), 445 3550p HP470S, FVHP475HV 4800p	3660, 3750, 3860, 4100 3292, 8900, 8901, 8902, 8903, 8906, 8922,	NV366 1850p NV21 HQ, NV 180, NVD48 2000p	750, 751, 770, VB750, VK8220, VX750,	V83, V841V85, V86, V87, V88 1:
HP1250, FVHP430S 1950p	8928, 3V01, 3V06, 3V22 HR3660, 7600, 7610, 7650, 7700, HRD110,	NV7881 2500p NV810, NV8301 2400p	XR20 1900p V11560, VN1560, VN1561, VX1530,	DV90, 96, 97, NM3, V108, 109, 199, 200, 202, 205, 207, 209, 80,
0 3HSSDB, GHV121, RQ2011, 2031,	111, 120, 121, 220, 225, HRS100, 8904, 8923, 8924, 8925, 8929,	NV850, NV950 2750p NV870, NV890, NV970 3200p	VX1560, VX1561, VX1580 2200p PL30LR, PX3031, 31R, 32R, 990, 992, 991,	93, 94 1 V5470, V5480 1 V600 2
H51, GVH122, VCP4000, VCP4100,	8935, 8941, 8943, 8944, 3V16, 3V233V24, 3V31, 3V35, 3V36, 3V38, 3V39, 3V49	AG6024, NVG33, 46, NVL23, 25, 28, NVJ47,	PXP30, PXR30, VX 1260, SVX503, SX3230, 3231, 3260, 3261, VK30, 300,	V880MS 2 V700G 3
V1232, 1233, 1241, 1242, 1243, 1244, 15, 1246, 1266, 1290, 1291	3V39, 3V49 625p BR1600, HRD140, 141, 142, 143, 150, 152, 156, 157, 158, 160, 5101	49, 700PX, NVSD20EE, 400, 44, 45 NVG10, 11, 12, 14, 16, 120, NV250, 280,	1230, 1260, 1261, VK30R, 31R, 32R, VXK300, 301, 306, 320,	V500G, V509G V9680 2
V1295, 1296, 1891, 8210, 8215, 1221, 10, 1241, 1247, 1248, 2145	HRS10, 8947, 8948, 3V42, 3V44, 3V45, 3V46, 3V47, 3V52, 3V54,	450, 465 1500p NVG18 1800p	321, 326, 336 1900p S11230, 1240, SVX600, SX1230, 1231,	V300G, V301, V305, V306, V309G 2
P400, VCP4130, 4300, 4301, 4305, 16, 4310, 4311, 4315, 4316,	3V55, 3V56, 3V57 1150p HRD 154, 170, 171, 210, 211, 217, 310,	NVG20, 21, 22, 25, 28, 200, NVD48 1700p	7230, 7301 1900p	V61, V63 V110, V120, V130, V140, V210, V211
P4320, 4321, 4325, 4326 1100p 11, GHV1392P, 1393P, 19OOP, 1290,	320, 321, 350, 521, 522, 525, 526. HRD527, 540, 550, 560, 590, 770,	NVG50, NVG300 2000p NVG45 1450p	VTC5000, 5400, 600, 6000, 6010, 6500,	V212, V220, V221, V222 1
91PQ, 12931Q, 1295P, E1295PQ, GSE1296, 1297, 1891, 1910,	HRDX20, HRDX22, 8950, 8951, 3V64, 3V65, FV10, FVII, FV20, FV21, FV26	NVH70 3600p NV688 2400p	VPR5000, VTC 1500, VTCM 10, 11, 20, 21 VTCM25, VTC2000, 5100, 5150, 5300,	V711, V880 3
005, 2000, GSEC200, SEC205, 211, 2301, GSEG2301,	HRD565, HRD566, 3V48 2200p	NV600 1050p AG6800, AH6810, AG6820 2600p	5400, VTC5350, 5370, VTCNX10, VTCNX15, 20,	V65, V66, V6 1 V312, V322, V412 2 V91G 4
EQ12, 204, 20, 22, P416P, P500P JISY22, QUISY24, RC205P, RG11P,	HRD725, HRD755, 3V43, 3V53 8930, 8931, 8933, 8940, 3V29,	AG6100, AG6200, AG6300 2600p NVG7, NVG9, NV230 1050p	1800p VTC5500, 5550, 9100, 9300, 9350, 9355,	V609 V610V610B, V610UK, V611,
120, RG2001, RG20, 1204HP, RQ241, VCP100P,	3V30 700 0 8945 2400 0	NV780 2400p NVG 15, NVG400 2600p	1900p VHR1110, VHR1150, VHR1300, VHR1700,	V312, V403T, V413G
SEG10 1600p HV4400, 4400, GSE-Q404P, QUISY40, C405P 2350p	3V00, 8902, 8903, 8909, 8912, 8922 1000p	NVM7, NVMC20 3800F	VHR3200, 3270, 3100, 3110, 3150, 3300,	V703W, V813G 5 V95G 8
2350p SEQ121, RQ2011, RQ2031, D2051 1950p	FV31, FV41R 1500p FV37, FV43H, HRD860 3100p	NVSD40 2250;	VHR1500, VHR2500, VHR3330 2100 p	CDANDATALTO
.E.C.	BR7030/40H, BR7040 2600	NVF75, NVF77 4750; NVF55 4000; NVFS200, NVFS88, NVSF90,		UNANDATA LID
000H, 4001H, 4002H 1200p	PD6200 700r	NW8000 4600r	VHRD4710 2700p	TEL: 0181-900 232
4001H V4004 V4100 1200p		NVHD90 NVHD 100 NV HO 101 NVHF	VHR150E, 153, 154, 1501H, 240, 250, 251.	
4001H, V4004, V4100 1200p 4005H 1500p RANADA SI, DS2 1600p	HRD455 2000j HRD520 1400j	NVHD90, NVHD 100, NV HO 101, NVHF 100 3100; NVSD1 1400;	VHR150E, 153, 154, 1501R, 240, 250, 251, 27, 350, 474, 5350E, 7500, VHR7530, 7540, 8500SP, 8800, VHRD5350E, 5450E, 6550	FAX: 0181-903 612

	V	CR BELT KIT	2	
Model Price	Model Price	Model Price	Model Price	Model Pric
AKAI VP7100, VS9300, VS9500, VS9700, VS9800	TX3650, VCR3000, VCR3002, VCR9500 75p	406, 407, 4092, 410, GV411, 412, 414, 415, 416, 417, 4192, 4200, 420, 430, 434, 435.	N.E.C.	V1710, 730, 750, 970, VX710, 712, 720, 730,
120p	FISHER	GV437, 440, 450, 4592, 460, 464, 470, 500,	N830, N831, N832, N833 100p N895 80p	970, 971, 972 100 VX9880 110
VS1, VS2, VS3, VS5, VS12, VS15, VP88 70p	VBS7000 245p	501, 5050, 5095,	PVC2300, PVC2400 180p	VX9880 110 SX7121 95
VS10 65p	VBS9000 120p	GV5105, 511, 530, 5395, 540, 560, 5695, MV4005, 4105, SE4100, 4104, 4120, 5102,	DX1000, 1600, 1800, 2000, 3000, N9012, 9013	SANYO
VSX9, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 240, 244, 245, 247,	FVHP520, FVHP530, FVHP420 60p	5104, 5106, TVR37001 70p	9014, 9016, N9033, 9034, 9053, 9054, 9055, 9056, 9066, 9096, 9110, 9120,	VTC5000, 5150, 6000, 6500, VTCM10, 11, 20,
248, 250, 512, 515,	FVHP615, 618, 620, 622, 710, 711, 715, 720, 721, 722, 725, 730.	HINARI	N9510, 9520, 9530, 9610 SOp	21, 30, 31, 50 65 VTC5300, VTC5350, VTC5400.
516 200p	FVHP830, 840 60p	VXL2 80p	NATIONAL PANASONIC	VPR5800 80
VS22, VS23, VS25, VS35, VS37, VS38, VS53,	FVHP905, 906, 907, 908, 910, 911, 915, 916,	VXL7, VXL8, VXL9, VXL10, VXL11, VXL19,	NV300, NV330PX, NV332, NV333 NV340,	VTC5500 70
VS55, VS66 80p VS4, VS6, VS8, VS9 95p	918 75p	VXL90, VCR34, VTV 100, 200 100p	NV366 100p NV777, NV788 100p	VTC9100, VTC9300 140
VSA77 120p	VBR330, VBS7500, VBS7600, VBS9900 100p	VXL4, VXL35, VTV300 70p	NV2000, NV2010, NV3000 80p	VTC1100, 1300, 1500, VHR1100, 1110, 1150, 1200, 1300.
VSS99 105p	VBS9900 100p VBS3500 75p	VXL5, VXL6 100p	NV7000, NV7200, NV7800 75p	VHR1500, 2370, MVR220 80
ALBA	FVHD140, FVHD40, FVHD55, FVHP1, FVHP10,	VXL3, VXL20 90p	NV8600, NV8610, NV862 145p NV230, 250, 280, 430, 431, 433, 450, 460, 465,	VHR2100, VHR2300, VHR2500,
VCR40000 130p	FVHP20 110p	HITACHI	470, 650, 730, NV770, 810, 870, 890, 970, AG	VHR2700 100 VHR3100, 3110, 3150, 3300, 3310, 3400, 3500, 370
VCR5000, VCR6000 105p VCR161, VCR222 100p	FVHD230, 250, 270, 370, FVHP1100, 1200, 1250, 130, 132	VT11, 14, 16, 17, 19, 33, 330, 34, 35, 350, 38, 39, 88, 165, 5030 75p	1000, 1050 85n	3800, VHRD500, 700, TLS1000, TLS1001 65
VCR161, VCR222 100p VCR3000X, VCR4000, VCR4000X 75p	FVHP1340, 1400, 1410, 1440, 1500, 2000, 200,	VT5000, VT5500, VT18 120p	NV370, NV380, NV480, NV630, NV780,	VHR120, 130, 14, 141, 143, 14, 150, 151, 153,
VCR7000, VCR7800, VCR8000, VCR8800 110p	210, 250, 3, 300,	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
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	VT9700, 9900 75p	400, NVH70 50p	VHR4770, 5080, 5100, 5200, 5300, 5350, 5700
TVR123, VCR4600, VCR4700,	FVHP5000, 5005, 5050, 5075, 5100, 975, 980, 990	VT52, VT57, VT61, VT62, VT63, 64, 65, 85, 86.	NVFV1, NVM10, 3000, 3300, 40, 7, 9000, 9900, NVMS1, 4	6850, 7100, VHR7200 7250, 7260, 7300, 7400, 7500, 7520, 7530, 7530, VHR7540, 7700, 774,
VCR3200 BUP	990 95p G.E.C.	640 60p	NVM 1, NVM3, NVM5 70p	7800, 7810, 8000, 8100, 8200, 8250,
	4005 150p	VT3000 120p VT100, 110, 111, 113, 115, 118, 120, 125, 128,	PHILIPS	8500, VHR8800, 8801, VHRD4400, 4410, 4500,
3603, 8604,	V4004 100p	130, 135, 138,	VR6460, VR6920 170p	4600, VHRD4610, 4710, 4890, 6700 601
/CR8700, 8704, 8714, 8800, 8804, 9000, 9005,	V4007 80p	VT145, 150, 168, i70, 175, 220, 225, 250, 255,	VR6540 100p	VMD66, VMD68P 80 VTR1000 70
9244, 9340,	GOLDSTAR	258, 260, VTL30 60p	VR6442, VR6542 70p VR2025, VR2580 100p	VTR1000 70 ₁ VTC6010 75 ₁
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, 75p	1244, 1245, GHV1246, 1247, 1248, 1250, 1266, 51, 8000,	J.V.C. HR3300, HR3330, HR3360, HR3660,	761, VR201, 202, 203, 211, 2115, 212, 213, 223.	VC200, 381, 384, 385, 386, 388, 390, 393, 838,
, op	8200, 8210, 8215,	HR4100 130p	311, 312, 313, 3210, 3219, 322, 32, 29, 323, 535, VR20DV1, 20DV2, 20RW7, 21DV1, 21DV2,	9100, 9300, 9500, VC9700 801 VC7300, VC7700, VC7750, VC7800.
BLAUPUNKT	VCP4100, VCP4130 80p	HR7200, HR7300 50p	21D. V3. 25BO1. 25BO2. 11. 12. 302. 303. 305	VC8000 110
TV100 200p	GHV1290, 1291, 1295, 1296, VCP4000, 4200,	HR7350, HR7600, HR7610, HR7650,	31DVI, 31DV2, 31D, V3, 3SB11, 3SB12, 3SB13,	VC8300 115
	4300, 4301,	HR7655 50 p HR7700 50 p	72SB8, VR30DV2, 35BO2, 35BO3, 635B7,	VC300, 387, 471, 473, 481, 482, 483, 486, 488,
	VCP4305, 4306, 4310, 4311, 4315, 4320, 4321, 4325, 4326	HR7700 50p HRD110, 111, 120, 121, 220, 225,	715B4, 715B5, 715B8, VR865B2, 915B2, 925B3, VR6180, 6182, 6185, 6285,	496, 8481 80; VC402, 500, 571, 573, 581, 582, 583, 584, 585,
	4325, 4326 120p GRANADA	BP5000 60p	6290VR6291, VR6293, 6362, 6367,	VCSF3, VC8581 Ror
	VHSH1, VHSAH3 100p	HRD140, 141, 143, 150, 152, 157, 158, 160,	VR6390, 6391, 6393, 6467, 6468, 6470, 6561,	VC108, 405, 408, 550, 600, 651, 674, 681, 682,
	VHSVH4, VHSWH1, VHSXH1 60p	190, 250, 257, 310, HRD455, 565, 566, 725, 755, HRP50 45p	6570, 6581, 6670, VR6676, 6710, 6760, 6761, 6762, 6870, 6970, 6975, VR68SB4, 86SBI,	682, 684, 685, 693
RTV324, RTV32565p	VHSYH2 50p	HRD170, 171, 180, 210, 21 1, 217, 230, 300,	92SB3 75p	VC700, 750, 783, VC6F3, VC6V3 70, VC208, 671, 772, 779, 780, 781, 782, 785, 786,
	VHSBH1, VHSCH 1 150p	320, 321, 330, 337, HRD350, 370, 400, 430,	VR445B9, VR445B920, VR445B922, VR6443,	787, 793, 800, VC7810, 7822, VCA100, 102,
	VHSBP1 135p VHSAN3 110p	440, 44 1, 500, 530, 700, 750.950,	6843, 6843, VR6943 100p VR3260, 6349, 6448, 6449, 6548, 6648,	103, 104, 131, 140, 170, 202, 03, VCA234, 501
	VHSDS2 125p	HRS5000, 5500, 8000, 9000, BR9060, BRS600, 605, 920, 925 45p	49SB620, 644869S, 49SB6 110p	502, 602, 5011, VCB311, 361, VCD801, 802, VCH851, 852, 882, VCM73, VCT72 65g
ERGUSON	VHSAY3 125p	HRD227, 520, 52 1, 522, 527, 600, 610, 620.	VKR6850, VKR6855 70p	VCA10, 103, 105, 106, 113, 11613, 211, 234,
	VHSBY3 100p	637, 641, 650, 830,	VR501 110p	244, 254, 30, 33, 35, VCA36, 37, 40, 43, 454,
302, 6303, 6304,	VHSEY1, VHSEY2 70p VHSCC1 100p	HRD840, HRDX20, 22, HRJ200, 205, 300, 305, SR330, HRS10 125p	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,
906, 8909, 8912, 8922 120p	GRANADA	HRD840, 550, 560, 580, 590, 640, 660, 670,	237, 23, 241, 2410, 2419, 242, 243, 245, 2469,	VCBS97, VCD805, VCD806, 810, 815, VCH80,
V23, 0923, 8924, 8929 V20, 2V20, 9020, 9021, 9022	VHSDP1, VHSFV2 80p	720 730 740 770 HRD920 960 970 990	247, 2479, 251, 252, 256, 257, 258, 33, 19, 332	81, 85, 865, 910 VC51000
940 65p	VHSTJ1, VHSTJ2 150p VHSTJ3 65p	910, 960, 980, HRDX20, 25, HRJ2 10, HRJ215, 315, 316, 318, 400, 405, 407, 410.	3329, 333, 337, 339, 3419, 342, 343, 3469, 347, 3479, 35, 1, 352, 357, 358, 422, 4229, 432, 437,	VCT212, 310, 410, 610, VCT1314, VCTS312, 313, VC790ET 80p
V31, 3V32, 8941, 8942 60p	VHSWJ1, VHSWJ2 120p	411, 415, 416, 507, HRJ6 10, 615, 715, 97,	442, 4229, 432, 437, 442, 44, 5, 4469, 447.	VCC10 70p
V35, 3V36, 3V38, 3V39, 3V49, 8943,	VHSXJ3 85p	HRS4700, 5800, SR3200, SRS368E 60p	4479, 451, 452, 457, 458, 459, 512, 522, 5229,	SONY
	VHSYJ2 80p VHSFJ2 140p	HRJ600 40p	6379, 642, 647, 722, 7229, 723, 7379, 747, 8389, 948, 9489 70p	SLC6, SLJ10, SLT6ME 140p
V55, 3V57,	VHSFJ2 140p VHSFS1, VHSFS2 130p	VR955 180p	SAISHO	SLC5, SLC7, SLJ7, SLJ9, SLT7ME 140; SLC9, SL8000, SL8080, SLT50 165;
945, 8947, 8948 45p	VHSFG1, VHSFG2, VHSFG3,	VR955 180p	VR2000, VHL3 90p	SL8000E, SL8080E, SL8200, SL8600 175p
	VHSFG4, VHSF63 180p	VX600, 730, 735, 750, 755, 765, 850, 6000,	VR3800, 3200, 3300, 3500, 3600, 3650,	SLV255, 125, 213, 225, 262, SLVX1,
951, FV10, FV11, FV12, FV13, FV14, FV20, V21, FV22, FV26, FV32, FV39, VC141L 45p	GRUNDIG MVS400, 440, VS400, 410, 415, 435, 440, 441,	VS888 75p	VRS4400, 5000 75p VR3400 100p	20, 3 95p
	450, 456, 460 55p	VX1000, VX2000, VX2500, VX3000,	SAMSUNG	TOSHIBA V55, V57 85p
V61L, FV62, FV67, FV68, FV70, FV71, FV72,	VS180, 200, 220, 226, 262, 265, 267, 2X40800.	VX6000 80p VX800 70p	SV716, 717, V1616, V-621, V1626, VX616,	V55, V57 V33, V31, V32, V51, V52, V53, V9600.
V74, FV77 50p 1	0850, 0880,	MITSUBISHI	VX617, VX619, X626, VX627, VX629,	V9680 85p
	1600, 2000, 2080, 2200, 2280, MVS200RC 90p	HS200 200p	VX714 75p VB520, 510, 610, 616, 617, 619, 620, 626, 627,	V61, V63, V65, V66, V67 160p DV80B, DV80D, V71, 73, 74, 75, 77, 81, 83, 85,
V52 650 1	/S150 160p	HS300, 301, 302, 307, 310, 337, 338, 347, 349	629, V1510, 520, V1611, 616, 621, 626, VX510.	DV808, DV80D, V71, 73, 74, 75, 77, 81, 83, 85, 86 80p
VA1R EVA2I 100m	VS310, 311, 315, 320, 326, 340, 345, 380, 385,	411, 412, 421, 480, HSB10, 20, 30, HSE10, 20,	511, 520, VT320, 5600 80p	V108, 109, 110, 120, 130, 140, i99, 209, 210,
IDELITY	445 85 p √S150 75 p	30, 70 80p HS303, HS304, HS306, HS307, HS330, HS400,	VB900, VB910, V1900, V1910 110p	211, 220, 221, 411, V421, 609, 610, 611, 659,
QS200, VCR1000, 2000, 600, 6000,	C290N, LC295SN, SVS 180, VS 170 70p	HS700 110p	PX980, 981, 982, SE9001, SV9001, SVX307, 319, 322, VB750, 770, 8220, 8225, V1770, 790,	660, 711, 880 120p V91 G. V95G 115n
100 180p	S 160, BARCELONA, FLORENZ, GV4000,	HS318, HS319, HS410 110p	8220, 8225, VK8220, VPX31, VX750, VX770,	V91 G, V95G 115p V212, 213, 22-2, 3i2, 322, 403, 412, 413, 610,
LK 100 160p 4	1000, 4001,	HSM1000, 16, HSM23, 25, 33, 34, 35, 37, 54,	790, 8220, 8225, SE9000, 9001 90p	703, 813 50p
	2 7 7 9 9 4 7 1 1 4 1 1 1 4 1 1 1 4 1 2 1 4 1 4 1 4 1	55, 57, 58, 59, 68 55p	SVX301, 303, 305, SX7301, VB710, 971,	VCPB1E 110p

		EMENT II	DLER	RS & 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, 86, 330, 350, 640, 16S, 5030	FF Rew Idler 6886792	Ferguson	3V39, 3V30, 3V31, 3V32, 3V353V36, 3V38, 3V39, 3V49, 8930, 8931, 8933, 8940, 8941, 8942, 8943, 8944	Take Up Clutch PU 51380
Order Code:		Price 100p	J.V.C.	HR7200, 7600, 7650, 7655, 7300, 7350, 7610	Take Up Clutch
Hitschi Order Code:		Play Idler 6861482 6861481 Price: 180p	ļ		PU 53462A PU 51380
Blaupunkt	RTV301, 306, 307, 309, 311, 312, 315, 316, 317, 319, 320, 404, 414, 424, 434, 444, 478, 707	ldler	Order Code Philips	DB532, VR6520, 6843, 644	Price: 200p Reel Idler
Goldstar	GHV1221, 1232, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247	, Idler	Sharp	VC600, 651, 681, 682, 684, 685, 693, 699, 700, 783, 6FR, 6V3,	Idler Assembly
Grundig	GHV1248, 8000, 8200, 8210, 8215, GVHP51, VCP4100, 4130 MVS400, 440, VS400, 410, 440VS450, 460	Idler	Order Code	6F3 : IDL88	NPLYV0107GEZZ Price: 615p
National	NV230, 250, 260, 280, 370, 380, NV430, 431, 433, 450, 460, 465, 470, 480, 630, 650, 730, 780, NV810, 830, 850, 870, 890, NVG7, 9, 10, 11, 12, 14, 15, 16, 18, 30, 130, 400, AG1000, AG1050, 1200		Philips Sharp	VR6843, 6943, 44SB9, VR44SB920, 44SB922, 6943 VC72, 780, 781, 782, 785, 786, VC787, 800, 793, 799, 7810,	Reel Drive Unit Idler
Philips Order Code:	1500, 1810, AG2100, 2200, NVH65, 70 VR6460, VR6520, VR6920 IDL08	Idler Arm 40340162 Price 100p		7822, VCA100, 102, 104, VCA131, 140, 170, 202, 203, 234, 501, VCA602, 5011, VCD801, 802, VCH851, 852, VCH882, VCM73, VCT72, VC782MK11	NPLTV0111GEZZ
Amstrad	VCR7000	Idler 150280	Order Code		Price: 700p
	VC200, 381, 383, 384, 385, 386, VC388, 390, 393, 3300, 8381, 9100, 9300, 9500, 9700	Idler NIDL0005GEZZ	N.E.C.	N911, 915, 916, 917, 9012, 9013N9014, 9016, 9033, 9034, 9053, N9054, 9055, 9056, 9066, 9096, N9110, 9120, 9510, 9520, 9530,	71100.7000
Order Code:		Price: 100p	ł	N9610, DX1000, 1600, 2000, DX3000, PX1200	Idlas Assa Assaulti.
Philips	VR6540	Idler	Order Code		Idler Arm Assembly Price: 270p
	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 Assembly
Order Code:	581, 582, 583, 584, 585, 8481, 5F3, 5W20E	NIDL0006GEZZ Price: 100p		312, 313, 3210, 3219, 322, 3229, 323, 535BO, VR486, 471, 562, 582, 571, 761, 201, 202, VR203, 302, 303, 305, 6180, 6182, 6185,	PS403-40205
Akai	VS10	Reel Idler	}	6285, 6290, 6291, 6293, VR6362, 6367, 6390, 6391, 6393, 6467,	
Ferguson	3V23, 3V29, 3V30, 3V31, 3V323V35, 8923, 8924, 8929, 8930, 8931, 8940, 8941, 8942	Reel Idler PU48967		6468, 6470, 6561, 6570, 6581VR6670, 6676, 6710, 6760, 6761,	
	HR7200, 7300, 7350, 7600, 7610, 7650, 7655, 7700	Reel Idler PU48967 Price: 175p		6762, 6870, 6970, 6975, 86B1, 63SB7, 68SB4, 71SB4, 71SB5, 72SB8, 72SB8, 92SB31, 20DV1, 20DV2, 20RW7, 21DV1, 21DV2,	
Ferguson	3V39, 3V30, 3V31, 3V32, 3V353V36, 3V38, 3V39, 3V49, 8930, 8931, 8933, 8940, 8941, 8942, 8943, 8944	Take Up Idler PU 51402		2SB01, 2SB02, 2SB11, 2SB12, 30DV2, 31DV1, 31DV2, 31DV, 33SB02, 3SB03, 3SB05, 3SB11, 3SB12, 3SB13	
J.V.C.	6951, 6953, 6940, 6941, 8942, 8943, 8944 HR7200, 7600, 7650, 7655, 7300, 7350, 7610, HRD110, 111, 120, 121, 225	Take Up Idler PU 51402A	Toshiba	V91, V95	Pressure Roller Assembly
Order Code:		Price 100p	Order Code:	PR232	PS403-40205 Price: 300p

			_	_	EN'				
Akai	M32773	IT01	Ferguson	PU51380	IT07		VXP0433	IT15	
	MZ366960J2	IT02		PU51402A	1T08		VXP0463	IT16	Price:
Goldstar	VXP0521	IT17		PU55373	IT09		VXP0521	IT17	20p each
Hitachi	6861471	IT03		PU55374	IT10		VXP0581	IT18	16p each pack of 5
	6861482	IT04	National	VXP0329	IT11	Sanyo	1430662T15620	IT19	13p each pack of 10
	6886971	IT05	Panasonic	VXP0343	1T12	Sharp	NIDL0005GEZZ	IT20	
JVC	PU48697B	IT06		VXP0344	IT13	•	NIDL0006GEZZ	IT21	Deales are for such model
				VXP0401	IT14		NPLY0107GEZZ	IT22	Packs are for each model



	Pi	NCH ROLLEI	RS	
Pin				Affordal Price
Model Price	Model Price FVHP615, 618, 620, 622, 710, 711, 715, 716,	BRS600, 605, 747, 777, 920, 925 140p	Model Price NS7000 140p	Model Price 681, 682, 684, 685, 693,
VS10, VS9300, VS9500, VS9700, VS9800,	720, 721, 722, 725, 730,	HRS10 140p	ORION	VC699, 700, 772, 750, 779, 780, 781, 7810,
VP7100, VP77 140p VS1, VS2, VS3, VS4, VS5, VS6, VS8, VS9,	FVHP810, 830, 840 140p FVHP905, 906, 907, 908, 910, 911, 915, 916,	BP5000, HRD110, 111, 120, 220, 225, 455 1100p	VH1, VH2 140p VC150, 180, VH3, 33, 200, 201, 205, 212, 250,	782, 782MK2, 7822, 783, VC785, 786, 787, 793, 800, 7810, 7822, VCT72,
VS12, VS15 140p VS105, †12, 115, 116, 120, 125,	918, 970, 975, 980, 990, FVHP 5000, 5005, 5050, 5075, 5100 140p	PINCH ROLLER ASSEMBLY HRD140, 141, 142, 143, 150, 152, 157, 158,	254, 288, 300, 303, 312, VH404, 555, 700, 704, 712, 770, 780, 844, 900,	VC6F3, VC6V3, VCA 100, 102, 104, 131, 140, 170, 202, 203, 211, 234, 303, 501, 502,
126, 155, 165, 205, 220, 240, 244, 245,	VBR330, VBS3500, 7000, 7100, 7500, 7600, 9000, 9900 140p	160, 565, 566, 725, 755, HRP50 1350p	1000, 2948, 3030, 3312	VCA602, 5011, VCD801, 802, 851, 852, 881,
VS247, 248, 250, 512, VS515, 516, VSX9 140p	FVHD230, 250, 270, 370, 2000D, FVHP3, 210,	PINCH ROLLER ASSEMBLY	VHF2A, VP2948 140p COMB 15000, 16000, HV03, LVH50, NEVH,	882, VCM73, VCT73, VCT72, VCB361 140p
VS201, 301, 303, 304, 603, 606, 607, VSP8, VSP82, VP58, VP82 140p	250, 300, 310, 1100, FVHP1200, 1250, 130, 132, 1340, 1340, 1400,	HRD1520, 510, 520, 521, 522, 525, 527, 560, 600, 610, 620, 637, 641,	NEVHM, NEVHML, TVP230RC, VCP, VH04, 30, 103, 300, 358, 360,	VC220 140p
VS125, VS155, VS165, VS220, VS240, VS250, VS512 140p	1410, 1440, 1500, 200, FVHP320410, 420, 430, 440, 445, 470, 475,	HRD650, 720, 830, 840, 910, HRJ205, HRS5800 350p	362, 400, 416, 512,	VCA10, 30G, 60, 103, 105, 106, 111, 113, 131, 211, 244, 254, 33, 35, 36,
VS22, 23, 25, 35, 37, 38, 53, 66, 75, 422, 425,	FVSP290S, 495, 2905 140p	PINCH ROLLER ASSEMBLY	VH530, 532, 535, 536, 600, 630, 635, 640, 666, 730, 735, 744, 774, 790	VCA37, 39, 40, 42, 454, 46, 47, 48, 50, 505, 51,
426, 427, 462, 465, 467, VS485, 765, 766, 767, 768, 865, 867, 965, 967,	FVHD140, FVHD40, FVHD55, FVHP1, FVHP10, FVHP20 140p	BR7030, BRS600, HRD160, 170, 171, 180, 190, 210, 211, 217, 227,	VH800, 820, 850, 888, 893, 900, 930, 940, 942, 974, 1012, 1040, 1050,	52, 53, 54, 55, 57, 58, 505, VCA60, 605, 615, 62, 63, 67, 68, 1031, 11613,
VSA77, VSA650, VSF10, 11, 12, 15, 180, 190, 200, 210, 220,	FVHD140, 40, 55, FVHP1, 10, 25, 30, 40, 4000, FVHS10, 30 1350p	HRD230, 271, 300, 310, 320, 321, 330, 337, 350, 400, 430, 440, 441,	VH1060, 1070, VH1100, 1120, 1204, 1440, 1500, 1660, 1800, 2004,	VCB311, 320, VCBS97, VCD805, 806, 810, 815 VCH80, 81, 865, 910, VCS 1000, VCT310,
221, 222, 230, 240, 30, 33	PINCH ROLLER ASSEMBLY	HRD470, 500, 530, 700, 750, 950, HRS5000,	VH2151, 2308, 22042400, 2500, 2600, 2700,	VCT410, 610, VCT 1314, 5313, VC790 140p
VSF330, 4, 500, 550, VSP88, VSR100, VSX400, 450, 470 140p	GOLDSTAR GHV51, 1221, 1232, 1233, 1240, 1241, 1242,	5500, 9000 875p PINCH ROLLER ASSEMBLY	VH2960, 2970, 3050, VH3060, 4000, 4008, 4010, 4012, 4015, 4015,	VC780, 790, VCA10, 103, 1031, 105, 106, 211, 244, 254, 255, 30, 35,
VSF260, 261, 262, 265, 270, 274, 275, 280, 290, 340, 350, 410, 420, 43C	1243, 1244, 1245, 1246,140p GHV1247, 1248, 1250, 1266, 1290, 1291, 1295,	HRD540, HRD550, HRD580, HRD660, HRD860, HRD960 700p	4020, 4300, 5020, VP 10, 200, 220, 225, 245, VR821, 925, 1032,	VCA340, 43, 47, 50, 60, 605, 615, VCD806,
VSF441, 440, 450, 455, 480, 490, 497, 510,	1296, 1392, 1393,	PINCH ROLLER ASSEMBLY	2949, 2959, 2957, 2966, 2979, 2980, VTV300,	815, VCH80, 81, 83, 85, VCH865, 87, 910, VCS 1000, VCT212, 310, 410
560, 580, 590, 599, 600, VSG20, 21, 23, 24, 25, 30, 33, 34, 35, 51, 54,	GHV1891, 1900, 2145, 3000, 3010, 4400, 4410, 51, 8000, 8200, GHV8210, 8215, 8430	HRJ600, HRJ605, HRJ815, HRS9200 875p	VXL20, 25, 30 140p PHILIPS	510, 610, VCTI314,
55, 60, 64, 65, 70, 73, 74, 75, VSP110, VSX560, VSX580 140p	GHVP1240, 1241, 1247, 1248, 1290, 1291, GHVP1295, 1296, VCP4000, 4100, 4130, 4200,	MATSUI	VR6460 VR6920 140p	VCTS313 525p PINCH ROLLER ASSEMBLY
VS17, 20, 22, 23, 24, 25, 26, 27, 35, 37, 38, 53,	4300, 4301, 4305, VCP4306, 4310, 4311, 4315,	VX6000, 730, 735, 750, 755, 765, 800, 850, VS888 140p	VR2020, VR2021, VR2022, VR2023, VR2024 140p	SAISHO
55, VSA77 775p PINCH ROLLER ASSEMBLY	4316, 4320, 4321, 4325, 4326, 4350, GSE1290, 1291, 1295, 1296, 1297, 1891, 1910, 20005,	VX1000, VX2000, VX2500, VX3000, VX6000A 140p	VR6711 140p VR6540 140p	VHL3, VR1000, 2000, 2500, 3200, 3300, 3500, 3600, 3650, 3850, VRS4400, VRS5000 140p
VS422, 425, 426, 427, 462, 465, 467, 485, 498, 765, 766, 767, 768, 865,	2000 140p HITACHI	MITSUBISHI	DV856, 586, VR702, 703, 6485, 6585, 6589,	VR3400 140p
867, 965, 967, VSA650, VSF10, 11, 12, 14, 15, 180, 190, 200, 210, 220,	VT7, 11, 14, 16, 17, 18, 19, 33, 34, 35, 350, 38,	HS12, 5300, 5424, 5600, HSB11, 12, 16, 21, 27, 31, 32, 41, 51, 52, 82,	6785, 6880, 6948 140p VR445, VR6442, VR6542, VR6643, VR6843,	SAMSUNG
221, 222, 230, 240, 30, 300, 301, 310, 320, 33,	39, 88, 330, 680, 4200, VT5000, 5030, 5500, 6500, 6800, 7000, 8000,	HSE12, 16, 17, 21, 22, 27, 31, 32, 41, 51, 52, 82, HSM1000, 110, 120, 15	VR6943, 44SB9 140p DV464, 662, VR2220, 2300, 2324, 2330, 2334,	SV716, 717, VB510, 520, 610, 616, 617, 619, 620, 626, 627, 629, 900,
330, 4, 500, 510, 600, VSR110, VSX100, 400, 450, 470 800 p	8300, 8500, 8700, 930, VT9500, 9700, 9900, VM600 140p	0, 16, 170, 190, 210, 23, 25, 250, 27, 33, 34, 35,	2340, 2350, 2414, VR2480, 2485, 2486, 2489,	V910, V1510, 520, 611, 616, 621, 626, 900, 910, VX510, 520, 616,
PINCH ROLLER ASSEMBLY	VT8, 52, 57, 61, 62, 63, 64, 65, 85, 86, 88, 100,	36, 37, 370, 380, 45, 450, 5 4, 55, 555, 57, 58, 59, 68, HSMS2, 9, HSS11,	2490, 2498, 2840, 6462, 6463, 6464, 6560, VR6660, 6860, 6861, 6862, 6863 140p	VX617, 619, 626, 627, 629 140p
VSS99 140p	110, 111, 113, 115, 118, VT120, 122, 125, 128, 130, 135, 138, 145, 150,	14, 15, 17, 19, 25, 5600, HV F125, 150, 303, 85, SV8900, 8930 750p	N-1700, VR2870 140p VR2025, VR6580, VR6581 140p	SVX301, 303, 305, 307, 319, 322, VB710, 713,
VCR3000X, VCR4000 140p VCR5000, VCR6000 140p	168, 170, 175, 220, 225.	PINCH ROLLER ASSEMBLY PART NO:	49SB6, VR3260, 6349, 6448, 6449, 6548,	750, 770, 971, 8220, VB8225, V1710, 730, 750, 770, 790, 8220, 8225, 970, VX710, 712,
VCR161, VCR222 140p	VT250, 255, 258, 260, 400, 405, 410, 413, 414, 415, 416, 418, 420, 425	948D020010 HSE11, 12, 16, 17, 21, 22, 27, 31, 32, 41, 51,	6648 140p PRESSURE ROLLER ASSEMBLY PS403-40205	VX720, 730, 750, 770, 790, 825, 8225, 970, 971, 972, 8220, PX980, 981, 982, SE9000,
VCR7000, VCR7800, VCR8000, VCR8800 140p	VT426, 428, 430, 431, 435, 438, 450, 498, 510, 515, 517, 518, 520, 525,	52, 5300, 5424, 5600, HSB11, 12, 16, 21, 27, 31, 32, 41, 51, 52, 82, HSM1000, 110, 120, 150,	DV186, 190, VR211, 2115, 212, 213, 223, 286, 291, 292, 311, 312, 313,	9001, SX7120, 7121, 7220, 7221, 7230,
VTV10 140p	VT526, 530, 535, 536, 540, 545, 546, 548, 570,	HSM16, 170, 18, 190, 210, 23, 25, 250, 27, 30,	VR3210, 3219, 322, 3229, 323, 535BO, 486,	SX7301, VK8220, VPX31 140p
VCR1000, 2000, 4500, 4600, 4700, 5200, 6000,	575, 576, 580, 585, 588 VT640, 830, VTF660, 665, 70, 770, 774, 775,	33, 34, 35, 36, 37, 370, 38, HSM380, 40, 45, 450, 50, 54, 55, 555, 57, 58, 59, 60, 68,	471, 562, 582, 571, 761, VR201, 202, VR203, 302, 303, 305, 6180, 6182,	VX9880 140p
6100, 6200, B600, VCR8602, 8603, 8604, 8700, 8704, 8714, 8800,	780, 785, 860, 861, 865, VTL30, 1000, 2000, VTLC50, VTM598, 620,	HSMS2, 9, HSMX1, 18, 19, 2, HSS11, 12, 14, 15, 17, 19, 21, 25, 5600, HVF125, HVF150, 303,	6185, 6285, 6290, VR6291, 6293, 6362, 6367, 6390, 6391, 6393,	PX31 R, 32R, PXR30, SV80, SX3230, 3231, 3260, 3261, VS390, VX30, 31, 32, 3560, 3561,
8804, 9000, 9005,	622, 625, 626, 630, 635 VTM636, 640, 645, 646, 720, 722, 725, 726,	85, SV8900, 8930 140p	6467, 6468, 6470, 6561	370, 375, 380, VXK300, 301, 306, 307, 320, VXK321, 326, 330, 331, 336, 337, 350, 351,
VCR9244, 9340, DD8900, 8904, TVR1, 2, 3, 4 140p	727, 728, 730, 731, 735,	HS200, HS300, HS301, HS302, HS303, HS304, HS310, HS320, HS330, HS360,	VR6570, 6581VR6670, 6676, 6710, 6760, 6761, 6762, 6870, 6970,	356 140 p
VCR7000 140p DD8900, DD8904, VCR6000, 6100, 6200, 8600,	VTM736, 740, 745, 746, 748, 753, 754, 820, 821, 822, 825, 830, 831,	HS700 140p HS306, HS307, HS318, HS319, HS337, HS338,	VR6975, 86BI, 63SB7, 68SB4, 71SB4, 71SB5, 72SB8, 72SB8, 92SB31, 20DV1, 20DV2,	PX990, 991, 992, S11230, 1240, SVX4000, 503 504, 600, SX1230,
8602, 8603, 8604,	VTM835, 838, 840, 841, 845, 920, 921, 922, 925, 930, 931, 935,	HS347, HS349, HS400, HS410, HS411, HS412,	20RW7, 21DVI, 21DV2, 2SB01, 2SB02, 2SB11,	SX1231, 1260, 1261, 1566, V11560, VPK43,
VCR8700, 8800, 900>9, 9140, 9244, 9340 700p	VTS80, 85, 890, 895VM200, 2300, 2380, 3200,	HS421, HS480, HS710, HSB 10, HSB20, 30, HSE 10, 20,	2SB12, 30DV2, 31DVI, 31DV2, 31DV33SB02, 3SB03,	VX1230, 1260, 1261, VX1560, 1561, 1850 140 p
PINCH ROLLER ASSEMBLY PART NO: 153148 TX3650, UF20, VCR3000, VCR3002, VCR4000,	3280, 500, VMS7200 140p VT3000 140p	30, 70 140p NATIONAL PANASONIC	3SB05 3SB11 3SB12 3SB13 280p VR231, 232, 332, 422, 4229, 512, 5229, 722,	SONY
VCR9500 300p PINCH ROLLER ASSEMBLY PART NO:	VT410, 420, 428, 430, 450, 498, 518, 520, 522, 530, VTF770, 780,	NV100, 180, 300, 330PX, 332, 333, 340, 366,	7229, 723 140p VR501 PR38 140p	SLC5, 6, 7, SL3000, 8000, 8080, 8200, SLJ 10, SLT6ME, SLT7ME 140p
2554966	VTM598, 622, 722, 740, 748, 753 650p	600, 688, 777, 788, 3321, AG6010, 6015, 6100, 6200, 6400, 6800,	SANYO	SLC9, 20, 24, 30, 33, 44, SLHF100, SLF1, 11,
DD9900, 9904, TX3650, UF20, 22, 24, VCR3000, 3002, 9500 140p	PINCH ROLLER ASSEMBLY VTF150, 155, 180, 185, 250, 255, 260, 265, 280,	7450 140p NV230, 250, 260, 280, 370, 380, 430, 431, 433,	VHR1100, 1110, 1150, 1200, 1300, 1500, 2100, 2300, 2370, 2500,	20, 25, 30, 35, 60, 100, SLF200, SLF60PS, SLF90E, SLFH150, 850,
VS1004 VS1104 140p	285, 350, 351, 355, VTF360, 365, VTM140, 141, 145, 145, 210, 211,	450, 460, 465, 470, 480	VHR2700, 3330, MVR220 140p	SLK88, 95, SLT20ME, SLT30ME,
FERGUSON 3V00, 3V01, 3V16, 3V22, 3V23, 3V24, 3292,	212, 215, 220, 221,	NV630, 650, 730, 770, 780, 810, 830, 850, 870, 890, 2000, 2010, 3000,	VTC5000, 5150, 5300, 5350, 5400, 5500, 6000, 6010, 6500, 9100,	SLT50ME 140p BMC 100, BMC 200, BMC 500 140p
8900, 8901, 8902, 8903, 8904, 8906, 8909, 8912, 8922, 8923, 8924, 8925, 8929 140p	VTM230, 231, 235, 284, VTS390 140p HINARI	NV7000, 7200, 7800, 8050, 8150, 8170, 8200, 8300, 8400, 8500, 8600	VTC9300, VTCM10, 20, 11, 21, 30, 31, 40, 50, VPR5800 140p	SLV201, 202, 301, 302, 401, 402, 801,
3V29, 3V30, 3V31, 3V32, 3V52, 8930, 8931,	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, VTV100, 200 140p	NV8610, 8620, NVG11, 14, 16, NVG7, 10, 12,	VHR3100.3300, 3310, 3400, 3500, 3700, 3800,	802 140p SLV210, 270, 273, 275, 300, 353, 373, 410, 415
8933, 8940, 8941, 8942 140p 3V35, 3V36, 3V38, 3V39, 3V42, 3V43, 3V44,	VXL2, VXL3 140p	15, 18, 30, 130, 400, AG 1000, 1050, 1200, 1500, 2100, 2200, 6500,	VHRD500, 700 140p VTC3000 140p	474, 656, 715 300p
3V45, 3V48, 3V49, 3V53, 3V54, 3V55, 3V56, 3V57, 3V58, 3V59, 3V65, FV10, FVII, FV12,	VXL4, VXL20, VXL35 140p VTV100, VXL10, VXL11, VLX9,	6810, 7500, 7510, NVH70 140 p	VHR120, 130, 14, 141, 143, 14, 150, 151, 153, 154, 15, 16, 171, 194, 22	SLV757, 777 140p SLV255 140p
FV14, 8943, 8944, 8945, 8947, 8948 140p 3V52 140p	VXL90 700p PINCH ROLLER ASSEMBLY	NVG9, NVG120 140p AG6840, 6720, 7150, 7330, 7350,	0VHR23, 235, 240, 244, 250, 251, 274, 27, 297, 310, 330, 335, 350, 390, VHR4100, 4105, 4150,	SLV275, 282, 315, 325, 353, 363, 373, 410, 415
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,	416, 474, 625, 656, SLV715, 725, 727, 757, 777 815, 825, SLVX30, 50, 55 140p
22L, 26D, 31R, 32L,FV33H, 39S, 41R, 42L, 50B, 51R, 52L, VC141L 140p	J.V.C. HR2200, 3300, 3330, 3360, 3660, 4100,	28, NVG300, NVF65, NVF70, NVFS1 NVFS 100, NVG 19, 20, 25, 33, 40, 50,	VHR5100, 5200, 5300, 5350, 5600, 5700, 6850, 7100, 7200, 7250, VHR7260, 7300, 7400, 7440.	SLV125, 213, 225, 252, 255, 262, SLVXI,
FV37H, FV44L, FV46T, FV43H, FV57H 140p	7700 140p	NVV8000 140p NVD48, NVD80, NVG21 NVG45 140p	7500, 7520, 7530, 7540, 7700, 774, 780, 0VHR7810, 8000, 8070, 8100, 8200, 8250,	20, 3 SLV215, 216EE, 275, 282, 315, 325, 353,
3V35, 3V36, 3V38, 3V39, 3V49, 8943,	HR2650, 7200, 7300, 7350, 7600, 7610, 7650, 7655 140p	NVJ700PX 140p NVHD100, NVHD101, NCHD90, NVSD30,	8500, 8800, VHRD4400, 4410, 4500, 4600,	363EE, 373, 393, 410, 415,
8944 1100p PINCH ROLLER ASSEMBLY	HRD110, 111, 120, 121, 140, 141, 142, 143, 150, 152, 156, 157, 158,	NVSD40 1125p	VCR100 140p	SLV416EE, 474, 494EE, 555UC, 559, 575UC, 579, 585HF, 595HF, SLV60W, 615, 625, 656,
3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8945, 8947, 8948 1350p	HRD160, 220, 225, 250, 257, 445, 455, 565, 566, 725, 755, HRP50, BP5000, BR7000,	PINCH ROLLER ASSEMBLY AG5150, 5250, 5700, 6024, NVD38, 48, 80,	VHR120, 135, 150, 190, 4150, 4160, 4350, 5200, 5240, 5350, 7200, 7250, 7260, 7700,	676UC, 686HF, 696HF, 715, 725, 727, 757, SLV767B, 777, 815, 825, SLVE7, 8,
PINCH ROLLER ASSEMBLY	BRS611, 811 140p	NVF55, 65, 70, 75, 77,	VHRD4410, 4610, 4710, 4890, 5450, VHRS700 975p	9SLVX30AS,
FV37, FV57, FV58 350p PINCH ROLLER ASSEMBLY	HRD520, 540, 550, 560, 580, 600, 610, 620, 637, 640, 641, 650, 660,	NVFS1, 100, 200, 88, 90, NVG 19, 20, 21, 22, 25, 28, 300, 33, 40, 45, 46,	PINCH ROLLER ASSEMBLY	SLVX35AF, SLVX50AS, SLVX55DH, SLVX65BR, SVO140, 160 1250p
FV31R 140p FV41L, FV42L 925p	HRD670, 720, 730, 740, 770, 820, 830, 840, 860, 870, 880, 910, 960,	NVG50, NVH65, 75, 77, NVJ30, 33, 35, 37, 40, 42, 45, 47,	VHR3100, 3200, 3300, 3310, 3400, 3700, 3800, VHRD500, 7000 1350p	PINCH ROLLER ASSEMBLY PART NO: X37277701
PINCH ROLLER ASSEMBLY	HRD980, HRDX20, 22, 25, HRJ200, 205, 210,	NVL20, 23, 25, 28, NVW 1 300p PINCH ROLLER ASSEMBLY	PINCH ROLLER ASSEMBLY	SLV210, 212, 270, 273, 275, 285, 300, 310, 335
3V58, 3V59, 3V64, 3V65, FV10, 11, 12, 13, 14, 20, 21, 22, 26, 30, 32, 33	215, 300, 315, 316, 318 HRJ400, 405, 407, 410, 411, 415, 416, 507,	N.E.C.	SHARP VC200, 381, 383, 384, 385, 386, 388, 390, 393,	425, 427 350p PINCH ROLLER ASSEMBLY
FV39, VC141L 875p PINCH ROLLER ASSEMBLY	600, 605, 610, 615, 715, 815 HRJ97, HRS4700, 5800, 5900, 6800, 6900,	N830, 831, 832, 833, 895 140p PVC2300, 2400, 740, 744, 746, 760, 764,	800, 2300, 3300, 6000, VC6200, 6300, 7300, 7700, 7750, 7800, 8300,	SV6700.8750, 9700, VHR3100, 3200, 3300,
FV43H, FV44L, FV45X, FV46T 700p PINCH ROLLER ASSEMBLY	SR3200, 330, 368 140p	766 140p	838, 9100, 9300, 9400,	3310, 3400, 3700, 3800, VHRD500, 700 1350p PINCH ROLLER ASSEMBLY
FV61, FV62, FV67, FV68, FV70, FV71, FV72,	HRD170, 171, 180, 210, 211, 217, 230, 300, 320, 321, 330, 337, 350,	DX1000, 1600, 1800, 2000, 3000, N9012, 9013; 9014, 9016, 9033	VC9500, 9600, 9700, 9800 140p VC300, 387, 402, 471, 473, 477, 481, 482, 483,	SL100, 200, SLC20, 30, 33, 34, 40, 44, 80, 88,
FV74, FV77 775p PINCH ROLLER ASSEMBLY	HRD370, 400, 430, 440, 441, 470, 500, 530, 700, 750, 950,	N9034, 9053, 9054, 9055, 9056, 9066, 9096, 9110, 9120, 9510, 9520,	486, 488, 496, 500, 571, 573, 581, 582, 583, 584, 585, 8481, VC5F3,	9, SLF1, 20, 25, 30, 35, 45, SLF60, 65, 73, 90, SLHF100, 150, 950, SLK85, 95, SLO1700,
FISHER	HR\$5000, 5500, 8000, 9000, BR7030, 7040,	N9530, 9610, PX 1200 140p	VC5W20E, VCA1031 140p	SLS550, SLT0, 30, 50 300p PINCH ROLLER ASSEMBLY
FVHP420, 520, 530 140p	9060,	DS6000G, DX4000, N9077	VC108, 208, 405, 408, 550, 600, 651, 671, 674,	THIGH ROLLER ASSEMBLE
		VIDEO LAMPS		

Order Code Price | Models & Description Models & Description Order Code Price Models & Description

											_
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			100p	AKAI, GRANADA (VHSTJ2),	VL01	25p	AUTHENTIC (N850), DECCA	VL07	40p
80mV (310mm WIRES)			BLAUPUNKT, FERGUSON, F			HITACHI (VT3000), ITT (VR3912,			(VR8300), GRANADA (VHSTJ3,		
PANASONIC VIDEO LAMPS	VL02	30p	FISHER, FUJITSU, FUNAI, G			VRP3833), JVC (HR2200, 3300,			(VR0300), GRANADA (VR3133,		
			GOLDSTAR, GRANADA, GR			3330, 3660), MITSUBISHI (HS20			WJ1, WJ3), ITT (VR3913, 3914,		
SHARP VIDEO LAMPS	VL02	30p	1			TELEFUNKEN (VR510, 519, 610)					
HITACHI 5381682 (VT63, VT64)	VL04	135p		SHI,		THOMSON (VK300, 305, 306, 33			3963) JVC (HT7200, 7300, 7350		
VIDEO LAMPS			NEC, ORION, NATIONAL,			FERGUSON (3V00, 16, 22, 24, 32			TOO TELEFICACEN OVER S	^	
AKALIVETOL CRANADA	VL06	40-	PHILIPS, SAISHO, SALORA,			8900, 8901, 8902, 8903, 8909, 59	912,		7700) TELEFUNKEN (VR450, 52	u,	
AKAI IVS10),GRANADA		40p	וואווטטוויט, טאוייטטוואטן			8922, 8925)			529, 540, 549, 620, 640, 920, 19	20)	
(VHSXJ3), TT (VR3993,3994), JVC			SIEMEN, SONY, TELEFUNK	EN,		BLAUPUNKT, ORION (VH1, 2A).	VL02	30p			
(HR2650, 7600, 7610, 7650, 7655), TELEFUNKEN (VR530, 535, 539, 5			THOMSON,TOSHIBA			NATIONAL (NV200,2010, 3000,	VLUZ	Joh	THOMSON (V4100, VK308, 309	, 312,	
630, 650), THOMSON (V309, 316,			GRANADA (VHSAY3).SHAR	P VL08	45p	7000, 8150, 8200, 8400, 8600, 86	:10				
VK309, 411,TX8000), FERGUSON			(VC200, 381, 384, 385, 386, 3		45p	8620), SHARP (VC2300, 6000, 60			410), FERGUSON (3V23, 29, 30	,	
(2)(21 9041 9042)			200 202 0200 0500 0700	000,		6300 7300 7700 9300\	200,		8023 8024 8020 8030 8031 8	1010	- 1

VIDEO SERVICE KITS

			AIDEO SE	RVICE KI	12			
AMSTRAD		- 3	HITACHI			NV600/NV688		
VCR700			VT11/VT33			Contents	Economy Kit Contents	
Contents BELT SET. PINCH ROLLER. REEL 1	DI FR VIDEO LAMP		Contents BELT SET. PINCH ROLLER. TENSION	BAND, IDLER TYRES		BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER.	BELT SET, PINCH ROLLER PLAY IDLER TYRE. FF/REW	
Order Code: SK41		£5.50	Order Code: SK08		£5.00	TENSION BAND	IDLER TYRE	
FERGUSON & JVC			VT11/VT33			Order Code: SK25	12.00 Order Code: SK26	£6.00
3V42/43			Contents	Economy Kit Contents		NV730/NV770		
HR0455/HR0725			BELT SET. T/UP REEL TABLE TYRE, SUPPLY REEL TABLE	BELT SET. PINCH ROLLER. FF/REW IDLER TYRE. T/UP REEL		Contents	Economy Kit Contents	
Contents BELT SET, PINCH ROLLER,	Economy Kit Contents BELT SET, PINCH RÜLLER		TYRE. PINCH ROLLER. FF/REW	TABLE TYRE. SUPPLY REEL		SLOT IN BELT. LOADING BELT PINCH ROLLER. IDLER UNIT.	SLOT IN BELT. LOADING BELT. PINCH ROLLER. IDLER TYRE	
CLUTCH MECHANISM, TENSION	SUPPLY CLUTCH, TAKE UP		IDLER. CLUTCH PLATE. TENSION BAND	TABLE TYRE		TENSION BAND	FINCH ROLLER, IDLER TTRE	
BAND	CLUTCH			Order Code: SK46	£3.75	Order Code: SK19	£5.50 Order Code: SK20	£3.00
Order Code: SK37 £16	00 Order Code: SK38	£9.00	VT52/61/62/63/64/65/85/86/640			NV370/NV380/480/630/780/830/	/850/AG2100PK/AG2200PK	
3V58/59/64/65			Contents	Economy Kit Contents		Contents	Economy Kit Contents	
HRD170/180/210/230/300/320/370/ HRS5000	400/430/530/700/750		BELT SET, PINCH ROLLER,	BELT SET, PINCH ROLLER		BELT SET, PINCH ROLLER, IDLER. TENSION BAND	BELT SET, PINCH ROLLER	
Contents			FF/REW ARM. CLUTCH PLATE. TENSION BANO	FF/REW IOLER			IOLER TYRE £5.00 Order Code: SK22	£2.75
BELT SET, PINCH ROLLER, IDLER	ARM, TENSION BAND			Order Code: SK50	£3.00			
Order Code: SK44		£7.00	VT400/405/410/13/14/15/18/420/25/26/	28/430/31/35/48/450/498/	- 1	NV777/NV788 Contents	Economy Kit Contents	
3V29/3V30			510/520/25/26/530/35/36/540/545/46/4	8/570/75/576/580/85/88		BELT SET, PINCH ROLLER,	BELT SET, PINCH ROLLER	
HR7200/7300/7350 Contents			Contents TIMING BELT. PINCH ROLLER. FF/RE	W ARM CHITCH BASE	- 1	IOLER UNIT. TENSION BAND	IDLER TYRE	
BELT SET, PINCH ROLLER, TENSI	ON BAND, IDLER TYRES		TENSION BAND			Order Code: SK17 SHARP	E6.00 Order Code: SK18	£4.00
Order Code: SK05		£5.00	Order Code: SK52	,	£9.75	VC381		
3V35/36, 38/39/49			VT100/110/111/113/115/118/120/125/1	28/130/135/138/145/150/		Contents BELT SET. PINCH ROLLER.	Economy Kit Contents BELT SET. PINCH ROLLER	
HRD110/111/120/225			175/220/225/250/255/258/260/VTL30			REEL IDLER. TENSION BANO.	REEL IOLER TYRE	
Contents BELT SET, PINCH ROLLER, TENSI	ON RAND IDLER TYRES		Contents BELT SET. PINCH ROLLER. FF/REW A	RM. CLUTCH PLATE.		VIDEO LAMP	00.00 0 1 0 1 0777	
Order Code: SK04	UN DARD, IDEEN TINES	€5.00	TENSION BAND Order Code: SK51		.,	Order Code: SK47	£8.00 Order Code: SK48	£3.25
			Ordet Code: 2K31		£14.00	VC500/VC571/VC581/VC582/VC		
3V31/3V42 HR7600/7610/7650/7655			PANASONIC			Contents	Economy Kit Contents	
Contents	Economy Kit Contents		NV2000/NV2010NV7000/NV7200/NV7 Contents	800 Economy Kit Contents		BELT SET. PINCH ROLLER. REEL IDLER. TENSION BAND	BELT SET. PINCH ROLLER REEL IDLER	
BELT SET, T/U REEL TABLE TYRE, PINCH ROLLER, REEL	BELT SET, T/U REEL TABLE		BELT SET. PINCH ROLLER.	BELT SET. PINCH ROLLER.		Order Code: SK60	£9.50 Order Code: SK61	£5.00
IOLER. T/U CLUTCH. T/U IDLER.	TYRE. PINCH ROLLER. REEL IOLER TYRE. T/U IOLER TYRE.			TENSION BAND. IDLER TYRES Order Code: SKO2	£5.00	VC781/VC7810/VC7822/VC785/\	/C798A/C703A/C90A/	
TENSION BAND. VIDEO LAMP	T/U CLUTCH			Older Coup. SAGE	23.30	VCA100/VCA102/VCA104/VCA2		
Order Code: SK33 £11.	00 Order Code: SK34	£5.00	NV300/NV330/NV333/NV340/NV366 Contents			Contents BELT SET, PINCH ROLLER.	Economy Kit Contents	
3V35/36/38/39/49			BELT SET. PINCH ROLLER, TENSION	BAND. IDLER TYRE	i	REEL DRIVE UNIT, TENSION	BELT SET. PINCH ROLLER REEL ORIVE UNIT TYRE	
HRD110/111/120/121/225	Farman Wit Combands		Drder Code: SK01			BAND		
Contents BELT SET. T/U REEL TABLE	Economy Kit Contents BELT SET. T/U REEL TABLE		NV2000/NV2010		I	Order Code: SK64 £	13.50 Order Code: SK65	£3.75
TYRE. SUPPLY REEL TABLE	TYRE. SUPPLY REEL TABLE		Contents BELT SET. PINCH ROLLER. FF	Economy Kit Contents BELT SET, PINCH ROLLER.	- 1	VC681/VC682/VC684/VC685/VC	693/VC699/VC6F3/VC700	
TYRE. PINCH ROLLER. T/U CLUTCH. T/U IDLER. REEL	TYRE. PINCH ROLLER. T/U CLUTCH. T/U IOLER TYRE. REEL			IDLER TYRE, PULLEY TYRE	- 1	Contents	Economy Kit Contents	
IDLER, TENSION BAND	IOLER TYRE		BAND. VIOEO LAMP	0-4 0-4 044		BELT SET. PINCH ROLLER. REEL ORIVE UNIT. TENSION	BELT SET. PINCH ROLLER REEL ORIVE UNIT TYRE	
Order Code: SK35 £10.	00 Order Code: SK36	£5.50		Order Code: SK14	13.50	BAND		
3V29/3V30			NV7000/NV7200/NV7800	F	l	Order Code: SK62 £	13.50 Drder Code: SK63	£5.00
HR07200/7300/7350	5 W: 0		Contents BELT SET, PINCH ROLLER,	Economy Kit Contents BELT SET, PINCH ROLLER	1			
Contents BELT SET. T/U REEL TABLE	Economy Kit Contents BELT SET. T/U REEL IDLER			IDLER TYRE. CLUTCH TYRE	i	FOR MORE	DETAILS OF OVER 500	
TYRE. SUPPLY REEL TABLE	TYRE. SUPPLY REEL TABLE		TENSION BAND Order Code: SK11 £8.50	Order Code: SK12	£3.25	TYPES (OF SERVICE KITS	
TYRE. PINCH ROLLER. REEL IDLER. T/U CLUTCH. T/U IDLER.	TYRE. PINCH ROLLER. REEL IDLE TYRE. T/U IOLER TYRE.						EASE RING US!	
TENSION BAND, VIDEO LAMP	T/U CLUTCH		NV300/NV330/NV333/NV340/NV366 Contents	Economy Kit Contents		FLI	LAUL HINTO UU:	
Order Code: SK31 £10.	00 Order Code: SK32	£5.00	BELT SET, PINCH ROLLER,	BELT SET, PINCH ROLLER		SERVICER	IT & UPGRADE FO	\mathbf{R}
3V44/45/48/53/54/55/57			TENSION BAND	IOLER TYRE. PLAY IDLER			A TV CHASSIS	
HRP50/HRD140/150/158/160				Order Code: SK16	£3.25			
HRD250/257/565/566/755 Contents	Economy Kit Contents		NVG7/NVG9/NVG10/NVG11/NVG12/N	IVG14/NVG15/NVG16/			D401 ON THE 20/21 CHASSIS) I	S NOT
BELT SET. PINCH ROLLER.	BELT SET. PINCH ROLLER		NVG18/NVG30/NVG120/NVG130/NVG	400/NVH65 (PX/AC)/	- 1	UNCOMMON.		- 1
CLUTCH MECHANISM, TENSION BAND			AG1810 (P/K) Contents	Economy Kit Contents			ASSEMBLED AS A REPAIR KI	
	00 Drder Code: SK40	£9.50	LDADING BELT. CAPSTAN	LOADING BELT. CAPSTAN	- 1	POWER SUPPLY.	RES AND AS AN UPGRADE FO	KIHE
EIGHEO			BELT. PINCH ROLLER. IOLER TENSION BAND	BELT. PINCH ROLLER. IDLER. TYRE	П		E ALL THE DECUMED COMPO	JENIES
FISHER FVHP905/906/907/908/910/911/916	918			Order Code: SK28	£3.00		F ALL THE REQUIRED COMPONETE WITH FULL INSTRUCTIONS	
Contents	Economy Kit Contents		NV332			CIRCUIT DIAGRAM.	J IIII I ODD ING I ROCITON	71,10
BELT SET. PINCH ROLLER. (OLER. GEAR IOLER UNIT.	BELT SET. PINCH ROLLER. IDLER TYRE		Contents	Economy Kit Contents			TO FIT THE FOLLOWING MAKE	SANTO
TENSION BAND				BELT SET, PINCH ROLLER PLAY IDLER TYRE, FF/REW	1	MODELS,	10 111 HIL POLLOWING MAKE	ט אוא ט
Order Code: SK57 £13.	00 Order Code: SK58	£5.00	TENSION BAND. FF/REW TYRE	IDLER TYRE		* ALBA / BUSH	* AKAI	
FVHP615/618/620/622/710/711/715	716/720/721/722/725/		Order Code: SK29 £12.00	Order Code: SK30	£5.10			
730/830/840			NV230/250/260/280/430/450/460/470/6	50/810/890/	İ	* GOODMANS	* HINARI	
Contents Economy Kit Content BELT SET, PINCH ROLLER.	ats Belt set. Pinch Roller.		AG1200PK/AG1500PK Contents	Economy Kit Contents	ļ	* JAC	* MATSUI	
IDLER. GEAR IDLER UNIT.	IDLER TYRE		BELT SET, PINCH ROLLER,	BELT SET, PINCH ROLLER		ORDER CODE : O	ONWAKIT PRICE: 1	200n
TENSION BAND Order Code: SK68 £11.	00 Order Code: SK69	£300	IDLER. TENSION BAND	IDLER TYRE			ALREADY TAKEN STEPS TO UPGRADE THE POWER	
	OU CHURT CORE: ARDS	2.500	Order Code: SK23 £6.00	Order Code: SK24	£3.25			

REPLACEMENT VIDEO CASSETTE HOUSINGS

Name	Models	Code	Price	Name	Models	Code	Price	Name	Models	Code	Price
AKAI	VS35, VS53, VS55,				FV31R	CH19	4300p		VCA103, 103GV, 106, 106GVM,		
	VS56, VS75	CH18	3200p		HRD515, 520, 527, 540, 550, 580,				254GVM	CH23	2500
GRANADA	VHS0P1	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,		
OLOSTAR	GHV1290P, 1291P, 1295P, 9400,				HRO 540, 580, 830, 860, 910, 960,				410G, 610	CH24	2500
	73401, GSE1295P, GSE1891P,				HRD970, HRDX20,			TELEFUNKEN	VR2970	CH02	2800
	20001Q, 20051Q, VCP4200, 4300,			FERGUSON	FV57H	CH27	2400p	THOMSON	V320, 321, 323, 326, 4200, 4300	CH01	2800
	4301, 4305, VCP4306, 4311, 4315,			I.T.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	2800p		6000, 8540	CH02	2800
	1242, 1244, 1246, 1248, GHVB000,				VR3916, 3926, 3946, 3948, 3976,			TOSHIBA	V55, V57	CH01	2800
	8200	CH26	2900p	l	3986, 3995, 3997, 6948	CH02	2800p		V65, V66	CH02	2800
ERGUSON & J.V.C.	3V38, 3V39, 8943, 8944, 8951,			NATIONAL PANASONIC	NV730	CH06	4300p				
	3V35, 3V36, 3V49, HRO 110, 111,			N.E.C.	N830EG, N831EG, N831EG, N832,			-A- A- AA	**	1 -4 - 4	AA_
	120, 121, 225	CH01	2800p		N833EG	CH01	2800p	MMMM	M M M M M M M M M	AMA	W W
	3V42, 3V43, 3V44, 3V45, 3V48,				N895	CH02	2800p	AMS	TDAD MOD I	ZTT	*
	3V53, 3V54, 3V55, 3V57, 8945,			PHILIPS	CASSETTE LIFT ASSEMBLY (691203	66)		AIVIS	TRAD MOD I		N
	8947, 8948, HRO 140,				DV186, 190, 286, 471, 562, 761,			*			*
	141, 150, 157, 158, 160, 250,				VR6180, 6182, 6185, 6285, VR6290,						N
	HRO257, 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,			VCR 4500 .	4600, 4700, 5200, TVR 1	.2.3	M
	20B, 21R, 22L, 26, 395, HR0230,				6761, 6870, 6970	CH05	1100p	*	,,,	,-,-	*
	430, 530	CH03	2800p		VR6443	CH22	2900p	7. 3		_	~
	3V58, 3V59, 3V64, 3V65, FV11R,				VR6448	CH23	2500p	A PRIC	E: £2.25 + VAT ex	ach	*
	8950, 8951, HRD170, HRO180,				49SB6	CH24	2500p				. ~
	HR0370	CH04	2800p	SHARP	VCA100, VCH851, VCH852	CH22	2900p	TO TO TO TO	***	8 28 2	*

MODE SWITCH

NV2000, 2010, 7000, 7200, 7800 (VS50048)

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

NV830 (VSS0091)

(VSS0110)

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

(VSS0060

NVG21, 25, NVH65, NVD80 (VSS0175A)

AUDIO CONTROL HEADS

PRICE: 1350n

AMSTRAD ORIGINAL NO: 150751

TOWADA: UNIVERSUM

£3.50

£2 25

£2.10

£3.75

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,

AMSTRAD ORIGINAL NO: 153134 Used on: AMSTRAD DD8900, 8904, VCR2000, 6000, 6100, 8600, 8602, 8603, VCR8604, 8700, 8704, 8714, 8800, 9005, 8244
Also fits: ANTECH, BONDSTEC, CASIO, CROWN, FIDELITY, GOLD-HAND GRANADA HINARI MAROLIANT OMEGE PROFEX SCHNEL-

ORDER CODE: AH01

DER, SEG, SENTRA, SHINTOM, TASHIKO, TATUNG, TOWADA PRICE: 1450n UNIVERSUM ORDER CODE: AH02

Replacement Audio Control Video Sound Head for National Panasonic

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

SET OF 8 ALLEN KEYS

0.77mm

1.27mm

1.60mm

0.90mm

1.50mm

2.00mm

3.00mm

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

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

UP BATTERIES

PHILIPS

Part Nos: 138 - 101138, 138 - 10313 1.2v 90mAH

Order Code: BB01

Part Nos: 138 - 10229, 2.4v 100mAH

Order Code: BB02

FERGUSON

Part No: 00E6 - 067 - 001 1.2V 100mAH

Order Code: BB03

Part Nos: 00E6 - 606 - 8001 2.4V 100mAH

MAKE & MODEL

Price: 90p

PRICE

CODE

Price: 135p Order Code: BB04 Price: 150p

SATEL ITES

Price: 70p

MAKE & MODEL	CODE	PRICE
PACE PRD800, PRD900	SATPSU1	600p
PACE SS9000, 9200, 9010, 9210, 9220	SATPSU2	550p
AMSTRAD SRD510, SRD520	SATPSU3	600p
AMSTRAD SRD500	SATPSU4	600p
AMSTRAD SRX340, SRX345, SRX350	SATPSU5	600p
PACE D100/150	SATPSU6	650p
CHURCHILL D2MAC	SATPSU7	650p
PACE MSS100	SATPSU8	730p
	1	

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.

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 *Detection Range: -60 to -10 DBM
- * Max. input signal: -10 DBM

ORDER CODE: TOOL22 PRICE: 8500p

REPLACEMENT T

GRUNDIG

PART No: 29703, 29102

USED ON:

C7500, C8500, C8502, C8712... .ETC

Order Code: SW1

Price: 100p

PHILIPS

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

Price: 95p

SONY

USED ON:

KV1612, KB1612, KV1614, KV2052, V2056 KV2062, KV2067, KV2212 . . .ETC Order Code: SW5 Price: 130

KV1400, KV1440, KV2040, KV2060

USED ON:

(POWER SWITCH 26mm)

Order Code: SW12

Price: 110p

SONY

USED ON: KV2020

(POWER SWITCH 21mm +Remote)

Price: 130p Order Code: SW6

SONY 2 PIN FUNCTION SWITCH

Order Code: SW9

Price: 35p

		FUSES		
	TIME LAG (20mm)		QUICK BLOW (20mm)	
CURRENT RATING	ORDER CODE	PRICE	ORDER CODE	PRICE
J00mA	FUSE36	75p	FUSE37	60p
160mA	FUSE01	75p	FUSE17	60p
250mA	FUSE02	75p	FUSE18	60p
315mA	FUSE03	75p	FUSE19	60p
400mA	FUSE04	75p	FUSE20	60p
500mA	FUSE05	75p	FUSE21	60p
630mA	FUSE06	75p	FUSE22	60p
800mA	FUSE07	60p	FUSE23	60p
1A	FUSE08	60p	FUSE24	60p
1,25A	FUSE09	60 p	FUSE25	60p
1.6A	FUSE10	60p	FUSE26	60p
2A	FUSE11	50p	FUSE27	60p
2.5A	FUSE12	50p	FUSE28	60p
3.15A	FUSE13	5 5 p	FUSE29	50p
4A	FUSE14	5 5 p	FUSE30	50p
5A	FUSE15	60p	FUSE31	50p
6.3A	FUSE16	60p	FUSE32	50p

CERAM	IIC PLUG T	OP
CURRENT RATING	ORDER CODE	PRICE
3A	FUSE33	100p
5A	FUSE34	100p
13A	FIISE35	100n

32 mm CERAMIC SLOW BLOW

CURRENT RATING	ORDER CODE	PRICE
8A	FUSE44	185p
10A	FUSE45	185p
15A	FUSE46	185p
20A	FUSE47	210p

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

20mm CERAMIC TIME LAG

CURRENT RATING	ORDER CODE	PRICE
6.3A	FUSE38	100p
8A	FUSE39	100p
. 10A	FUSE40	100p
3 15A	FUSE41	85p
4A	FUSE42	85p
5A .	FUSE43	85p

38mm CERAMIC TIME LAG FUSE48

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

VOLTAGE TESTER

A terminal screwdriver incorporating continuity & voltage with Euroslot PRICE: 220p

ORDER CODE: TOOL11

SPRING HOOK

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

ORDER CODE: TOOL20

PRICE: 265p

FAULT FINDING COMPARISON BOOKS

Satellite Fault Finding Guide Issue 1. Listing about 1,000 faults for over a range of 24 different brands. Order Code: BOOK05.

Price £8.50 - No VAT.

TELEVISION Edition 6

Lists more than 8,450 faults with 460 pages covering 58 different brands Price: 1600p only - no VAT. Order Code: BOOK02

Satellite Repair Manual Edition 4

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

Price £15.00 Only No VAT Postage 100p

SOLDERING

ACCESSORIES

SEMICONDUCTOR COMPARISONS 1997/8

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

SEMICONDUCTOR COMPARISONS 1997

The new 1997 Jaeger Semiconductor with 952 pages packed with information on over 80,000

semiconductors in much greater detail plus mar

keting data on SMD devices and a separate

generic table of all type designations.

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

Order Code: BOOK06

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

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

Order Code: BOOK03

I.C. PROTECTORS

ICPF10, ICPF15, ICPF20, ICPF25, ICPF38, ICPF50, ICPF75 ICPN5, ICPN10, ICPN15, ICPN20, ICPN25, ICPN 38, ICPN50, ICPN75

PRICE: 30p EACH ONLY

SERVICE AIDS

VOLUME	COOE	PRICE
75ML	SP01	145p
176ML	SP02	155p
200ML	SP03	180p
170ML	SP04	295p
400ML	SP16	580p
400ML	SP05	180p
200ML	SP06	180p
200ML	SP07	200p
200ML	SP08	340p
400ML	SP17	580p
200ML	SP09	250p
250ML	SP10	170p
250ML	SP13	235p
250ML	SP18	180p
400ML	SP19	225p
200ML	SP20	260p
400ML	SP21	260p
50 GRAMMES	SP11	225p
75ML	SP22	250p
75ML	SP23	250p
25 GRAMMES	SP12	150p
200ML	SP24	150p
200ML	SP25	145p
	SP26	2100p
	75ML 176ML 200ML 170ML 400ML 400ML 200ML 200ML 200ML 200ML 200ML 250ML 200ML 250ML 200ML	75ML SP01 176ML SP02 200ML SP03 176ML SP04 400ML SP16 400ML SP05 200ML SP06 200ML SP06 200ML SP06 200ML SP07 200ML SP08 400ML SP17 200ML SP09 250ML SP10 250ML SP10 250ML SP10 250ML SP10 250ML SP18 400ML SP18 400ML SP19 200ML SP20 75ML SP11 75ML SP21 75ML SP21 75ML SP21 75ML SP22 75ML SP22 25 GRAMMES SP12 200ML SP22 200ML SP22

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

OESCRIPTION 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 \$102 \$103 \$104 SOLDERING STAND & SPONGES SOLDERING STANO (MADE BY ANTEX) SPARE SPONGE SOLDER 18 SWG 500 GRAMMES 20 SWG 500 GRAMMES 22 SWG 500 GRAMMES 500p 650p 700p DESOLDERING AIDS SOLDER MOP STANOARD GAUGE 1.2MM X 1.5M SOLDER MOP 1.2MM X 10M DESOLDERING PUMP 100p 420p 320p 60p \$113 \$105 \$106



CAN'T FIND WHAT YOU'RE LOOKING FOR?

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

GRANDATA

Tel: 0181 900 2329

Fax: 0181 903 6126

GRANDATA LTD

Tel: 0181 900 2329

CASSETTE DC MOTORS

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

170p 170p 170p 170p 290p

CASSETTE TAPE HEADS

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

ATMA XC007	00p 00p 00p 00p
XC007	00p 00p 00p 00p 00p
DX-990A, DX-DIA CKISG, CXLBG, CXLBG, CXLBG, CXN3100, CXN320, CXN3300, CXN360, CXN400, CXN430, CXN450, CXN540, CXN550G, CXN990, CXN990, CXN990, CXN5170, DXZ9100M, FDNS36, FDN6S36, FDN6S39, EDN6S39, EDN8399, LCXS0, CXN540, CXN540, CXN550G, CXN990, CXN990, CXN920, CXSL70, DXZ9100M, FDNS36, FDN6S36, FDN6S39, EDN8399, SXX400, NXS990, NXS982, NSX999, NSXD536, NSXD938, NSXD938, NSXD938, NSXD936, NSXD936, NSXD937, NSXS90, CXS90, XCS90, XCS	00p 00p 00p 00p 00p
CXL69G, CXL69G, CXL93100, CXN32100, CXN3200, CXN360, CXN400, CXN4300, CXN3400, CXN3500, CXN390, CXN3900, CXN3900, CXN369, CXN3900, CXN3900, CXN369, CXN3600, CXN3700, CXN3600, CXN3600, CXN3600, CXN3700, CXN3600, CXN3700, CXN3600,	00p 00p 00p 00p
XC550, XC750, XC900, XC950, XCN992, XG320, XG380, XG400, XG990, ZD3000M, ZD3100M XS512A 161 XCAP1, CXL7, CXL8G, CXLC50P, CXZ8, DXM740, DXM75, DXM76, DXM77, LCX50, LCX7,	00p 00p 00p 00p 00p
LCX86_LCXAP1_XC002_XC004_XC005_XC777	10p 10p 10p 10p 10p 10p
XP6_XP7	10p 10p 10p 10p 10p 10p
AKAI AKAI CD73, DC33 CD73, DC33 CD73, DC33 CD75, CD23, CD32, CD32, CD32, CD35, CD37, CD52, CD55, CD57, CD650, CD69, CD70, CD69, CD79,	10p 10p 10p 10p 10p
CD73, DC93 CD75, CD26, CD27, CD32, CD36, CD37, CD52, CD55, CD57, CD650, CD670, CD69, CD750, CD75, CD56, CD27, CD26, CD26, CD26, CD26, CD27, CD26, CD27, CD26, CD27, CD26, CD27, CD26, CD27, CD26, CD26	00p 00p 00p 00p
CDM480, CDM600, CDM610, CDEM710, CDM959, MX590, MX590, MX590, MX570, MX590 KSS210A 180	00p 00p 00p 00p
DCD1500J, DCD1520, DCDE320 DCD1409, DCD600, DCD800 DCD14020, DCD600, DCD800, DCD800, DCD810, DCD820, DCD800, DCD910, DCD920 DCD1410, DCD1208, DCD2606, DCD810, DCD800, DCD800, DCD810, DCD910, DCD920 DCD91015, DCD1208, DCD2606, DCD315, DCD480, DCD800, DCD815, DCD915, DCD8226, DCD890, DCD895, DN2000F GCD8226, DCD890, DCD895, DN2000F GCD8226, DCD826J, CD952LJ, CD952SJ, FFH101KL, FFH101WL, FFH222AL, FFH272L, FFH333L, FFH373K, FJ806, FR606L CD2020AL, DCB8050L, FFH212AL, FFH212AL FFH212E GRUNDIG CD320AL, DCB8050L, FFH212AL, FFH212E GRUNDIG CD380, CD45 GCD300, CD101MCD904, MC10, NEW ORLEANS CD KRCD100, RR1900CD, RR3100CD, RR4000CD, RR610CD, RR700CD KSS210A KKCD100, RR1900CD, RR3100CD, RR4000CD, RR610CD, RR700CD KSS210A CD965 CD965 KSS331A AMC10 AWS500 HDPM3 218 FK-10 KSS210A 180 KSS210A 181 KSS210A 182 KSS210A 184 KSS210A 186 KSS210A 187 KSS210A KSS210A KSS210A KSS210A KSS21	00p 00p 00p
DCD1400, DCD5000, DCD5000 KS152A 186 DCD14020, DCD500, DCD610, DCD620, DCD660, DCD810, DCD820, DCD860, DCD910, DCD920 KSS210A 186 DCD1015, DCD1209, DCD2060, DCD20606, DCD316, DCD480, DCD590, DCD910, DCD920 KSS240A 256 GOLDSTAR CD952A, LCD852AJ, CD952J, DCD952SJ, FFH101KL, FFH101WL, FFH222AL, FFH272L, FFH33SL, FFH373K, FJ606, FR606L KSS210A 286 CD320AJ, CD630SAJ, FFH212AJ, FFH212E KSS210B 20 GRUNDNG GD45ABAJ, GC63ABAJ, GC63ABA	00p 00p 00p
DCD1420, DCD520, DCD610, DCD620, DCD660, DCD610, DCD620, DCD680, DCD610, DCD610, DCD610, DCD620, DCD610, DCD610, DCD6100, DCD610, DCD6100, DCD6100, DCD6100, DCD6100, DCD6100, DCD610, DCD6100, DCD610, DCD610	90p 90p
DCD1015, DCD1290, DCD2060, DCD20606, DCD2015, DCD480, DCD615, DCD715, DCD2026, DCD809, DCD895, DCD809, DCD895, DCD809, DCD895, DCD8090, DCD895, DCD8090, DCD805, DCD8090, DCD805, DCD8090, DCD805, DCD	00p 00p
GOLDSTAR CDB52A, CDB52LJ, CD952LJ, CD952SJ, FFH101KL, FFH101WL, FFH222AL, FFH272L, FFH333L, FFH373K, FJ606, FR608L)0p
FFH333L, FFH373K, FJB06, FR606L KSS210A 18F ORD20AL, CD630S/L, FFH212A/L FFH212E KSS210B 20C GRUNDIG CD360, CD435 HOPMS CCD360, CD435 KSS210B 20C CD360, CD435 KSS210B 20C CD560, CD90, RR3106CD, RR4000CD, RR610CD, RR700CD KSS210B 20C CDF60, CD90 KSS210B 20C C	
CD320AL_CD630S/L_FFH212AL_FFH212E	
CD360, CD435 HOPM3 218 CCD200, CD101MCD904, MC10, NEW ORLEANS CD KSS2108 20 KRCD106, RR1900CD, RR3100CD, RR4000CD, RR610CD, RR700CD KSS2108 20 CDP60 KSS200A 25 CDP65 KSS2313 34 CD905 OPTIMAS 30 HTATCH DAW560 HOPM3 215 FX-10 KSS210A 18 AXC10 KSS210A 18 JV.C. KSS210A 18 SIP99-1992, LATE 1987-1988 - XLE300BK, XLE31BK, XLE51BK, XLE900BK, XLME91BK, XLV101BK, XLV21BK, XLV222BK, XLV311BK, XLV333BK, XZ1010TN, XL241BK, XLZ444BK, XLZ555BK, XLZ611BK OPTIMAS 40 CDRADIO CASSETTE, MINI SYSTEMS - MODELS 1990-1992 OPTIMAS 60 CAC-C33, CAM-MOSBK, CAM-M33BK, XLV3-60, XL-M309, XL-M4098, XL-M408, XL-M408, XL-M409, 60	
CCD300, CD101MCD904, MC10, NEW ORLEANS CD KSS210A 181 KCD100, RR1900CD, RR3100CD, RR4000CD, RR610CD, RR700CD KSS210B 200 CDP60, CDP90 KSS220A 25 CDP65 KSS20A 25 CDP65 KS20A 25 CDP65 KSS20A 2	iOn.
KRCD100, RR1900CD, RR3100CD, RR4000CD, RR610CD, RR700CD KSS210B CDP60, CDP90 CDP60, CDP90 KSS210A 40CD905 KSS331A 34C CD905 KSS331A 34C CD905 KSS331A 34C CD905 KSS31A 34C CD905 KSS210B CD805 C	10p
CDP65)0p
CD995	
HITACHI DAWS60 HOPMS 2115 EX-10 KSS210A 186 AXC10 KSS210B 206 J.V.C. J.V.C. J.V.C. J.V.C. J.V.C. D30-1992, LATE 1987-1988 – XLE3008K, XLE31BK, XLE51BK, XLE9008K, XLME91BK, XLV101BK, XLV101BK, XLV21BK, XLV323BK, XZ71010TN, XLZ11BK, XLZ444BK, XLZ558BK, XLZ511BK OPTIMA3 406 CDRADIO CASSETTE, MINI SYSTEMS – MODELS 1990-1992 CA-C33, CA-MY308K, CA-MY338K, UX-A5, UX-A6, XL-M309, XL-M4038K, XL-M408, XL-M409,	
DAWS60 H.DPM3 2.15 FX-10 KS210A 186 AXC10 KS210A 186 AXC10 KS210B XS210B AXC10 KS210B AXC10 CSCACTA AXC10	Up
AXC10 J.V.C.	Op.
J.V.C. 1990-1992, LATE 1987-1988 - XLE300BK, XLE31BK, XLE51BK, XLE900BK, XLME91BK, XLV101BK, XLV11BK, XLV22BK, XLV311BK, XLV32BK, X.Z010VTN, XLZ11BK, XLZ244BK, XLZ555BK, XLZ511BK OPTIMAS 40C CDRADIO CASSETTE, MINI SYSTEMS - MODELS 1990-1992 OPTIMAS B0C CAC-33, CAM-X050K, CAM-X33BK, UX-A5, UX-A6, XL-M309, XL-M409BK, XL-M408, XL-M409, XL-M408, XL-M408, XL-M408, XL-M409, XL-M408, XL-M408, XL-M409, X	
1990-1992, LATE 1987-1988 – XLE300BK, XLE31BK, XLE51BK, XLE900BK, XLME91BK, XLV101BK, XLV111BK, XLV21BK, XLV21BK, XLV31BK, XLX25BK, XZ7101DTN, XLZ41BK, XLZ5558K, XLZ511BK OPTIMA3 400 CDRADIO CASSETTE, MINI 972FEMS – MODELS 1990-1992 OPTIMA4S DOPTIMA4S CA-CA33, CA-MX30BK, CA-MX33BK, UX-A5, UX-A5, XL-M309, XL-M403BK, XL-M409, X	Юр
CDRADIO CASSETTE, MINI SYSTEMS – MODELS 1990-1992 OPTIMA4S 60C CA-C33, CA-MX30BK, CA-MX33BK, UX-A5, UX-A6, XL-M309, XL-M408, XL-M408, XL-M409,	
CA-C33, CA-MX30BK, CA-MX33BK, UX-A5, UX-A6, XL-M309, XL-M403BK, XL-M408, XL-M409,	
	ЮÞ
XL-V241TN, XL-242BK, XL-V251TN, XL-V252BK, XL-Z1050TN, XL-Z551TN, XL-Z552BK OPTIMA5 300	Юр
1994 ONWARDS - CAE4BIK, CAMCG7, CAMXG9, CAS20BK, CAS20BK, VAS50, CAS60BRK, MXS20, MXS30, MXS60, PCX105, PCX130, PCX95, RCX230, RCX320, RCX520, RCX620, RCX720, UXA4, UXA5, UXA85, UXC7, UXT1, UXT3, XLF115, XLF116, XLF215, XLF216,	
XLMC100/M, XLMXG7, XLMXG8, XLV163TN, XLV164BK, XLV174, XLV283TN, XLV284BK, XLV274BK, XLZ463TN, XLZ464BK, XLZ574, XLZ674, XTMXG7, XTMXG9, XTS60 OPTIMA6S 200	Mn.
KENWOOD	vp
DP47, DP660SG, DP8020, DP87, L1000D KSS 152A 160 DP1030, DP1510, DP2010, DP2030, DP3010, DP3030, DP3050, DP4030, DP491, DP5010, DP5030,	Юр
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 180	
DPC42, DPC77, DPC80, DPC92 KSS220A 250 DP1050, DP2050, DP2050, DP501, DP5060, DP722, DP76, DP85, DP89, M77A, PD3060,	
UD502, UD701, UD701, UD90, XE5 KSS240A 25 0 DPC321, DPC521, DPC6311, DPC631K, DPC721, DPC731 KSS331A 340	
DPC321, DPC521, DPC631, DPC631K, DPC721, DPC731 KSS331A 340 DP1060, DP2060. PART No: RCTRH8136AFZZ RH8136A 450	
PANASONIC	ΔÞ
SLP177A, SLP202A, SLP212A, SLP222A, SLP277A, SLP377A, SLP477AK, SLP477A, SLPG100A, SLPG200A, SLPG400A, SLPG500AK, SLPG500AS, SLPJ24A, SLPJ26A,	
SLPJ27A, SLPJ28A, SLPJ325A, SLPJ325A, SLPJ37A, SLPJ38A, SLPJ46A 691-30209 55 0	

Models & Description	Order Code
SAD30, SLCH9, SLP150, SLP170, SLP200, SLP202, SLP222, SLP230, SLP250, SLP333,	0.00.000
SLP370G, SLP400C, SLP555, SLP777, SLP999, SLPA10, SLPC20, SLPC25, SLPJ25,	
SLPJ26, SLPJ27, SLPJ37, SLPJ45, SLPK25, SLPK26, SLPS50, SLPS70, SLPS700, SLPS840, SLPS900	SOAAD70A
PHILIPS	
AZ8304, CD070, CD080, 690, 910, 920. PART NO. 4822-691-20768	4822-691
D100, CD130, CD1380, CD1482, CD200, CD204, CD210, CD300, CD303, CD304, CD380, CD480, CD482, CD500, CD502, CD582, CD583, CD584, CD610, CD620, CD630, CD780.	
D781, CD782, CD840, CD883, CD960, CDF104, CDM4/19, FCD185	691-30209
AS440, AS445, AS540, AS640, AZ8048, AZ8640, CD070, CD080, CD091, CD163, CD165,	00100200
:D690, CD710, CD720, CD732, CD740, CD750, CD910, CD920, CD935, FW17, FW21,	
FW26, FW330, FW36, FW360, FW380I, FW40, FW41, FW46, FW56, FW66, FW68	CDM12.1
CD1210/40 VZ8006	CDM12.4 KSS210B
W11	OPTIMA6S
PIONEER	G/ 11111/10G
PDM400, PDM410, PDM500, PDM510, PDM600, PDM610, PDM700, PDM710, PDM730,	
DT303, PDT403, PDT503, PDX940M, PDX950M. PDZ560T, PDZ72T, PDZ73T, PDZ81M,	
DZ82M, PDZ83M, PDZ960M, XDZ53T, XDZ54T	KSS151A
J32, N90M, PD101, PD201, PD32, PD41, PD4500, PD4700, PD52PD5700, PD65, PD6500, PD6700,	
D7700, PD8700, PD970, PDCP420, PDCP520M, PDCP520T, PDJ400T, PDJ500T, PDJ800M, PDJ900M, PDM450, PDM550, PDM630, PDM630, PDM50, PDM901, PDP710T, PDP720T, PDP910M.	
DP920M, PDS501, PDS601, PDS701, PDS701G, PDS901, PDT310, PDT510, PDZ, PDZ570T, PDZ74T,	
DZ84M, PDZ970M, PXA1349, S125CDT, S135CDT, S303CDM, S303CDT, S505DM, S505DT, S707DM,	
5707DTM, S909DM, S990DT, XCP410M, XCP410T, XDZ54T, XDZ55T, XDZ64M, XDZ84T, XRP310, XRP320	PEA1030
DM400, 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
BASUNG	1 111 1003
D20	нормз
D1200, CD1310, SCM-6000, SCM6900	KSS210A
ICD1200, RCD1300, RCD1350, RCD1600, RCD2600, RCD990, RCD995, SCM6900	SOH90T4N
ANYO	
DCFS3, DCT55, DCX502, DCX701, DCX702, DCX802, DCX891, DCX891N, MCDZ10.	
PART No. 6142186855	614218 614220
DCFS5, MCD450K, 660K, MCDZ30L, 60F. PART No. 6142205006 DCX1000MD, DCX1003, DCX900MD, DCX903, DCX915	KSS210A
DCD10, DCD11U, DCD20, DCD30, DCD30AT, DCD6, DCD8U, DCMS1, DCX110, DCX120,	RODETOR
DCX210, DCX220, DCX993, DCX994, MCDMS40L, MCDMS50L, MCDMS660L, MCDZ1L,	
MCDZ2L, MCDZ3L. PART No. 6142391303	614239
CD12. PART No. 6450055966	645005
ACDZ31L, MCDZ41L, MCDZ61L, MCDZ71L	KSS210B
SHARP	
D-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-12, CD-X13, CD-X16, CD-X17, CD-X20, CD-X3, CRC630, CM3336D, DX-130, DX-130, DX-1430, DX-460, DX-460, DX-650, DX-660, DX-999, DX-A3, DX-N45, DX-R554, DX-R7, DX-R75, DX-R750,	
DX-R77, DX-R770, DX-R820, DX-R840, DX-Z100, DX-Z1000, DX-Z1500, GFCD55, QT-30CD, QT-33CD	u.
1T-350CD, QT-37CD, QT-38CD, QT-CD20, QT-CD33, RS95, SC-77CD, SC-99CD, SC-RS95, SG-A1,	
G-W1CD, SG-W2CD, SYS302, ZCD7CD. PART No. RCTRH8122AFZZ	RH8122A
0T-50CD, QT-60CD, QT80CD. PART No. RCTRH8124AFZZ	RH8124AF
DXR-840B, PART No. RCTTRH8130AFZZ DS360E, 360H, 370, 450H/E, CMS150CDH, CMSR400CDH, CP150, CPR400, CPS360, 370,	RH8130AF
ART No. RCTRH8136AFZZ	RH8136AF
SONY	
ISS240A	KSS240A
ISS121A	KSS121A
SS151A	KSS151A
SS210A	KSS210A
SS210B SS220A	KSS210B KSS220A
.SS331A	KSS220A KSS331A
SS360A	KSS360A

			REN	TOP	E	CONTROLS					
Description	Code	Price	Description	Code	Price	Description	Code	Price	Description	Code	Price
AKAI			A512120/230	RC900	650p	PANASONIC			SONY		
RC-V10A	RC876	650p	A514790	RC901	650p	EUR51200	RC200	650p	RM604, RM605, RM606	RC140	650p
RCV 37 B	RC891	650p	A5088470	RC902	650p	TC2200	RC204	650p	32 CHANNEL	RC140	650p
V25A	RC896	650p	A518612	RC903	650p	VSQ0357/NV730	RC202	650p	RM613	RC141	650p
DECCA			SCL002	RC904	650p	TNQ1621	RC203	650p	RM632, RM636	RC160	600p
RC70	RC894	650p	C2096	RC905	650p	PHILIPS			TATUNG		2001
FISHER			A511940	RC906	650p	RC5002,5154	RC134	650p	FXA	RC877	650p
RC905B	RC879	650p	655602H	RC1920	650p	KT3 NON TEXT	RC135	650p	RC70	RC883	650p
	110073	osoh	lπ			69117032	RC178	650p	FX70 FASTTEXT	RC894	650p
GRANADA	00000	000-	IFB13, 14, 15	RC143	650p	69117194	RC180	650p	TELEFUNKEN		300,
UNIVERSAL TEXT MK4 TEXT, 70155G, 70115G, 70133G	RC309 RC880	650p	FS4	RC148	650p	RC5991-UNIV RC38	RC300 RC301	550p 650p	FB632	RC632S	T 650n
95288E	RC882	650p 650p	RG305	RC305	650p	KT3 TEXT	RC5301	650p	FB639	RC639	650p
94490D	RC884	650p	RG306	RC306	650p	RC5352	RC5352		THORN/FERGUSON		2001
	110004	oaoh	FS9/1-10/1	RC307	650p	RC5375	RC5375		3V35-42	RC342	600p
GRUNDIG	DC107	CF0-	VS5 RUK	RC308	650p	RC5 STANDARD	RC300	550p	3V31-32	RC344	650p
TP160E TP200, TP300	RC107 RC380	650p	VS4-1 MULTICONTROL (17C20)	RC308 RC311	650p	RC5903	RC5903	650p	3V57-58	RC628	650p
TP400	RC401	650p 600p		ncoll	650p	SALORA			TX10 TEXT	RC732	575p
TP590-600	RC600	650p	LOEWE	2011-		SERIES L	RC190	650p	TX10 STEREO TEXT	RC738	575p
TP390, TP610	RC610	650p	DC11	RC146	650p	86173	RC882	650p	TC9-90-100	RC740	600p
TP621	RC612	650p	MATSUI			SANYO			3V55, FV11	RC783	650p
TP630, TP650	RC650	650p	010270601	RC889	650p	RC218, RC222, RC228, RC238	RC140	650p	TX100 FASTTEXT	RC789	650p
TP666	RC660	650p	VX770	RC892	650p	JXGE	RC878	650p	TX100 ST, FASTTEXT	RC789	650p
TP661	RC661	650p	NOKIA			JXDE	RC884	650p	PROFESSIONAL	RC790	650p
HITACHI			SATELLITE	RC550	650p	VHR2300 RC628	RC890 RC865	650p 650p	TOSHIBA	110730	0001
CLE800-CLE830	RC140	650p	ORION			SHARP	11000	osop	CT937	RC950	650r
A617402/655602	RC1920		RC53	RC892	650p	G0121CESA, 123CESA, 204, 251	RC140	650p	CT9117	RC951	650p

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

8 way Preprogrammed Universal Remote Control

A single remote control to operate Televisions, Videos and Satellite Receivers.

Plus Auxiliary Options!

Replaces up to 8 remotes with one • Simple 4 digit setup routine

Controls 1000s of models • Teletext functions with Fastext

Clear (large key) layout • Code Search Facility

Stylish and easy to operate • Replace broken or lost remotes

Original remote not required

Order Code: 8 WAY

PRICE: 1450p + 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

28.35		RI	EPL	ACE	ME	NT LI	NE	Ol	UTPU	ΓTR	A	NSFO	RN	101	RS		
Part No.	Code	Price	HITACHI			4515 01 19	LOT169		TLF 14520 F	LOT40 150		094-01020/0.7	LOT59	1400p	1-439-303-31		1300p
AKAI			2424593		1050p	4515 01 24	LOT137		TLF 14521 F	LOT39 185		094-01021/0.6	LOT59	1400p	1-439-303-32		1300p
45150344		1650p	2432101		1600p	4515 01 46	LOT136		TLF 14567 F	LOT39 185		094-01027/0.0	LOT186		1-439-311-00		1550p
101-214017-03	LOT278		2432461	LOT169		4515 03 01	LOT169		TLF 14568 F	LOT40 150		094-01038/0.7	LOT245		1-439-311-11		1550p
101-220005-03A		1600p	2432611		1800p 1800p	4515 03 02 4515 03 04	LOT180 LOT169		TLF 14584 F TLF 14586 F	LOT41 200 LOT42 180		094-01052/0.8 094-01057/1.1	LOT186 LOT285		1-439-311-13 1-439-311-31		1550p 1650p
D 050/37		1450p	2432651 2432761		1500p	4515 03 04 4515 03 05	LOT180		TLF 15606 F	LOT256 200		610.018.6620	LOT189		1-439-311-31		1550p
D 053/37	LOT207 LOT56	1650p	2432781		1200p	4515 03 06	LOT168		TLF 70012	LOT78 150		610.018.6637	LOT215		1-439-331-32		1550p
D 056/37 D 059/37	LOT200		2432981		1200p	4515 03 08	LOT22		TLF 70012 F	LOT78 150		SHARP	-0.1.0		1-439-331-41		1550p
D 069/37		1650p	2432982		1200p	4515 03 09	LOT178		TLF 70012A	LOT78 150		RTRNF 1220 CEZZ	LOT39	1850p	1-439-332-00		1600p
FCM 2015 AL		1600p	2433011	LOT171		4515 03 10	LOT168		TLF 70018	LOT274 155		RTRNF 1783 BMZZ		1800p	1-439-332-11		1600p
FERGUSON	20170	тооор	2433012	LOT171	1650p	4515 03 13	LOT30	1250p	TLF 70018 F	LOT274 155	0p]	RTRNF 1783 CEZZ	LOT202	1800p	1-439-332-21		1600p
00 D-3-508-001	LOT38	1250p	2433014	LOT171		4515 03 14	LOT174	1400p	TLF 70161	LOT278 130	Op	RTRNF 1786 BMZZ			1-439-332-41	LOT100	
00 D-3-508-002		1250p	2433212	LOT168	1500p	4515 03 15	LOT22	1250p	TLF 70162	LOT72 160			LOT211		1-439-332-42	LOT101	
00 D-3-508-003	LOT276		2433291	LOT172		4515 03 18	LOT192		TLF 70162A	LOT72 160		RTRNF 2000 BMZZ			1-439-332-52	LOT100	1500p
00 D-3-515-001 PL1			2433301	LOT246		4515 03 19		1250p	TLF 70162B	LOT72 160		RTRNF 2002 BMZZ			1-439-333-00	LOT270	1550p
00 D-4-208-001		1600p	2433441	LOT188		4515 03 20	LOT190		TLF 70162G	LOT72 160		RTRNF 2002 CEZZ			1-439-333-11	LOT270	1550p
00 D-4-208-002	LOT79	1600p	2433442	LOT191		4515 03 22			TLF 77001 B	LOT274 155	Up	RTRNF 2003 BMZZ			1-439-333-12	LOT270	
00 D-4-235-002	LOT240	1250p	2433451		1350p	4515 03 24	LOT194		PHILIPS	LOT142 400	a	RTRNF 2004 BMZZ			1-439-363-11	LOT268	
00 D-4-235-002 HTI	LOT81	1350p	2433452		1250p	4515 03 25	LOT22		4822 140 10142 4822 140 101145	LOT142 180 LOT134 145		RTRNF 2005 8MZZ RTRNF 2006 BMZZ			1-439-363-21	LOT268	
00 D-4-235-00201G	LOT81	1350p	2433453		1250p 1600p	4515 03 26	LOT198 LOT27	1450p	4822 140 101145	LOT112 170		RTRNF 2007 8MZZ			1-439-387-11	LOT311	
00 D-4-260-004 HT1		1250p	2433455 2433521		1600p	4515 03 28 4515 03 29	LOT 193		4822 140 10146	LOT102 170		RTRNF 2023 BMZZ			1-439-387-21	LOT311	
00 H-0-701-2400	LOT182		2433581		1250p	4515 03 29	LOT179		4822 140 10161	LOT102 175		SONY	201310	Тооор	1-439-416-11	LOT255	
06 D-3-083-001		1250p	2433361		1400p	4515 03 31	LOT207		4822 140 10171	LOT104 150		3753100	LOT275	1500p	1-439-416-12	LOT255	
06 D-3-083-002		1250p	2433751		1300p	4515 03 34		1650p	4822 140 10176	LOT114 115		1-439-243-00	LOT91		1-439-416-21	LOT255	
06 D-3-084-001		1400p	2433752		1300p	4515 03 35	LOT193		4822 140 10194	LOT105 150		1-439-243-11	LOT91	1600p	1-439-416-23	LOT255	
06 D-3-087-001		1400p	2433752		1350p	4515 03 38		1450p	4822 140 10198	LOT116 160		1-439-243-12	LOT91	1600p	1-439-416-41 1-439-416-51	LOT255 LOT255	
06 D-3-088-001		1450p	2433891		1400p	4515 03 40	LOT200		4822 140 10201	LOT104 150	Op	1-439-243-31	LOT229	1700p	1-439-430-21	LOT271	
06 D-3-093-001		1600p	2433892	LOT84	1450p	4515 03 41	LOT56	1650p	4822 140 10236	LOT118 155	Op	1-439-243-32	LOT229		154125A	LOT275	
06 D-3-095-001 06 D-3-095-002	LOT87 LOT87	1000p	2433893	LOT23	1400p	4515 03 43	LOT196		4822 140 10246	LOT111 150		1-439-243-41	LOT229		TOSHIBA	LOIZIS	Тэсор
06 D-333-512-001	LOT204		2433952	LOT33	1000p	4515 03 44		1650p	4822 140 10247	LOT105 150		1-439-244-00	LOT48	1600p	37010	LOT131	1450n
FETX 100 90 DEG		1500p	2434002		1400p	4515 03 46	LOT201		4822 140 10254	LOT107 145		1-439-244-11	LOT48	1600p	37011	LOT131	
FETX 90 WHITE		1650p	2434141		1000p	4515 03 50		1450p	4822 140 10263	LOT117 155		1-439-244-21	LOT48	1600p	37012	LOT131	
FETX 100 100 DEG			2434141		1000p	4515 03 51		1450p	4822 140 10269	LOT210 135		1-439-244-31	LOT48 LOT45	1600p 1650p	37013	LOT131	
GRUNDIG	20.04	.ооор	2434274		1050p	4515 03 75		1650p 1250p	4822 140 10271 4822 140 10274	LOT208 165 LOT123 145		1-439-256-00 1-439-256-11	LOT45	1650p	37014	LOT131	
29201.008.01	LOT153	1750p	2434274 2434453		1050p 1600p	4516 16 01 MITSUBISHI	LU122	123Up	4822 140 10274	LOT123 149		1-439256-21	LOT45	1650p	37015	LOT131	1450p
29201.014.01	LOT140		2434455		1600p	731003	LOT51	1550p	4822 140 10282	LOT104 150		1-439-256-22	LOT45	1650p	37016	LOT131	1450p
29201.015.01	LOT149	1400p	2434593		1050p	276-16399		1500p	4822 140 10294	LOT125 215		1-439-276-21	LOT230		37017	LOT131	1450p
29201.017.01	LOT60	1250p	2435062	LOT296		334 B 07803		1450p	4822 140 10306	LOT110 120		1-439-280-00	LOT92	1600p	37018	LOT131	
29201.018.01	LOT163	1300p	2435121		1000p	334 B 078030		1450p	4822 140 10325	LOT132 150		1-439-280-13	LOT92	1600p	37019	LOT131	
29201.018.02	LOT61	1700p	2435131	LOT251		334 B 08104		1600p	4822 140 10326	LOT122 130		1-439-286-00	LOT46	1300p	1810951		1400p
29201.019.01		1250p	2435141	LOT282		334 B 08108	LOT295	1600p	4822 140 10328	LOT124 145	Op	1-439-286-11	LOT46	1300p	2433751		1300p
29201.019.02		1250p	2435301		1450p	334 P 18506	LOT51	1550p	4822 140 10349	LOT106 125	0p	1-439-286-12	LOT46	1300p	2433752	LOT250	
29201.022.01		1700p	2435671		1600p	334 P 18507		1500p	4822 140 10353	LOT284 145		1-439-286-13	LOT46	1300p	23236023	LOT281	
29201.022.02	LOT166		2436201	LOT109		5908-05008A-AA		1500p	4822 140 10356	LOT284 140		1-439-286-21	LOT46	1300p	23236052	LOT131	
29201.022.03	LOT165		2436202	LOT109		D 108/37		1500p	4822 140 10367	LOT286 140		1-439-288-00	LOT228		23236098	LOT288	
29201.022.04	LOT165		2432101-2	LOT79	1600p	DCF1577	LOT273		4822 140 10369	LOT109 120		1-439-288-12	LOT228		23236198 23236255	LOT288 LOT289	
29201.022.04A	LOT165		2433451H	LOT81	1350p	DCF2077A	LOT272		4822 140 10381	LOT128 130		1-439-289-00	LOT47 LOT47	1400p 1400p	23236424	LOT1209	
29201.024.01	LOT65		2433453H	LOT82	1250p	KFS 60226B	LOT279		4822 140 10384	LOT127 155 LOT116 160		1-439-289-21 1-439-289-22	LOT47	1400p	23236425	LOT288	
29201.024.04 HINARI	LOT164	1400p	2433891H 2433892G	LOT23 LOT84	1400p 1450p	MSH-1FBW08 NIKKAI	LOT78	1500p	4822 140 10395 4822 140 10406	LOT73 115		1-439-289-22	LOT47	1400p	23236428	LOT289	
154 138 K	LOT24	1500e	1.T.T.	LU184	·+aob	BABY10	LOT67	1450r	4822 140 10406	LOT109 120		1-439-294-00	LOT93	1450p	3122113837011	LOT131	
51 13914 1	LOT24	1500p	4515 01 08	LOT113	1400p	ORION	20107	. 450р	4822 140 17078	LOT103 125		1-439-294-11	LOT93	1450p	150F6D	LOT131	
51 14184 1		1500p	4515 01 15			3714002	LOT02	1500p	SANYO		-	1-439-294-21	LOT269		TF8 4039 AD	LOT293	
CF 44 A	LOT24	1500p	4515 01 16			PANASONIC		•	094-00020/0.9	LOT113 140		1-439-303-00	LOT94	1300p	TF8 4048 AD	LOT281	
HM51-1411834-1	LOT24	1500p	4515 01 17	LOT139	1675p	TLF 14512 F	LOT39	1850p	094-00035/0.2	LOT162 135	Op	1-439-303-11	LOT94	1300p	TFB 4048 BD	LOT281	130 Op



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: £3.50 + VAT Special Offer: £7.50 + VAT

CD Cleaning Accessories

FULLY AUTOMATIC CD CLEANER (Battery Operated)

PRICE £12.50 + vat ORDER CODE: SP32

CD CLEANING PADS (Pack of 12) ORDER CODE: SP33 PRICE £1.20 + vat

CD CLEANING SYSTEM (with tray and fluid) ORDER CODE: SP34 **PRICE £3.00 + vat**

CD CLEANING SYSTEM (with fluid, boxed tray and brush) ORDER CODE: SP35 PRICE £4.00 + vat

CD LASER LENS CLEANER (with music + voice) ORDER CODE: SP36 PRICE £3.50 + vat

CD LENS CLEANER - WET (with music + voice) ORDER CODE: SP37 PRICE £3.50 + vat

COMPACT DISC MAINTENANCE KIT **ORDER CODE: SP38 PRICE £8.00 + vat**

CD ROM LASER LENS CLEANER (with animation display) ORDER CODE: SP39 PRICE £4.00 + vat

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

Helps continued from page 718

Letchworth, Herts SG6 4RZ. 01462 484 920. Wanted: Complete manual for the ITT Nokia Model FX6320, or possibly a chassis (Core 2 110°). Keith Patton, 1 Glenvale, Duneaney Road, Glarryford, Ballymena, Co. Antrim BT44 9QB. 01266 685 531.

Wanted: Circuit diagram for the Kenwood DPC42 portable CD player. P. Farrugia, 18 Murray Walk, Melksham, Wilts SN12 7AZ. 01225 702 340.

For disposal: Approximately 70 CD service manuals plus approximately 180 audio service manuals, all in very good condition. 48 brand new panel meters 40 x 40 x 29mm, 250μA FSD, scaled signal 0-5. 40 brand new 120 x 65 x 40mm grey ABS boxes with lids and screws. Two brand new Philips CDM2/29 assemblies (includes PCB, disc motor, laser). A large quantity of new Philips CD player hardware (PCBs, ICs, lasers etc.). Offers, or exchange for colour security camera or similar. John Teece, 51 Pine Hall Drive, Monk Bretton, Barnsley, S. Yorkshire. 01226 217 347.

Wanted: SIMMs, 72-pin with parity. Must be either 8Mb Compaq part no. 141685-001 or Kingston part no. KTC-8000/N, or 4Mb Compaq part no. 118690-001 or Kingston part no. KTC4000/N. Offer £3 per Mb. Spectroline PC110A UV EPROM/wafer erasing system with built-in timer, offer £80. Pivotelli very heavy-duty wall-mounting swivel arm for TV or monitor, black finish, with fixings, offer £30. Julian Bohan, 01522 871 926 or 0958 771 319.

Wanted: Does anyone know how to cure teletext lines with the Murphy MC6124/ Bush BC6004 (RRI sets)? A.G. Davies, 16 South Street, Crewkerne. 01460 73 348. Wanted: Loewe Profit T28 chassis complete and/or tuner type U1100. Have for disposal back issues of *Television* 1990-94 at cost. Peter Hill, 3 Mayfair Avenue, Halifax HX4 9JH. 01422 370 338 evenings. Wanted: Tuning panel type 14111/1CC for the Fidelity AVS2000, or the ICs on it (SL471.8827ASR and M19281.98349) or equivalents. D. Andrews, 20 Frobisher Court, Old Hall, Warrington WA5 5PQ. 01925 223 432 days, 01925 415 817 evenings.

Wanted: Circuit diagram for the Hartley CT436 double-beam scope. Bruce Adams, Vintage Radio repairs, 53 Red Leasowes Road, Halesowen, West Midlands B63 4SE. 0121 550 0019.

Wanted: User manuals for the Panasonic NV7200 and ITT VR3913 VCRs. Photocopies OK. D.J. Rockliffe, 3 Hewell Lane, Barnt Green, Nr. Birmingham B45 8NZ. 0121 445 5360.

Wanted: Working printhead and/or circuit diagram for the Canon BJC600 colour printer. J.J. Winchcombe, 34 Whitehouse Crescent, Sutton Coldfield, West Midlands B75 6ER. 0121 378 0477.

Wanted: Philips N1500 VCR in good working order. David Goodsell, 7 Gibbons Street, Ipswich, Suffolk IP1 2HL. 01473 413 223.

For sale: Twelve VHS VCRs, some in working order, £70 ono. Buyer collects. Phone 01932 565 248 (Chertsey, Surrey) after 3.30 p.m. and ask for Terry.

Wanted: Main microcontroller chip (IC001) type M50436-511SP for the Sony KV21XRTU (SX chassis). Would be interested in the chip, the main PCB or a complete set. Phone Andy Dyson on 01745 888 889.

Wanted: U-View *Television Servicing* 1987-88 volume. Also a service manual/circuit diagram for the Philips FAX3300 (photocopy OK). Joe S, c/o Petersonpark PO, 14 Yokermill Road, Glasgow G13 4PF. 0141 952 8870.

Wanted: Pre-war Emiscope 3/3 CRT to complete restoration of an HMV TV receiver. Robin Howells, Stourport, Worcs. Please leave message with friend on 01384 872 744. Distance to object.

Free: Panasonic PVM1328 combined 14in. CTV and VHS video. Imported from USA in 1994, hence NTSC/525-lines/110V only. Minor power supply fault otherwise as new. Free if collected promptly. Nicholas Arnold, 19 Bond Street, Bournville, Birmingham B30 2LB. 0121 458 1187 or 01483 573 491.

Wanted/for disposal: Require unbroken control flap for the Hitachi Model CPT2198. Have for disposal about 30 BSB receivers, some still in boxes and new. Open to offers. J. O'Neil, J.F. O'Neil Ltd., 7 Smithy Green, Ince, Wigan WN2 2AT. 01942 242 421, fax 01924 322 944.

Wanted: Tuning control panel 1-606-473-13, also teletext decoder panel with leads, for the Sony Model KV2212 (YE2 chassis). Ron Bruce, 11 New Zealand Way, Rainham, Essex RM13 8JP. 01708 558 792.

Wanted: Connection details and voltage requirements for the following boards: Apollo computer interface board REV 01 003355 (contains 298 ICs); and AB Series 2 (Sweden) basic PC motherboard NB12 117/R/7 (approximately 80 ICs). T.N. Casey, Tallaghan, Edmondstown, Ballaghadereen, Co. Roscommon, Ireland. Wanted: Pushbutton switch unit for the Ultra FM82 AM/FM radio. H. Trindall, 103 Farebrother Street, Grimsby, Lincs DN32 0JT. 01472 358 994.

Wanted: EHT meter/probe in good condition. Justin Smith, ATV, 419 Langsett Road, Hillsborough, Sheffield S6 2LL. 0114 285 4254.

Wanted: Power supply for the Akai VS-X470EGN. A used one would do (I have the transformer). Also a circuit diagram for this PSU (photocopy OK). S. Akers, 8 Farm Road, Lakeside, Redditch, Worcs B98 8LB. 01527 456 313.

Wanted: Drum motor or complete machine for spares, Panasonic Model NVHD100B. Also working power supply for the Ferguson Model FV31LV. Andrew Osbourne, 2 Cedar Tree View, Elkesley, Retford, Notts DN22 8EL. 01777 838 897.

Wanted: SN76730N IC for the Panasonic Model TC2031 and a transformer (T4QLP0564A or QLP0722A) for the Panasonic RS260US cassette deck. H. Mode, 24 Steven Court, Egerton Road South, Manchester M21 0XH. 0161 862 9628 after 6 p.m.

Wanted: LA1357N IF chip for the Sanyo Model CTP3131. D. Jordan, Central Electronics, 6 Queen Street, Stirling KK8 1HN. 01786 451 230.

For disposal: Have twelve old 22in. TVs that are free to collect – Ferguson, GEC, Decca, Sony etc. Arthur Slark and Sons, 43/45 Thicketford Road, Bolton, Lancs. 01204 526 684.

Wanted: Circuit diagram/service manual, copy or loan, for the Pace PRD800 satellite receiver. Can someone tell me the value of RS23 in the Nokia SAT780. S. Outen, 2 Heol Vaughan, Burry Port, Carms SA16 0HF. 01554 833 024. E-mail s.outen2061@aol.com.

Wanted: LOPT for the Fidelity Model CTV140 (ZX3000 chassis). Need not be new as long as it works. Also two remote control units for this model and one for the ITT VR3917 VCR. M. Payne, 66 Nevinson Avenue, South Shields, Tyne and Wear NE34 8NP. 0191 536 3744.

Wanted: Service manuals for the Grundig Model T51/T56 2406 and Baird FE2423 TV sets. Photocopies OK. Ron White, 29 Nunnery Street, Castle Hedingham, Essex CO9 3ND. 01787 463 091.

Wanted: CRT base panel and tube socket for the Ferguson Model 14M2. Parts from scrap set OK. Also circuit diagram/service manual for this model – photocopy OK. Wayne Brill, 31 Parnell Road, Ipswich, Suffolk IP1 6SP. 01473 742 568.

Wanted/for disposal: Does anyone have any B&O monochrome sets they no longer require? Am having a workshop clear-out, hence Sixties mono sets, early Sony Trinitron sets, early 26in. G8, Sony VCRs (C5-9, F1 etc.), JVC HR3300EK, Hitachi CED Videodisc player and discs, etc., etc. for disposal. Small donation secures anything. Tim Jarman, 7 Cadet Way, Church Crookham, Fleet, Hants GU13 0UG. 01252 616 938

Wanted: Instruction book and service manual for the Philips VKR6855 Explorer camcorder. Monty Alter, 18 Twyford House, Chisley Road, London N15 6PA. 0181 800 7636.

Wanted: Service manual for the Sanyo VTC6500 Betacord VCR (photocopy OK). Ron White, 29 Nunnery Street, Castle Hedingham, Essex CO9 3ND. 01787 463 091.

Wanted: Lower drum assembly, or just the drum motor stator, for the Sony SLV815UB VCR. Would be prepared to consider a complete drum assembly if the lower section is in good working order. Graham Brock, 2c Weigall Road, Lee, London SE12 8HE. 0181 318 0524 or 0973 167 035.



Reports from
Eugene Trundle
Gerald Smith
Maurice Kerry
Ronnie Boag
Paul Hardy and
C.J. Guy

Hitachi VTM720

This machine had suffered from a very intermittent fault – for years! It would sometimes eject a cassette immediately after insertion, or try to pull the empty cradle back in after eject. It would often behave itself for months. We finally tracked the cause of the fault down. When it occurred, the voltage at pin 65 of the syscon chip rose to about 1V instead of 5V. There was an 'invisible' dry-joint at one of the wire links that supply the pull-up resistor R759. E.T.

Hitachi VTF641

This machine appeared to be dead, with no deck operation and no front-panel display. The power supply seemed to be working all right, but neither microcontroller chip had a reset pulse. We found that the +5D line voltage was low at 4.6V, because of heavy electrical leakage in the capstan motor. When the deck was unplugged, the display lit up and the control system responded to commands. A new capstan motor restored normal operation.

VTM6XX series models are similar, so you could get the same problem with them. E.T.

Hitachi VTF550

Another intermittent front-loading fault! We had fitted new end sensors and a mode switch, but this machine continued, at rare intervals, to try to kick the FL cradle outwards at switch-on with no tape

VCR Clinic

present, or eject the cassette at the completion of front loading. It transpired that the front-loading switch S2102 would sometimes stick in its in position. A replacement switch cured the fault forever! E.T.

Sharp VCM271

This machine wouldn't accept a tape. But if you took the top cover off it started to work. A new LED restored normal operation. G.S.

JVC HRD820

Playback was marred by lines on the picture while the sound was a little too fast. If the capstan was slowed by hand the speed and picture would lock and stay OK until you went to search or stop. Replacing IC401 cured the fault.

Sharp VCM27

This machine didn't erase the previous sound and failed to record the new sound. A check on the erase bias showed that its frequency and amplitude were too high and the waveform was generally unclean. The fault was cured by repairing the print at C623, which is connected to the base of the bias oscillator transistor. G.S.

Daewoo V225

This machine came in dead. Checks showed that the primary side of the chopper power supply wasn't working. The cause was the $1\mu F$, 100V start-up capacitor C53 – a replacement restored normal operation. G.S.

Sharp VCM271

This machine would accept a tape then promptly eject it. Replacing the start and end sensors cured the fault. G.S.

GoldStar T2631

This machine didn't record the audio signal and failed to erase the previous sound track. The bias/ erase oscillator wasn't running, but

started up when the full erase head was disconnected. A replacement head, part no. 523-833A, cured the fault. M.K.

Sharp VCM271

This machine was brought in because it was dead. Checks in the power supply showed that the output voltages were low and pulsing. Further checks revealed that Q921, a 2SB709 surface-mounted transistor, was leaky. I replaced it with a 2SB710 which cured the fault. M.K.

Mitsubishi HS761V/641V

One of these machines was brought in with a fully-laced tape in it. When eject was pressed the guides came back half way then returned to the fully laced position. I removed the tape manually then inserted it in the cassette housing: this produced only a forwards-backwards movement.

These machines have an optical mode control system. The cause of the trouble was the LED D5B5, whose output was low. Replacement cured the fault. We've had this fault on a number of occasions now. The part no. of the LED is 264P696010. M.K.

Sanyo VHR286

The customer complained that this machine lost time intermittently and that timer recordings were unreliable. I eventually found that crystal X3002, next to IC302, had a dryjoint at one lead. M.K.

GoldStar T161/T1631

There was no capstan servo lock. Playback of prerecorded tapes was OK, but with the machine's own recordings the picture ran through. Replacement of the audio/control head, part no. 225-371A, cured the fault. M.K.

Sharp VCH84

The complaint with this machine was intermittent loss of functions.

The cure was to replace the faulty gear assembly part no. NGERH1128GEZZ. **R.B.**

Toshiba V204

There was no playback or E-E picture. The cause was found to be loss of the supply to the RF modulator. Checks showed that CW001 (100µF) was faulty, a replacement curing the problem. **R.B.**

JVC HRJ246

The loading motor would run for a few seconds then the machine would switch to standby. The cause of the trouble was dry-joints at the end sensors. **R.B.**

Sanyo VHR275

This machine chewed tapes in play. Replacing the arm lever load, part no. 613-164-4762, cured the trouble. **R.B.**

Toshiba V204

This machine was dead though the power supply was ticking. Capacitor CP007 ($10\mu F$, 50V) had fallen in value – a replacement restored normal operation. **R.B.**

Panasonic NVJ35B

The main complaint, low gain via the tuner/booster unit, was cured by resoldering a number of bad joints in this module. But there was still a problem – severe patterning with the output from the modulator. This disappeared gradually when the machine had been on for a while. C9 in the power supply had fallen in value. **P.H.**

NEC PX1200R

The customer said that this machine would sometimes fail to record and, when setting timed recordings, would show "error" in the display. I also found that it would sometimes auto play a tape even though the record tab was present on the cassette. The cause of the trouble was that the contacts of the record protection switch had gone high-resistance. Replacing this item and giving the machine a 'rubber' overhaul completed the repair. P.H.

Nokia VR3783

This centre-deck Hi-Fi VCR would not accept a cassette. The lift was mistimed, and it looked as if someone had already had a go. I retimed the lift and replaced the front loading gear – the tension of its retaining lever had been lost, with the result that the gear moved up the shaft. The timing of the main gears was checked and found to be fine.

There were no damaged teeth. But when the VCR was powered the deck went berserk. I retimed it and operated it manually. As everything seemed to work all right the most likely suspect was the mode switch, which is buried inside the loading block. It was, with a great deal of effort, replaced. Fortunately this cured the problem. **P.H.**

Mitsubishi HSM18V (J Deck)

The mechanism had jammed. I removed the cassette and checked the deck mechanism, which was fine. The problem was being caused by the sense and drive gears on the cassette lift – they had both lost some teeth. Willow Vale do a service kit (77048KT) which cured the fault. **P.H.**

GoldStar KI14V20 (D17 deck)

A cassette was jammed in this combined TV/VCR. When it had been removed and the lift had been refitted a cassette could be inserted. But when play was selected the tape was damaged by the pinch roller as it made its way down the guide.

After watching the operation of the mechanism a few times, using a dummy cassette, I realised that the take-up arm was bent and didn't clear the pinch roller when in its correct position. A service kit (88021FA) from Willow Vale was fitted – it has the take-up arm assembly, the take-up lever and the pinch tower. There is also a kit (88100L) which has only the pinch tower and the take-up lever. A modified pinch roller assembly (88100F) was fitted to complete the repair. **P.H.**

Mitsubishi HSM54

The sound was being played back at slow speed. On investigation I found that the pinch roller wasn't engaging fully because the grease on its guide pin had gone hard. Cleaning and regreasing the guide was the only action required.

I always clean and regrease the guide pin when I get a VCR fitted with this deck. Failure to do so will lead to the pinch-roller assembly sticking on the guide pin and the cam pinch lever breaking. This item can be obtained from Willow Vale – the order code is 77890L. **P.H.**

Panasonic NVSD200

The report said that this machine intermittently locked up and displayed F03. Now the usual cause of

this is the mode switch or its connector, but not this time! Eventually the fault did put in an appearance – after changing from reverse search to play. There was a whirring from the loading motor, but nothing happened. Then the machine shut down. When repowered it unthreaded normally. An examination of the loading motor revealed that the plastic coupling on its shaft had split. Replacement cured the problem. **C.J.G.**

Hitachi VT11/GEC V4005

The problem was intermittent loss of drum and capstan servo lock. Its cause was traced to intermittent loss of the 4.43MHz input at the servo chip. It comes from the HT3509 thick-film module on the Y/C board. A tap on this chip would instigate the fault - the 4.43MHz output at pin 27 disappeared. But the oscillator in the module didn't stop. We cured the problem by soldering a 1nF capacitor between pin 27 and the side of the crystal farthest from the pin. The owner was saved the cost of this expensive module. C.J.G.

GoldStar GSE1290

This machine worked perfectly but its owner complained about a very loud whistle. It came from the piezo 'buzzer' P8501, which proved to have DC leakage. As a result, the oscillator transistor Q502 was permanently biased on. C.J.G.

Auto Head Cleaners

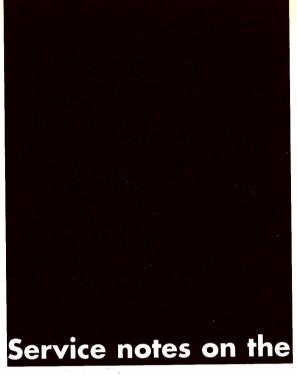
Whenever you replace the head in a VCR that has one of these abortions in it, replace the cleaning roller as well. I had one ruin a new head in a very short time, because it had become hard and abrasive. Better still, remove the thing altogether – I reckon the heads will last a whole lot longer! **C.J.G.**

Ferguson FV91L

There was no drum rotation, only a slight twitch when it attempted to start. The rotor had been pushed too far on to the shaft. If it's pushed all the way down to the bearings, it is too far away from the PCB-mounted stator when the deck is assembled to the PCB. C.J.G.

Philips VR203

The sound produced by this Charlie deck VCR suffered from severe wow. None of the usual problems was the cause. Idler 216 turned out to be the culprit. The bearing in this item had seized up. **C.J.G.**



Mitsubishi EE3 Chassis

John Coombes describes some faults you could experience with these sets and some modifications that might be required

he EE3 chassis is used in a number of Mitsubishi CTV receivers that include AV1 in the model number, e.g. the CT21AV1B, CT25AV1B and CT28AV1B. The sets first appeared in about 1995. The following notes, based mainly on Model CT21AV1B, summarise our fault experiences to date.

No Results

This is often because the line output transistor Q552 has gone short-circuit. A modification kit (AVM5-KIT) is available to deal with the situation. It includes a number of components that may fail should Q552 have gone short-circuit. The components supplied are as follows: R713 ($1k\Omega$ – value changed during production), R726 ($5.6k\Omega$ – value changed during production), Q552 (type 2SD1556), Q901 (S2000N), R508 (value change to $3.9k\Omega$, 5W for CT25/CT28AV1 range models only), R991 (4.7Ω , 10W), zener diode D909 (RD3 0FB2) and a 10μ F, 25V capacitor which has to be added and is then known as C720. There is also a 22pF capacitor in the kit – this is used in only M5 series models (EE4 chassis).

Replace Q901, R991 and D909 only if they are faulty. R713 and R726 must be changed to the new values and C720 added in all early production receivers whether Q552 has failed or not. Note that R726 is normally unmarked: it's the $10k\Omega$ resistor that is probably attached to the print side of the main PCB with one leg soldered to C717 and the other to pin 12 of IC701 – in later production R726 is on the component side of the board, near Q716. Fit C720 on the print side of the PCB, see Fig. 1.

Q552 may have gone short-circuit because the HT is high. If so, check whether C914 (47 μ F, 35V) is open-circuit.

No results can be caused by failure of circuit protector Z951, which should be uprated from 2A to 3.15A.

The cause of the fault can also be in the feed to pin 15 of the TEA2261 chopper control chip IC901, including

the start-up resistors. Check R915 (15 Ω , 2W), R922, R901 and R902 (all 22k Ω , 2W). R902 often goes open-circuit.

If the 2AT mains fuse F991 has blown violently, the S2000N chopper transistor Q901 is probably short-circuit. In this event IC901 (TEA2261) and the TCDT1124G optocoupler PC951 should also be replaced. Check the zener diode D909 (RD3-0FB2) and the current sensing resistors R908 (0-33 Ω , 2W) and R909 (0-22 Ω , 2W) any of which could be opencircuit.

Blank Raster/No Sound

If there is a blank raster and no sound but the on-screen graphics can be displayed, check whether circuit protector Z953 (1.6A) is open-circuit. In sets that incorporate a satellite receiver (models CT21AV1BS etc.) the cause of this may be a short in the LNB feeder. In these sets Z953 has been uprated to 3.15A to avoid failure because of accidental shorts – the part no. is 299P193030. Z953 must remain at 1.6A in non-satellite models.

Blank Raster/No Sound/No Graphics

Circuit protector Z953 may be open-circuit because the 2SC2236-O,Y 8V regulator transistor Q952 has failed or is dry-jointed. If so, obtain the 8VREG-KIT – this is also its part number. Change the value of R957 to $1.2k\Omega$ and replace the RD9·1D3 zener diode D957 if faulty. After fitting the kit, check the resistance between the emitter of Q952 and chassis. The reading should be about $2k\Omega$. If it's incorrect, suspect IC202 (TEA6415C) and/or IC301 (MSP3410). These two chips are not included in the kit.

No Results/Green LED On

With this condition voltages are present on the secondary side of the power supply but there is no line drive. The condition may clear if the receiver is switched off then on. There is loss of memory, e.g. no tuning data, no text. IC951 (TDA8137) will be the cause when its 5V outputs are low. Check whether C955 has been upgraded to 3,300 μ F, 16V (part no. 181P353000). Change C702 to 10 μ F, 25V (part no. 181P353020). If the set is a Dolby model, increase the value of R3D68 to 680 Ω (0.25W).

It may be necessary to reprogramme the EEPROM (IC702) to restore the line drive – adjust the options and VCJ settings. The options settings are in the service manual. Adjust the VCJ settings for optimum picture performance.

Replacing C955, C702 and R3D68 as described above normally cures persistent lock-up and memory corruption. In a few rare cases the symptoms may persist. If so, change the value of R702, R213 and R214 to $1k\Omega$, 0.25W.

No Sound

Obviously the TDA7263 audio output chip IC351 can be the cause of this. But it can fail for an unusual reason. This is to do with the mute circuit, which includes C368, Q301, Q302, Q304 and Q305. C368 controls the voltage at the bases of the muting transistors Q301/2. At some point as it discharges, HF oscillations can occur in Q301/2. These damage IC351. To overcome the problem, remove C368: the switching of Q301/2 will then be more positive.

Intermittent no sound when switched on from standby can occur with the Dolby Models CT25AV1BD, CT25AV1BDS, CT28AV1BD and CT28AV1BDS. The

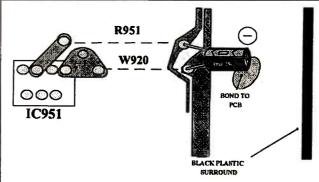


Fig. 1: How and where to fit C720 - on the print side of the main PCB. It must be close to IC951, as shown.

solution is to add a 560k Ω , 0.25W resistor across X3D1 on the print side of the Dolby PCB.

Tuning Drift

The tuner may be faulty or the $\mu PC574~33V$ regulator D956 leaky – check the later by replacement. If there is tuning drift when the receiver is cold, change R736 to $15k\Omega$.

If still in trouble, obtain modification kit TD-EE3/4 to improve the AFT pull-in range. If necessary check the $180k\Omega,\ 0.25W$ resistor in series with a 1N4148 diode whose cathode is connected to the tuner unit's 5V line. When this modification has been completed, ensure that the AFT is set to the on position. The tuning drift problem tends to occur at the higher end of the band.

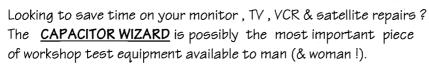


P.O. BOX 142, NOTTINGHAM, NG9 3RX, ENGLAND
Tel: +44 (Ø)115 932 Ø152 Fax: +44 (Ø)115 944 4ØØ4
E-Mail: tony@iche.com WEB SITE: http://www.iche.com





Searching for the keenest pricing and availability for that specialist monitor IC like <u>WELTREND</u> (WT8041, WT8042, WT8043, WT8045, WT8048) <u>ZILOG</u> (Z0860204PSC, Z0861404PSC, UX051B311, UX054B110) etc.? Then look no further! We have them in stock!!







Got a glitch on your monitor you can't get rid of?

Try "TECHTIPS for WINDOWS" the monitor repair database. We also have the largest selection of MONITOR SCHEMATICS available!!



"ALWAYS THE FRIENDLY PROFESSIONAL SERVICE"





Microvitec Series 13

Stephen Moorhouse explains the operation of and the reason for the unusual line scan/EHT generator system used in this monitor chassis

n his article on servicing the Microvitec Series 13 monitor chassis (May issue) Russ Phillips refers to its "unusual" line output stage. The main reason for the development of this circuit was the need to be able to compete on a global scale in what had become a very price-sensitive section of the monitor market. In fact however the Series 13 line deflection system was a development of a previous circuit that was used for many years in earlier Microvitec designs, including the Series 7 and Series 9 generic chassis. Microvitec owns a patent for it.

Basic Concept

An essential requirement of an autosync monitor, i.e. one that will operate at different line frequencies, is a line deflection system that generates a substantially constant EHT and line deflection current independently of the line frequency, as well as providing suitable EW geometry correction. This means that the HT supply that powers the line output stage must be proportional to the line frequency.

This can be achieved by inserting an additional "Buck regulator" between the main chopper power supply circuit and the line output stage, see Fig. 1. This consists of a series chopper FET, an efficiency diode D, a reservoir inductor L and a smoothing capacitor C. The output voltage Vo = Vin x (Ton/Th), where Vin is the HT produced by the chopper power supply, Ton is the on period of the pulse-width modulated drive to the Buck regulator FET and Th is 1/fh.

In the Series 13 circuit the Buck regulator and line output stage circuits are combined, see Fig. 2. The line output transformer's primary winding and the scan-correction/coupling capacitor now perform two roles: in addition to their normal functions they act as the storage elements for the Buck regulator. The result is a considerable saving in material.

The use of what's called a "negative flyback" system (the line flyback pulse, produced at the junction of the line output transistor's emitter and the input to the line output transformer's primary winding, is negative-going) is a cost-effective way of carrying out this combination. By turning the line output stage upside down, drive for the n-channel FET becomes very simple as it is now "ground-referenced". Because it's connected to the flyback pulses, additional isolation is required in the line driver transformer.

Active Breathing and Class D EW Correction

The other "novel" features of the circuit are the ways in

which EW and picture breathing correction are implemented (see Figs. 4(b) and 5 on page 509 of the May issue).

Traditionally a transductor or a diode modulator is used to apply EW correction to the line scan current. Both are relatively costly, particularly in an application where a fixed raster "width" will suffice. The technique adopted here is to use the class D, pulse-width modulated FET drive to generate the EW correction for the tube in addition to its main role in controlling the EHT and line scan. An EW parabola obtained from the TDA4851 sync processor chip is fed to pins 6 and 7 of the NE555 chip IC101 that produces the drive for the FET. The NE555 is arranged as a monostable oscillator, and the parabola modifies the on time of its output. In this way the degree of EW correction applied automatically tracks with the line frequency.

The arrangement requires an integral EHT capacitor (3nF in this case) in the line output transformer. In addition to improving the short-term EHT source impedance, this capacitor prevents excessive modulation of the EHT voltage by the parabola. Otherwise there would be unacceptable geometry distortion when the CRT's beam current is high

Since the source impedance of an EHT supply is typically $2\text{-}2\text{-}2M\Omega$, a 1-1-5kV EHT change is not uncommon between CRT beam current extremes – between a black and a full white screen. Without corrective action the result is unacceptable variations in the picture width. The usual technique adopted in TV sets and monitors that don't have a diode modulator is to add an anti-breathing resistor in series with the HT supply to the line output stage. The voltage drop across this resistor varies with the EHT current, providing roughly the right correction. In the Series 13 chassis this approach is implemented using active circuitry.

The voltage at the lower end of the EHT bleed resistance (typically some $500M\Omega$, and part of the line output transformer) is sensed to generate a limited amount of 'positive feedback' which is applied of the timing pins 6 and 7 of the monostable circuit (IC101), together with the EW correction parabola. As a result the EHT is reduced with increasing beam current, along with a corresponding reduction in the scan current. Since the picture width is proportional to the scan current and is inversely proportional to the square root of the EHT voltage, the technique produces a constant-width display.

It is worth mentioning the role of VR302 which is within the feedback loop – it's associated with IC303 (see Fig. 5, page 509, May). This potentiometer is included to ensure optimum correction: it provides compensation for the ± 20 per cent tolerance associated with the EHT bleed resis-

tance. If a replacement line output transformer has to be fitted, it will nearly always be necessary to readjust VR302. The procedure is given in the relevant Microvitec service manuals.

Conclusion

Although the line deflection system employed in the Series 13 monitor chassis is somewhat unusual, it provides an extremely cost-effective means of generating the EHT and line scan with an autosync monitor.

Finally, there were a couple of errors in the circuit diagrams in the May article. In the chopper power supply circuit (Fig. 1) TR2 is shown as type BF547B: it is in fact type BC547. This transistor is used to lock the chopper power supply's operating frequency to that of the line output stage, via an isolated winding on the line output transformer. TR2 terminates the oscillator ramp generated within the UC3842 control chip by driving pin 4 high during the line flyback, thus initiating, after a short dead time, the next cycle.

Secondly Fig. 4(b) is incorrect in that TR102's drain should be shown connected to the control pin 5 of IC101, not to the timing pins 6 and 7. TR102 implements power management by shutting down the line output stage in the absence of line sync pulses. In this condition there is no clamp pulse output from IC201 (TDA4851) to drive the NE555 F-V converter chip IC401. TR600 (on the geometry module) switches off and TR102 switches on.

Editorial note: Our apologies for these errors, which are also present in the Microvitec circuit diagram we used as the basis of our drawings. At least we showed TR102 as a FET – it's

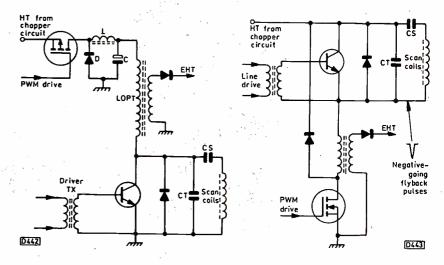


Fig. 1(left): Use of a Buck regulator and separate line output stage to provide, with an autosync monitor, a constant EHT and line deflection current independently of the line frequency.

Fig. 2 (right): The arrangement used in the Microvitec Series 13 monitor chassis combines the Buck regulator and line output stage. The resultant saving in component costs is a great help in a highly price-sensitive section of the market.

shown as a bipolar transistor on the original circuit diagram. We would have spotted the incorrect transistor type had we gone by the parts list.

A whole station for the price of a London – Edinburgh return.



For just £99 we will provide you with our 50 watt soldering station, a bench stand and a temperature feedback controlled soldering iron.

Unlike 'energy controllers' this station will electronically control the tip temperature of your choice between 65°C and 450°C with excellent

repeatability. At a slightly higher price platform is our 690SD ESD safe station which has digital readout, electronically lockable settings and many other features. For details, or a copy of our brochure call: 01822 613565 Fax 01822 617598 E-mail: sales@antex.co.uk

ANTEX NOT JUST ANY OLD IRON

Technology at MCES

Martin Pickering pays a visit to this specialist repair company to find out how they tackle LNBs, tuners, etc

Hen I arrived at MCES in Davyhume, Manchester I thought I'd gatecrashed a butchers' convention. It was a hot, sunny day (unusual for Manchester!) and the staff of MCES, all wearing striped aprons, were enjoying ten minutes of fresh air in the car park.

I was greeted by Graham Dobson, the Managing Director, and John Glenton the Technical Director. They invited me to look around the workshops to see how repairs are carried out.

MCES is run like a small, family business and has a very friendly atmosphere. The firm began with tuner repairs 27 years ago. As with all repair businesses today, the profit margins are very tight and the staff have to work hard to maintain a high throughput. They do this with a level of skill and cheerfulness I've seldom found in larger companies.

The company undertakes contract repairs for companies such as Grundig Microwave Technology. It seems that the Grundig LNBs are very reliable compared with others that the firm has handled. So MCES is not repairing as many LNBs as it used to.

Mixing contract work with one-off repairs for the likes of you and me presents an interesting logistics problem,

but MCES seems to handle it with ease.

Graham Dobson explained that everything is done in batches. The Grundig stock is all kept in a completely different stores area so that there can be no mix-ups.

Tuners

When tuners are repaired they are first separated into batches of identical ones. A control sample tuner is sent down the line to ensure that the test equipment is all calibrated for that particular tuner type. Then the batch of faulty tuners is repaired and tested. The process is repeated for every variant.

I asked about customer complaints. Naturally these arise from time to time. They generally occur because a shop has sent a tuner that's not the actual cause of the reported fault.

It's not possible to fault-find to particular components with every tuner. The batch approach means that every component known from experience to cause problems in the type of tuner concerned is replaced, then joints that can be poorly made in manufacture are resoldered. Only then is each tuner tested.

By this time most faults will have been cured. So MCES does not expect to see the reported fault during test. Each tuner is finally fitted to a test jig that connects it to a real TV set, satellite receiver or VCR so that the picture it produces can be seen and the sound heard. If a customer subsequently phones to say that a tuner "is still faulty", MCES can with good reason say that it's OK!

LNBs

John Glenton had some interesting comments to make about LNBs. "Most people think you can simply drill out the rivets, prise apart the housing, solder in a new transistor then screw the LNB together again using self-tappers.

It's not as simple as that. For a start the manufacturer's specification for noise and gain variation has to be met. This can't be done when self-tapping screws are used. The company has developed various ways of taking LNBs apart without damaging them — many modern LNBs are glued together using silicone adhesive.

The front-end FETs are extremely sensitive to heat and to static electricity. So electrostatic-safe workstations

The tuner repair workshop.



are used, together with special soldering irons that have needle-point tips but can raise the temperature to an accurately set limit within seconds. John Glenton demonstrated this by placing the tip of an iron on to a tuner casing and immediately melting solder on the metal. Special low melting-point solder has to be used to fit FETs, and to achieve this the iron tips are set to about 160°C.

Once repaired, each LNB is reassembled, frequency tuned and tested. It also undergoes a water bath test to ensure that it is watertight. Even the silicone RTV sealant used is a special product from Dow Corning. As John explained, "you can't use ordinary bath sealant because it produces acetic acid that can cause serious damage inside an LNB".

Each LNB contains a tuned cavity that's usually held by screws. These have to be tightened in a set order to a specified torque. "What some people try to get away with would astonish you" John added, "we've seen some real horror stories. Amazingly, some of them worked – after a fashion!"

Other Items

MCES also excels at VCR head refurbishing. The equipment used has been installed for a long time, but is tried and tested and works extremely well. MCES is considering the purchase of a new alignment jig however, as the present one is very time consuming to set up. Since time costs money, an investment of a few tens of thousands of pounds to speed up the operation can be justified.

The one drawback with a VCR head is that it would be



impractical to test it in a VCR. Instead, the inductance of each head winding is measured to ensure that they match to a very close tolerance. This measurement provides an excellent guarantee that the heads will not only function but will produce pictures free from annoying streaks.

The LNB repair workshop.

Contact Details

You can reach MCES on 0161 746 8037, or by e-mail at sales@mces.co.uk. A new web site is being set up at www.mces.co.uk. The fax no. is 0161 746 8136.

ROCDAN LIMITED

UNIT 21, 6/F, GOLDFIELD IND. CENTER, 1 SUI WO ROAD, FOTAN, NEW TERRITORIES, HONG KONG FAX: (852) 26027743

THE FOLLOWING ARE READY FOR EXPORT IN RELIABLE QUALITY & COMPETITIVE PRICE:

- A GRADE TV IN FULLY REMOTE.
- ☐ B GRADE TV IN FULLY REMOTE.
- TV W/QUALITY USED TUBE (IMPORTED FROM JAPAN) IN FULLY REMOTE.

SPECIAL OFFER FOR USED ITEMS

- ✓ TVs FROM SIZE RANGE 14"-37" SPECIALISTS IN CONVERSIONS TO PAL SYSTEM
- ✓ REFRIGERATOR 2-5 DOORS
- ✓ AIR CONDITION SPLIT TYPE
- ✓ ALL TYPES OF AUDIO APPLIANCE

FOR FURTHER ENQUIRIES
PLEASE CONTACT US BY FAX OR
E-MAIL: tobyu@netvigator.com

IS YOUR RENTAL BUSINESS EXPANDING?

Broughfame Ltd.

can help to expand your television/video rental business and increase your profitability. Our rental Finance Plan offers you financial facilities from £1,500 upwards.

Block Discounting finance also available.

For further details ring or write to:

Broughfame Ltd. 115A St John's Hill, Sevenoaks, Kent TN13 3PE Tel: (01732) 743400 Fax: (01732) 743335

E-mail: R@Broughfame.TelMe.com http://www.elated.com/broughfame/



Alan Willcox describes a simple unit that can be used to increase the sensitivity of a digital meter so that unambiguous readings of lowresistance values can be obtained. There are other advantages for fault finding

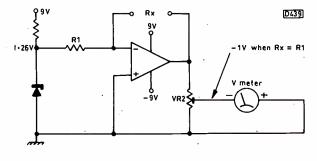
Low-Ω Add-on Unit

decided to develop this add-on ohmmeter because of the difficulty, when using a digital meter, of getting unambiguous readings with low-value resistors. Such resistors are used in the current sensing, supply feed and other circuit positions in modern consumer electronic equipment.

It is also useful to be able to pinpoint quickly the location of a short-circuit. When there is a short across the HT line in a TV set how many of you have, like me, juggled with the meter probe between the collector of the line output transistor, the transformer's HT pin and the HT reservoir capacitor looking for the lowest reading while taking into account the 0.5Ω or so that's usually present, and varying, with your digital meter on the ohms range? This seems to be a common weakness with such meters, even quite expensive ones.

The problem has been addressed in these pages before on a few occasions. In the March 1992 issue Ian Rees came up with quite a novel solution: a self-contained device that measures as low as 0.1Ω . Another approach that interested me was the circuit for a linear ohmmeter described by William E. Harrison in the December 1981 issue. This is mains-powered and uses a moving-coil movement as the indicator. I built one and found that it would also, with a good large-scale movement, provide a resolution down to 0.1Ω . It uses two operational amplifiers to convert resistance to a related linear voltage. Anyone who is interested in this particular circuit should note that there is an error in the circuit diagram (Fig. 1 on page 83): pin 6 of IC2 should be shown connected to the common end of the three resistors associated with SW1b - as drawn, the circuit will work only on ranges 1 and 2.

Fig. 1: Basic principle of operation.



Present Circuit

In this much slimmed-down version I've used the same principle of operation (thanks for the idea, William!). The power requirement is low, so a battery was chosen as a more convenient option. Stability has been much improved by the use of a precision reference voltage source: this, coupled with a digital read-out, takes the resolution down to 0.01Ω (0.001Ω is possible, see later). The resistance of a PCB track is thus readable and, by checking directly for shorts across suspect devices connected to the same line, you should be able to establish, by the lowest reading, which is the faulty one. In practice there are some restrictions, as we shall see.

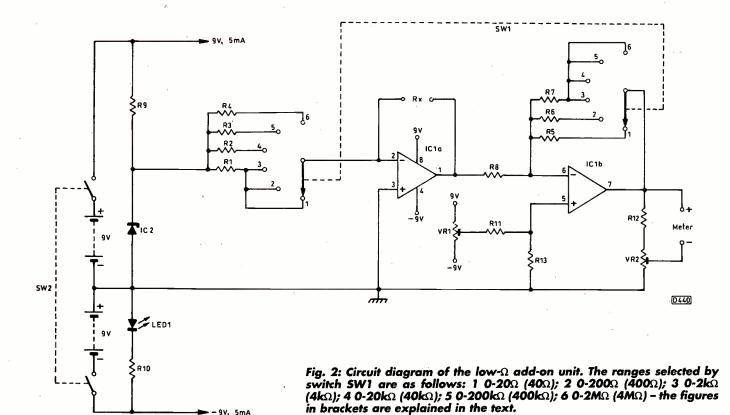
The operational amplifier used has a short-term offset drift that amounts to an error of around 0.05Ω maximum. Because of this, and to compensate for lead resistance, a front-panel set-zero control is included. In practice the unit quickly settles down after switch-on. Don't confuse this with any changes you might experience with your normal meter when it is used on the low-ohms range.

When using this add-on unit the least significant bit represents hundredths of an ohm. Use of a digital read-out is also justified on economic grounds. An inexpensive meter costs less (around £7) than a moving-coil movement. Although it will probably be poor on the ohms range it will be quite good on the voltage range.

Principle of Operation

Fig. 1 shows the basic principle of operation. R1, which is connected to the inverting input of an operational amplifier, is part of the input switch network. The resistor to be measured (Rx) is in the amplifier's feedback loop. Now if Rx is $1k\Omega$ (Rx = R1) the amplifier will have unity gain and its output will be -1.26V. If VR2 is set at the position where -1V is fed to the meter, +1V will represent $1k\Omega$. If Rx is $2k\Omega$, the gain is -2 and a 2V reading on the meter represents $2k\Omega$. With Rx at 500Ω the gain is -0.5 and so on. The meter is generally used on its 2V range, so in the example shown a full-scale reading represents $2k\Omega$.

To get down to really low-resistance readings we need a full-scale reading of 20Ω . This is achieved by using a



second operational amplifier (in the same package) to obtain gains of 100 and 10 on ranges 1 and 2, with unity gain on the other ranges. The result is full-scale readings of 20Ω and 200Ω respectively.

Fig. 2 shows the full circuit diagram. IC2 provides the precision reference voltage for IC1a. Although switch positions 1 and 2 both use R1, the range changes because of the gain provided by IC1b as R5 or R6 is switched into circuit. IC1b's gain is unity in the other switch positions. The offset adjustment VR1 is set to give zero output at pin 7 of IC1 when the test leads are shorted across. The is really necessary only in position 1 where the gain is 100 (R5/R8).

Construction

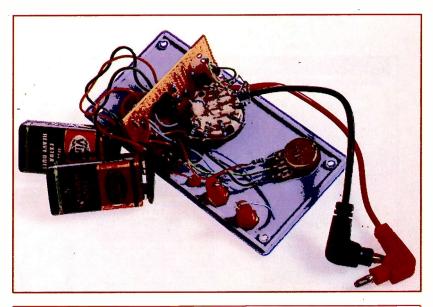
A suggested layout on stripboard is shown in Fig. 3. Make sure that R1-9 are 1 per cent tolerance metal-film resistors – the accuracy of the meter depends on them. Avoid skimping on the switch, presets, connectors and test leads. Buy new – it defeats the object otherwise. Good test leads might cost more than the rest of the components put together, bit it's worthwhile in the long run.

I opted for a front-panel set-zero control for the reasons mentioned above. This control is quite sensitive. To make it less so I wired a resistor at each side of the potentiometer (minimum value $22k\Omega$, linear) to reduce its range. The values I ended up with were of the order of $82k\Omega$ or so, chosen to more or less centralise the control.

Set Up and Use

Setting up is straightforward. Short the test leads together and adjust VR1 for a zero reading. Connect a good $180k\Omega$ resistor to the terminals and adjust VR2 to produce a reading of 1800 on the display.

The multimeter is normally used on the 2V (2,000mV) range. This represents the full scale as marked on the switch. But the output from IC1 can go higher than this – to over 4V with a 9V supply. Thus if you select say the next voltage range up, resistors up to $4M\Omega$ can be mea-



Parts	ľ	İS	t
--------------	---	----	---

R1	1kΩ	VR1, 2	47kΩ min. linear horizontal
R2	10k Ω	presets	See note in text on VR1.
R3	100 k Ω	•	•
R4	$1M\Omega$	IC1	TL802
R5	100 k Ω	IC2	ZN423
R6	10kΩ	LED1	2mA low-current type
R7	$1k\Omega$		
R8	1kΩ	SW1	2p, 6w
R9	3-9kΩ	SW2	dp on/off
R10	3-9kΩ		
R11	820kΩ	0⋅1in. str	ipboard
R12	100k Ω	2 PP3 ba	tteries and connectors
R13	1kΩ	Plugs, lea	ads, case etc.
.All 0	·6W 1%		

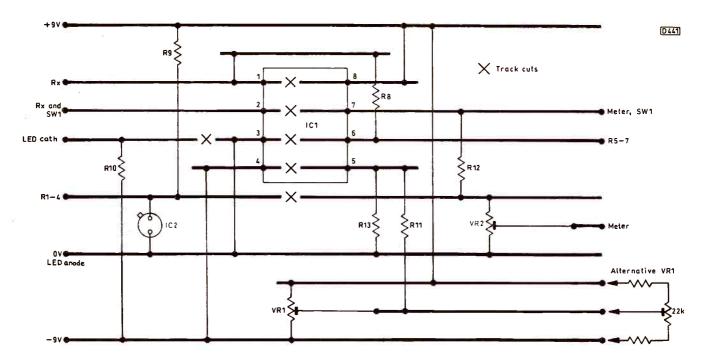


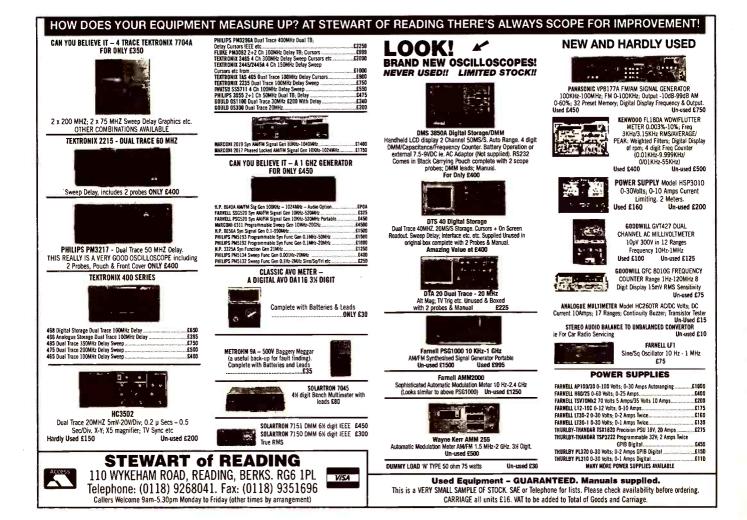
Fig. 3: Suggested layout on 0·1in. stripboard.

sured on the $2M\Omega$ range.

By the same token, if you select the 200 mV range you can measure down to 0.001Ω . Set zero now becomes more critical. A point is reached at which the PCB track resistance can be read, getting to the stage where we can get 'colder' or 'warmer' with a leak or a short. Chokes, transformer windings, circuit protectors, low-ohm feeds

etc. are all taken into account easily. To make best use of this low- Ω feature, it's an idea to solder a set of test leads direct to the rear of the sockets. Make sure that the probes are clean and sharp.

In practice the $200k\Omega$ range can be used to read from $1k\Omega$ up to $200k\Omega$ and the $2M\Omega$ range from $10k\Omega$ to $4M\Omega$.



The Pace Link Memo

The Memo box is the latest development in the Pace Link system from Kesh Electrics. Martin Pickering, B.Eng., describes its operation and use

he original Pace Link system was designed by Kesh Electrics to provide an interface, via scart connection, between Pace PRD, PSR and MSS series receivers and a PC. The software requires the use of Windows 3.1 or a later version, and is able to access the EEPROM in a Pace receiver to carry out read and write operations.

Pace Link Versions

Pace Link Pro software can communicate with almost any Pace receiver and costs £199 including VAT. The subsequent Pace Link Lite costs £49.99 but works with just one model, which you can specify.

The Pro version is obviously intended for the professional workshop whereas the Lite system is more useful to say the owner of a Model MSS508IP. The software allows "drag and drop" editing of the channel order on a computer screen as well as the facility to type in channel names, frequencies and other parameters.

Unless you are lucky enough to own a lap-top PC, it is inconvenient to take a computer system to the customer's home. So you've had to take the customer's receiver back to the workshop for reprogramming – until now.

The Memo

The Pace Link Memo is a small box with two separate interfacing leads, one to provide a computer connection and one for the receiver's scart connection. You can upload the channel information for a specific model from your PC to the Memo box, take the

Memo box to the customer's home, then download the contents to the receiver. This is really handy on those occasions when you know that the customer has messed with all the settings! It's also handy if you want to retune every channel 250MHz higher for use with an enhanced LNB. And it could save you a lot of time when you are doing a motorised installation.

The battery-powered Memo box has two minor limitations: you can't store information for more than one model at a time, and you can't upload channel information from a receiver into the box – it's strictly a one-way system, from computer to Memo box to receiver. But you can't really complain, as the unit costs just £59.99 + £2.50 postage. In addition, it comes with the very latest upgrade of the Pace Link Pro software (V1.33). This includes up-to-date channel listings for each model.

Installation and Use

Installation of the PC software is a doddle – which is praise indeed from a confirmed Macintosh user! Just follow the instructions on the label, or the accompanying sheet, and that's it.

Use of the Memo is also simple. So simple that the full instructions fit on a label on the case. I tried it with several Pace receivers and there were no problems at all. Anyone who already has the Pace Link Pro system will be delighted with this addition.

If you point your internet browser at

http://www.pacelink.co.uk



you will find a channel list library (click on 'support') that's continuously updated by Kesh Electrics.

Availability

The Pace Link system is supplied by Kesh Electrics (Satellite Systems) Ltd., 6-11 Main Street, Kesh, Co. Fermanagh, N. Ireland BT93 1TF. Phone 01365 631 449, fax 01365 632 003. It is not supplied by Pace.

Hugh Cocks adds: Use of the Pace Link system to program a receiver's channel order list saves a tremendous amount of time compared with setting up with a remote control unit. Now, all you need to take to the job to do this is the Memo box and the receiver connecting lead. This is connected to the relevant scart socket, which is normally the decoder one though it's the VCR one with the MSS100 and the TV one with the Prima and the MSS228 (non-VideoCrypt model).

I now normally carry a Memo box programmed with our current MSS100 channel listings, and am surprised how often I use it.

Incidentally the latest version of the Pace Link Pro software (V1.33) has just been released – it covers 42 models. A feature of this is a 250/500MHz frequency offset done on a per channel basis, to provide easy programming of older receivers with either an ADX channel shifter or a replacement 9.75GHz LNB. The cost is £199.

DX and Satellite Reception

Terrestrial DX and satellite TV reception and news. Is Band S another signal source for us? The problem of feeder matching with a wideband aerial. Roger Bunney reports

As I write this at the beginning of June the 1998 Sporadic E season has, so far, been rather a disappointment. Some SpE signals have been received, but there have not been the big openings I had hoped for. Perhaps things will improve in a couple of weeks time. Meanwhile, here's a summary of SpE reception to June 1st:

ARD (Germany) ch. E2; TVE (Spain) ch. 5/5/98

Unidentified ch. E2 signals received at 6/5/98 0420!

12/5/98 RAI (Italy) ch. IA; Video (Italy) ch. E2. 15/5/98 RTP (Portugal) chs. E2, 3, 4; TVE E2, 3, 4;

RAI IA; Video E2. TVR (Romania) E2; RAI IA; Video E2; YT-17/5/98 1 (Ukraine) R2. Plus several other unidentif-

ied signals.

18/5/98 NRK (Norway) E2. RAI IA, B; Video E2; TVA (Italy) IA; HRT 19/5/98

(Croatia) E4; SLO-1 (Slovenia) E3; RTS-1 (Serbia) E3; SYR-2 (Syria) E2 (corner ident); LTV (Lithuania) R2. Plus unidentified signals including an Arabic one in ch.

E3, possibly JTV (Jordan). 25/5/98 SVT-1 (Sweden) E2.

SYR-2 E2; SYR-1 E4; YT-2 R2; TVR-1 R3; 27/5/98 RAI IA. Plus unidentified signals.

Video E2

28/5/98 TVE E4: HRT E4. 29/5/98

1/6/98 A weak FUBK test pattern was received from the SE at 0745 for fifteen minutes. It then faded.

> My thanks to Peter Schubert and Garry Smith for reception reports to supplement my own loggings. In recent days there have been several sightings of programming on ch. R2 with an 'RTL' logo at the top, lefthand corner. This is so far unidentified.

Satellite Sightings

Jim Scofield (Sandown, Isle of Wight) has written in about his satellite reception. His 1m dish and universal LNB feed a Nokia 9600 digital receiver and a Strong SRT339LTP analogue receiver. Jim clearly likes sports, and mentions that most American sports can be seen each night via Intelsat K - basketball, baseball, ice hockey, football etc. Digital transmission can provide more video sources per carrier, i.e. multiplexed channels: during a recent Formula one event réceived via PAS-3R Jim found that one channel showed the different track positions while others were dedicated feeds for Canal +, Telepiu and DSF. There was also a spare. An analogue sighting of his on May 18th produced, via Telecom 2C (3°E), Spanish racket ball. This is apparently quite a dangerous sport.

Edmund Spicer (Littlehampton) has been tuning in to Telecom 2B at 5°W. It provides domestic programmes in the clear, enabling him to achieve conversational French for his university examinations. He mentions that the M6 subcarrier (7.25MHz at 12.522GHz vertical) has changed from an encrypted to a clear service with a rich variety of music.

The EBU feed via Eutelsat II F4 (7°E) is to go digital in early August, but SIS signals continue to be seen. May 24th produced news coverage of the troubles in Indonesia, with a test card from "EBU Jakarta". That same day saw the homecoming, at Southampton, of those in the Whitbread Round the World race. Although many of the

feeds from Ocean Village were digital, there were at least two analogue links, including Associated Press APTV via Intelsat K (21.5°W, 11.499GHz horizontal).

Again on the 24th a dramatic open-air concert was screened live via the Egyptian Space Channel from Eutelsat II F3 (16°E). It was also carried as a EBU feeder (SIS) at 7°E. The programme consisted of classical music and singing, also the presentation of awards for services to the arts. Seen early in the evening here (1800BST onwards), the event took place at the feet of the Sphynx with the Pyramids at Luxor as the backdrop - appropriately lit and with laser lights and other special effects. Well worth watching.

While monitoring the Brightstar feed via Intelsat K just before noon on the 27th I saw colour bars at sparklie level with the identification 'TVN ui ans Helsinki fur die ARD". Finland is a rare visitor to this satellite. Once the uplink dish had been aligned the power increased and the sparklies almost cleared, though the signal was not at the normal level from this transponder. I was pleased to receive signals from a new satellite, Intelsat 801 (31.5°W), that same evening: there was an analogue football programme at 10.974GHz vertical. Others have spotted this new bird relaying analogue sports programming, including offerings for Sky Sports - in the clear!

It was a busy month for analogue transmissions, with the G8 conference, the Northern Ireland Referendum and the American school shootings. The BBC UKI-

231 truck provided an agricultural show feed, location not mentioned, for the Plymouth newsroom. This was on May 21st via Intelsat at 27.5°W.

Terrestrial News

Spain: The government has announced plans for digital terrestrial TV. The present analogue transmissions are to cease by the year 2010. Antena 3 and Tele 5 must have digital TV up and running by 2002, Canal + by 2003, transmitting in parallel with the present analogue services. The government estimates that by next spring fifty per cent of homes will have access to digital TV, rising to 70 per cent in 2002 and 95 per cent in 2008.

Hungary: Kids channel Nickelodeon will be available in Budapest and other main population centres this September, via MMDS transmission and cable distribution. The programmes are to be dubbed and the Hungarian Broadcasting Corporation will be responsible for commercial sales and transmission. South Africa: A commercial service, MIDI TV, is now available: it uses the logo 'ETV'.

Cambodia: Japan has provided some \$13m in new equipment and transmission gear, including a satellite uplink for national coverage, for the TVK service, which is censored. 50MHz Amateur Band: Greece has released the 6m band for amateur radio use for "an indefinite period". Germany is also about to make the band available for amateur use there are currently some 1,000 temporary licence holders. In Lithuania all class A licencees can use the band, which has also been made available to amateurs in Slovenia. UK: A digital committee report recommends the closing down of analogue transmissions in 2010. Leedsbased RSL operator Ramadham Radio Leeds has been banned until February 1st after transmitting at 170W ERP instead of the allowed 10W. Asian programmer Sunrise Television has been awarded an RSL to transmit in the Ealing/ Hounslow/Brent/Hillingdon area of W. London: it is expected to be on air in the autumn. Check out the FM band for BBC Radio 1 via SpE: the BBC has obtained a licence to transmit in Band II from Ibiza during the summer months this year. Isle of Wight Radio has delayed closure of its medium-wave transmitter (1,242kHz) until mid-summer, when a new VHF relay will open at Ryde: IWR currently transmits at VHF from Chillerton Down

(107MHz) and a relay at Ventnor (102MHz).

USA: Radio amateurs in Virginia are lucky: local government legislation now allows masts up to 75ft to be erected in urban areas. In rural areas the masts can reach up to 200ft.

Sweden: STV is to start a digital terrestrial TV service towards the end of the year, with SVT-1, two other channels and a 24-hour news channel.

S-band TV

A few countries use S band (2.5-2.7GHz) for TV downlinking, making this a possible source of 'DX' signals.

Several police forces have airsupport units that use analogue TV downlinks at 2.36GHz from omnidirectional aerials to mobile and base units for traffic chases, surveillance etc. The ground mobiles have a two-way switch for monitoring an on-board camera or a downlink.

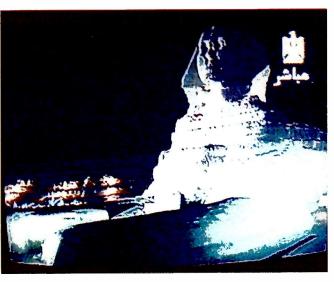
It seems that this use may soon change to 3.4GHz. Analogue transmission at 2.36GHz provides only a single downlink video channel, and there are interference problems. A move to 3.4GHz would provide two analogue or four digital channels.

S-band reception should be simple. The video is analogue, and all you require is an S-band LNB with a stub quarter-wave dipole against a ground plane on a post. You just need to know when the plane is airborn!

Satellite News

From an enthusiast's viewpoint I have to say that the Cable and Satellite Show (see report elsewhere) has changed considerably since the early days. I miss the small trader stands with bits and pieces, the pirate decoders and so on. 1998 was the year of the digital box. They were everywhere, with numerous demonstrations, some impressive and others less so. At least the second generation box seems about to arrive.

The big organisations were there in force. Sky Digital's AV presentation was impressive, with a video wall that consisted of 96 colour monitors - all exactly colour matched! If you wanted to buy a Boeing launch rocket, orders were being taken. Established dealers have long disappeared, for example Eurosat and Protel. This year Chaparral shared a stand with KTI. Raven Manufacturing displayed the Sidewinder range of dishes: the 1.4m one looked interesting - wonder if it



would work all right in Band C?

The Australian Galaxy digital pay-TV group went into receivership in early May, with debts of \$A600m. As there were only 90,000 subscribers, that works out at nearly \$A6,600 each!

According to SatFACTS the new AV-COMM digital receiver, Model R3100 (badged, maker unknown

The Sphynx at Luxor was used as the stage for a concert of classical music and presentations broadcast by the Egyptian Space Channel. Reception was from the Brightstar transponder aboard Eutelsat II F3 at 16°E.



Multisystem Converter with Pattern Generator



CDM-820 broadcast-class coverter

Features

- Two sets of S-VHS inputs and outputs ■ Input auto detection
- Digital conversion from input TV signals of NTSC, PAL to output signals of NTSC or PAL
- Digital line (525 ↔ 625 lines) and field (60 ↔ 50 fields) conversion
- 8M bit field memory
- Built-in time base correction (T.B.C.) function for signal synchronization £649.00

Input TV systems	NTSC 3.58, PAL (8, D, G, I)
Output TV systems	NTSC 3.58, PAL (B, D, G, I)
Connection terminals	Video Input: 1 S-Video Input: 2
	Video Output : 1 S-Video Output : 2
Picture resolution	500 lines for both dynamic and
	static picture
	Y:8 Bits
Digital Cord Bit	R-Y: 8 Bits
•	B-Y: 8 Bits
Memory size	8M Bit
Line conversion	525 ↔ 625 lines
Field conversion	60 •→ 50 fields
Power supply	AC 110/220V

AC/DC TLV-1061

10 inch colour Television/Monitor with built-in "ON-LINE" Videorecorder, 30 preset memories, Hyperband and full function remote control. Autorepeat function. Double Audio-Video sockets (SCART+RCA), 12V DC and mains operation

£549.00



AKAI VS X480 EGN MULTI-SYSTEM VCR

Covers PAL 1; PAL B/G; PAL D; SECAM B/G; SECAM D/K; SECAM L (for FRANCE); NTSC 3.58MHz and NTSC 4.43MHz.
VHF/UHF Tuner. DX4 head with Long play.
NTSC playback on a PAL TV. 8 Event, 1
year timer. Auto voltage selector for use worldwide. Complete with infra-red remote control. £499.00 inclusive of VAT

FULL CATALOGUE Features Satellite, Muiti-AVAILABLE BY RETURN OF POST FOR ONLY £1

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



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



Telefonica uplink live from Madrid via PAS-3R at 43°W.

Fig. 1: lan Moody's

transformer

Band I Yagi

aerial. The winding can be

design for use

with a wideband

obtained from a

ferrite Y splitter.

300/75Ω balun

but it's manufactured in Hong Kong), is the best yet for signal acquisition - weak-signal performance exceeds that of the benchmark Nokia 9600 version 5. With auto-FEC detection and 1-45MS/sec symbol rate, it gained full marks in recent tests. I'll try to establish availability in Europe.

The Russian NTV channel is to be added to the French Canal-Satellite digital service as part of the basic package. RAI (Italy) and TF1 (France) are discussing the possibility of an Italian digital service to compete with Telepiu.

The launch of Astra 2A has been delayed again and is now likely to take place towards the end of August. Hughes is apparently late with the satellite delivery and there are continuing problems with the Proton launch vehicle (following orbit of AsiaSat-3 (now called

MTV-Nordic started a new service to Scandinavia in mid-June, via

the AsiaSat-3 launch failure last December). The duff, eccentric HGS-1) has been partially corrected by 'flying' the craft around the moon and then bringing it into a new Earth orbit: a second lunar flyaround is to take place in an attempt to improve the orbital characteristics further.

PCB Plain Side 6BA 72" bolts Washers PCB Copper side 6BA K"bolt PCB muts

Sirius-2. EurasiaSat-1, a Turkish satellite on order from Aerospatiale, is to be launched into orbit at 42°E in early 2000, alongside Turksat C. It will have 32 Ku-band transponders. The holding company for EurasiaSat is to be based in Monaco, where it will be free from EU media and broadcasting regulations.

Telesat Canada's ANIK-FI satellite is to be launched in spring 2000 at 107.3°W with 48 Ku-band and 36 C-band transponders. In a startling development in SE Asia one of the transponders aboard Apstar-1 (138°E) jammed in mid-March, cutting off a hundred paging and other services. Users were switched to other frequencies. The cause of the problem is being investigated.

Help Please

Douglas Byrne (G3KPO), who runs the Isle of Wight Radio/TV Museum, is seeking one of those plastic filter screens that produced a 'coloured' picture with a monochrome set in the early days of colour TV over thirty years ago. So, if you've got one stashed away anywhere please contact Douglas on IW 01983 567 665.

On a personal note, I've been using four Ferguson 3845 12in. sets (1690 chassis) as RF monitors for DX/satellite reception for about twenty years. During this time only one fault has ever occurred - a low-gain tuner! The receivers continue to work well, but the A31-510W tubes are now getting decidedly tired. Can anyone advise on a source of new/replacement tubes?

Aerial Matching

Ian Moody has raised the question of aerial matching. Some years ago he bought a five-element wideband aerial for DXing in Band I and was concerned about matching the output to a 75Ω coaxial downlead, which is unbalanced. He found that instead of saddle/clamping the aerial connections consisted of brass pin screw terminals (like a 13A plug): the insulator cap had two holes with spacing similar to that of 300Ω ribbon cable, which is balanced. At the time Antiference could supply a wideband 300Ω balanced ribbon to 75Ω unbalanced coaxial transformer - it was intended for matching imported FM tuners to UK aerials. Ian felt that the use of one of these would improve matters, and found that it did in fact improve signal transference noticeably throughout Band I. So things remained for five years, then the

weather interfered and the ribbon connection snapped.

He has now constructed a new balun transformer (see Fig. 1). It's housed in a Maplin YM90X waterproof box with cable gland access which is used for the ribbon input/coaxial output. Take care to avoid ingress of water, and fit appropriate grommets. From my own experience, I would suggest adding a 'grommetted' hole on the underside to allow air movement and prevent condensation.

The balun transformer is built on a home-made PCB which is in turn supported on small bolts within the plastic box. The intention had been to use brass studding bolted on to the base of the box, and clamp or bolt this to the aerial boom. I advised against the use of brass in contact with alloy because of the electrolytic corrosion that occurs when these metals touch - plastic ties would perhaps be more suitable.

At its resonant frequency a straight dipole on its own has a centre impedance of 75Ω . With a folded dipole the impedance is 300Ω . When director and reflector elements are added to form a Yagi array the centre impedance falls. Since a folded dipole provides a four times impedance increase at the aerial terminals, it can be used with a multi-element array for impedance correction to match the 75Ω coaxial downlead – the alternative is to use a straight dipole with a matching transformer.

It is extremely difficult to maintain correct 75 Ω matching over the bandwidth with a wideband Band I aerial. Ian has used a flat-response wideband transformer to match to 75 Ω . The original Yagi-type aerial (WB5/FD from Aerial Techniques) uses a folded dipole to raise the centre impedance to something closer to 75Ω : use of the transformer will, I suspect, increase the impedance still more. To retain the advantage of a balanced dipole with a better match it would, I feel, be advisable to reduce the dipole/reflector spacing to say 1.25 wavelength at the 55MHz centre frequency, lowering the centre impedance in the hope of achieving a closer match. It's likely that, with the wide dipole-impedance swings you get with this type of aerial away from band centre, Ian's balun system may have improved the overall matching. Anthing that provides signal improvement is to be welcomed! Any comments?

EURA

- covering all important service information
- for all manufacturers

...more than 488,545 (+11,087) repair tips for 595 manufacturers

...TecTra with more than 73,180 (+6,549) ICS

...29,558 (+3,904) IC diagrams

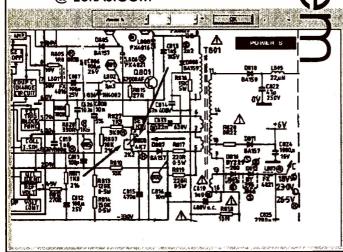
...35,175 (+196) compatible transistors on ECA

...More than 59,900 (+14,170) extracts of Circuit diagrams

...Diagram Archive Management

NEW FEATURES ON VERSION 05/98

- Data Updates via Internet
- New in TECTRA: Number of transformers: 79,000 entries for 30,700 models
- Complete power supply circuit diagrams for 654
- Monitor Database out now @ EURAS.COM



Save YOUR money and call us now on 0117 9860900 for a 30-day Trial or visit us on the Internet@ http://www.euras.com

B. BAMBER ELECTRONIC

Bridge rectifier Type W08, 800v at 1.5amp, £1 for

Diodes Type 1N4007, 1Kv at 1 amp. £1 for 50. Klockner Moeller FAZG DIN rail mount circuit breakers, single pole, 4A, 6A, 16A, 20A,

£2 each.
Seiko Epson Supper Twist Graphics Blue Mode LCDs 320x240 Pixel Size, 132x103 Overal, £5 each. 3 for £10. No details.
Densitron Liquid Crystal Displays, 5 Digit, Type LSH5060RP. £1 each.

LSH5060RP. £1 each.
Proximity switches for doors and windows, surface mount, £1 for 3.

Capacitors, 4.7mfd, 400v, radial electrolytic (Jamicom) 15 x 10mm. £2 for 100.

Weir Bench Power Units Type 460, 0-60v at 0.3a, 0-20v at 1a, metered output £30.00.
Hera Foot Switches, 250vac. 3amp. £4.00.
Siemens Min Relays Type C1062A307, 12v, 10a single pole, normally closed or Type C1062A308 normally open, £1.00 each.
Tangential Fans, 240vac, 80mm. £4.90.

JIP DIL Switches, 6 Way £1.00 for 3.

Avo Valve Valve Tester Type CT160, with valve data book. £160.00.

DC Voltage

£160.00.
Time DC Current Calibrator, 0-10mA, £160.00.
Zemco central locking interface kits type SA535 allows the Zemco SA530 vehicle alarm to automatically lock and unlock the vehicle doors by use of the remote transmitter, £5 each.
Zemco vehicle alarm Biavial Piezo Shock Sensor Kit Type SA405, £5.00.
Zemco add on quartz Ultrasonic Sensor Kit Type SA404, £5.00.

Rolling Ball East Flow Sensors suitable for Retrol and Diesel. £5 each.

In Switches for car Door/Boot/Bonnets less nuts, £1 for 6.

(£1 for 6.)
Page Powersense mains analyser, £400.00.
Marconi Af-Power Meter Type TF893A, £25.00.
HeiHemann Lightning Arresters Type SAL, 220/250vac, £10.00.
SCART Plugs, £2 for 5.
Dipped Ceramic Capacitors, 1nF, 500v. 5mm
Pitch. £1 for 50.
Konek Capacitors (Dipped) 100nF, 250 vac, 15mm Pitch. £1 for 25.
BNC Pichk Angle Advancer £1.00 math

Sanyo Laptop Nicad Batteries Type 12HR-4/3A size 270 x 50 x 18, 14.4v, 2.2AH. £5.00 each.

Sharp Laptop LCDs Type LM64P725, £20.00

Frame HDD Part No 55F9915, 1GB, £20.00

each.

Mains Transformers 240vac input, 12v at 2 amp output. £2.00 each.

Marconi 110MHz Spectrum Analyser Type TF2370, 30Hz-110MHz. £350.00.

Pye Pocketfones Type P5001, Low Band AM. 86MHz, sets complete but untested and sold as is.

Pye Pocketfones Type P5014, UHF, 440MHz, sets complete but untested and sold as is. £25.00

Pye Battery Chargers Type BC28, for P5000, 10 Way, £45.00 each.

Pye Mobile Radios Type M293, Low Band AM, sets complete but less mics speakers etc, £25.00

each.

Pye Mobile Radios Type M296. UHF, sets complete but less mics speakers etc, £25.00 each.

Pye 'L' Shaped Base Mic's, £15.00 each.

Pye Controllers Type PCI: £25.00 each.

Pye Controllers Type PCI: £25.00 each.

Philips Digital Recorder Type PM4202, £20.00.

Gould AF Signal Generator Type 13B, 10Hz
100KHz, £150.00.

Hewlett Packard Signal Generator Type 8616A. 1.8-4.5GHz, £250.00.

1.8.4.5GHz, £250.00.
Hilger & Watt Stereo Scope, £45, buyer collects.
Computer Cables, 15-way, 3 mts long, £2 each.
Levell Transistor RC Oscillator Type TG150, £25.
Pro-Log PROM Programmer Type M900, £95.
Parallell Port 16-Bit Stereo Code les Type
AD1848KP, £4.00 each.
Bulgin IEC Filter Plug Units, Part No
PS620/1/10A 250v, 10a, £1.00 each.
APC Smart-UPS v/s 1000va, £95.00 each.
APC Smart-UPS v/s 1000va, £95.00 each.

Keyswitches Radial Pin, SPST, Common Key, £1 for 2.

Liteon Switched Mode PSU, 150 x 140 x 85, +5v @ 27a,-5v @ 0.5a, +12v @ 9a, -12 @ 0.75a, fully cased with built in fan, IEC power input, flylead output, £9.00 each.

Zenner Diodes 270V, 3w, £1 for 10

Please add £3.50 P.P. to all orders under £30. NO VAT

20 WELLINGTON STREET, LITTLEPORT, CAMBS CB6 1PN PHONE: 01353 860185 FAX: 01353 863245

P. V. TUBES

108 ABBET STREET, ACCRINGTON, LANCS BB5 1EE Tel: 01254 872500 / 390936 Fax: 01254 872166

TRADE COUNTER OPEN MON-FRI 9-5, SAT 9.30-12

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 LG. 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

Order by mail order today for only £32.50

Armed Forces, Aviation and

Computer Companies.

Keep cool this Summer with our Electric Desk Fans

9" Fan - £13.57 12" Fan - £17.86 16" Fan - £21.27

We have an extensive range of Valves in stock

EL34 £7.00 PCL86 £2.50 £3.00

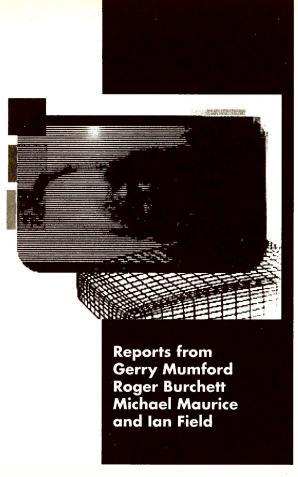
PL509 £5.95

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 Linda



Acer 71342T

There was an intermittent sideways picture jitter. Scope checks showed that the supplies and the line drive waveform were all clean, so the cause of the fault had to be in the line output stage. It turned out to be C335 (220pF, 2kV), which was leaky. G.M.

Apple Performa Plus M9102Z/D

This monitor came in dead with the front LED blinking at a very fast rate. Unfortunately the short-circuit that caused the power supply tripping was the line output transformer, type AT2090/33. When I fitted a replacement I noticed that the picture was too narrow and tall. After a few seconds C2119 (100 μ F, 63V) fizzed and blew up. The cause was R3319 (1 Ω , 0.25W fusible) which was open-circuit.

You also find this monitor badged **Philips** and **RM-Nimbus**. **G.M.**

Commodore JD144C

These monitors usually suffer from problems in the primary side of the power supply. The two most common faults are a completely dead monitor because D807 (1N4935) is leaky or short-circuit, or just squealing because D808 (1N4935) is leaky – in this event R827 $(0.68\Omega, 0.25W)$ will also fail. G.M.

Compaq 462

If one of these monitors comes in dead, check D927 (UG4D). This rectifier, which is on the secondary

Monitors

side of the power supply, tends to go short-circuit. In this event the power supply shuts down. The rather easier to obtain UF5408 can be used as a replacement. **G.M.**

AOC 4VLR

This monitor produced a streaky picture. The colour was poor, and the overall picture brightness seemed to fluctuate. The cause of the fault was D814 (1N4148), which is the black-level restorer diode in the red channel. It was leaky. **G.M.**

Apple M1212

These monitors usually come in dead, the cause of the fault being trivial – dry-joints at the IEC mains inlet socket! The poor quality of the soldering overall can cause problems however, so it's always advisable to give the PCB a thorough visual inspection.

Dry-joints in the primary side of the power supply can cause a blow up, killing QP1 (IRFBC40) and IP1 (TDA4605-2) with the mains fuse going open-circuit. When there are dry-joints in the line output stage, specifically at CL8 and CL10, QL1 (MJF16206) can become leaky: the result is the usual bleeping/blinking LED. Dry-joints at QL2 are often responsible for intermittent field collapse. G.M.

Compaq 420SC

This monitor was dead because of a power supply blow up, but there was surprisingly little damage. The TEA2019 chopper control chip IC1 had failed, taking with it R17 $(2\cdot2\Omega, 0\cdot25W)$, R18 $(1\cdot2\Omega, 0\cdot5W)$ and R21 $(10\Omega, 0\cdot5W)$. **G.M.**

CTX 1565D

The complaint with this monitor was that the front controls didn't work. The cause was simply that the 'recall' switch was permanently on. It's at the far right on the little PCB under the CRT, looking from the front of the monitor. No damage or reason for the situation could be found. It seems that the control

can become bent with heavy-handed use, the switch then being permanently on. **R.B.**

DAN CD1764

This monitor was completely dead. Checks in the primary side of the power supply proved fruitless. When attention was turned to the secondary side I didn't have to look far. D6150, the rectifier for the 180V supply, was short-circuit. A new RGP15M restored normal operation. M.M.

AST 66267

There was no picture. Everything was up and running and the voltages at the CRT base didn't look too bad. A dull green display appeared when the CRT's control grid (G1) pin was unsoldered. When the first anode control's setting was then advanced the display brightened and whitened. The display continued to recover, ending up with a flooded screen with flyback lines.

I've had an increasing number of monitors with this fault recently. All have been easy to repair. Once the CRT's emission has recovered, a 24-hour soak test with a peak-white test pattern will stabilise the cathodes, after which the grey scale balance can be checked – none of the monitors dealt with recently required any adjustment however! I.F.

Royal DN1782G

"Flickering" was the complaint. On test this monitor performed a series of antics but there was no picture, flickering or otherwise. As everything except for the heater supply seemed to be alive, I fed the heaters from an external supply to see if I could get any clues. The result, scanning with no line sync, didn't help very much.

So I set about a more thorough examination and found that one of the two 1,000 μ F, 25V electrolytics in the 12V rectifier circuit, on the separate power supply panel, had vented. **I.F.**

Answer to Test Case 428 - see page 707 -

Mid-mount VCRs are certainly less engineer-friendly than older designs, especially in a case like this one where the deck and sensor operation had to be monitored continuously in the play mode. Having got the machine apart and running on soak test, Sage did all the right things. But they were based on a false assumption – that the take-up reel pulses, the very first thing he had checked, were OK. His AC-coupled scope checked only their presence, not their amplitude.

In fact the take-up sensor optocoupler was faulty. The voltage across the phototransistor dropped to about 2·2V instead of almost zero each time it saw darkness. This voltage is very close to the microcontroller chip's yes/no decision point. Sometimes the phototransistor's off voltage stayed even higher. The deck would then shut down, the microcontroller chip assuming that the take-up reel had stopped rotating. Why was rewind permitted? Because in this mode only the supply-reel pulses are monitored – a design quirk that's unusual and could hardly have been appreciated initially.

Two new optocouplers (D854 and D855) were fitted, because the originals would have been from the same production batch and Sage didn't want to run the risk of the other one developing a leak. Why are optocouplers, in VCR decks and in power supply circuits, so much less reliable than other semiconductor devices?

NEXT MONTH IN TELEVISION

Servicing the Panasonic NVJ40/42/45/47/F55

These VCRs use the final version of the G deck, with its improved mechanism response time. Most models feature NTSC playback and dub. Brian Storm provides servicing notes, including a list of fault codes.

Latest Panasonic Technology

Panasonic recently released details of its latest TV and video technology, including that used in DVD players. George Cole attended the technical seminars and reports back.

Squeezing STB Technology

The digital TV set-top box is miraculous when you consider the amount of AV processing carried out within a modestly sized unit. This has been made possible by advances in semiconductor technology. Noel Hurley of Advanced RISC machines explains what's involved.

Microwave Ovens - Hints and Tips

Robert Blair has been servicing microwave ovens for several years. He has some time- and money-saving tips for those who are about to venture into this field.

Servicing the JVC C14/C21ET1

These are the JVC models that use an Onwa chassis. Cliff Martin reports on his servicing experiences with them.

TELEVISION INDEX/DIRECTORY AND FAULTS DISCS PLUS HARD COPY INDEXES & REPRINTS SERVICE

INDEX DISC

Version 6 of the computerised index to TELEVISION magazine covers Volumes 38 to 47 (1988 – 1997). It has thousands of references to TV/VCR fault reports and articles, with synopses. A TV/VCR spares guide, an advertisers list and a directory of trade and professional organisations are included. The software is easy to use and very quick. It runs on any IBM or compatible PC with 640K RAM and a hard disc. Price is £35 (3.5"HD, alternatively 3.5DD"). Those with previous versions can obtain an upgraded version for £15. Please quote the serial number of the original disc.

FAULT REPORT DISCS

Each disc contains the full text for 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:

```
Volume 38 (November 1987 – October 1988);
Volume 39 (November 1988 – October 1989);
Volume 40 (November 1989 – October 1990);
Volume 41 (November 1990 – October 1991);
Volume 42 (November 1991 – October 1992);
Volume 43 (November 1992 – October 1993);
Volume 44 (November 1993 – October 1994);
Volume 45 (November 1994 – October 1995);
Volume 47 (November 1996 – October 1997).
```

Price £15 each (3.5"HD, alternatively 3.5"DD if required).

NEW - FAULT FINDING GUIDE DISC

This disc is packed with the text of the TELEVISION Test Cases, What a Life!, Service Briefs and other vital fault finding information. It is accessed via the Index disc. Price £15 each (3.5"HD, alternatively 3.5"DD if required).

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 47 at £3.50 each.

All the above prices include UK postage and VAT where applicable. Add an extra £1 postage for overseas EC orders, or £5 for non-EC overseas orders. Cheques should be made payable to SoftCopy Ltd. 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. 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 BPC Magazines (Carlisle) Ltd., Newtown Trading Estate, Carlisle, Cumbria CA2 7NR. Distributed by MarketForce (UK) Ltd., 247 Tottenham Court Road, London W1P OAU (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.

28-29 RIVER STREET, DIGBETH, BIRMINGHAM B5 5SA

TEL: 0121-772-2733

FAX: 0121-766-6100

10 CTVs TX100 FST Type (5 TEXT) with R/C

compl. with Handsets

10 CTVs TX9/TX10 TELETEXT &

10 CTVs TX9/TX10 STEREOTEXT

VALID UNTIL 31st JULY

10 VCRs FRONTLOADERS with **Remote Controls**

X-rental working stock

7-717

Computer Monitors ftom

COMPUTERS 386's from £15

GRADED STOCK-GOOD AS NEW 8mm CAMCORDERS

complete with Accessories from

H. THE

AMSTRAD MCD804 (GRADED STOCK)

10 VCRs 3V35 (8944)

frontloaders with Handset

CD/RADIO/TWIN CASSETTE STEREO

£9.95

£10.95

ALSO AVAILABLE BRANDED GRADED STOCK SANO

£14.95

- ALL AS GOOD AS NEW SAMSUNG

PIONEER VALID UNTIL 31st JULY

LT-37P (GREENSPOT)

fits FERGUSON models: 22B1,22B3,22B4,22D1,22D2,22D3, 26D1,26D2,26D3,22B2,22D4,22G2, 22G3,22H1,22H2,22H3,26G2,26G3, 26H2,26H3,22G1,2353 & 2373 also fits THORN & LOGIK models...

LT-90P (REPLACEMENT) fits BUSH, SAISHO, ORION, MATSUI,ALBA,HINARI, **AMSTRAD & GOODMANS** models...

OEM no.:003261001, 0437140021 043714002J £10.95

りらり (REPLACEMENT)

fits HITACHI models: CPT2174, CPT2176, CPT2178, CPT2147,CPT2130, CPT1808SF,CPT2008SF replaces OEM 2434274...

LT-45G(GENUINE)

£9,95 fits FERGUSON models : 59B5,66H3/4/5,59B2/3,59B4/5, 59B8,59D2/3,59H2/3/4,59H5,59J7, 66B2,66B3/5,66B8,2445,2452, 2453,2463,59G2/3,66D3...

LT-273P (REPLACEMENT)

£10.50 fits PHILIPS models : 21PT161A,21PT166A,ANUBISA,14PT136A,21AA350A, 14PT156A,21PT164A,17PT161A,15PT161A, 14PT135A,14PT155A,21PT165/A,21PT161A 21PT166A,142133,143243,37TA1160,37TA1210, 37TB1140,37TB1151,37ZZ3223,38TB1191,38ZZ3253, 43TA1271,51TA1410,52TA1071,M2125/6,M2140,M2141

LT-03P (REPLACEMENT) fits PANASONIC models:

LT-110P (REPLACEMENT) fits PANASONIC models : TC2232,TC2233,TX2230,TX2231, TX2234,TX2244,TX2636,TX2646, TX223,TC221,TC2235,TC2238DR, TC2238/9UR,TX2240UR,TX2245UR, TC2633,TC2634UR,TX2640UR TC2645, TC2648, CT2015, CT225.

£14.95 LT-112P (REPLACEMENT) fits PANASONIC models : TC1631,TC1641,TC2031,TC2033, TC2043,TC2243,TX1642,TX2034, TX2044,TX2200,TX3300,TC1634UR, TC1637DR,T1637UR,T1647DR...

TX24T1,TX2472,TX2470,TX2475,TX2492,TX2482, TX2480,TX24T2,TXC74,TXC78,TXC84,TX25T2, TC2475,TX25T2K,TX25T2P.

GRANADA: C59GK5.

LT-36G (GENUINE)

fits FERGUSON models: U2001,16A1,20E1/2,1179,16A2 20E1,20E2.

LOGIK: 4090,4094.

LT-1976 (GENUINE) fits FERGUSON models:

36K3,41H2,41H3,51P7,51P8,TX78, TX98,TX99,J51P8.

£9.95

LT-113P (REPLACEMENT) fits PHILIPS models:

66KE2812,59KE2706,56KE2612,68KE2906,66KE2822, 21CE2340,27CE2390,51KE2402,24CE2670,21CE2640, 22CE2060,22CE2061,22CE2065,22CE2261,22CE2267 22CE2561,22CE2565,22CE2567,24CE2370,26CE2080, 26CE2081,26CE2281,26CE2581,27CE2690,52KE2403, 52KE2406,56KE2610,56KE2600,22CE2261 GRANADA: D14XP1,D20BP3,D22AP1,D26CP5, D51DP4,D51DP5,D66DP5.

TRADE ONLY PLEASE NOTE: ALL STOCK IS SUBJECT TO AVAILABILITY, POSTAGE & V.A.T

FREEFAX ORDERLINE: 0500 55

CENTRAL TV

WHOLESALE DISTRIBUTION LTD

HSTA253

HSPX747

AIWA PRODUCTS

AUDIO

 EX-RENTAL TVS & VIDEOS
ALWAYS AVAILABLE
PHONE NOW
FOR BEST PRICES

PHILIPS, PANASONIC, SHARP, SANYO, FINLANDIA ETC...

AMSTRAD SRX 100 AT ONLY £2.00 A PIECE
AMSTRAD SRX 200 AT ONLY £10.00 A PIECE
BT 250 AT ONLY £7.00 A PIECE
(QUANTITIES OF 10 + ONLY)
PLUS VIDEO CRYPT DECODERS NOW AVAILABLE

WALKMANS

HSTA223

HSTA153

HSPX447

HSTA353 HSTA423 HSTX356 HSTX646 HSTX446 HSGS242 HSGS252 HSGS352 HSPX257 HSPX347 HSPX357

PHONE FOR BEST PRICE ON THESE 'A' GRADED STOCK

HSPX547

PLUS MANY MORE MODELS AVAILABLE

SANYO GRADER
28", 25", 21" F.S.T.
SP/LP VIDEO +
(NOW IN STOCK)

FOR ALL EXPORT
ENQUIRIES ON TVS
AND VIDEOS CALL OUR
BIRMINGHAM OFFICE
NOW

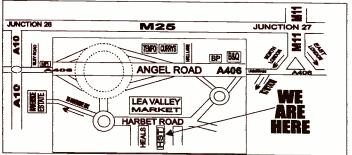
LONDON CONTACT: JOSHI/SALEEM ELEY ESTATE, NOBEL ROAD, EDMONTON N18 TEL: 0181 807 4090 FAX: 0181 884 1314 BIRMINGHAM CONTACT: ASH/MICK 369 STRATFORD ROAD, SPARKHILL, BIRMINGHAM B11 4JY TEL: 0121 772 1591

FAX: 0121 766 6383

APPROVED TELEPRICE DISTRIBUTORS DISTRIBUTORS LOCAL DOCUMENT OF High quality

Suppliers of high quality EX-RENTAL & GRADED TV'S AND VIDEO'S DIRECT From Source

PHONE FOR DELIVERY DAYS ON 0181 - 803 0505



UNIT E2/3, HARBET ROAD, (off Angel Road), STONEHILL BUSINESS PARK, LEA VALLEY TRADING ESTATE, LONDON. N18 3LD MAJOR MANUFACTURERS
NEW 'B'
GRADE PRODUCTS
READY FOR SALE

T.V. - VIDEO - AUDIO MICROWAVE OVENS

APPROVED DEALERSHIP (TRADE ONLY)

CONTACT PAUL OR MICHAEL (01375) 640800 (ONLY 10 MINS FROM LAKESIDE/M25)

CLEARVISION

30a CORRINGHAM ROAD STANFORD LE HOPE ESSEX SS17 0AH



vista electronics LTD

Manufacturers of television tube and video heads

TV AND VCR SPARES

KIT FOR TDA
8178S MITSUBISHI
TV ONLY £3.95 + VAT

FREE

POST FOR ALL ORDERS ABOVE £10

PINCH ROLLERS NORMALLY £2.25 NOW £1.75

FREE

BATTERIES WITH ALL RCU'S TDA8350Q

ONLY

£3.95 + VAT

OVER 200 VIDEO HEAD MODELS IN STOCK

5%
DISCOUNT FOR
VIDEO HEAD
ORDERS ABOVE

£20

HEADS AVAILABLE **NOW**

TIME LAPSE

NEW 'B' GRADE **TV TUBES**

RE-GUN

COMPONENTS

TEL 01429 838057 FAX 01429 838543 **TUBES**

TEL 01429 837100 FAX 01429 837101

VISTA ELECTRONICS LTD, UNIT 1B, WINGATE GRANGE IND EST WINGATE, CO DURHAM TS28 5AH









TOP BRAND GRADED STOCK

14" R/C £75 20" R/C £90 20" FASTEXT £115 21" FASTEXT £125 21" NICAM £145 25" FASTEXT £155 25" NICAM £175 28" NICAM £235

GRADED HOME COMPUTER MULTIMEDIA SYSTEMS

486 100MHz £150 PENTIUM P75 £195 ALL WORKING WITH KEYBOARD MONITOR & MOUSE

WHITE GOODS

WASHING MACHINES: £65 **TUMBLE DRYERS:** £35 £35 SMALL FRIDGES: **MIDI FRIDGE/FREEZERS:** £55 LARGE FRIDGE/FREEZERS: £70 £90 **GIANT FRIDGE/FREEZERS: ELECTRIC COOKERS FROM:** £65 **GAS COOKERS FROM:** £75

All units are tested and are fully working

Ex Rental Bargains (Working Stock)

TX100 51cm TEXT £30 TX 9/10 TELETEXT £18 TX100 59cm TEXT £33 3V35 FRONT LOADER £20 TOP LOADER £15 8947/3V55 £30

STOCK CLEARANCE OF 1,000 GRADED CAMCORDERS PRICES START FROM £95 FOR BRANDED MODELS

BRANDS INCLUDE: CANON, FERGUSON, JVC, PANASONIC, SHARP AND SONY

SATELLITE RECEIVERS

MSS500 £85 MSS100 £60 PRIMA £45 APOLLO £35 800/900 £30 MSS1000 £120 ALL PRICES ARE BASED ON A QUANTITY OF 5 UNITS AND SUBJECT TO VAT

HEAD OFFICE: BIRMINGHAM

208 BROMFORD LANE, ERDINGTON, BIRMINGHAM B24 8DL 0121 327 3273 Fax: 0121 322 2011

CLEVEDON

UNIT 20, 5C BUSINESS CLEVEDON, NORTH SOMERSET, BS21 6AU TEL: 01275 341789

LONDON

UNIT 2, CENTRE, CONCORDE DRIVE, THE ROYAL LONDON ESTATE, 29/35 NORTH ACTON RD, LONDON NW10 6PE TEL: 0181 961 5005

PRESTON

UNIT 439, OAKSHOTT PLACE, WALTON SUMMIT INDUSTRIAL ESTATE, PRESTON PR5 8AU TEL: 01772 312101

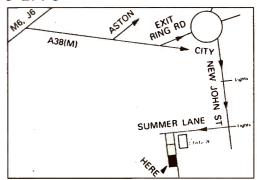


SALE

TO CELEBRATE THE OPENING OF OUR NEW AND LARGER PREMISES and 25th Anniversary 1973-1998

NEW 'B' GRADE ★TOP BRANDS ★ TOP SERVICE TRY A SAMPLE ORDER OF 1-3 ITEMS MONEY BACK GUARANTEE IF NOT SATISFIED

14" R/C from	£65	Radio Cass from	6
20" R/C from		Music Centres from	£15
20" Text from		Micro + CD	£25
25" Text from	£165	Rad. Cass. CD from	£25
28" Nicam from	£200	irons from	£4.50
VCR V.Plus from	£85	Kettles from	£7.00
Camcorders from	£165	Jamo Speaker from	£25
Faxes from	£75		
Δ11 4	stock hove	d and working	



FERGUSON - SANYO - TATUNG - DECCA - AMSTRAD - BEKO - VARIOUS JAPANESE FULL RANGE - CURRENT MODELS - CONTINUOUS SUPPLY - (Prices subject to VAT +

NATION-WIDE NEXT DAY DELIVERY SERVICE - VISITORS BY APPOINTMENT

ione 0121-35 FAX 0121-359 6344

MERICAN DERES



PHOENIX HOUSE, 190 BRIDGE ST. WEST, **BIRMINGHAM B19 2YT**





YOUR PREMIER SUPPLIER FOR OVER 30 YEARS NEW STOCKS ARRIVING DAILY

100'S OF EX-RENTAL TV'S NOW IN STOCK - ALL TESTED, SEEN WORKING

Large stocks available A and B grade:

makes include: Kenwood, Aiwa, JVC, Sanyo, Akai, Pioneer, Panasonic, Goodmans, Alba etc. Alba/Bush Ghetto Blasters, CD, Radio, Tape boxed £25
Alba/Bush CD Micro Systems boxed £35 c Alba/Bush CD Midi Systems boxed £40 Systems boxed £40

Most goods under half price.

HIFI HIFI HIFI

100s OF UNITS IN STOCK!!

VIDEOS/TV's: A and B Grade

Bush/Alba long play boxed £60 ● Roadstar long play boxed £50 Akai, Sanyo, JVC, Toshiba, Aiwa less than half price 21" Remote Control Crown/Bush, Alba boxed £60

EX-RENTAL TV/VIDEO ALL TESTED. SEEN WORKING

Philips complete with remote £45

Salora all models with remote £65, Grundig from £65 many other makes/models in stock Cheaper Video/front loading from £25.

ALL MAKES, MODELS & SIZES OF TV IN STOCK

Brown cabinet working TVs from £12 ● Videos off the pile from £10 We stock camcorders, car stereo, portable radio/CD Large quantities jug kettles, coffee makers, mixers, irons etc.

Basement Clearance 300 Ex Rent Colour TVs £1,500 The Lot **TERMS - CASH ONLY**

* DISCOUNT ON BULK PURCHASES *

Walker House, 16 Bottomley Street, Manchester Road, Bradford BD5 7LJ Tel: (01274) 308186 Fax: (01274) 722229

STARVISION

SUPPLIERS OF HIGH QUALITY EX RENTAL - EX DISPLAY TV & VIDEO

ALL SETS ARE FULLY SERVICED WITH REMOTE CONTROLS AND ARE READY FOR RETAIL SALE

MOST POPULAR MAKES ALWAYS IN STOCK AT PRICES THAT WON'T SHOCK

ALL PRICES INCLUDE V.A.T.
NO MINIMUM QUANTITY

RING TODAY FOR LATEST PRICES TELEPHONE 0121 502 3016 - 0121 505 1033

STARVISION UNIT A, BRUNSWICK PARK ROAD WEDNESBURY, WEST MIDLANDS WS10 9QR

C.T.V.

UNIT 5, THE PHOENIX BUILDING, RUSHOCK TRADING ESTATE, DROITWICH ROAD, DROITWICH WR9 0NR TELEPHONE: 01299-251522 0589-888021/0850 486147 (24HR)

SUPPLIERS OF HIGH QUALITY
GRANADA AND THORN
EX-RENTAL TELEVISIONS AND VIDEOS
LARGE STOCKS ALWAYS AVAILABLE
ALL AT COMPETITIVE PRICES

Satellite Receivers

Complete Range of Hand Sets EXPORT ENQUIRIES WELCOME

OPEN: MON-FRI - 9.30-5.30

TEL: 01299-251522

Fax: 01299-251543

TUBES

Mid-Summer Madness

Stock clearance of tubes for current models

£69}

66 EAS 13 x 01

66 ECY 13 x 21

66 ECY 13 x 31

66 ECY 13 x 38

£49

48 ECR

48 EEV

48 LPE

£49

510 UFB

51 EBV

51 EFS

£54

51 EAL

Ring Irene or Jane for price and availability



Carriage and VAT extra



EXPRESS TV

The Mill, Mill Lane, RUGELEY, Staffs WS15 2JW

Tel: 01889 - 577600

Fax: 01889 - 575600

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 BO BD BYT ROV BDW BDX BF BFR BFS BFT BFW BEX BFY BLY BLX BS BR BRX BRY BS
BSS BSV BSW BSX BT BTA BTB BRW BU BUK BUT BUV
BUW BUX BUY BUZ CA CD CX (XA DAC DG DM DS
DTA DTC CL GM HA HCF HD HEF ICL ICM IRF J KA KIA L LA LELC LD LF LM M MAM MA MAB MAX MB MC MDA J MJE MJE MM MN MPS MPSA MPSH MPSU MRF NJM NE CM OP PAPAL PIC PN RC S AA SAB SAD SAJ SAS SDA SG SI SL SN BO STA STK STR STRD STRM STRS SVI T TA TAA JAG TBA TC TCA TDA TDB TEA TIC TIP TIPL TEA TL TLC TMP TMS TPU U UA UAA UC UDN ULN UM UPA UPC UPD VN X XR Z ZN ZTX + others. We can also offer equivalents (at customers' risk). We also stock a full range of other electonic components. Mail, Phone, Fax, Credit Card orders & callers welcome



Connect AMERICAN



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

VIDEO PARTS UNAVAILABLE

? TOO EXPENSIVE?

SECOND HAND PARTS

TESTED & GUARANTEED

(Complete boards, head motors, loading motors, capstan motors, mechanisms, panels, etc.)

> CALL/FAX 01349 884804 **EASI-SPARES** (at RADCOM UK)

10 Averon Road, Alness IV17 OPT

Overseas customers welcome

When calling, please quote any numbers on the part itself, as this will help us locate the right part or any equivalents

Payment by cheque with order (no credit cards) to RADCOM; prices on application plus p&p for all orders.

HOUESAUE LID.

QUALITY USED TV & VIDEO

COMPLETE RANGE OF TVs VIDEOS AND SATELLITES

Most makes and models available TVs from £3.00 • Satellites from £8.00 Videos from £15.00 Prices Ex-VAT

Free Delivery Service to most areas of the UK

U.K.s Largest Export Wholesaler Specialists in conversions to most countries systems

UNIT 75, BARRACKS ROAD, SANDY LANE INDUSTRIAL ESTATE. STOURPORT-ON-SEVERN, **WORCESTERSHIRE DY13 9QB** Just 10 Mins from M5 Junct. 6 Worcs North

01299-879642 (3 lines) FAX: 01299 827984

Sole UK Agents for

SADELTA



TC-402D

Due to its weight and size, the TC-402D is the ideal instrument for the installation of FM and Terrestrial TV antenna, as well as CATV

- Multi-turn potentiometer to enable tuning
- Frequency Indication with 4 digit LCD Display

Built-in loudspeaker for AM and FM reception

■ 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



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

CHEAPEST VIDEO HEADS IN THE UK

Make Id Akai Akai Akai Akai Akai Akai Akai Akai	VP7700 VP77 VS11 VS105 VS108 VS108 VS1105 VS108 VS1115 VS1116 VS1128 VS1128 VS125 VS128 VS202 VS202 VS202 VS203 VS203 VS204 VS205 VS220 VS224 VS224 VS224 VS224 VS224 VS224 VS224 VS225 VS33 VS301 VS303 VS303 VS304 VS303 VS304 VS307 VS308 VS308 VS307 VS308 VS308 VS307 VS308 VS307 VS308 VS307 VS308 VS42 VS42 VS42 VS42 VS42 VS42 VS42 VS42	Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price Price	Fergiuson Fergiu	3V16 3V22 3V23 3V23 3V23 3V23 3V23 3V24 3V30 3V30 3V31 3V32 3V35 3V36 3V39 3V41 3V42 3V45 3V45 3V45 3V55 3V56 3V57 3V58 3V59 3V55 3V55 3V55 3V55 3V55 3V55 3V55	£13.00 £13.00 £13.00 £13.00 £13.00 £13.00 £13.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00	Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hillachi Hil	VT330 VT34 VT340 VT341 VT340 VT35E VT38 VT39EM VT39EM VT39EM VT420 VT425 VT425 VT425 VT425 VT426 VT428 VT431 VT435 VT431 VT435 VT535 VT536 VT536 VT536 VT548 VT548 VT548 VT548 VT548 VT548 VT5500 VT545 VT546 VT546 VT546 VT546 VT546 VT546 VT546 VT546 VT546 VT547 VT570 VT576 VT586 VT586 VT587 VT587 VT587 VT588 VT800 VT8000 VT8	£21.00 £17.00 £5.50 £5.50 £5.50 £5.50 £5.50 £5.50 £5.50 £5.50 £5.50	JVC JVC JVC JVC JVC JVC JVC JVC JVC JVC	HRD143 HRD150 HRD157 HRD158 HRD1100 HRD170EA HRD170EA HRD11010EE HRD211EM HRD211EM HRD211EM HRD211EM HRD211EM HRD211EM HRD211MS HRD2257 HRD300EE HRD3370S HRD3370S HRD3370HRD400E HRD400ES HRD400ES HRD400ES HRD400ES HRD400EH HRD400ES HRD400EH HRD400ES HRD400EH HRD400ES HRD400EH HRD400ES HRD400EH HRD400EH HRD400ES HRD400EH HRD400ES HRD400EH HRD400ES HRD400EH HRD400ES HRD400EH HRD400ES HRD400EH HRD400ES HRD400EH HRD400ES HRD400EH HRD410EB HRD410EB HRD410EB HRD410EB HRD410EB HRD410EB HRD410EB HRD410EB HRD630 HRD6	\$5.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50 \$25.50	Panasonic Panaso	NV3666 NV370 NV380 NV390 NV390 NV390 NV490 NV490 NV490 NV490 NV490 NV490 NV790 NV777 NV788EG NV777 NV890 NV890 NV890 NV890 NV890 NV970 NV890 NV970 NV890 NV970 NV890 NV970 NV980 NV980 NV970 NV980 NV9	£19.00 £6.99 £6.99 £7.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00 £11.00	Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS	DV80 MCV105 V110B V110/GS/W V120 V130 V140 V2038 V210 V211 V212 V220 V221 V55 V63 V64 V65 V65 V67	220.00
Akai Akai Akai Akai Akai Akai Akai Akai	VSG24 K VSG24EGK VSG24EGK VSG24EGH VSG24EGH VSG24EGH VSG24EGH VSG24EGH VSG25EGGV VSP100EM VSP100EM VSP100EM VSP5 VSP8 VSP88K VSP88K VSP88K VSP8100EM VSR100EM VSR300EM 214.00 214.00 214.00 214.00 214.00 214.00 214.00 29.00 214.00 214.00 214.00	Goldstar Goldstar Goldstar Goldstar Goldstar Goldstar Hitachi Hitachi Hitachi Hitachi Hitachi Hitachi	GSE1295PQ GSE1299PQ GSE1297PQ P416P RC205P VCP100P V9 VT100 VT110 VT111 VT113 VT113	£13.00 £13.00 £13.00 £13.00 £13.00 £13.00 £25.00 £11.00 £11.00 £11.00 £11.00 £11.00	750 750 750 750 750 750 750 750	BR7000ER BR7000S BR9060E HR2200 HR3300 HR3320 HR3350 HR3600 HR3660 HR3660 HR3750	£21.00 £21.00 £17.00 £5.50 £5.50 £5.50 £5.50 £5.50 £5.50 £5.50 £5.50 £5.50	NEC NEC NEC NEC NEC NEC NEC NEC NEC NEC	N9015 N9016 N901A N902A N9033 N9034 N9054G N9063 N9065S N9066 N906A AG1000E/EI	£9.00 £9.00 £9.00 £9.00 £9.00 £9.00 £9.00 £9.00 £9.00 £9.00 £9.00 £9.00	Sanyo Sanyo Sanyo Sanyo Sanyo Sanyo Sanyo Sanyo Sanyo Sanyo Sanyo Sanyo Sanyo	VHR240G VHR250G VHR251G VHR251 UHR251 UHR251 UHR251 UHR251 UHR327PR VHR3100 VHR3150 UHR3270 UHR3270 VHR3270 VHR3270	£15.00 £20.00 £20.00 £20.00 £20.00 £20.00 £11.00 £11.00 £11.00 £11.00 £11.00	Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS Toshiba VHS	V2008 V210 V211 V211 V212 V220 V221 V55 V57 V63 V64 V65 V66 V67 V71 V73 V74 V75 V80 V80 V80 V80 V80 V80 V80 V80 V80 V80	£12.00 £12.00 £12.00 £12.00 £12.00 £12.00 £5.50 £5.50 £12.00 £12.00 £12.00 £9.50	

PLEASE ADD £1.00 POSTAGE AND PACKAGING AND VAT AT 17.5% TO ALL ORDERS. ALL BRAND NEW HEADS AT THE LOWEST PRICE.
WE ACCEPT VISA, ACCESS, SWITCH AND CHEQUES



NAV SPARES

Tel: 01274 772249 Fax: 01274 772247 WEST END BUSINESS CENTRE, 237 THORNTON ROAD, BRADFORD, WEST YORKSHIRE BD1 2JS



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 £14.50 per single column centimetre (minimum 4 cm). Classified advertisements £2.00 per word (minimum 20 words), box number £22.00 extra. All prices plus 171/1/8 VAT. All cheques, postal orders etc., to be made payable to Reed Business Information. Advertisements, together with remittance, should be sent to Television Classified, 11th Floor, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS

Service Manuals



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/

	orward your Catalogue of Technical Books and Service Index on PC Disc for which I enclose 4 x 1st class stamps.
Name	
Address	

Postcode

Fryerns

Information

Circuit Diagrams

TV's, VCR's

SATELLITE AUDIO & HI-FI

Most models/makes old & new covered Also fault guidance service available Prices are from £3.75 + £2.50P/P i.e. 1 item - total £6.25 inc

2 items - total £10.00 inc

3 items - total £13.75 inc

4 items - total £17.50 inc

Payment by credit card or Postal Order for next day delivery. Cheques to clear

Tel/Fax: 01268 470899 Answerphone outside office hours P.O. Box 5830 Basildon, Essex

SS13 3RX please note new prices To Advertise in

TELEVISION CLASSIFIED Telephone Pat Bunce on

0181 652 8339 or Fax on 0181 652 8931

THE "HOOKINGS" INDEX

More than 14,000 entries including remedies where appropriate, from "TELEVISION" magazine.

Bang up to Date: Jan'87 to Aug '98 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

Repair Databases & Indexes

SERVICE INFORMATION SPECIALISTS

New: Kwik Tips on Disk Version 1.1

After many requests for a FAULTS & REMEDIES database, E.C.S has now released Kwik Tips On disk V1.1, Compiled from over 20,000 entries & covering 1,435 Chassis & Models, This concisely Edited TV & Video repair database will prove itself a valuable resource for workshops large or small (and pay for itself with just 1 repair). Kwik Tips V1.1 only £27.95

New: Edition 20 Fault Indexes in book format.

Just released - Edition 20 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 series. In daily use in workshops across the UK (And beyond).

ISBN 1898394 24 5 Edition 20: Complete set £14.75

New: Fault indexes on disk - Version 1.6

Our largest ever fault index database on disk, Covering a massive 19,350!! Television, Video, Camcorder, Satellite, CD & Monitor faults listed in 18 years of Television Magazine.

Version 1.6: Indexes on Disk (price held) ow cost updates are available for all fault ina

<u> Latest release - Equivalents guides - 2nd Edition.</u>

Now available, Over 6,300 Equivalent entries covers TVs, Video Camcorder & Satellites plus TV model-chassis guide. This single comprehensive book contains all FIVE guides.

Edition 2: Equivalents guides Only £5.95

All programs require a PC or compatible & are supplied with a user manual.

Technical Publishing

316, Upton Road, Noctorum, Wirral Merseyside. L43 9RW. Tel / Fax 0151 522 0053

Please add £1.75 P & P to total (Europe £2.75, r.o.w please enquire).

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

LASSIFIED TEL:0181 652 8339

Staines & Glasgow

Engineer - TV, Video or Audio Repair - c.£16,500 Product Inspector - c.£9,750

At Sony, we produce some of the best consumer electronics products there are. Clearly, we need to make sure they stay in great condition, and we need talented bench engineers to join our service centres in Staines and Glasgow.

With productivity targets in mind, you will maintain the workshop's high standard of repairs, and your main duties will include repairing TV, Video, Audio or Camcorder products as part of a small team.

As long as you have City & Guilds I, II and III or equivalent, plus at least 5 years' experience, we'll offer you a competitive salary, dependent on your qualifications, and a range of benefits.

We also have vacancies for Product Inspectors and Administrative Staff at our Staines centre, no technical experience is required as full training will be provided.

To work with one of the biggest names in the business, please write to Karen Axten, Human Resources Dept., Sony United Kingdom Limited, National Operations Centre, Pipers Way, Thatcham, Berkshire RG19 4LZ.

Closing date: 31st July 1998.

SONY



WANTED

FIELD/BENCH SERVICE ENGINEER

This position would suit someone currently employed in the consumer TV video market qualified to City and Guilds 224.

A competitive salary, company car and BUPA are ready for the right applicant Please send CV to:

Sally Wheeler ES VIDEO

6 The Riverside, Farnham, Surrey GU9 7SS

REPAIRS

accént

TECHNIC

CAMCORDER REPAIRS

Collection and delivery anywhere in the UK. All makes, fast service.

Phone free for details.

Fax: 01905 796385 (0800) 281009



WANTED

Young Enthusiastic

TV ENGINEER AUDIO ENGINEER

Apply in writing enclosing CV to:

Mr John Burke J.B.T.V. Centre, Newtown, Castlebar Co. Mayo, Eire



Servatech Ltd, a dynamic computer maintenance company are looking to add to their numbers and are currently seeking to recruit a very experienced component level

Bench Repair Engineer +

Applicants must have first hand experience in the repair of a wide range of computers and peripherals down to component level (No System builders or trainees please). You must be an ambitious self starter and ready to accept responsibility for the day to day running of a busy workshop within twelve months. Excellent salary, entirely negotiable for right person.

Write Fax or E-Mail S. Spence, Servatech Ltd, Unit 1A Headway Business Park, Denby Dale Rd, Wakefield WF2 7AZ

Tel: 01924 880630 Fax: 01924 880631 E-Mail: Steve@Servatech.co.uk

To Advertise in TELEVISION RECRUITMENT

Telephone Pat Bunce on 0181-652 8339 or Fax on 0181-652 8931

TRANSFORMERS

TV LINE OUTPUT TRANSFORMERS

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

ALBA · AMSTRAD · BUSH · DECCA · DORIC · BLAUPUNKT · FERGUSON · FIDELITY · GEC · GRUNDIG · GRANADA · HITACHI · HINARI · INDESIT · ITT · KIMARA · NIKKAI · MATSUI · MURPHY · OSAKI · NORDMENDE · LOEWE-OPTA PANASONIC · PYE · PHILIPS · SANYO · SAISHO · SHARP · SONY · SOLOVOX · SUSUMU · TANDBERG · TELEFUNKEN · THORN · TRIUMPH · THOMSON · GOLDSTAR · BINATONE ·

FULL RANGE OF KONIG: VIDEO HEADS, BELT KITS, **IDLERS, PINCH ROLLERS, TENSION BANDS.** LARGE RANGE OF REMOTE CONTROLS IN STOCK

TIDMAN MAIL ORDER LTD · 236 SANDYCOMBE ROAD

RICHMOND · SURREY · TW9 2EO

Mon-Fri 9 am to 12.30 pm & 1,30-4,30 pm

Angrox, 1 mile from Kew Bridge.

FOR SALE

Trade Only

Televisions from £5.00 from £20.00 Teletext from £20.00 Videos Twin Speed Stereo from £25,00

Minimum quantity - 10 units

BOURNEMOUTH WHOLESALERS 01202 470443

LINEAGE

PRIVATE RETAILER has excellent part exchange colour televisions and videos to clear. Tel: 01494 814317.

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: 0532 496048.

OCHRE MILL Technical Services, Grundig TV spares for most models to 1985, Fast. friendly, helpful, sensible prices. Gt Lype Farm, Charlton, near Malmesbury, Wilts SN16 9DR. Tel: 01666 823228.

To Advertise in **TELEVISION CLASSIFIED**

Telephone Pat Bunce on 0181-652 8339 or Fax on

0181-652 8931

TV's, VCR's, HI FI's **COMPUTERS Major Retailer** Returns

Discount for Quantity

Tel: 01384 411414

EX HOTELS T.V. RENTALS 25" PANASONICS 25" MITSUBISHIS 14" FERGUSON 36K2 14" TATUNG TEXT

> Kent Trade Supplies 01622 7193131718136 0836 789528

TRADE ONLY PLEASE

COURSES

Digital **Television**

1 or 2 day courses for service engineers

Call 0181 208 5171

for further details

College of North West London Nillesden Centre

Dudden Hill Lane London NW10 2XD

SERVICE DATA

SERVICE INFORMATION

CIRCUITS and SERVICE MANUALS
from 1930s – 1990s:
Radios, amps. radiograms, tuners, CDs, TVs, videos,
cassette radios, ICE etc.
LARGE QUANTITY USED TV and VIDEO PANELS
BACK COPIES PW and TV MAG.

DAVE WILLIAMS

I6 Church Street, Owston Ferry

Doncaster, S. Yorks DN9 IRG

Tel and Fax: 01427 728046

WANTED



Sussex RH14 9EZ

VALVES WANTED FOR CASH

(KT88, PX4, PX25, DA100, EL34, EL37, CV4004, ECC83)

es 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

TEST EQUIPMENT



BMR 95 unique Regenerating-Computer and Analyser for CTRs, regenerates even better, also if all other machines do not succeed. Wi also it all other machines do not succeed. With CRPU*I BMR 95 removes shorts F-C, C-G1,G1-G2, FLASH-EX against remaining gast 165 adapters available! Book with 12.500 CTR-types Pays itself within 4 weeks! Please, ask for more

SEME Tel: 01664 481818 (UK) Dönberg Tel: 075 48275 (IRL) Müter Fax: 0049 2368 57017

PROPERTY

RADIO & TEST EQUIPMENT FOR SALE

DUE TO BUSINESS CLOSURE

All good quality items and in extremely good condition.

Will fax/post an inventory upon request.

Tel: 01481 720830 Fax: 01481 716252

COMPONENTS

RCS VARIABLE VOLTAGE D.C. BENCH POWER SUPPLY



Tel: 0181 684 1665

ADVERTISERS' INDEX

Aerial Techniques745	ICHE735
Bamber Electronics747	J.J. Components717
Besco754	MCES686
Broughframe757	
Bull Electrical711	Müter, Ulrich759
Campion Wholesale TV756	N.A.V. Spares757
Central TV Wholesale751	OZAN701
Clearvision751	
Coastal Aerial Supplies756	PhilexIFC
Colour Trade754	PV Tubes747
Cricklewood Electronics756 CTV755	Radcom
East London Components697	Sendz ComponentsIBC
Economic Devices688-689	Star Vision755
Electronic Sound Systems686	Stewart of Reading742
Euras747	Stewart of Iteating
Express TV755	Vista Elecronics752
Grandata Ltd719-730	Wallis Universal686 West Midlands TV446
HCTV753	Willow Vale LtdBC
HST Distributors London751	Wiltsgrove Ltd750

SENDZ COMPONENT	rs 01'	702 332992 & 338894 Spa	cial Offer Sale - 20 Remote Controls &	20.00 (mixed all well known brands
TERGUSON ICC 7 HAND SET	£3.00	POSITOR EQV 98009 – SALE PRICE 25p	I.T.T.	AMSTRAD EXPORT £3.
FERGUSON VIDEO FV90 LV HAND SET	£4.00	FERGUSON	IF MODULES:- 5827-01-51, 5827-03-51 EACH £8.00	4600 £3.0 4700 £5.0
FV80 LV HAND SET	£4.00	ADAPTOR - VPT - TEXT - VA354 £5.00 ADAPTOR-CHARGER -	5828-04-10, 5829-02-58 EACH £8.00	6000 £15.1 6800 £4.1
FERGUSON BATTERY CONVERTER TA606		AC MAINS & BATTERY-VA365 P/P £3.00ea £20.00 AMPLIFIER-TV-2 WAY GAIN 7DB – ICC7 £8.00	5929-03-41 EACH £8.00 TELETEX CONVERSION KIT £8.00	UNIVERSAL £3.0
24V DC/240V AC	£15.00	CAMCORDER BATTERY 6V-1400MA-VA366 £5.00	CORE 2 90° ITT TEXT PANEL £13.00	NICAM LCD £4.0 FERGUSON
ADAPTOR-KEYBOARD MAINS 12V 800MA	£5.00	CAMCORDER BATTERY, HIGH CAPACITY 9,6V 1800MA-VA310 £4.00	1996/7 MATSUI	BSB £1.
BENCH LAMP-FLUORESCENT WITH MAGNIFIER P/P £5.00ea	£50.00	CAMCORDER BATTERY CHARGER	VIDEO DECK COMPLETE P/P £5.00ea £16.00	FV41R/FV42 - FV51-52
BENCH POWER SUPPLY VARIABLE 0-30V 3A-TWIN METERS P/P £5.00cs	£50.00	9.6 VOLTS VAZ65 EACH £15.00 CAMCORDER CAR ADAPTOR CHARGER –	marin	IK2000, IK7000 EACH £5.6
BRIDGE RECTIFIERS 10 FO BURGLAR ALARM KIT full description	OR £1.00 £7.00	AND BATTERY-VA308 £20.00	MATSUI DECK AND HEAD-VP9501 P/P£5,00ca £20,00	SRD2, SRD3, SRD4 EACH £1.1
BURGLAR ALARM KIT send for data MAIN CONTROL PANEL		CAMCORDER LENS 2 OFF – TELE-CONVERSION LENS x 1.4 & x0.7 £6.00	DECKS WITH HEADS -	TV/SATELLITE WITH FST £3.0
BURGLAR ALARM SIREN 12 VOLT	£12.50 50p	CARDIOID CAMERA MICROPHONE-VA SUPER 218 TELESCOPIC BOOM & STAND £12.50	3000/ORION P/P£5.00ea £16,00 HEAD-VCR-VX3000 £10,00	CPT2158 (NO REPLACEMENT) £5.0 VIDEO RM933E VIDEO PLUS £30.0
CAMCORDER-UNIVERSAL BATTERY 9.6V = 1400MA FOR JVC-PANASONIC-PHILIPS	£9.50	CHASSIS-TX80-NEW-NO TUNER P/P £5.00ca £15.00	HEAD-VCR-VA3000 110.00 HEAD-VSR1500 = ORION D2096 £5.00	CLE874B £5.0 CLE883A = IR8512, CPT2196, CPT2578 £8.0
CAMCORDER-TRIPOD SHOULDER POD CAPACITORS:-	£5.00	CHASSIS-TX 100 VHF/UHF YELLOW SPOT AND SECAM P/P £5.00ca £20.00	PANEL-MAIN-VSR1500 P/P £5.00ea £3.00	TV MODEL C2558 (IR 1820)-CLE883A £10.0 MATSUI
IIN/2KV, 2NZ/2KV, 4NZ/4KV EACH 5N6/2KV, 6N2/2KV, 9NI/2KV EACH	15p 15p	CHOKE-MAINS INPUT-TX9-TX10 £4.00	POWER SUPPLY-VSR1500 £5.00 POWER SUPPLY & REG -	1500 £5.
35V-22UF, 50V-4. 7UF, 50V-100UF EACH COMPONENTS (MIXED) – BUY BY WEIGHT	25p	CHROME BOARD-ICC5 I/Cs U4647TKF OR HA11498 £6.00	TYPE STK5343-VP9501 £8.00	VX3000 £3.0
Ilb for £1 Ilb for £1 £1.	00 per 1b	DECK AND CAPSTAN MOTOR:- FV61LV, FV62LV, FV67LV, FV68LV EACH £30.00	POWER SUPPLY-SWITCH MODE-1500 £3.50	3000/ORION – TV AND VIDEO £2.0 RC = PACE 900, FERGUSON, SONY, GRUNDIG £5.0
CRYSTAL-4MHZ OR 6MHZ EACH	25 per 1b 30p	FV70B, FV71LV, FV72LV, FV74LVX EACH £30.00	PHILIPS	MITSUBISHI RM35 - VIDEO £5.0
CRYSTAL-TV-4.4MHZ OR 8.8MHZ EACH 4 MHZ XTALS	30p 30p	FV77HV £30,00 DECK AND HEAD-FV31R £25.00	DECODER-TEXT-K40-KT3 £10.00	RM45 – VIDEO £7.4 NOKIA
DESOLDER PUMP DIGITAL CAPACITANCE METER – CMC200	£2.00	DECK MECHANISM	IF PANEL FOR CP90-CP110 £5.00 INFRA-RED RECEIVER - HAND SET TESTER £1.00	RC202 £4.0
200PF-20MF DIODES-TV-100 MIXED	£28.00 £3.00	VIDEOSTAR-R2000 P/P£5.00ea £30.00 DRUM-LOWER-PDM2024A-1 £20.00	SOLDER IRON 25W-240V £6.00	TV AND VIDEO £2.1 VIDEO WITH LCD – 1992/93 MODELS £5.0
FILTERS - 455 & 480 EACH	20p	DRUM-LOWER-PUS362931-2 £30.00	TEXAS	PANASONIC EUR51142 f10.0
FOCUS POTS-K40 FRONT PANELS (PLASTIC) FOR AMSTRAD,	£2.00	DRUM-UPPER-20439318 £20.00 DRUM-UPPER-YDM2018B £10.00	NICAM BOARDS MK II £6.00	TC1632, TC1642, TC2232 EACH £8.0
PERDIO, FIDELITY, DECCA, TATUNG ALL 1992 MODELS EACH	£4.00	DRUM-UPPER-YDM2037A £20.00 HEAD-FV3IR £12.00	Tribune	TX2244, TX2300, TX2636, TX3300 EACH £8.0
CUSES-100 MIXED GAS SOLDER IRON-PORTASOL HOBBY	£3.00 £10.00	HEAD AND DRUM-FVZIA £15.00	TUNERS IF TERC8-022A TBJZ4-00ZA-ALPS £7.00	RC201 - TV - REPLACES TNQ1411/2 £8. PERDIO
IANDSETS-SEE SEPARATE LISTING NFRA RED DETECTOR		MODULATOR-SP212315 £5.00 MODULATOR-SRBI 25p	SATELLITE SXT2302180968 £3.00	PV 1188 £3.0 PHILIPS
WIDE/SHORT ANGLE WITH RELAY NFRA RED RECEIVER-MATSUMI MINIATUR	00.82 00.13 35	MODULATOR-SATELLITE-T1040-SRD3/4 £2.00	SATELLITE WITH BASE BAND MIN SXT2302234 £4.00	NEW TYPE UNIVERSAL £10.0 RC4001 £10.0
OPTs – SEE SEPARATE LISTING		PANEL-TX89 £10.00 PANEL-10 MIXED FROM TX9 TO ICC5 £20.00	SMALL UHF/VHF £3.50	SAMSUNG HANDSETS, TV & VIDEO - 12 TYPES EACH #3.0
MAGNIFIER – 2X AND 4X MILLI VOLTMETER-ELECTRONIC-LEADER	£3.50	PANEL-DECODER-ICC5 £5.00 PANEL-FRONT-TX98	VHF/UHF - TEKE4-I12A £4.00	SANYO UNIVERSAL VIDEO £3.1
LMV-181A 40V A/C IN-IMV F/S 1MV-300V CALIBRATED – COST £225,00	£35.00	T1353E W/INFRA-RED RECEIVER £5.00	4944 £3.00 U321, U341, U342, U343 EACH £5.00	SIEMENS TV/VIDEO – 1994 MODEL £5.0
COLOUR TV BATTERY CONVERTER IN 24VDC TO 240VAC OUT	£15.00	PANEL-FRONT-TX100 £4.00 PANEL-IF-TX9, TX10 £4.00	U344, U411, U412, U944 EACH £5.00	THORN
MODULATOR-TUNABLE SATELLITE-TV MODULATOR KIT, 5V TO 12V –	£1.00	PANEL-REMOTE AND POWER SUPPLY	U743, U744 EACH £3.00 AMSTRAD	9000, 9600, TX9, TX10, TX100 TEXT AND NON-TEXT EACH £10.0
FOR ALL CAMERAS	£5.00	FV31R DISPLAY P/P£2.00ca £5.00 PANEL-REMOTE-TX9, TX10 EACH £5.00	UE33-BO1 £3.00	L.O.P.T.
MOTORS – SEE SEPARATE LISTING NANEL-CM201	£10.00	PANEL-REMOTE-TX10-540/01 £5.00 PANEL-REMOTE-TX10, WITH BATTERY	FERGUSON	36061, 36162, 36362, 36383, 36481 EACH £10.0
ANEL-IK2-FM2211 STEREO ANEL-CVC80-POWER	£5.00 £5.00	AND 4 I/Cs = 1544-033C £7.00	IF2105-RE	1 36043 36063 EACH \$104
POSITOR 18 2 PIN POSITOR-2322 662 98009	20p 50p	PANEL-REMOTE TX90 – 139.001 I/Cs M293B1 AND MS1000 £10.00	UHF-ICC5 £5,00	2432211, 2432351, 2432491, 2432851 EACH £10.0 2432871, 2432981, 2432984, 2433752 EACH £10.0 2433952, 2434002, 2434141, 2434393 EACH £10.0
POSITOR-2322 662 98012 POSITOR-3 PIN POS.PTH451 BLACK TYPE	50p 50p	PANEL-REMOTE TX100	VHF - ICC5 £5.00 TX85, TX86, TX89, TX90 EACH £4.00	2435016, 2435062 EACH £10.0
POWER SUPPLY –		I/C M293BI-SAA5012 £10.00 PANEL-REMOTE TX100	TX85, TX86, TX89, TX90 EACH £4.00 TX98, T99, TX100 EACH £4.00	2435064, 2435085, 2435121 EACH £10.0 2435372, 2435701, 2436773 EACH £10.0
12V DC & 24V DC-REGULATED POWER SUPPLY-REGULATED 3-12V 500MA	£2.00 £5.00	WITH STAND-BY BATTERY AND I/Cs £10.00	ORION	2436792, 2436795, 2436797, 3216001 EACH £10.0 243066, 243063 £10.0
PSU AC 12V 500MA PSU AC 9V 1A	£1.00 £1.50	PANEL-T1228B TEXT FOR TX89, TX98, TX99, TX100 £15.00	1500 – UE33 BO9 £4.00 PANASONIC	3220029, 3714016, 47003481 EACH £10.0 AT2076/78, AT2076/88, AT2078/25 EACH £10.0
QUARTZ HALOGEN - 500W 200V FOR OUTDOOR LAMPS	£1.00	PANEL-TX90 THORN FRONT -	SMALL UHF/VHF £3.00	AT2077/81 £15.0 DST81N243/472593-00 £10.0 DST85B235/47328700 & /40153200 EACH £10.0
R.S. SAFE BLOC RELAYS-SUB MINIATURE	£5.00	- 8 BUTTONS 01M4-515-002 £10.00 PANEL-TUBE BASE-ICC5 £5.00	SANYO UHF/VHF TDO 124EB £4.00	DST85B235/47328700 & /40153200 EACH £10.0 DST88N234/400086AD, & /47805200L EACH £10.0 DST88N234/47320041, & /47317590 EACH £10.0
SATELLITE TUNER UNIT – 2427611	25p	PANEL-TUBE-BASE-TX89, TX98, TX99 £5.00 PANEL-TUNING 1509G-TX9, TX10 £5.00	UHF/VHF TDO 124EB £4.00 SHARP	DST186N243/473058-00 £10.0 TFB3035D, TFB3069D, TFB4023AD EACH £10.0
BASE BAND/VIDEO OUT SCART TO 4 PHONO LEADS 1.5M	£6.00 £4.00	POWER SUPPLY 12V-3A	TUNER AND IF 1810587 PAT UK £3.00	TFB4039AD, TFB4066AD EACH £10.0 FERGUSON
SCART TO 6 PHONO LEADS SCART TO "D" PLUG	£6.00 £1.00	FOR VIDEOSTAR CAMERA PP3 £4.00 PUSH BUTTON UNIT-TX85, TX86 – 8 BUTTONS £5.00	TATUNG UNIVERSAL 205 OR EQUIVALENT	TX9 £4.6 TX10 £6.0
SCART TO SCART LEADS – ALL PINS CONNECTED – 1.5 METRES	£2.00	RECEIVER - INFRA-RED - ICSL486-TX100 50p	WITH AERIAL SOCKET £8.00	TX85, TX86 EACH £8.6 TX89, TX98, TX99 EACH £12.6
OUND 5.5MHZ MPM 1000T OUND 6.0MHZ MPM 1040	£1.00	TRANSFORMERS-SWITCH MODE:- TX85, TX86, TX89 EACH £4.00	MOTORS	Y260781 £8.1 FSTY260482 £10.4
FRANSFORMER-RS ENCAPSULATED MAINS	3	TX100 £5.00 473190-00,40153000 EACH £5.00	HITACHI	LOPT BLUE SPOT £10.0
0-120V-0-120V PRI 0-9V-0-9V SEC FRIPLER BG 2032-642-3002	£1,00 £7,00	1CC5 3112-338-326842 £4.00	CAPSTAN - ACE G4-B to ACE G40-B £10,00	LOPT WHITE SPOT & YELLOW SPOT EACH £8.0 PANASONIC
RIPLER BG 2087-642-1005 RIPLER KT3/K30	£7.00 £4.00	НІТАСНІ	MICROWAVE TURNTABLE MOTOR £10.00 MATSUI	TC2203, TLF 1456B EACH £15.0 TLF1457B. TLF701/6 EACH £15.0
RIPLER – UNIVERSAL UNERS – SEE SEPARATE LISTING	£5.00	DECODER-TELETEXT PC232A5 - ISSUE 4 £15.00	CAPSTAN I/C NO. M56730 ASP £15.00	TOSHIBA TFB 3035D, TFB 4023AD, TFB 4032BD EACH £100
UNING POTS – 8 WAY	50p	HEAD AND DRUM - 620E £12,00 MAINS SWITCH WITH STAND-BY 50p	2 TYPES 1995 TO 1997 MODELS MATSUI VIDEO DECKS WITH CAPSTAN MOTOR AND HEAD £20.00	TFB 4038AD, TFB 4110AD
MSTRAD ISPLAY PANEL - LONG CHASSIS - 1992/93	£4.00	MODULATOR No 5587881 £5,00 OSCILLOSCOPE 20MHZ DOUBLE BEAM –	MITSUMI	VIDEO DECKS
RONT PANEL FOR ALL 1992 MODELS IEAD AND DRUM - 6000	£4.00 £12.00	V212 £188.00	MOD MRF7-UF32 £5.00	AIWA 1500 MATSUI VXA 1100
EAD AND DRUM – NICAM	£12.00	PANEL-TELETEXT G8P = ISSUE 6 £10.00 PANEL-TELETEXT PC315-I1 = ISSUE 7 £15.00	MOD TMUG3-103A £5.00 MITSUBISHI	MATSUI 1500 WITH HEADS ORION D1094
ANEL-CLOCK DISPLAY - 8,900 LASTIC FRONT WITH FLAP - 8,900	£5.00 £3.00	PANEL-TELETEXT PCB F.S.T. – ISSUE 6 £15.00	CAPSTAN-HSE41-I/C M51782ASP £4.00	ORION D1096 J ORION D2096 ETC EACH £20.
OWER SUPPLY-VS1000-VS1100 OWER SUPPLY, LONG OR SHORT CHASSIS	£5.00	PANEL-TEXT-VT753E £20.00 POWER SUPPLY TV SWITCH MODE	HANDSETS	CAPSTAIN MOTOR FOR ABOVE DECKS £15. AND HAND SETS £3.
1991/1992 MODELS OWER SUPPLY – SWITCH MODE	£3.00	STR 4211 ISSUE 10 £8.00 POWER SUPPLY VIDEO SWITCH MODE	CPT1408T, CPT2176, CPTZ.178 EACH £5.00 CPT2476, CPT2478 EACH £5.00	4 HEAD DECK FOR 1500 £30. POSTER EQV 98009 ETC EACH 2
- DOUBLE DECKER OFF MIXED NOKIA ITT.	£5.00	VTM312ELM £10.00	TEXT, REPLACES PHILIPS	20 HIGH VOLTAGE CAPS 1500V – 2000V MIXED £1.
ALORA FINLEX SERVICE MANUAL	£10,00 ST £4.00	THICK FILM-HM9204A £3.50	KT3, K30, K4 ETC. £9.00 UNIVERSAL, REMOTE TV1, TV2, VCR –	VIDEO PATTERN GENERATOR MODEL T9535 240V
IAINS ADAPTOR 12V AT 500 M/A		HOSIDEN	SAT, AUX, LCD, VIDEO, TV -	PALTV ADAPTOR – RGB IN UFH OUT £6.
EGATIVE CENTRE	1,00	TUBE BASE – Mixed 10 for £1.00 AA Batteries made by STC Group of Companies 10p each	ALL NEW 10 MIXED FOR ONLY £15.00	MOTOR 12V
05 20p 2SD1432 £1.00	BU205 BU206	75p BUT13 £1.00 BYW95C 10p £1.00 BUT18AF £1.00 BYW562A	HD6140815 £1.00 No accounts SEND	Z COMPONENTS No Credit Cal
06 20p 2SD1453 £1.00 09 20p 2SD1576 £1.00	BU206 BU207 BU208	£1.00 BUT71/800 LSp 100V 8p		
GZ 70n I 25D1577 #2AA I	BU208A BU208D	80p BUW11 40p BYX10 10p £1.50 BUW84 60p BYX38/300 25p 90p BUX39 £1.00 BYX55/350 10p	11GA1124A 50p 03 DISHUPS II	EIGNTON, SHOEBURYNESS,
812F 20p 2SD180T03 15p	BU222 BU326	61 00 RITYS4	ALP-15 £3.50	SSEX SS3 8AF.
812F 20p 2SD180T03 15p SC940 £1.00 2SD1878 £1.00 SC3795 £1.00 2SK1460 £1.00 SC3973B £1.00 2SK1464 £1.00	BU407	11.00 BUX84AF 50p BYX71/60 20p 40p BUY49 20p BYZ106 10p 90p BY187 5p BZWC110 5p £1.00 BY208-800 8p BZW83-C20 3p	6391 B1	32992 Fax: 01702 338805
812F 20p 2SD180T03 15p SC940 £1.00 2SD1878 £1.00 SC3795 £1.00 2SK1460 £1.00 SC3973B £1.00 2SK1464 £1.00 SC4313 £5.00 2SC4891 £500V/15A £2.00	BU508A	80p BY228 15p CA3123Q :50p	IR106A 10p Specific P/P charges are	PER ITEM • For UK addresses add P/P to
812F 20p 2SD180T03 15p SC940 6.1.00 2SD1878 6.1.00 SC3795 f.1.00 2SK1460 f.1.00 SC37973B f.1.00 2SK1464 f.1.00 SC4313 f.5.00 2SC4891 SC4589 1500V/JSA f.2.00 10AVJ500V f.2.00 ANS 521 f.1.00	BU508A BU508AF BU508D	at the language of Contraction and	LA7830 £1.00 order then 17.5% VAT to	total. This applies to EC unless VAT No. is t cost ● Postal Order/Cheque with order.
812F 20p 2SD180T03 15p 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150 150	BU508A BU508AF BU508D 8U508DF BU705	£1.00 BY229 6p CD4555BE 20p £1.00 BY255 5p CLE871A £5.00	M708 ABI £1.50 Given • Exports - P/P E	L COUL Y FUSICI CIUEI/CIIEUUE WILL DIGES.
812F 20p 2SD180T03 15p	BU508A BU508AF BU508D 8U508DF BU705 BU801 BU806A	1.00 BY255 5p CLE871A £5.00 50p BY299-200 15p FE3B 4p £1.00 BY299-800 30p HA1140 £1.00	M708 LBI \$1.50 Unless otherwise spec	ified add £1.70 P/P to SMALL ORDERS +
R12F 20p 2SD180T03 15p 1.00 2SK1400 1.00 2SK1400 2SK1440 1.00 2SK1440 1.00 2SK1440 1.00 2SK1440 1.00 2SK1440 1.00 2SK1440 1.00 2SK1431 BU508A BU508AF BU508D 8U508DF BU705 BU801 BU806A BU807 BU808DFI	£1.00 BY255 5p CLE871A £5.00 50p BY299-200 15p FE3B 4p £1.00 BY299-800 30p HA1140 £1.00 50p BY771-800 15p HA1185 £1.00 £1.00 BYV19-30 15p HA1185 £1.00	M708 LBI 61.50 Unless otherwise spec M37204ECSP 61.00 Additional P/P for HEA	ified add £1.70 P/P to SMALL ORDERS + VIER GOODS Technical Information by	
812F 20p 2SD180T03 15p 1.00 2SK1400 25K1400 25K1440 1.00 25K1400 1.00 25K1400 1.00 25K140 1.00 25K140 1.00 25K1510 1.00 25K1510 1.00 25K1510 1.00 25K1510 1.00 25K1610 1.00 25K1640 1.00	BU508A BU508AF BU508DF BU508DF BU705 BU801 BU806A BU807 BU808DFI BU824 BU824	\$1.00 8Y255 5p CLISR1 A \$5.00 \$0p HY299-200 15p FE3B 4p \$1.00 BY299-800 30p HA1140 £1.00 \$0p BY771-R00 15p HA1185 £1.00 \$1.00 BYV19-30 15p HA1186 50p \$0p BYV28-200 15p HA1186 \$1.00	M708 LB	ified add £1.70 P/P to SMALL ORDERS + WIER GOODS Technical Information by ment/School Orders on official headings.
SIZF 20p 2SD180T03 15p 1.00 SC3795 11.00 2SK1460 11.00 SC37975 11.00 2SK1460 11.00 SC37973 11.00 2SK1460 11.00 SC37938 15.00 2SK4464 11.00 SC37938 15.00 2SC4991 11.00 SC37930 15p NSSV1/15A 12.00 SC37950 15p ANS551 11.00 SD200 11.00 ANS581 12.00 SD200 11.00 ANS581 12.00 SD200 11.00 ANS581 12.00 SD200 11.00 ANS581 12.00 SD200 11.00 BC550C 20p SD7767 30p BDV648 50p SD7769 30p BDV648 50p SD789 30p BDV648 50p SD789 30p BDV658 50p SD789 30p BDV658 50p SD880 11.00 BP870 20p SD880 20p SD880 20p BU1054 80p SD1264 50p BU1054 80p SD1264 50p BU1054 50p SD1266 11.00 BU1054 50p SD1266 11.00 SD1264 50p SD1266 11.00 SD1266 50p SD1266 50p SU1054 50p SU10	BU508A BU508AF BU508DF BU508DF BU705 BU801 BU806A BU807 BU808DFI BU824 BU824 BU824 BU824 BU824 BU824 BU824	\$1,00 BY255 Sp CLERTIA \$5,00 BY295-200 I5p FEBB 4p £1,00 BY299-200 I5p FEBB 4p £1,00 BY719-800 30p HA1140 £1,00 BY719-800 I5p HA1185 £1,00 BY719-30 I5p HA1185 £1,00 BY719-30 I5p HA1196 50p BY719-80 I5p HA1196 £1,00 BY795B I0p HA11804INT £1,50 BY795B ID BY795B ID BY795B ID BY795B ID BY795B ID BY795B ID BY795B ID BY795B ID BY795B ID BY795B ID BY795B ID BY795B ID BY795B ID BY795B ID BY795B ID B	M708 LBI	ified add £1.70 P/P to SMALL ORDERS + VIER GOODS Technical Information by ment/School Orders on official headings. ondon Road, Southend-on-Sea. Closed
12F 20p 2SD180703 15p 1.00 157878 1.00 1.00 151878 1.00 1.00 151878 1.00 1.00 151878 1.00 1.00 151878 1.00 1.00 151878 1.00 1.00 151878 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	BU508A BU508AF BU508DF BU508DF BU705 BU801 BU806A BU807 BU808DFI BU8224 BU826 BUK 444/80	\$1,00 B Y255 \$ D CLEATIA \$5,00 B Y255 \$ D CLEATIA \$5,00 B Y259,200 I 5 D FEBB \$ D D D D D D D D D D D D D D D D D D	M708 LBI 1.50 M37204ESP 21.00 M38658P 21.00 M8658 21.00 M8505 21.00 S13522V 21.00 SAA1016 23.00 SAA3018 10.00 SAA3018 10.00 SAA3018 10.00 Monday, Tuesday, Wed	ified add £1.70 P/P to SMALL ORDERS + VIER GOODS Technical Information by ment/School Orders on official headings.



Willow Vale can now supply genuine spares and accessories for all these leading brands:

- Sharp
- Philips
- Pace
- Nokia
- JVC[®]
- 🍗 Matsui
- Grundig
- Ferguson
- Tatung
- Goldstar (LG Electronics)
- Panasonic
- Sony
- Toshiba
- Thomson
- Mitsubishi
- Akai
- Aiwa
- Pioneer
- Samsung
- Hitachi
- Amstrad
- Alba
- Bush
- Goodmans

TECHLINE is always available. Should you require any technical help or advice on 0891 615915.

(*all calls charged at premium rate).

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

