THE LEADING UK CONSUMER ELECTRONICS TECHNOLOGY MAGAZINE

TELEVISION

SERVICING·VIDEO·SATELLITE·DEVELOPMENTS

OCTOBER 1998 £2.70

A REED BUSINESS PUBLICATION

Servicing the Panasonic Euro-1 chassis

Testing polarisers

TEST REPORTS
The Internet STB
Video alignment test tape

CCTV monitor conversion

FireWire developments

PC-based Portable Database for field servicing

9 770032 647085 10>

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

Introducing the new genie UNIVERSAL Remote Control

Our very latest universal remote control. Not only does it replace the main functions of 3 infra red remote controls it also looks pretty good too. It makes operating main entertainment systems easy.

OUR GENIE IS DESIGNED TO GIVE YOU 3 WISHES:

- *Increased turnover (especially leading up to Christmas).*
- *Superb point of sale.*
- *Easy to use which gives additional customer confidence.*

PLUS LOOK AT WHAT THE GENIE HAS TO OFFER! WHY YOUR CUSTOMERS NEED THE GENIE!

- *To operate your TV, VCR and Satellite systems, or any combination of these 3 devices.*
- *Preprogrammed for easy set-up (Auto code search).*
- *Covers 1000's of popular brands.*
- *Customer Helpline. If you need help to master the Genie, call our helpline and our trained staff will be pleased to help you.*

  And don't forget, our Customer Helpline now operates even longer.
- *Unique design.*

FREE! Free counter top display and promo literature on request with every 50 pieces. Plus dummy Genie.

Also available with smaller orders at a cost of £5.00 + P&P

Order code:

Silver	RC012
Blue	RC012 Blue
Green	RC012 Green
Red	RC012 Red
Yellow	RC012 Yellow

Prices are available from our sales hotline!

Call today for the hottest remote this year!

PHILEX ELECTRONIC

SALES HOTLINE 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

October 1998 Vol. 48, No. 12

The Electronics Slowdown 839

Test Report: Video Alignment Test Tape 842
Eugene Trundle tries out the MB-SWISS 4 video alignment test tape, which is available from SEME at under £30. A bargain.

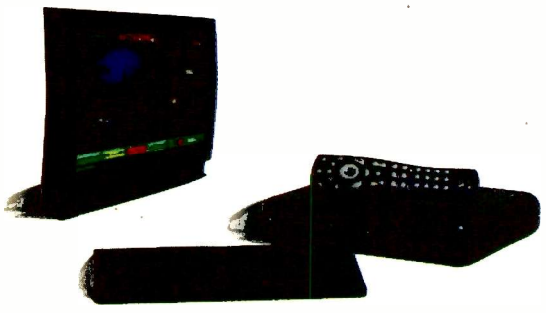
Teletopics 844
SkyDigital's offer, Teletest's new range of portable LCD monitors, digital TV equipment developments and other news.

FireWire, the PC and TV 846
Geoff Lewis, B.A., M.Sc., follows up his recent account of the FireWire digital signal interconnection system with a report on the latest controller chip from

TI and a description of the complementary Universal Serial Bus.

Service Casebook 850
John Edwards reports on servicing problems and procedures.

The Internet Set Top Box 852
Martin Pickering tries out the latest consumer electronics product, which provides access to the



internet and e-mail facilities without the need for a PC. It's foolproof, and is available at a modest price.

Satellite Workshop 854
Jack Armstrong's column on satellite receiver servicing.

Test Case 430 855

A Portable Service Database 856
This system is ideal for field servicing. It consists of a laptop computer and portable printer with appropriate software. Devised by Michael Maurice, it records jobs, monitors job progress, provides parts checking and ordering, and prints out invoices and reports.

Letters 858

Testing Polarisers 860
Pete Haylor, G6DRN, has devised a couple of modules for testing magnetic and mechanical polarisers.

Simple CCTV Monitor Conversion 862
Keith Cummins on how to go about converting an old monochrome portable for use as a CCTV monitor.

Satellite Notebook 864
Solutions to problems with satellite TV equipment and installations.

TV Fault Finding 866

Help Wanted 870

DTT Testing 883
Preparation for the start of digital terrestrial TV.

VCR Clinic 884

Servicing the Panasonic Euro-1 Chassis 886
John Coombes on the faults you may encounter with this chassis, which uses digital signal processing.

Servicing in 1956 890
Austin Fairchild got his first servicing job in 1956. Then, as now, it was a time of change.

DX and Satellite Reception 892
Terrestrial DX and satellite TV reception and news. A useful preamplifier for TV use. Roger Bunney reports.

Monitors 896
Hints and tips on dealing with monitor faults. An update procedure for the KDS KD1700V.

What a Life! 898

Camcorner 900
Fault reports and a note on the operation of auto-focus lenses.

Next Month in Television 901

Editor
John A. Reddihough

Production Editor
Tessa Winford

Consultant Editor
Martin Eccles

Publisher
Mick Elliott

Advertisement Sales Manager
Grant Allaway
0181-652 3032

Advertisement Sales Executive
Pat Bunce
0181-652 8339
Fax 0181-652 8931

Editorial Office
0181-652 8120
Fax 0181-652 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.

October issue on sale on September 16th.

Next issue, dated November, on sale on October 21st.

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.

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

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

MONITOR FLYBACK TRANSFORMERS
This is just a sample of the types we can supply

ACORN/DIGITAL/IBM etc	P.O.A.
AT2090/08 (ESCOM)	£19.95
CALIBRA AT2090/48	P.O.A.
COMMODORE 1084P/1084SP	£20.95
COMMODORE 1084ST	P.O.A.
ELONEX AT2090/33	P.O.A.
GOLDSTAR/DELL 154-166A	£27.91
OLIVETTI TFB200A	£26.95
OLIVETTI 1172.0018	£26.15
PHILIPS CM8833 Mk 1 (popular uSlot type)	£20.95
PHILIPS CM11342 (CM8833 Mk 2)	£22.45

CONTACT US FOR TYPES NOT SHOWN. NB: Please supply all markings from the original flyback, as some monitors utilise more than one type number.

** Other Computer Spares available **

REMOTE CONTROLS

GEC V4001H/V4005 – Genuine	£11.03
ITT IFB-13-14-15 – Replacement	£16.45
NOKIA Uni by PHILEX	P.O.A.

Many other Genuine and alternative types available P.O.A.

TV FLYBACK TRANSFORMERS

FERGUSON TX90 90 (RED SPOT)	£16.50
HITACHI CMD6011 (2435141)	£16.99
PHILIPS AT2140 (108-31000) by HR	£13.99

We can supply many other LOPTx's, for ALBA & BEKO through to TOSHIBA & ZANUSSI. Please supply model no. and full information from original part.

SELECTED VIDEO HEADS

AMSTRAD TVR1/VCR4500/5200	£13.99
FISHER FV HP420/615/720/721/722	£15.99
HITACHI VT11/33 & some others	£12.89
SHARP VC381 to VC388	£10.99

These are quality heads – Phone for models not shown

OCTOBER SPECIAL OFFERS (Valid to 21/10/98 or W.S.L.)

PHILIPS VR422/437/447/6485 GENUINE VIDEO HEAD (DM4)	£74.99
FERGUSON TX100 51cm Yellow Spot LOPTX	£12.99
FERGUSON TX9 LOPTX	£7.49
ICP F/N Circuit Protectors – PACK of 10 MIXED	£2.99
ZENER DIODES – PACK of 30 x 400mW (2 each of 2V7-30V)	£2.99
Replacement Telescopic AERIAL for BT FREEWAY	£1.99
SOLDER PUMP Special – PUMP + FREE SPARE TIP	£2.99

UP TO 50% OFF – SINCLAIR, COMMODORE and ATARI Spares
Satellite Repair Manual *Edition 5* in Stock

IC's for PHILIPS

MAB8461P W069	£13.15
MAB8441P T020	£6.42
MAB8461P W013	£8.10
NSM5480	**Check**
TDA1006	£2.59
TDA3730	£7.99
XC89507P	£17.96

Limited stock only
Other types P.O.A.

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

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

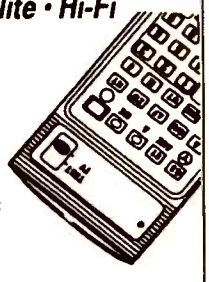
AIWA NSX-800	£9.56	AMSTRAD PC4386X	£16.29	AMSTRAD PCS286	£18.31
BINATONE 01/9771	£8.25	HITACHI CPT2658	£9.42	PIONEER XCP-410M/T	£14.53
PANASONIC KXP-1123	£12.41	PANASONIC TX2	£9.52	PHILIPS CM11342	£10.83
PHILIPS CM8524	£7.42	PHILIPS CM8833 (Mk 1)	£9.49	TOSHIBA ST-U2	£7.49

When ordering, please add £1.50 P & P and then add 17.5% VAT. (N.B. VAT is due on P & P – Equipment Manuals are zero-rated). Small payments by Card accepted, however a nominal surcharge may apply – please enquire. Overseas orders welcome – minimum P & P is £3.00, but please check to avoid delays. 'Validity Dates' required for card orders, also the Issue No. for SWITCH. All stock items despatched as quickly as possible, subject to clearance of payment. All items subject to availability – Prices can change without notice.

Very sorry, we are unable to accept callers – Please order by PHONE or POST.
We accept: VISA, ACCESS, MASTERCARD, DELTA, SWITCH, EUROCARD
M.E.C. 1 HORNBEAM MEWS, GLOUCESTER GL2 0UE

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

The Electronics Slowdown

To an old-timer it still seems strange that the electronics industry should be in a state of near slump, though the semiconductor sector has been suffering from falling prices for two and a half years now. It's almost incredible in this respect that until recently semiconductor manufacturers were continuing to pour vast sums of money into new fabrication plants. Korean companies, the main ones contributing to the build up of excessive manufacturing capacity, were of course encouraged by their government to adopt this policy. Didn't it occur to anyone that every large manufacturer can't go on expanding indefinitely, that there is not room for ever more newcomers, and that there must be a point at which production capacity exceeds likely demand?

The problem here is that Far Eastern businessmen have always tended to think in terms of market share rather than profitability, assuming that the former would inevitably lead to the latter. If you are lucky enough to have government backing, there's nothing to loose from adopting this policy. In the same way that MITI in Japan encouraged Japanese consumer electronics firms to achieve world dominance, the Korean government has been playing a dubious role in encouraging the country's semiconductor manufacturers.

There was a time when the electronics industry was relatively immune to basic business cycles. Shipbuilding, steelmaking and other 'rust-bucket' industries might suffer severe declines, but the ever-developing electronics technology and the need to adopt electronic solutions in all spheres of business ensured that the electronics industry thrived regardless. That was the situation until about a decade ago. Since then the electronics industry has become such a large part of the global business scene that it's no longer decoupled from the general economic situation. The electronics industry supplies everyone: so a general decline affects electronics as well.

The present economic turmoil, which started in Thailand in June 1997 because the banking system had become over-extended, has developed to such an extent that some commentators are talking about a world slump. With gross domestic product contracting 15 per cent in Indonesia, eight per cent in Thailand and seven per cent in Korea this year (Goldman Sachs' forecasts) the situation is pretty grave. This background, taken in conjunction with the fact that electronics markets had already to some extent become saturated, suggests that tough times in our industry will continue for some time to come.

Even if there was plenty of money to spare and a general 'feel-good' situation, there are just so many PCs that people and businesses need. The PC market is a major part of the world's electronics industry: when it takes a breather, the semiconductor industry goes into significant decline. To some extent the PC market has been built up on the basis of continual replacement/renewal as performance standards have improved. But here again there are limits, set by the physics of semiconductor materials, also the cost increase as firms push manufacturing processes to the limit. It has to be asked whether we really need ever-faster processors?

The consumer sector could be the one that gets the electronics industry out of its present decline then moving forward again. This assumes that, in the same way that businesses have been prepared to continue to invest in improved PCs and servers, the public will take to digital equipment – TVs, DVD players, camcorders and other products.

It seems that the Americans, always willing to invest in the latest technology, are already starting to buy HDTV sets – before the system specification has been finalised! HDTV sets are being sold with the digital decoder to follow – at extra cost. It would be nice to have customers like that . . .

Elsewhere, it's likely that the market for new consumer electronics technology will be slow to take off, particularly with consumer confusion over different systems in Europe, the general reluctance at present of Japanese consumers to spend (Matsushita has just announced a 58 per cent decline in after-tax profits in the first quarter of its financial year), and the economic woes throughout Asia and the Pacific rim – not to mention Russia.

One area that does seem to continue to thrive is IT software. According to research carried out by CSSA, the association for software and computing services organisations, nearly 300,000 new jobs have been created in the UK's computer services industry over the last five years. This implies that over ten per cent of the new jobs generated in the UK between 1993 and 1998 were in this sector. The figures include jobs in corporate IT departments. Here, the year 2000 compliance problem and work on preparation for entry into the European economic and monetary union have increased employment. But the research suggests that independent software and computer services firms have grown even faster. So, if you fancy a change from that smelly old soldering iron, the IT field beckons.

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 901.
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 843.

SUBSCRIPTION ENQUIRIES

Telephone:	01444 445 566
Fax:	01444 445 447
Credit card orders:	01622 778 000

Address: Television, Subscriptions Dept, PO Box 302, Haywards Heath, West Sussex RH16 3YY, UK.

Make cheques payable to:	Television
Subscription rates:	
UK	£32.00 per year
Airmail Eire	£36.00 per year
Airmail Europe	£46.00 per year
Airmail Rest of World	£59.00 per year

NEWSTRADE ENQUIRIES
Distributed by MarketForce
Telephone: 0171 261 7704

WEB SITE
For a full list of RBI magazines:
http//www.reedbusiness.com

ISSN **0032-647X**

REED BUSINESS INFORMATION

YOU!!  NEED ECONOMIC

1000's 1000's

Thousands of semiconductors I.C's etc.
of video parts, heads, belt kits etc.
of remote controls. etc. etc.

over 100,000 database records to help find the difficult video parts quickly. Stock availability & price in seconds

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

...and look at the special offers.....

(strictly while stocks last)

BUT11A @ 29p each BUT11AF @ 38p each
BU508A @ 60p each Fully wired scart lead 99p

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

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

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

Quantities add £1.00 handling all + VAT

New 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!

Yes Yes Yes only £6.95

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

PSU repair - refurb kits

Over 120,000 kits sold

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
KIT2 £6.95 Pace - SS900,9200,9210,MRD920, Ferguson SRV1, Grundig GIRD2000,3000, Philips STU801, Network 900,9200, Bush IRD150, Nokia SAT1500, Maspro SRE250S,350S,450S,Alba SAT6600, Finlux SR5700, Thompson SRS4
KIT3 £6.95 Amstrad - SR510,520,540,SRDR45,SRD550
KIT4 £6.95 Amstrad SRD 500
KIT5 £6.95 Amstrad SRX320,340 etc (export models)
KIT6 £6.95 Pace D100,120
KIT7 £6.95 Churchill D2MAC decoder
KIT8 £5.95 Pace MSS100
KIT9 £9.45 Pace MSS200,300,Apollo
KIT10 £13.11 Pace MSS500,1000
KIT11 £5.95 Ferguson SRD4
KIT12 £16.45 Echostar SR5500(early PSU with adjuster)
KIT13 £29.71 Echostar SR6500,7700,8700
KIT14 £23.95 Amstrad SRD600
KIT15 £7.36 Mimtec (Sorenson PSU type only)

Please add £1 handling all + VAT

The Satellite Repair Manual

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 so common faults, resets to factory default, sequences for parental lock[illegible] on LNB's, lists of manufacturers[illegible].

£16.95

Recoup the cost with your first repair

Repair Manual

Economic Devices

32 Temple Street, Wolverhampton, WV2 4AN, UK Tel ++ 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 got HASSLE ! !

USE your ACCESS or VISA

Economic supply TV & Video parts very very Fast

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

1N4001	0.03	2SC2274	0.35	AA119	0.36	BC557	0.09	BT151500R	1.12	BZX6122	0.19	MAX232CPE	4.70	TA7281P	3.20	TDA3654Q	2.82
1N4002	0.04	2SC2335	1.12	AC127	0.71	BC557B	0.18	BT151800R	1.15	BZX612V4	0.07	MC13002P	7.69	TA7698AP	5.97	TDA4500	4.66
1N4003	0.03	2SC2458	0.84	AD162	0.96	BC558B	0.18	BU208A	1.46	BZX6133	0.19	MC7812CT	0.77	TA7778P	5.11	TDA4501H	9.57
1N4004	0.11	2SC2482	0.35	AF127	2.48	BC558C	0.09	BU208D	1.61	BZX6136	0.19	MJ15003	2.23	TA8205AH	4.50	TDA4503	4.00
1N4005	0.06	2SC2570A	0.38	AN5265	1.76	BC559B	0.14	BU2508AF	1.58	BZX613V9	0.14	MJ2955	0.77	TA8210AH	0.00	TDA4505E	7.35
1N4006	0.06	2SC2655	0.31	AN5512	1.76	BC560C	0.11	BU2508DF	1.58	BZX615V6	0.11	MJ802	2.91	TA8210H	4.79	TDA4505M	11.97
1N4007	0.04	2SC2705	0.35	AN5515	2.79	BC635	0.23	BU326A	1.36	BZX6168	0.11	MJE13005	0.86	TA8215H	4.96	TDA4510	2.74
1N4148	0.06	2SC2785	0.36	AN5521	1.66	BC636	0.14	BU406	0.69	BZX616V2	0.11	MJE18004	2.05	TA8216H	8.01	TDA4580	10.05
1N5062	0.14	2SC3225	0.60	AN5601K	9.74	BC637	0.11	BU426A	0.86	BZX616V8	0.19	MJE3055T	0.45	TA8221H	0.00	TDA4600	2.14
1N5401	0.14	2SC3330	0.52	AN7171K	5.56	BC639	0.21	BU500	1.41	BZX617V5	0.09	MJE340	0.45	TA8403K	2.31	TDA4600/2/3	2.82
1N5402	0.14	2SC3400	0.17	AN7190K	11.11	BC640	0.11	BU500S	2.05	BZX618V2	0.19	MJF18004	2.05	TA8427K	3.76	TDA4601	1.46
1N5404	0.13	2SC3423	0.60	BA157	0.09	BC846B	0.52	BU508A	1.29	BZX619V1	0.09	MJF18204	6.07	TA8718N	7.69	TDA4601D	1.46
1N5408	0.09	2SC369	0.06	BA158	0.07	BC848B	0.35	BU508AF	1.32	BZX61C22V	0.11	MN650	1.71	TA8739P	6.01	TDA4605	4.10
1N6263	0.20	2SC3807	0.91	BA159	0.11	BC848C	0.41	BU508APH	1.99	BZX7910	0.30	MPSA06	0.35	TA4550B	0.31	TDA46052	1.97
1N914	0.02	2SC3953	0.72	BA3910B	6.99	BC856B	0.21	BU508D	1.56	BZX7912	0.11	MPSA13	0.18	TBA120S	0.89	TDA4950	1.76
1S44	0.11	2SC4517A	3.14	BA5406	2.14	BC858C	0.19	BU508DF	1.88	BZX7936	0.10	MPSA63	0.18	TBA120U	0.47	TDA7240A	2.57
2N2222A	0.23	2SC458	0.18	BA5412	2.48	BC875	0.33	BU508V	2.40	BZX793V9	0.09	MPSA93	0.11	TBA820M	0.35	TDA8138	3.59
2N3055	0.50	2SC4742	5.11	BA6209	1.18	BD131	0.26	BU536	1.65	BZX795V6	0.09	MR856	0.11	TDA1013A	1.56	TDA8140	4.62
2N3055H	1.29	2SC4769	4.02	BA6209N	1.27	BD132	0.26	BU806	1.03	BZX796V2	0.08	NE555	1.03	TDA1015	1.37	TDA8145	1.97
2N3773	1.52	2SC536	0.30	BA6219B	1.76	BD137	0.46	BU908	1.68	BZX79C33	0.11	NE555N	0.43	TDA1035T	4.27	TDA8170	4.70
2N3904	0.32	2SC945	0.11	BA6222	1.70	BD139	0.31	BUH515D	2.14	BZX79C5V1	0.11	P600A	0.33	TDA1044	1.43	TDA8172	2.65
2N4401	0.11	2SD1207	0.57	BA6247	1.95	BD140	0.24	BUK444500B	2.40	BZX853V9	0.11	P6KE130A	2.55	TDA1060	1.08	TDA8175	6.41
2N555	0.12	2SD1246	0.30	BAT43	0.52	BD233	0.23	BUL54AR	1.27	BZY8812	0.09	P6KE180A	4.65	TDA1085C	2.74	TDA8178FS	5.95
2SA1013	0.35	2SD1275	1.41	BAT85	0.96	BD234	0.36	BUT11	0.65	BZY882V7	0.23	PIC16C8404SO	4.50	TDA1170	1.82	TDA8180	4.87
2SA1015	0.11	2SD1276	1.39	BAV21	0.21	BD237	0.31	BUT11A	0.95	BZY883V0	0.11	R2KL	0.77	TDA1170N	2.57	TDA8190	3.59
2SA1020	0.44	2SD1292	0.64	BAX14	0.17	BD238	0.24	BUT11AF	1.18	BZY884V7	0.09	R2M	0.84	TDA1170S	2.05	TDA8350Q	5.56
2SA1029	0.26	2SD1330	0.31	BC107B	0.20	BD243	0.45	BUT12A	1.17	BZY885V1	0.13	R4050	3.04	TDA1180P	2.48	TDA8380	2.53
2SA1048	0.19	2SD1397	2.31	BC108	0.24	BD243A	0.60	BUT12AF	1.87	BZY88C12V	0.09	REGBABY10	13.00	TDA1516Q	3.59	TDA9503	2.13
2SA1145	0.36	2SD1398	2.14	BC109A	0.00	BD243C	0.44	BUT18AF	1.37	CD4001	0.24	RG2	0.64	TDA1518Q	4.27	TEA1039	2.11
2SA1286	0.60	2SD1426	3.51	BC141	0.36	BD244A	0.34	BUT56A	1.19	CD4017	0.47	RGP10G	0.26	TDA1519A	2.74	TEA2018A	2.29
2SA1370	0.43	2SD1427	2.91	BC147A	0.24	BD244C	0.43	BUV48A	1.97	CD4049	0.35	RGP15G	0.33	TDA1520B	4.50	TEA2029C	7.04
2SA1706	0.50	2SD1432	5.04	BC148A	0.35	BD245C	0.94	BUW11A	1.32	CD4052	0.29	RGP15J	0.17	TDA1524A	7.52	TEA2031A	4.26
2SA733	0.18	2SD1439	5.86	BC148B	0.11	BD433	0.29	BUW41B	1.39	CD4053	0.61	RGP15M	0.44	TDA1553Q	4.79	TEA2164	3.40
2SA872A	6.10	2SD1441	5.98	BC158B	0.12	BD434	0.31	BUW84	1.03	CNX62A	1.29	RGP30M	0.30	TDA1554Q	8.12	TEA2260	2.48
2SA933	0.36	2SD1453	3.85	BC168	0.04	BD436	0.52	BUX84	1.03	CNX82A	2.10	S2000A	2.57	TDA1557Q	4.23	TEA2261	3.68
2SA940	0.82	2SD1497	4.74	BC182	0.14	BD437	0.52	BUZ71A	1.03	CNX83A	2.55	S2000A3	3.59	TDA1558Q	7.69	TEA5101A	6.48
2SA950	0.18	2SD1541	4.96	BC182L	0.14	BD438	0.38	BUZ80	3.52	CNY75B	0.52	S2000AF	1.46	TDA1670A	2.98	TIC106D	0.82
2SA966	0.41	2SD1548	5.95	BC184A	0.12	BD681	0.47	BUZ80A	4.15	DTA114ES	0.31	S2055AF	3.74	TDA1675A	3.85	TIC246D	1.54
2SA992	0.31	2SD1554	3.25	BC184L	0.06	BD826	0.43	BUZ90A	3.40	DTC124ES	0.77	SAA129302	10.37	TDA1904	1.63	TICP106D	0.60
2SB1010	0.35	2SD1555	2.65	BC187	0.47	BD839	0.57	BUZ90AF	3.30	DTC144ES	0.19	SAB3035	1.71	TDA1908A	5.61	TIP110	0.35
2SB1066	0.82	2SD1556	5.11	BC212	0.09	BD901	0.52	BY127	0.18	FR605	1.90	SG264A	12.88	TDA2002	1.12	TIP112H	0.77
2SB1143	0.77	2SD1651	2.38	BC212B	0.19	BD902	0.60	BY133	0.08	FXT749	0.43	SGSIF344	10.70	TDA2005	1.83	TIP120	0.40
2SB1243	0.60	2SD1858	0.43	BC212L	0.18	BD911	0.52	BY206	0.20	HA13001	3.85	SL1430	1.92	TDA2006	1.06	TIP122	0.40
2SB560	0.43	2SD1877	2.14	BC237	0.12	BDT64C	1.18	BY227	0.13	HA13119	2.05	SL1431	2.82	TDA2030H	0.91	TIP2955	0.89
2SB643	0.29	2SD1878	2.63	BC237B	0.19	BDT65C	1.68	BY228	0.26	HA13151	13.20	SN74141N	0.17	TDA2030V	1.46	TIP29E	0.77
2SB647	0.57	2SD1879	3.16	BC238	0.11	BF194	0.22	BY2291000	1.31	HA51338SP3	7.69	STK4132II	10.00	TDA2050	4.56	TIP3055	1.08
2SB649A	0.77	2SD1884	3.35	BC238B	0.16	BF195	0.07	BY255	0.14	HM6251	14.32	STK4141II	10.23	TDA2270	12.08	TIP31A	0.36
2SB688	1.61	2SD1887	3.56	BC307	0.06	BF197	0.18	BY299	0.18	ICH28I	0.26	STK4142II	9.40	TDA2540	1.29	TIP32C	0.40
2SB698	0.35	2SD288	0.85	BC307B	0.15	BF199	0.18	BY397	0.20	IR9594	15.79	STK4152II	10.95	TDA2541	1.12	TIP35C	1.82
2SB716	0.43	2SD350A	1.97	BC308	0.09	BF258	0.04	BY398	0.16	IRFBC40	5.98	STK4192II	14.64	TDA2577A	3.45	TIP41C	0.65
2SB772	0.50	2SD381	1.66	BC308A	0.09	BF420	0.21	BY399	0.12	KIA6210AH	6.15	STK5332	2.82	TDA2578A	3.20	TIP42C	0.52
2SB774	1.61	2SD400	0.34	BC308C	0.26	BF421	0.24	BY448	0.30	LA4270	2.73	STK5342	4.07	TDA2579A	4.91	TIPL761A	1.85
2SB891	0.60	2SD401A	0.77	BC309B	0.10	BF422	0.19	BYD14J	0.35	LA4280	3.12	STK5372H	6.84	TDA2581Q	2.57	TIPL791A	1.25
2SB892	0.35	2SD468	0.28	BC327	0.10	BF423	0.14	BYD33D	0.12	LA4282	5.11	STK5421	9.52	TDA2582	3.85	TL072CP	1.03
2SC1008	0.24	2SD667	0.38	BC328	0.14	BF459	0.43	BYD33J	0.16	LA4445	3.45	STK5481	8.12	TDA2593	1.12	TMP47C432AP	8189
2SC124	0.48	2SD669A	0.64	BC337	0.14	BF471	0.37	BYD33M	0.26	LA4460	2.50	STK7253	7.69	TDA2600	7.69		15.19
2SC1318	0.19	2SD718	1.90	BC338	0.06	BF487	0.57	BYV10-40	2.55	LA4700	4.27	STK7308	6.41	TDA2611A	0.64	TMP47C434N	3537
2SC1473	0.21	2SD756	0.47	BC368	0.18	BF491	0.41	BYV95B	0.21	LA6324	2.05	STK7348	5.74	TDA2611AQ	1.32		15.22
2SC1573	0.52	2SD837B	1.12	BC369	0.18	BF494	0.12	BYV95C	0.28	LA6510	2.94	STR11006	7.37	TDA2653A	4.70	TMP47C434N	3555
2SC1675	0.14	2SD856	0.79	BC372	0.53	BF759	0.38	BYV96D	0.27	LA7830	1.88	STR4211	9.40	TDA3190	2.05		16.63
2SC1685	0.21	2SD882	0.43	BC546A	0.11	BF869	0.38	BYV96E	0.53	LA7832	2.40	STR50020	9.38	TDA3330	14.21	TPU2732	10.05
2SC1740	0.16	2SD898B	6.41	BC546B	0.12	BF871	0.41	BYW56	0.31	LA7835	2.99	STR50103	4.48	TDA3505	2.40	U2829B	3.40
2SC1815Y	0.11	2SD965	0.67	BC547	0.11	BF959	0.18	BYW95C	0.21	LA7837	4.19	STR50103A	5.56	TDA3560	6.13	UC3842	1.46
2SC2001	0.23	2SD965R	1.05	BC547A	0.04	BF960	0.30	BYW96E	0.50	LC7132	4.70	STR54041	5.15	TDA3561A	3.85	UC3844	1.20
2SC2023	3.18	2SK1117	3.40	BC547B	0.11	BF970	0.43	BYX55600	0.23	LED3G	0.10	STR5412	4.02	TDA3562A	4.62	UC3844N	1.91
2SC2073	1.03	2SK1118	3.40	BC548	0.11	BFR90A	0.68	BZV10	1.34	LED3R	0.10	STR58041	3.42	TDA3565	2.74	UPC1318AV	3.85
2SC2078	1.00	2SK30A	0.35	BC548A	0.11	BFY51	0.39	BZV85C5V1	0.15	LED3Y	0.10	STR59041	8.11	TDA3566	6.41	UPC1365C	1.70
2SC2120	0.23	7407	0.69	BC548B	0.06	BR100	0.18	BZX6110	0.16	LM317T	1.29	STR6020	6.07	TDA3576B	10.31	UPC1378H	1.71
2SC2229	0.31	74HC04	0.88	BC548C	0.14	BR103	0.62	BZX6111	0.10	LM324N	1.48	STRD1816	7.69	TDA3592A	4.60	UPC1394C	1.92
2SC2230	0.55	7805	0.78	BC549B	0.11	BRX44	1.02	BZX6112	0.13	LM339N	0.50	STRD4420	10.64	TDA3640	5.98	UPC1488H	2.99
2SC2235	0.36	7806	0.60	BC550B	0.16	BRX49	0.43	BZX61120	0.28	M494B1	11.85	T9053V	1.35	TDA3650	11.04	UPC1498H	2.31
2SC2236	0.36	7809	0.69	BC550C	0.09	BRY55	0.28	BZX6113	0.11	M5218L	0.69	T9064V	1.87	TDA3653B	1.54	UPC574J	0.86
2SC2240	0.21	7812	0.52	BC556A	0.11	BSX20	0.35	BZX6116	0.19	M54544L	2.04	TA7120P	0.66	TDA3653C	2.82	X2402P	5.78
2SC2271	0.67	78L05	0.35	BC556B	0.14	BT139600	1.29	BZX6120	0.19	M58655P	4.96	TA7280P	2.74	TDA3653CQ	2.57	ZTK33B	0.28
														TDA3654	1.44	ZTX650	0.51

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

Test Report

At under £30 this VCR test tape from SEME is a worthwhile buy for any service organisation

Video Test Tape

Video alignment test tapes have traditionally been very expensive. So the price tag with this one, £27.98, came as a surprise. The MB-SWISS 4, made by Nedis BV of the Netherlands, is a PAL-VHS standard-play test tape that has a wide range of features for electrical and mechanical checks and alignment. It's recorded on high-quality Panasonic tape and has a running time of thirty minutes.

Features

The test image produced by the tape, see Fig. 1, has many of the features provided by a conventional test-card pattern – grey-scale step-wedges, colour bars, frequency gratings and white-black-white transitions. In addition there are several 'special' features: a head-switch point that's well inside the main display, with associated pattern features; and some head-test blocks to give an indication of wear, balance, resonance and video head damping.

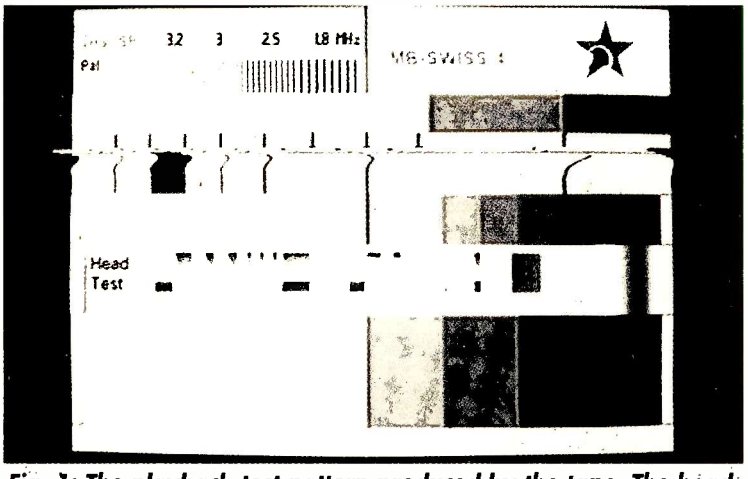


Fig. 1: The playback test pattern produced by the tape. The head-switching point is the 'kink' about a third of the way down the screen. The bottom third of the picture consists of standard (WYCGMRBB) colour bars. The VCR that was used to take this photograph had somewhat worn video heads, indicated by the reproduction of the blocks below the centre line of the picture.

The first minute of the tape is recorded with a reversed PAL chroma field sequence, to check for an incorrectly fitted (180° out) head drum. Thereafter the pattern and sound remain steady. The audio signal is a 1kHz sinewave that's recorded on both hi-fi/helical and mono/longitudinal tracks.

On Test

My first test of this tape was for tracking-centre, in comparison with the industry-standard JVC MH-2. It was spot-on, coming in at exactly the same tracking setting. After this I used the new tape for all my workshop needs for many weeks.

The most common uses of a test tape are for checking guide alignment and for setting the X position of the audio/control/erase head. No problems here. For azimuth setting of the audio head the 1kHz tone was adequate – not as good as the 5 or 6kHz tone that some other tapes provide.

The main features of this alignment tape spring from the fact that its field sync pulse is recorded about 13msec before the head switching point, rather than 416µsec. The only effect of this on the picture, which synchronises all right, is a 'glass-bar' or tear effect about a third of the way down the picture, because of the head switchover. You adjust the head-switching point to coincide with a horizontal line in the pattern, see Fig. 2. This corresponds with the exact 6·5H point required. An oscilloscope check proved that it was right.

The second virtue of the offset head-switching point is that you can easily see the skew error (corresponding with longitudinal tape tension) at the start and end of a head scan – above and below the switching pulse. The idea is to get the vertical black bar at the centre of the picture (see Figs. 1 and 2) as close as possible to the centre arrow above, by adjusting the back tension. Tolerance limits are indicated by the outer markers, one of which can be seen in Fig. 2. It worked well for me,

compared with a torque-gauge cassette. The latter and the tentelometer will now lie undisturbed in their drawer – and I won't have to keep replacing the damaged tape in the torque-checking cassette!

The three head-test boxes just below the centre line of the test pattern, see Fig. 1, contain specially-recorded signals to check for dropout compensation, head wear and video FM preamplifier gain, bandwidth and tuning/resonance. I found that it was easy, with some practice and experience, to judge the condition and state of wear of a video head without the need to take off the machine's cover or use an oscilloscope.

Indeed saving on the need to use expensive and specialised test equipment is what this tape is all about. Traditional alignment tapes contain frequency sweeps with markers for adjustment of the peaking and damping of tuned head amplifiers during playback. But these adjustments disappeared from domestic VCRs years ago. Even so, the instructions that come with the tape explain how, if necessary, to set them up.

The frequency gratings/multiburst at the top, left-hand side of the pattern puzzled me somewhat: virtually all the machines I tried were able to reproduce the 3MHz grating, but none of them managed the 3·2MHz grating. Yet with a 52sec picture-scan period 3MHz equates with 312 lines, which is way above the oft-quoted 260-line ceiling for standard-VHS machines.

Verdict

This is an excellent product: a terrific bargain that I can recommend to any technician. I would like to see further versions, in the VHS-C and Video-8/Hi-8 formats.

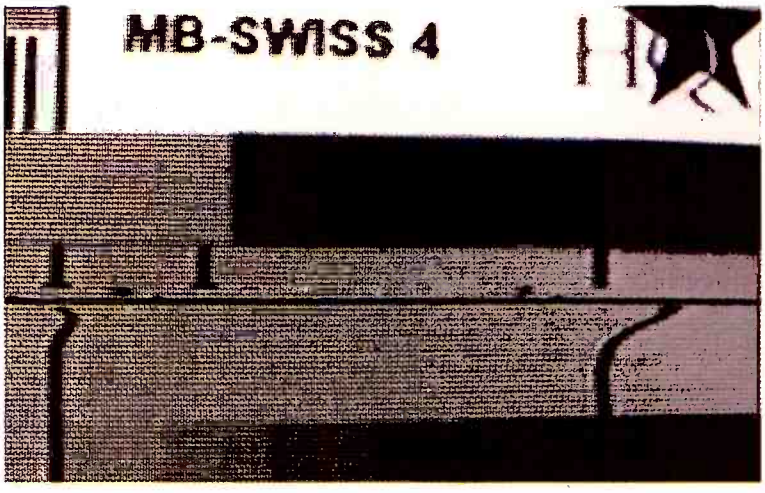


Fig. 2: Close-up of a section of Fig. 1. This shows that the head-switching point is in need of adjustment: it's two-three lines early, shown by the twinkling white dots above the grey horizontal line. The back tension is fine with this machine, indicated by the vertical pointer on the left-hand side.

If a Mark 2 version of the tape is contemplated, it would be nice to have a 6kHz audio tone somewhere. Also perhaps a better instruction sheet with a specification table.

The MB-SWISS 4 video test tape is available from SEME Ltd., Unit 2, Saxby Road Industrial Estate, Melton Mowbray, Leics LE13 1BS. Phone 01664 481 818, fax 01664 563 976.

TELETOPICS

BSkyB's Digital Offer

BSkyB has announced further plans for its digital satellite TV service. The company is offering a subsidised set-top box to new subscribers for £199, and to those who already subscribe for £159. To buy the subsidised set-top box, customers have to take out a Sky Digital package or register with British Interactive Broadcasting (BIB). The latter involves agreeing to have the set-top box connected to an existing phone line for at least one year.

The subsidy is provided by BIB, which is a joint venture whose members are BSkyB, British Telecom, Matsushita (Panasonic) and the Midland Bank (part of HSBC Holdings). According to an EC ruling, the subsidy must be available to those who wish to watch only free-to-air transmissions as well as those who subscribe to pay-TV packages. This ruling forms part of the European Commission's approval of BIB's plans.

In addition a free dish, with free installation, is part of the offer, also if required a telephone extension cable (but not an extra line) where the TV set is more than two meters from a phone point.

BSkyB is offering various subscription packages, starting at £6.99 a month for six channels. For £29.99 a month you get the complete 140-channel service. A choice of four different 15-channel packages is offered at £8.99 a month. There's a "family" selection of 40 channels for £11.99 a month.

BSkyB's digital TV service will start on October 1st.

The new oval mesh dishes for the digital service are 40cm high and 53cm wide. They are being made in the UK by Channelmaster and have a rounded edge and durable dark-grey finish. Other companies are developing similar designs which are expected to be approved and available shortly. The LNB, whose characteristics match the dish, is being produced by Cambridge initially. It has high gain and a noise figure of typically 0·7dB.

BSkyB has dropped its legal action against ONdigital over set-top box compatibility.

Digital TV Equipment

BSkyB has reached agreement with Amstrad, Grundig, LG, Panasonic, Samsung, Sharp and Toshiba on the development of TV sets that incorporate Sky's set-top box technology (IDTVs). Discussions with other manufacturers, including Philips and Sony, are at an advanced stage. Pace has agreed to work with a number of setmakers on the development of plug-in pay-TV modules for IDTVs, to support the Sky Digital services.

IDTVs for the Sky services should be in production by the end of the year. The first models to be introduced are expected to cost around £1,000. This could drop to around £500 by the middle of 1999.

Pace is working with LG Electronics and Toshiba on the development of IDTVs for both the Sky Digital and the ONdigital services.

Pace has also signed a deal with Cable and Wireless Communications (CWC) to supply 100,000 set-top boxes for the latter's digital cable TV networks. The boxes will use the US-developed multimedia cable network system (MCNS) rather than the expected European DAVIC standard. CWC is expected to run trial services at the end of the year, with commercial services starting next year.

CWC is to call its interactive system, which will offer home shopping, banking, ticket booking and other services, TV Mall. The system is based on internet technology. CWC is working with Barclays Bank, British Airways, Littlewoods Home Shopping/Granada Media Group, Associated New Media and ITN on the project.

Motorola has developed what is claimed to be the world's first single-chip front-end solution for terrestrial digital TV receivers. The MC92314DH can demodulate and decode the DVB-T 2k-carrier signals to be used by BDB. It's output is an MPEG-2 data stream for further processing. Volume production is expected to start in December, with the chips selling for below £15 in volume quantities.

A summary of BREMA members' forecasts for digital TV and set-top boxes suggests sales of 12,000 widescreen IDTVs, 4,000 4:3 aspect ratio IDTVs, 92,000 terrestrial STBs and 230,000 satellite STBs during the current year.

Teletest has launched a range of high-quality portable colour LCD monitors. Designed for use with a camcorder, the 2·9in. and 3·8in. models (at £120 and £190 respectively) are ideal for checking the video outputs from VCRs and satellite STBs in a customer's home when the TV set is suspect.

There are larger, stand-alone versions, a 6·4in model at £900 and a 10·4in. model at £2,000. These are ideal replacements for the bulky, fragile monitors currently used by film crews etc.

For further information contact Nick Rose at Teletest, phone no. 01202 877 270, fax 01202 877 271, e-mail nick@teletest.co.uk

There's also a web site – www.teletest.co.uk

Video News

Sony has launched a camcorder that stores the video and sound in a cartridge rather than a video cassette. Model CCD-CR1E is being marketed under the name Ruvi . It's as small as a 35mm film compact camera, weighing 370g when loaded with batteries and a cartridge.

The Ruvi is based on Hi-8 technology. The cartridges contain video heads and metal-powder tape. Horizontal resolution is claimed to be about 350 lines. A cartridge can store up to half an hour of moving video or 350 still images and can apparently be used several hundred times before the tape shows any signs of wear. Sony plans to supply replacement cartridges. The Ruvi should sell at about £550: no cartridge price has been suggested.

The Ruvi has a built-in LCD screen for viewing. It can be linked to a TV set or VCR.

Sony has also developed the Digital Mavicap, which can convert the Ruvi's still images into JPEG files for storing on a floppy disc or other use. This will probably sell at around £125.

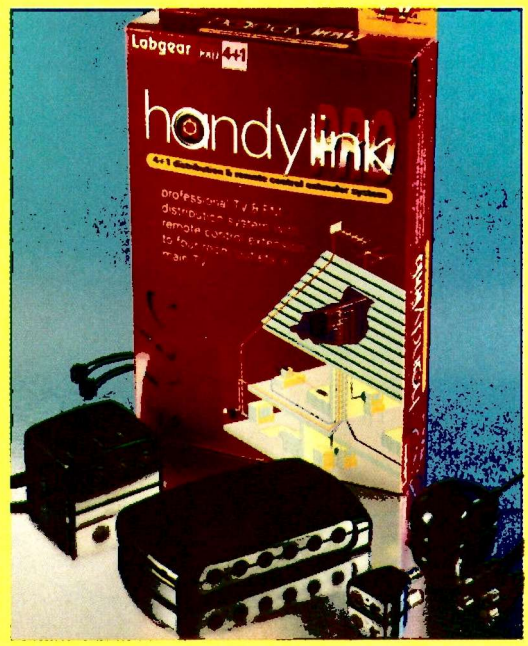
Sharp has introduced a digital camcorder, Model VL-PD1H ViewCam Slim, which for the first time brings touch-screen technology to camcorder use. Just a light tap on the screen enables you to control zooming, fix the point of focus or highlight selected areas of the image (backlight compensation). The VL-PD1H has a colour viewfinder and a 4in. flip-out touch-sensitive LCD screen. Fixed focusing enables you to avoid the problem of focus change in a busy area of view as objects cross the field of vision.

To take full advantage of its digital capabilities, the VL-PD1H complies with the IEEE1394 (FireWire) digital serial data interconnection standard. For additional flexibility when recording, there are five-mode scene adjustments (including sepia), snap-still-strobe functions, six shutter speeds and a fade effect.

Canon's new digital camcorder, Model DM-MV10, has a flip-out screen, optical and digital zoom and two audio modes – 48kHz, 16-bit two channel or 32kHz, 12-bit four channel. It's expected to sell at about £1,400.

JVC has launched its first S-VHS VCR at under £350 in the UK. Model HR-S7500's specification includes Nicam and a 'Spatializer' system to provide home cinema sound without the need for additional speakers, NTSC playback, and BEST (Biconditional Equalised Signal Tracking) for optimum picture quality with the type of tape in use.

Panasonic has launched a portable colour TV set, the Genus Model TX-G10, that's been designed for use in all European countries. Features include an AC/DC converter for 12V or 24V battery or mains power use, PAL/SECAM/NTSC reception in several versions, and an S-video terminal. An owner-identification system enables you to program your name, address and post code into the set's memory. The Genus should sell at about £280.



Labgear has introduced the Handylink PRO 4+1 domestic TV signal distribution system. It enables terrestrial TV, satellite TV and VCR output signals to be fed to four rooms (expandable up to eight) plus the main TV set, with remote control extension.

The built-in IR remote control extension facility is available at all the additional outlets, using the normal handset. Remote control is via the system, with none of the interference problems that can occur with wireless remote extender systems.

The Handylink PRO complements the Labgear Handylink Remote Control Extender system introduced in 1997. While the latter is intended for retro-fitting to an existing small distribution system, the Handylink PRO is ideal for new or replacement installations.

For further information call Labgear on 01223 222 090.

News Briefs

Eutelsat has signed a contract with Matra Marconi Space for a new satellite to be called RESSAT. It will guarantee service continuity in the event of a launch failure of one of the W series of satellites, the first of which is due to go into orbit this month (October). It will be equipped with 28 transponders, based on the Hot Bird specification.

Schaffner has redesigned and upgraded its web site to make the company's EMC (electromagnetic compatibility) expertise available to engineers and management all over the world. The site (www.shaffner.com) provides up-to-date listings of the latest EMC standards, links to standards-setting bodies, news and comment on EMC issues and product information.

The annual meeting of the Domestic Appliance Service Association (DASA), plus open forum and social event, is to be held at Huddersfield on October 24th. Members, associate members, guests and anyone with an interest in the electrical and electronic service industry are welcome to attend. For further details check with Chris Hayter on 01920 872 464 – fax 01920 872 498, e-mail dasa@globalnet.co.uk

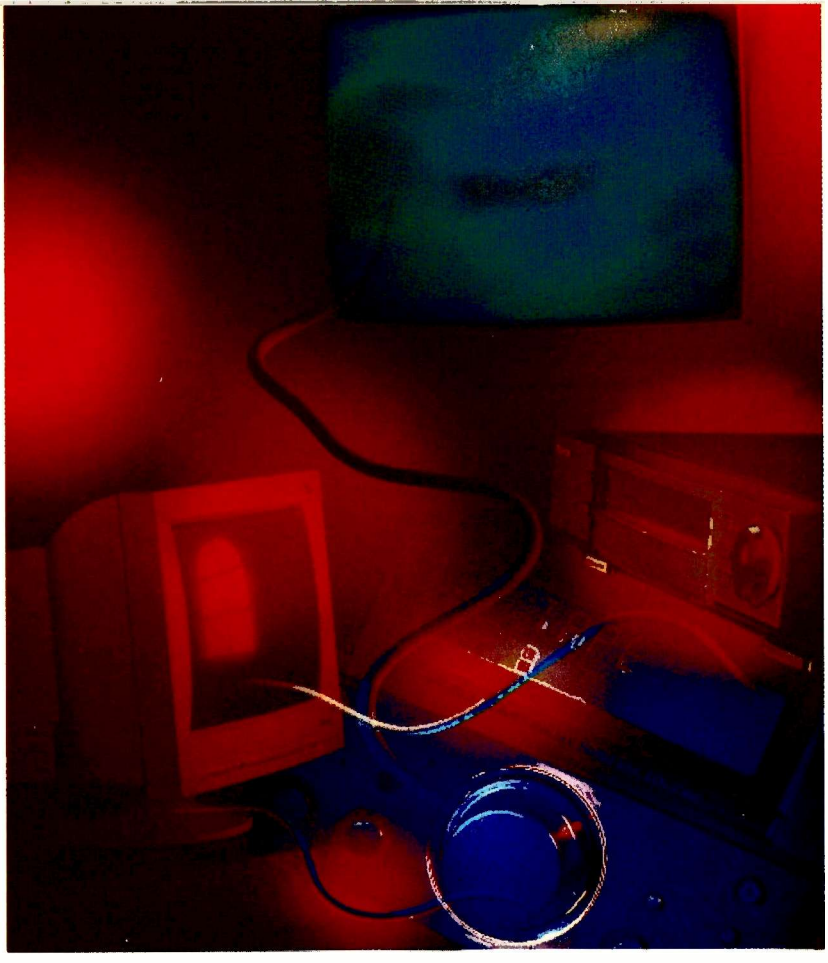
Thomson Multimedia plans to enter into partnerships with Alcatel of France, NEC of Japan and Microsoft and DirecTV of the USA. Each of these companies is being offered a 7·5 per cent stake in Thomson Multimedia.

LSI Logic and DSP Center, a Beijing-based consumer electronics design house, have entered into an agreement to provide engineering and technical support to original equipment manufacturers (OEMs) of DVD players for the consumer market. The agreement will enable OEMs to produce clearly-differentiated players quickly and cost-effectively for the Chinese consumer market and for export.

Plasma Panels

Fujitsu of Japan and Philips are to collaborate on the development and manufacture of plasma display panels (PDPs) for TV receiver use. Fujitsu is the leading manufacturer in this field – last year it produced some 80 per cent of the panels sold globally. The aim is to develop, by the end of the year, a 42in. PDP for sale in the USA, Europe and Japan at a price of about $6,897.

Thomson Multimedia and NEC of Japan are also collaborating on the development of PDPs.



Geoff Lewis, B.A., M.Sc., describes the latest FireWire control chip from Texas Instruments, fault-finding and the Universal Serial Bus – and takes a look at the future

FireWire, the PC and TV

The basic FireWire (IEEE 1394) fast, wideband serial data connection system was described in a previous article (July, page 632). Perhaps its most important feature is that it can move packetized data around a system at very high speed. The significance of this is that with the MPEG compression system used for digital TV the data is in packetised form. Just to recap, the MPEG data is arranged in packets so that data from different channels/programmes can be combined as a single data stream then separated and used at the receiving end. Each MPEG-2 packet consists of a sync word followed by 187 bytes of data, including the programme identification, and finally a 16-byte checksum for error correction purposes.

Data Rates

It has been demonstrated that for studio and production use a bit rate of 50Mbits/sec is suitable for MPEG video data with a resolution of ten bits per sample. A bit rate of 6Mbits/sec can provide good definition with a broadcast TV receiver. With an MPEG-2 data rate of 2Mbits/sec you get VHS-quality images.

The new North American high-definition (HDTV) format proposed by the Advanced Television System Committee (ASTC) would, for distribution purposes, use a coded data rate of 120Mbits/sec, for which it is proposed to use the 155Mbits/sec Asynchronous Transfer Mode (ATM) telecommunications standard. The final transmission rate enables HD signals to be fitted within the current 6MHz NTSC channel bandwidth.

These data rates are all well within the capabilities of FireWire.

On the domestic side it's expected that users will want to be able to edit digital video and audio signals recorded on tape.

Hence the growing interest in the FireWire system, with its ability to handle MPEG-2 video and audio signals.

A New Link Controller

The latest FireWire development from Texas Instruments is the highly-integrated link controller chip type TSB12LV41, or MPEG-2 Lynx, which is encapsulated in a 100-pin plastic quad flat pack. It acts as a bus interface controller that transmits and receives FireWire-formatted serial data packets via the associated physical link chip. It detects lost cycle-start packets, generates and tests the 32-bit cyclic redundancy check (CRC) data, and can act as a cycle master (CM), isochronous (real-time) resource manager (IRM) and bus manager (BM).

The Lynx IC accepts decoded MPEG-2 data, inserts a time stamp, and reformats the data packets. Its first-in-first-out (FIFO) memory is large enough to provide bi-directional transmission and reception of either MPEG-2 or digital satellite system (DSS) data. In fact the Lynx acts as a system core, handling the data protocols that control interoperability: it sits between the system application software and the hardware.

The MPEG-2 Lynx can handle audio, video and data applications running at up to 200Mbits/sec. It can be used for set-top box (STB), multimedia, tape and disc drive applications that work with MPEG-2 formatted isochronous data. Because of the wide range of data inputs it can handle – MPEG-2, DSS, isochronous or asynchronous, in serial or byte formats – these are referred to generically as bulky data (BD).

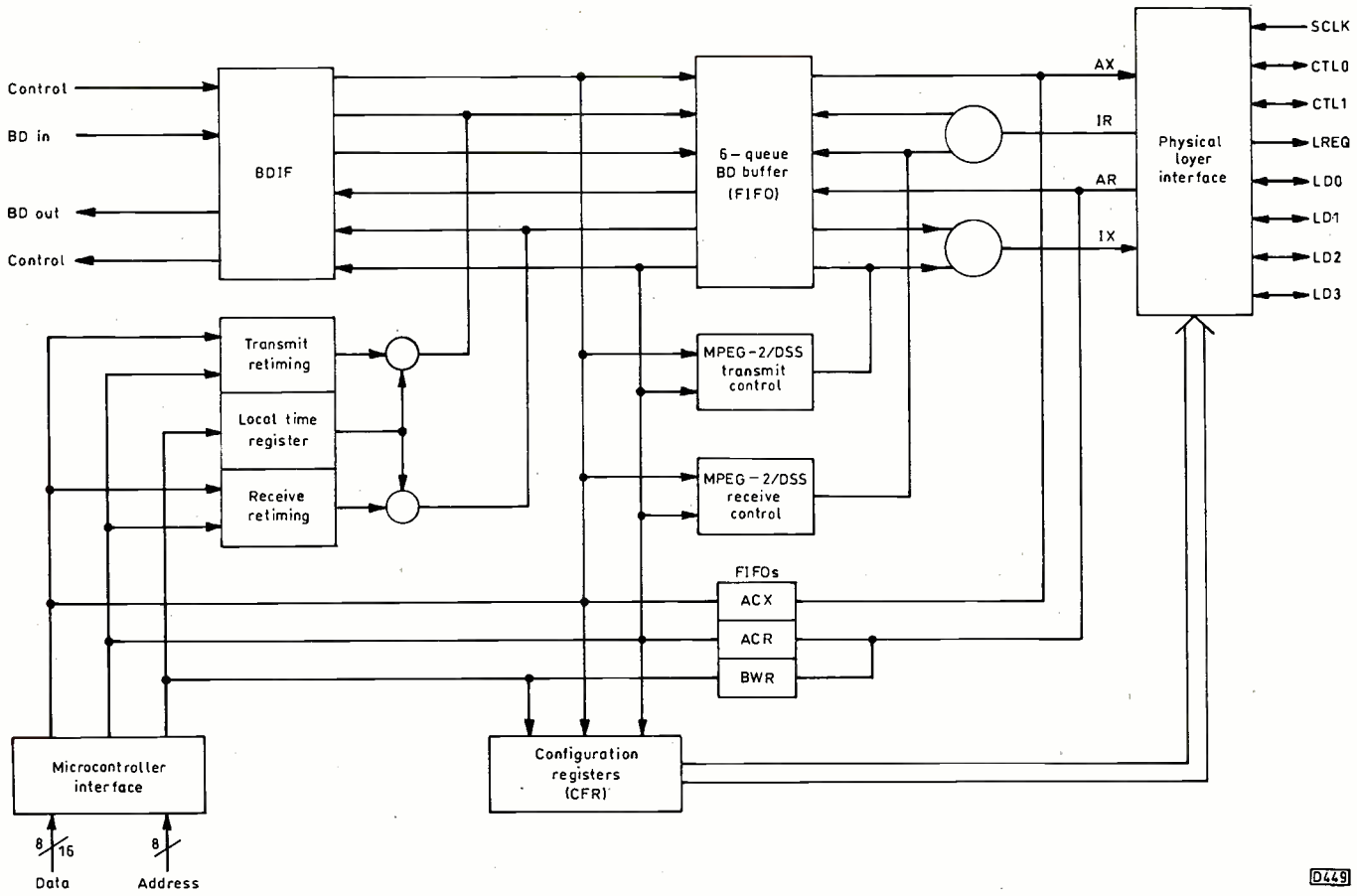


Fig. 1: Simplified block diagram of the Texas Instruments MPEG-2 Lynx FireWire controller chip.

Operation

Fig. 1 shows a simplified block diagram of the chip. At the top left the BDIF (bulky data interface) connects the input/output data to the chip's FIFO memory. Connection is controlled by the logic conditions at four status lines: these set the link for MPEG-2 or DSS data reception or transmission.

Partitioning within the FIFO creates six queues, which buffer the data stream in four quadlet groups. There are separate memory buffers for MPEG-2/DSS transmit and receive data, isochronous transmit/receive data, and asynchronous transmit/receive data.

The local time register acts as the system cycle timer (CT). It time stamps data packets and controls the transmission/reception of what are called common isochronous packets (CIPs). An ageing function invalidates packets that are out-of-date.

The microcontroller interface (bottom left) has provision for 8- and 16-bit data: it enables the Lynx chip to be connected to most common microcontroller and microprocessor chips, such as the Texas TMS320AV700, the Motorola 68XXX and Intel 80XX series. A couple of external control lines (MCSEL0 and MCSEL1, see Fig. 2) provide device selection while logic within the chip automatically converts between data in big-endian or little-endian formats (most significant byte first or last respectively) to suit the actual processor chip – with the Motorola processors' 16-bit data bus only the lower-end byte carries actual data, the upper end byte being padded out with zeros.

Three more FIFO memories are incorporated for system control. These are shown as ACX, ACR and BWR. The data held in ACX and ACR is used to control asynchronous transmission and reception respectively. The BWR FIFO is used for reception of asynchronous transmission write/request packets – basically low-speed control data.

The data held in the configuration registers controls the various modes of operation. Access to this is via the external microcontroller chip.

The physical layer interface is connected to the physical link chip, which provides the actual connection to the FireWire bus as described in the previous article (July). This includes access to the bus, sending and receiving data and control packets and receiving acknowledgement packets.

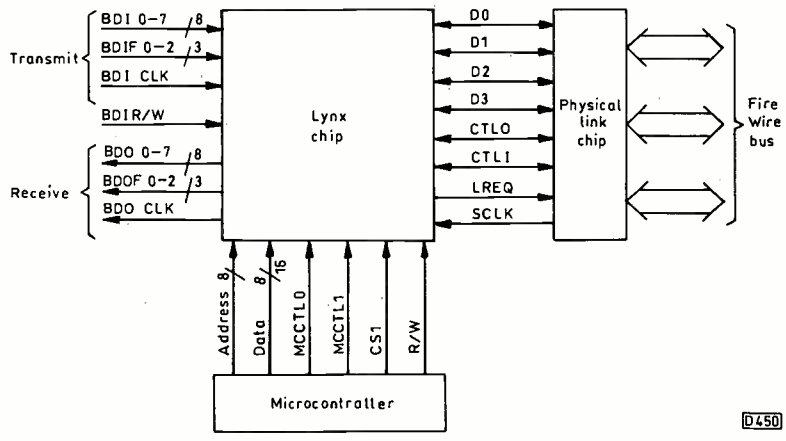


Fig. 2: Typical external connections to the MPEG-2 Lynx chip.

External Connections

Fig. 2 shows a typical Lynx chip/microcontroller chip

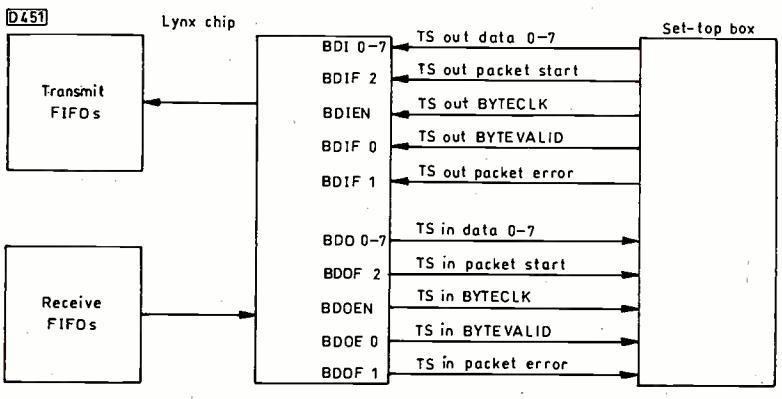


Fig. 3: Asynchronous connections between the MPEG-2 Lynx and set-top box circuitry.

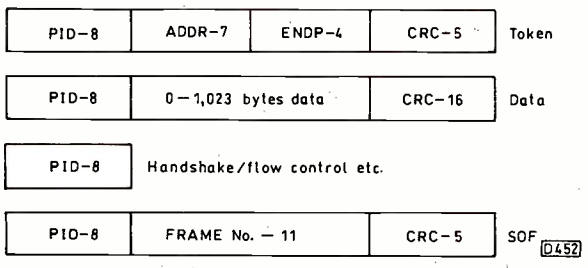


Fig. 4: The USB packet/frame arrangement. PID = packet identity; ADDR = address; CRC = cyclic redundancy check.

interconnection arrangement. At the present stage of development the TSB12LV41 can be used with TMS320AV700, 680X0 and 8051 microcontrollers. The logic states at the two lines MCSEL0 and MCSEL1 establish which device is actually present. Once this has been determined at power-up, the microcontroller input/output lines are all mapped to correspond with the external device's pin functions. When used with the Texas microcontroller, this interface is synchronised by the Lynx block clock (BClk). With the Motorola and Intel microcontrollers the interface is synchronised to the SClk provided by the physical link chip.

The CS1 and R/W lines perform conventional functions, as do the address and data buses. The BDIR/W line controls the direction of the MPEG-2/DSS data transfers. Bulky data input or output is via the eight parallel BDI (0-7) or BDO (0-7) lines, with each mode driven by the appropriate clock signal. Two groups of three lines, BDIF (0-2) and BDOF (0-2), perform the control functions listed in Table 1.

Fig. 3 shows how time-stamped (TS) asynchronous data is passed between the Lynx chip and the set-top box control circuitry, together with error-control checks and timing signals.

Fault-finding

Much basic information about the action of this complex chip can be obtained using a DC voltmeter and an oscilloscope. Of the hundred pins, eight (10, 23, 44, 48, 60, 72, 87 and 97) are connected to ground, four (15, 41, 65 and 90) are connected to the +5V supply and eight (5, 17, 32, 43, 57, 67, 81 and 92) to the +3·3V supply.

Clock signals appear at pins 66 (bus clock), 16 (bulky data output clock), 91 (bulky data input clock), 42 (system clock) and 14 (test clock). Pins 13 and 18 are provided for test data input and output data signals respectively. Pins 45, 46, 47 and 98, 99, 100 are for the BDIF and BDOF (0-2) indicators. Bulky data uses pins 1-9 and 19-22/24-27 for input and output respectively.

Apart from sixteen address bus and eight data bus lines, most of the remaining pins are used for status and system control.

The Universal Serial Bus

PC connectivity has been further enhanced by the development of the Universal Serial Bus (USB) which provides communication at data rates ranging from 1·5Mbits/sec to 1·5Mbytes/sec via a four-wire, low-capacitance cable with a maximum length of five metres. The cable contains two pairs of wires, one for power and one for signalling purposes, and is terminated by standard connectors. As with the FireWire system, USB interconnected devices are all 'hot-pluggable'.

The USB enables devices to be added in a daisy-chain fashion to provide an addressable local area network (LAN) of 127 different interconnected units, operating in a Windows-compatible fashion (the all-zero address is excluded). A USB interface can contain multiple outputs (often four), connections to these forming a mini-star network. The USB enables any device ranging from a mouse to a monitor, including serial printers, fax machines and telephones, to be connected to a PC. Since each of the external devices must contain its own USB interface, there is no longer a need to add interface cards to the PC.

Unlike the FireWire link, USB uses differential non-return-to-zero inverted (NRZI) coding. By the use of differential coding, with each line at opposite-polarity voltage, the signal amplitude is effectively doubled. This gives the system an improved signal-to-noise ratio of about 6dB in comparison with a single-ended signalling system. The coding is also more robust under noisy conditions than some other signalling codes.

The basic power supply has to provide 5V DC, with the signalling interface driven from 3·3V. The twisted-pair signal cable has a nominal line impedance of 90Ω.

Data Transfer Types

The four basic types of signal data transfer are as follows:

(1) Isochronous, for the transfer of real-time data such as voice. To avoid reproduction errors the data stream has to be delivered at a constant rate.

(2) Bulk format, used for devices that need to move large amounts of data but not necessarily in real time, the output from a scanner or printer for example. The data is transferred in bursts as and when sufficient signal bandwidth is available.

(3) Interrupt signals are used for requests for service and the delivery of data from slow devices such as a mouse or pointer.

(4) Control signals are used for bus management, initialisation and set-up. Again this involves the movement of only small amounts of data.

Packetized Format

Communication between a host PC and a USB interface can be either unidirectional or bidirectional, the data stream being organised into packets of 1msec frames as outlined in Fig. 4. Each packet is preceded by an identity code (PID). Except for the handshake byte, which carries its own error correction, each ends with a cyclic redundancy check (CRC) of appropriate length.

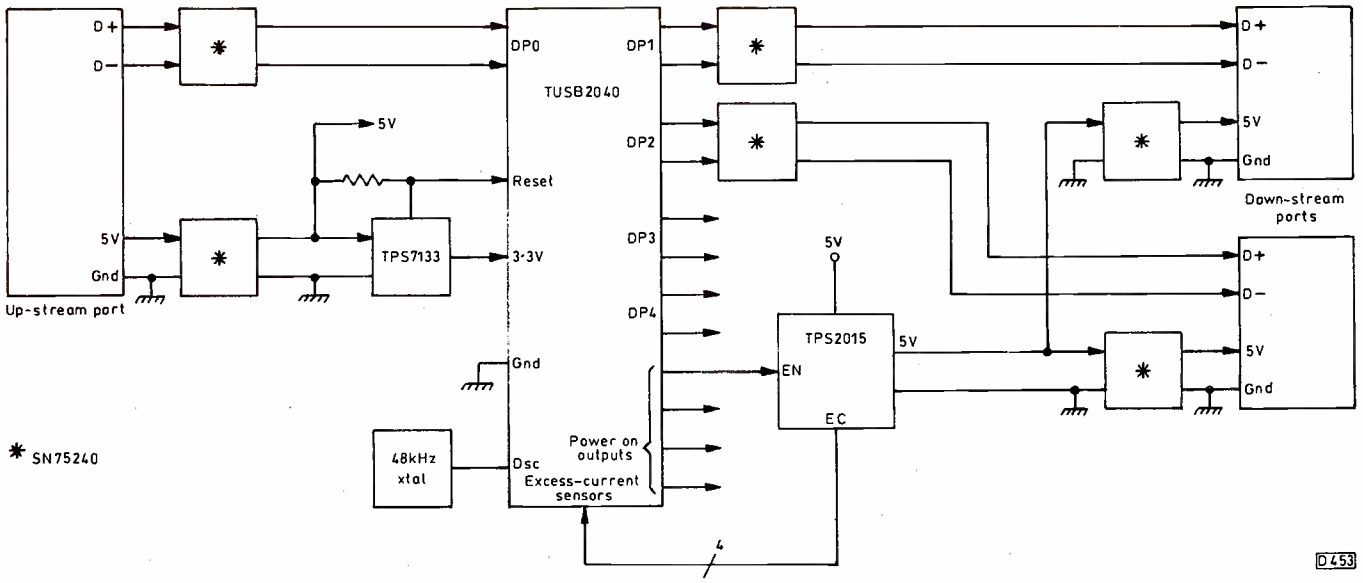


Fig. 5: Block diagram of a USB bus-powered hub interface.

The token packet can be issued only by the host PC. It consists of a PID byte, a seven-bit address group (27 = 128), a four-bit end-of-packet (ENDP) nibble and five bits of CRC. The PID byte specifies either in, out or set-up. In PIDs identify a data transfer from the addressed terminal to the host: the out and set-up groups operate in the reverse direction.

The data packets can carry an integer number of bytes from 0 to 1,023. The data in each byte leaves with the least significant bit (LSB) first.

The handshake PID is used to indicate the status of a data transfer, ready or received.

The start-of-frame (SOF) packet is issued by the host PC at 1ms intervals. The eleven bits allow up to 2,048 frames to be enumerated.

Table 1: BDIF and BDOF control.

Line status	*Meaning*
001	MPEG-2 cell
010	Isochronous packet byte
011	Asynchronous packet byte
100	BDIF reset receiver, BDOF no output data available
101	First byte of an MPEG-2 cell
110	Last byte of an isochronous packet
111	Last byte of an asynchronous packet

The USB Interface

Texas Instruments has developed two specialised chips, which are bus-powered, to carry out the majority of the interface operations. These are the TUSB2040 and TUSB2070, which can be used with either four or seven down-stream ports from a single up-stream port.

The general circuit arrangement is shown in Fig. 5, which shows how the chips can be combined with power management and electrostatic discharge (ESD) protection devices to provide a mini-star distribution hub.

Power is supplied at 5V via the up-stream port and is converted to 3·3V by the TPS7133 low drop-out voltage regulator for use by the signalling-control circuits. This IC provides up to 100mA at each output port and generates a power-good (PG) signal that produces the reset action at power-up.

The set of SN75240 chips provide ESD protection while hot-plugging. They act as transient suppressors to reduce inrush current and voltage spikes that might damage the interface and also pass through the hub and damage any terminal devices connected to the output ports.

The TPS2015 chip provides multi-port power management. It checks the supply voltage and for an excess current situation, and provides short-circuit protection for the down-stream ports.

The USB standard has provision for the connection of battery- or self-powered terminal devices. Excess-current protection for these is often provided by positive-temperature coefficient (PTC) resettable fuses, for example those in the Raychem polyswitch series. Any excess current through one of these creates a sudden rise in temperature and a corresponding large resistance increase, lowering the current. When the overload condition has passed the thermal fuse reverts to its initial low-resistance value.

What's Ahead?

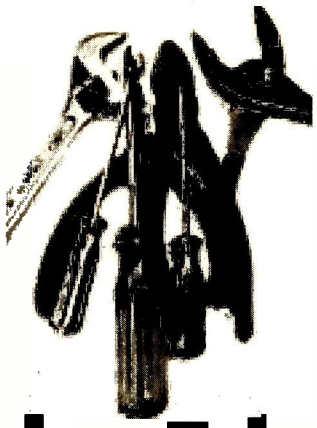
The possibility of connecting to the FireWire system optical-fibre links with data rates as high as 3·2Gbits/sec means that, with the addition of USB to handle computer communications at up to 24Mbits/sec, there's the prospect of full convergence between the PC and other equipment. It has been suggested that the PC could, within the next five years, be a sealed box with just two ports, IEEE 1394 (FireWire) and USB. The end of the need for plug-in cards with their attendant driver software problems would be a boon to many home-based computer users.

References and Acknowledgement

TSB12LV41 (MPEG-2 Lynx) Link Layer Controller, Product Preview Information, Texas Instruments Inc.

Data Transmission Design Seminar 1997, Texas Instruments Inc.

I would like to acknowledge the help provided by Colin Davies of Texas Instruments Inc. in the preparation of this article.



John Edwards' Casebook

Hinari VXL35

There were no deck functions and the red power-on LED went out a couple of seconds after switch-on. As with normal operation, the selected channel's green indicator LED remained on. There was the usual cracked print around the legs of Q02 in the power supply, but repair made no difference. Checks on the STK5332 regulator then showed that the switched output at pin 5 was at only 6V instead of 13V. A new regulator restored normal operation.

Sony KV1421

The complaint was no colour after about half an hour. I found that there was a dry-joint at the 4·43MHz crystal X352 in the colour decoder circuit.

Ferguson TX100 Chassis

The customer said that this set was dead. In fact the power supply was working but there was no line drive. It didn't take long to discover that the BC372 Darlington line driver transistor TR8 was short-circuit and its 15Ω feed resistor R143 open-circuit (note that the value of R143 varies with the type of tube fitted). I replaced these two components and, with great confidence, switched on. But there was still no line output stage operation, only the smell of R143 cooking.

I switched off and allowed the transistor and resistor to cool down. Then I disconnected the driver transformer's secondary winding and switched on again. This time there was a healthy drive waveform at the collector of TR8 and no overheating. So I concluded that the BU508A line output transistor was overloading the stage. When it was checked with a meter it claimed to be innocent. But I've been caught out before, so I checked it again with the scope component tester. Hey presto, the base-emitter waveform was that of a zener diode. In went a new BU508A, and confidence returned. My only doubt was whether the condition of the tube would have warranted the repair. Fortunately the picture was good.

Mitsubishi CT25A5STX (Euro 14SF Chassis)

Sound was OK but the picture was blanked out. When the setting of the first anode preset on the LOPT was advanced I saw that there was field collapse. It didn't take long to establish that there was no LOPT-derived 27V supply at the cathode of D553. In fact the reading from this point to chassis was just 3Ω and, not surprisingly, circuit protector Z551 (315mA) had failed.

When the small, vertically-mounted PCB that holds the TEA2031A EW correction chip IC5E1 and a few other components was removed the short-circuit had gone. So far there hadn't been any real surprises. I replaced IC5E1, refitted the small PCB and switched on. Up came the sound followed by a picture – with severe EW distortion. Adjustment of the three presets had no effect, and the new IC was very hot. I unplugged its PCB again and looked closely under the main board. There was a beauty of a dry-joint at one leg of the line scan coupling capacitor C557. I resoldered this, confident that I'd found the cause of the fault. In fact I got a bit carried away and resoldered most of the joints in the line output stage and the surrounding areas. Feeling perhaps too confident, I refitted the PCB and tried again. Once more there was sound and a picture, with EW distortion and a cooking IC.

I checked the EW modulator diodes, then every component on the EW board, but everything was OK. The only likely suspects that remained were the two coils L554/5. They didn't show any signs of distress, but I decided to order replacements. At least I'd have a couple of days' break from it!

A few days later the coils arrived. As I placed the set on the bench my mind was already wondering about other possibilities. How's that for confidence? Anyway once the coils had been fitted I obtained an almost perfect raster. A slight tweak of the three presets, which I'd disturbed, produced really excellent geometry.

Goodmans C1401R

The chap who brought this set in said it produced a lousy picture on all channels and had to be tuned in each time he switched on. In fact the tuner had very low gain: a picture could just be seen amongst the snow. In addition, when the tuner was gently tapped the picture broke up, a symptom you get with those Sony sets which have a VIF module that's prone to dry-joints. The customer's comment about the need for retuning was simply because the gain was so low he thought the set wasn't tuned to anything.

While booking the job in I was reminded by the customer how cheap tellys are to buy. So I wasn't to get "carried away" while repairing the set. From this it was obvious that the job would bring in very little money. I decided that there was no point in buying a tuner, which would leave no money for my efforts. It would have to be a labour-only job if it was to show a small profit. If I couldn't fix the tuner, or the cause of the trouble was something else, I would have to suggest that the set was beyond economic repair.

When I removed and opened up the tuner I saw that the solder joints around the edge of the PCB – they include the metal case for earthing – looked crusty. So I resoldered them, also a few suspicious joints within the tuner's circuitry. There were first-class pictures on all channels when the tuner had been refitted, and the display remained rock-steady when the tuner was tapped.

GoldStar RQ121

This mid-mount machine was dead with no power-on LED illumination or display. The customer said that "the bloke down the road" wanted £90 to fix it – "if you can do it cheaper the job's yours". The figure of £89.99 came to mind, but I said nothing. Instead, I agreed to have a look.

I didn't have the circuit diagram but, when I removed the top cover, I was delighted to see that the power supply is readily accessible. Within seconds I had removed the three securing screws and had the power supply lying alongside the machine, still linked to the main board via its 12-pin connector PL101. To provide further help, the voltages are printed alongside the connector.

The 12V and 5V supplies were missing at the relevant pins. So I followed the tracks back and came to a short-circuit 13V zener diode, ZD102. When this had been replaced the 12V supply was present. The 5V supply is produced by a three-pin 7805 regulator, IC101. It had 13V at its input pin but no output. Once a replacement had been fitted the machine was back in service. The customer was delighted to pay far less than £90.

Ferguson TX99 Chassis

There was nothing but a snowy raster. R334 (4·7Ω) in the feed between the chopper power supply and the 5V regulator on the control board was open-circuit. I've been told that this is quite a common fault, so jot it down in your book.

Hitachi CPT2178 (G6 Chassis)

The jovial chap who brought this set in explained that he was late for work. Could I have a quick look at it? He would like, if possible, to collect it on his way home that evening. He went on to explain that switch-on would sometimes require several attempts – apart from this it was a good set and he didn't want the bother of having to buy a new one.

I wasn't too concerned, because the two 82kΩ start-up resistors R902/3 cause this problem. I whipped them out and checked them. One measured over 300kΩ. "As I thought" I said, "it won't take long."

"Fine" he replied, "I'll pick it up tonight. I'm really grateful. You've come highly recommended." Then he was gone.

What a nice guy I thought as I reached for two replacement resistors. After fitting them I switched on and waited for the rustle of EHT. I was about to fill in the repair ticket when the power supply emitted a familiar high-pitched whistle, indicating line output transformer trouble. Sure enough the transformer was faulty, but at least the transistor was OK. A feeling of relief came over me when I discovered that I had a good second-hand transformer in stock.

Seeing that it wasn't a new one, I thought, I won't make a song and dance. I'll fit it free of charge for this nice young man and put it down to a public relations job. After fitting the transformer I switched on and was greeted by the crackle of EHT, followed by audio hash and a raster. Feeling much happier, I connected the aerial cable. The picture verticals were corrugated and the high-pitched squeal returned. Oh dear! It was probably only capacitor trouble, but I was getting a bit fed up. What could I charge, after giving the customer the impression that it was a simple repair taking only a few minutes to do? I gritted my teeth and started to check the electrolytics in the power supply. C905 and C910, both 4·7μF, 160V, were leaky and virtually open-circuit.

Once replacements had been fitted the job was at last complete. When he called to collect his set I told the nice young man that what had started out as an apparently simple job had in fact taken longer than expected.

"I know how you feel" he replied, still smiling, "I've had a day like that too". He then looked at the set, which I'd left on the soak-test bench. "Ah, I see you've managed to get rid of those wiggly lines around the edges of people, and that horrible squealing noise – well done!" As he spoke he withdrew a £10 note from his wallet.

Suddenly I thought this wasn't a nice young man at all. "That'll be fifty quid" I said.

He stopped smiling.

Ferguson FV30B

The customer's complaint was that this machine wouldn't timer record. Instead when the timer button was pressed, after the programming sequence had been entered, the machine went straight into the record mode – as if instant record had been selected.

I would have been baffled to know where to start without being given the additional information that no clock settings or channel information were retained when the machine was disconnected from the mains supply. Back-up battery I thought, and was correct. The 2·4V battery, mounted on the front panel assembly, was virtually flat. Once a new battery had been fitted the machine accepted and retained the clock and channel information and a timer recording was successful.

When I returned the machine to its owner I was told that it was disconnected from the mains supply every night for safety. I explained that it's designed to be left plugged in. But I had a feeling that the nods of agreement I received on leaving the house were more of courtesy than intention.

JVC AV28F1EK (JX Chassis)

The cause of intermittently reverting to standby is usually dry-joints at the pins of the L7812ABV regulator IC521. To prevent other intermittent problems developing, the L7805ABV regulator IC522, which is mounted on the same heatsink, should also be resoldered.

Monitor Repairs

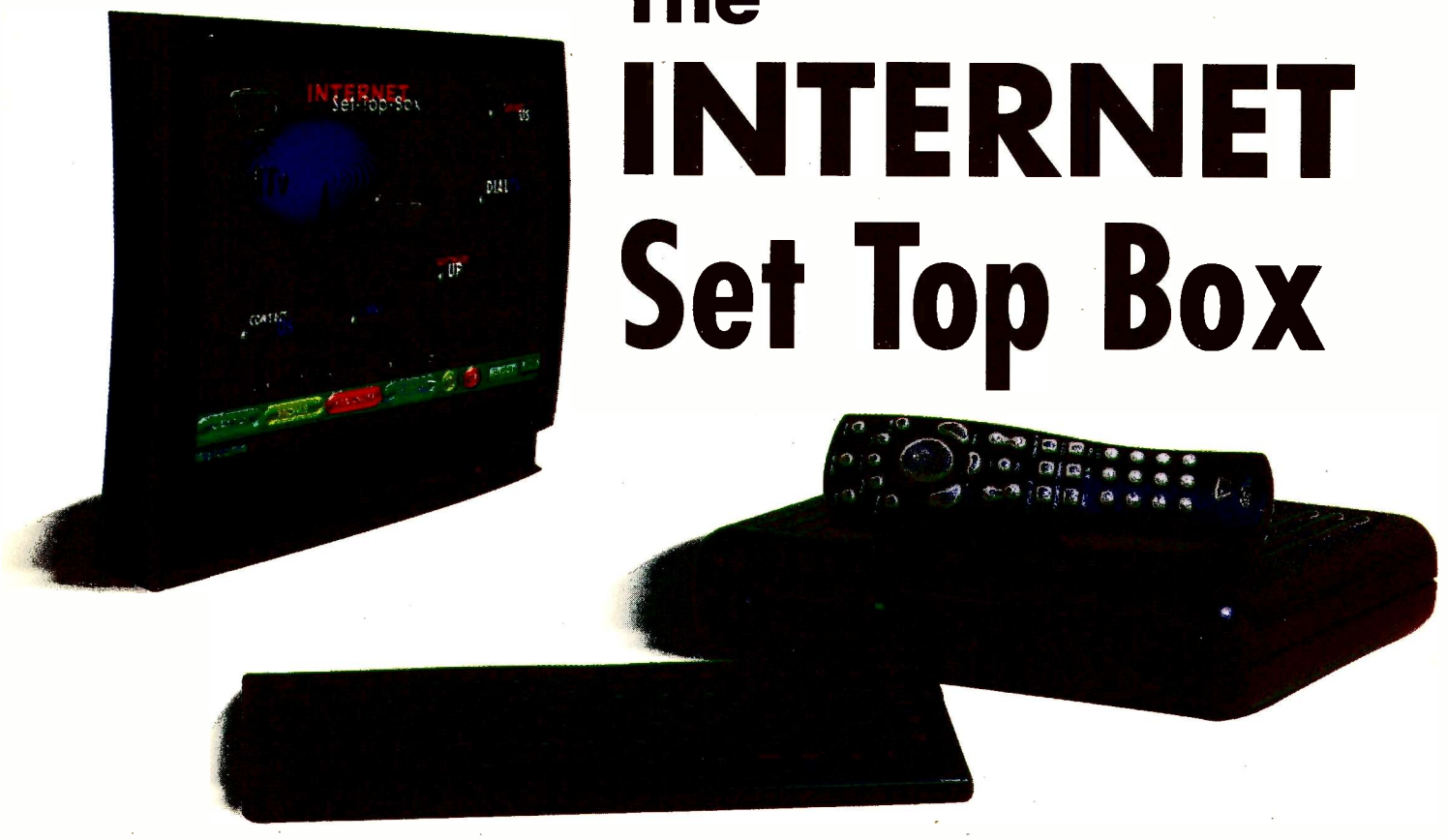
Here are a couple of recent monitor repairs I've had:

Viglen MT1428LE: Intermittent frame collapse was the complaint with this one, the cause being dry-joints at the frame deflection coil plug/socket. Resoldering put this right.

Digital PCXBV-BC: The power supply had shut down because the BU2525A line output transistor 7617 had gone short-circuit collector-to-emitter. The cause was dry-joints in and around the line driver circuitry.

Review

The INTERNET Set Top Box



Martin Pickering describes the latest consumer electronics innovation, the internet set-top box. It provides PC-less internet access with an e-mail facility

There are times when it would be helpful to be able to see into the future. Consumer electronics dealers would find it particularly helpful to know what families will want next. In this respect however you don't need to be able to look into the future: it's here now, in the form of the internet set-top box (ISTB) that's available from Satellite Scene.

The ISTB provides internet access and an e-mail facility without the need to use a computer. You simply connect it to your TV set and to a telephone line and the display comes up on the screen. It's a family-friendly system that's totally foolproof. You get your own e-mail address, and the cordless, infra-red keyboard that comes with the ISTB enables you to send e-mail messages anywhere in the world from your armchair.

Problems?

For many people the internet is an off-putting technical matter. If they have a PC they may feel that it would take hours or weeks to get the settings correct. Or maybe a new computer might be required. The ISTB is a simple solution that avoids all this hassle. It's no more difficult to use than teletext. In addition it's relatively inexpensive. The system we had for review sells at just £399, which includes a year's free internet subscription. How difficult is it to set up?

Installation

In fact it's easy. We opened the box and removed the ISTB, the keyboard, the remote-control handset, the batteries, cables and mains power supply. The batteries are fitted into the handset and the keyboard. We connected the ISTB to our TV set, using the scart cable provided, and to a telephone extension socket via the nice long lead supplied. The mains unit looks like an ordinary plug-top charger, with a thin wire to plug into the back of the ISTB.

When we switched on, the front panel lights flashed then a picture appeared on the screen. Press enter on the handset and the box dials out, connects to the internet and displays the "dialTV" home page on the screen.

From opening the box to browsing the web took less than five minutes – and there wasn't a computer technician in sight!

Comparison

How does the ISTB compare with internet access via a computer? In fact it's like using teletext rather than a computer. The handset has a nice, solid feel to it and enables you to move a pointer around the screen to select what you want to do. All very easy. Select internet and the unit dials out and makes the connection, all the while displaying little screen messages to tell you what's happening. You can use the keyboard to type in the name of any subject under the sun: the search engines will then find the information for you somewhere in the world.

The unit makes typewriter clicking noises each time a key is pressed. This feedback is reasuring. If you are sitting in your armchair ten feet from the TV set with the

keyboard on your knees it's nice to be sure that the box has recognised each key press.

You can return to the main menu by pressing quit, and can disconnect the telephone call at any time by pressing the off key.

E-mail

Apart from searching for information on the world wide web you can send and receive e-mail messages to/from almost anywhere in the world. Simply select e-mail and the ISTB will dial out, connect to the internet and wait for you to send your message. Select "new" and you will see a blank message screen. Type your message, enter a title and the e-mail address of the recipient then press "send".

You can see a list of incoming messages and replies, which you can read on the screen. No paper is involved. It's a great way to keep in touch with relatives who live far away, or for schools to contact other schools for projects or information exchange, or even for businesses that don't want to tie up expensive computer systems just for e-mail.

If you need a hard copy, you can connect a standard computer printer to the socket provided. If you find that the TV set doesn't provide sufficiently good quality, you can connect a monitor to the VGA socket provided.

What's inside?

Inside the ISTB's plastic housing there's a fully-shielded PCB assembly attached to an internal modem board. The quality of the workmanship is superb. It's nothing less than a very fast computer with a user-friendly interface. On-board memory is limited because all incoming e-mail messages remain on the ISP server until you delete them.

The internal running software can be upgraded directly from the internet. The implications of this are interesting. If you find a feature that's missing, or if some change to the internet makes the unit outdated, you simply "flash upgrade" by connecting to the internet home page. Then you have an up-to-date model once more. Don't you wish you could upgrade your car as easily?

Recording

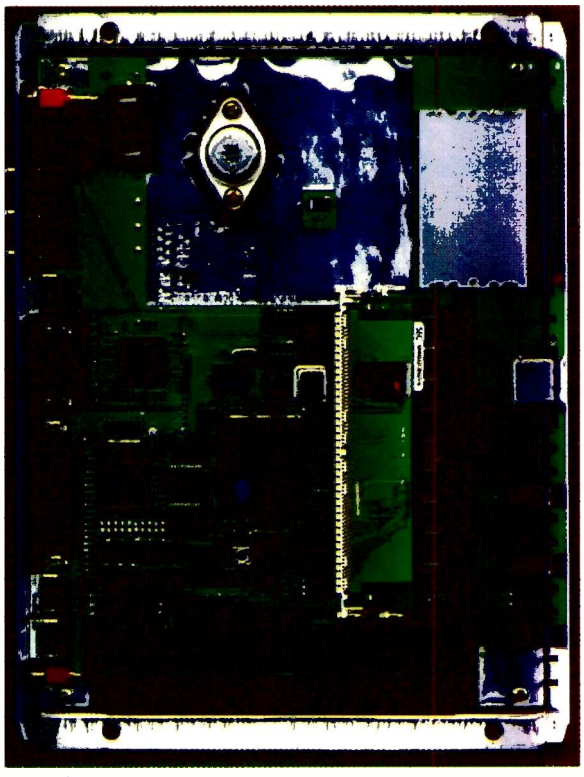
An interesting feature is the ability to use a VCR to record everything on screen. This could be used as a crude form or parental monitoring of what the children are browsing, or simply to record interesting web pages for future reference. From the retailer's point of view, it enables demonstration videos to be made to impress potential customers who want to know "what this internet thing is all about?"

We even used a VCR to capture a password that flashed on the screen for just a single frame. It consisted of about eleven numerals and letters and would have been impossible to read otherwise.

A marketing opportunity

If you are a retailer, the potential of this unit should be immediately apparent. Apart from the domestic market, hundreds of schools are buying PCs at in excess of £1,300 each. They could buy three ISTBs from you for the same price: if only internet and e-mail access are required, they will be fine for the job.

Then there's the office equipment market. A secretary/PA could send and receive e-mails without the need to tie up the main computer or a PC, leaving access to customer records, wages, databases etc. free. Those e-mails could be kept confidential if required. The unit is small enough to sit on a desk without wires trailing everywhere. It's hard to beat for the small office that doesn't have an e-mail facility yet (yes, they do still exist!).



Interior view of the ISTB.

But probably the biggest market will be all those families out there who want internet and e-mail for interactive TV.

There is endless potential, especially if you take into consideration the ISP (internet service provider) renewal at the end of twelve months and the decent mark-up offered to bona fide dealers.

Where to get it

So it's about time you had a talk with the importers, Satellite Scene. You can phone the company on 01332 812 588 (fax 01332 850 300), write to it at PO Box 5070, Derby DE74 2ZU, or send an e-mail to

satscene@netcentral.co.uk

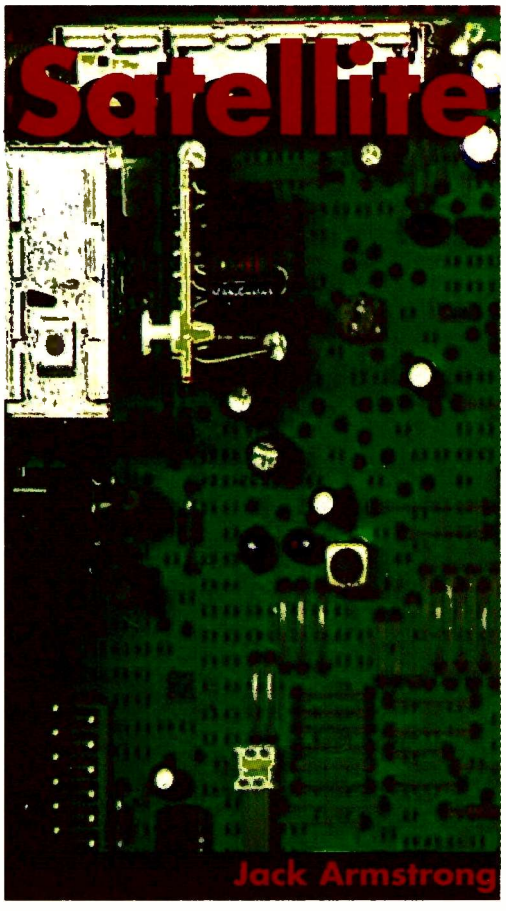
The company has a very informative web site at

www.netcentral.co.uk/satscene

Brief specification

Hardware
32-bit RISC multimedia processor
4Mb RAM expandable to 32Mb
1Mb flash ROM, expandable to 8Mb
Anti-flickering hardware for improved TV picture
33·6kbits/sec standard data/fax modem
Parallel port for printer connection

Software
Native HTML-3 compliant browser
Netscape and HMTL-3 extensions
Full frames support
Native IMAP and POP3 e-mail with up to four accounts
PAP, CHAP, TCP/IP and PPP support for password authentication



WORKSHOP

Ferguson SRD6

Nigel, our local hairdresser, brought his receiver in for repair. "Blue screen" he said, flapping his hands and looking flustered.

I suggested that this was a pigment of his imagination, because the receiver was completely dead. Maybe he'd been drinking the blue rinse?

Nigel appeared to be disgusted by my frivolity. He looked back as he went towards the door. "I need it by five. Don't want to miss Captain Kirk!"

Only the BUT11AF chopper transistor, the 1·8Ω fusible resistor and the fuse had failed. I fitted a 2·2Ω fusible resistor because that's what the circuit diagram says it is and I had this value in stock. The receiver worked perfectly.

Nokia SAT1700

The original version of the SAT1700 had a 400mAT fuse soldered into the board to protect the power supply against mains surges. It seems that Nokia bowed to public concern about the "unreliability" of this fuse, because the Mk 2 version is fitted with a 1·25AT fuse. I've never known one of these to fail – the surface-mounted items in the power supply go off like firecrackers in their haste to protect the fuse! The customers no longer complain, and seem to be happy paying me lots of money to fit "Satkit 23".

The complaint I had recently with a Mk 2 SAT1700 was not "went bang with lots of smoke" but "won't decode Sky channels". The customer was quite right, as there were no decoder messages on the screen.

I had visions of having to replace expensive (or unavailable) PTV type ICs in the decoder. But I decided to replace the 1µF electrolytic next to the PTV111 sync separator chip first, since it's known to cause problems in other models. To my delight, the replacement restored normal operation.

For my own peace of mind I replaced the fuse with one rated at 500mAT. This is an excellent compromise between the original 400mAT type and the 1·25AT fuse fitted in the 'improved' version.

Remote Control Problems

I had an interesting e-mail from David Needham recently. All was well when he installed a Pace MSS500IP until, for no apparent reason, the display went haywire and the receiver locked up – he couldn't do anything except switch off to reset. A Multilink remote control extender was in use – it worked perfectly with his old Nokia receiver.

When he asked Pace Technical about the problem he was told that this type of extender doesn't work with their receivers, which are too sensitive and pick up the extender's inherent radiation. A Handylink coaxial type extender worked satisfactorily.

Subsequently Patrick Hannon came up with the solution. There's a little potentiometer at the back of the Multilink transmitter. Turn it down until the red light at the front goes out. This cures the problem.

Tony Daly sent me an e-mail on a similar problem with an Echostar LT8700. Because of interference from an uniterruptable power supply (UPS) which he was using to protect his video/audio equipment from power surges/outrages etc., the Echostar receiver didn't respond to commands from its UHF remote control unit. When the UPS was disconnected the UHF remote control system worked normally. The LT8700 responds to an infra-red remote control unit only when the little UHF aerial that's screwed into the back is removed. He decided to use infra-red remote control instead, so that he could continue to use his UPS.

Pace PRD800

A repairer brought me this one. His customer had said it was "whistling then dead". He'd replaced C5, C7 and C8. This had got the receiver working, but there were horizontal lines across the picture on most but not all channels. Some horizontal and some vertical channels were not obviously affected. He had then spent hours replacing every other capacitor in the unit. Finally, in desperation, he brought it to me.

"Heat and cold don't affect the fault" he volunteered, "I've used a whole can of freezer."

I removed the PCB assembly and looked underneath.

"Where's the RF modulator's screening cover?" I asked.

Write me an Essay

I receive quite a few letters and e-mail communications. Provided an address is given, I reply to them all. Some are interesting and amusing – I like those – but some are simply frustrating. I have to force myself to reply to these politely.

There are the one-liners. This sort of thing: "My BTXXX123 must have a faulty crystal because it won't tune in. All I get is snow and squiggles. Thanks. J. Bloggs."

I prefer something with a friendly, informal style that tells me something about the person. It's also helpful to know of any tests that have been carried out and

the writer's level of expertise. I am hardly inspired to write a technical essay if J. Bloggs has no soldering skills or electronics knowledge. He might as well go to his local repair shop!

If you want a useful reply, tell me a little about yourself so that I can judge your level of expertise. For instance, what equipment do you have? Tell me whether the LNB supply voltage is correct, and what happens when the receiver is swapped over with a known good one.

Finally, the best way to contact me is by e-mail. "No computer" is no longer an excuse – you don't need one. You can obtain from Satellite Scene in Derby (01332 812 588) a simple internet box that plugs into your TV set and offers free internet for just £399.

Matsui RD600

Window cleaners seem to chuck in their jobs in favour of doing dish installations. A case of "have ladder, will climb" I think. I've seen some of their work, and am not impressed. Harry, my local glass polisher, has kept his business going however. I let him clean my windows more out of pity than because they need it. Anyway, last week he brought me his Matsui RD600 "to have a look at".

It's based on a Grundig chassis. Occasionally sets that use these chassis seem to kill off their special STV type chip, or damage it so that it won't pass the video from the decoder section. I thought this was the problem in the RD600 receiver, because there were no decoder messages.

The channel names were "hopping" sideways every second or so however. It looked like a sync problem, so I chased my tail for half an hour before replacing the PTV115 chip. This cured the fault. Note that it's more common for the decoder's PTV110 chip to fail. If you can't get one from a scrap panel, try Wilf at Calder Components (01924 411 089).

Harry was so happy with his receiver that he volunteered to clean my gutters – something he'd previously refused to do, even for money!

Caller Dismay

In common with many people, some months ago I bought one of those "caller display" units that show the telephone number of the person calling. I subsequently kept a mental note of the time wasters. Nearly all of them withheld their telephone numbers. So now I ignore the call whenever the display says "withheld". This saves me about half an hour a day.

Here's my definition of a time waster: someone who calls you for expert advice then spends the next twenty minutes telling you why you are wrong.

[redacted]

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.

Test Case 430

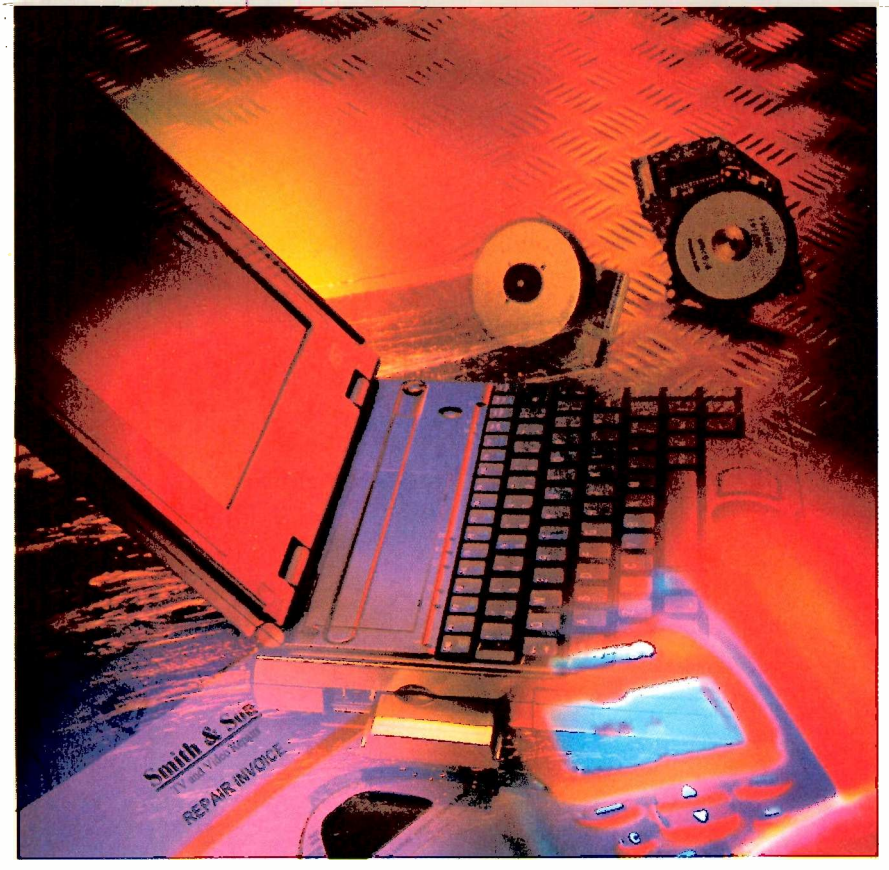
At one time a lightning storm would have relatively little effect on TV sets. If there was a direct strike that reached the aerial or the mains wiring, then yes you may have had to replace the fuse and a few other bits. The situation is now so different that the consequence of a storm in the district is a whole crop of damaged equipment, with faults that are often obscure and difficult to diagnose.

The most recent storm around here produced a dozen or so assorted casualties. A relatively modern JVC set, Model C21ET1EK, was amongst them. It didn't work at all, and its mains fuse F901 was very black inside. An ohmmeter test showed that the 2SD1545 chopper transistor Q904 was short-circuit. Not only that, it had a little burn hole in it. In addition R914 (0·33Ω), which is in series with its emitter, was open-circuit. The mains bridge rectifier BR901 seemed to have held out. It had obviously been overloaded however, so we added this and its 4·7Ω surge limiter R901 to the spare-parts order. There were no discernible problems elsewhere in the power supply or the line output stage. The rectifier diodes connected to the chopper transformer's secondary windings and the line output transistor seemed to be OK when checked with an ohmmeter.

We fitted the replacement parts carefully when they arrived. Two resistors, the bridge rectifier, the fuse and the chopper transistor. At switch-on the set worked perfectly well, though there was a little hesitation about powering up. The technicians involved didn't know this chassis particularly well, and assumed that this was a characteristic of its design. After a bit of setting up with the test-card pattern the picture was nicely centred with correct colouring. So it was sent on its way. Then we realised that while all the other storm-damaged gear had come from the Westmere and St. Peter's districts, the JVC set lived in the village of Crowdown, out of the path of the storm on that dramatic night a week before. But funny things can happen with rural electricity distribution systems, can't they?

An indication that lightning might not have been the cause of the breakdown came a week or two later, when the JVC set bounced back into the workshop. It had once again died. We were told that the failure occurred a second or two after switch-on. There had been a "grumbling" noise that culminated in a bang and a flash from within the set. This took place on a calm, sunny evening. So Zeus and his thunderbolts could not be blamed this time. Neither could the village electricity supply . . .

When we checked inside we found that the mains fuse had once more failed in a big way, while the new chopper transistor had suffered the same fate as its predecessor. Its series resistor R914 still functioned, but had gone a very funny colour. The mains bridge rectifier and its surge-limiter resistor had survived. But this time one of the transistors in the chopper transistor's switch-off circuit, Q902 (2SB744), was found to be leaky. The failed items were all re-ordered, but a question mark hung over the job which, this time, had to be done free of charge. What was really wrong with the set? If only the workshop wallies had known! For the solution, turn to page 901.



A Portable Service Database

Michael Maurice devised this portable PC/printer system for use when carrying out repairs at customers' homes

For some time I had been thinking about updating my business, in particular to keep accurate records. I have to admit that administration has not been my strong point in the past.

Most of the servicing I do is carried out at customers' premises, either homes or offices. So what I needed was a portable computer system with a portable printer. The software selected would include a dedicated program which would serve as a database.

Hardware

The hardware I chose was a Compaq Pentium laptop computer and an Olivetti JP90 printer. The computer was purchased second-hand. Laptop computers of this quality cost around £2,000 new but, like all electronic equipment, they are coming down in price. The printer was chosen after much searching and many phone calls: it's a truly portable one that can run on ten AA batteries (a holder is included), metal hydride rechargeable batteries or a nicad battery.

Batteries are not included with the printer – they are available as an optional extra. The mains adaptor that comes with it can be used to recharge the batteries. The printer is colour compatible, though a colour cartridge will have to be obtained. Something else that will have to be obtained is a centronics-to-D connector.

Software

With any computer system the most important part is the software. My laptop came preloaded with Windows 95 and Office 97. The latter is a powerful wordprocessor, spreadsheet database etc. I find the wordprocessor useful for writing reports, e.g. for insurance purposes, away from the office.

The Compaq computer has a modem that plugs into it. I have also installed Eaziview, which when used with the modem turns the computer into a Viewdata terminal. In this way suppliers' computers can be accessed to check on prices and availability, and you can order spares on the spot. But take care not to reveal your account numbers and passwords. I also suggest you keep your buying price to yourself. If you intend to return a few days later to fit the parts, it's best to ask the customer for a deposit – parts ordered can seldom be cancelled.

The Service Program

The dedicated service program is by far the most important feature of my set-up. After some searching I decided on Servicebase Lite from PC Control Systems. David Botto reported on what is now known as Servicebase Professional in the April 1994 issue of *Television*. While this program is ideal for the busy retail/rental outlet, it would not suit most small repair businesses. And it isn't cheap at about £399 + VAT.

To overcome the problem PC Control Systems devised Servicebase Lite. It doesn't have retail or rental modules, and doesn't include mail merge.

Servicebase Lite assigns to each job a new job number, and enables you to enter the customer and equipment details. It lists spares, provides an initial fault report and allows for engineer's and invoice notes. From this it will produce an invoice for you.

The program enables you to set up and manage trade accounts. It has powerful search routines: you can type in a job or invoice number, a customer's name and address, a manufacturer and product type, or a serial number.

Demo Version

A demonstration version of Servicebase Lite is available from PC Control Systems. For thirty days you can try the program out to see whether it fulfils your requirements. After thirty days it locks out and you have to purchase the full program if you want to continue using it. The demo program also locks out when thirty jobs have been logged in, though there was no mention of this in the letter that came with it. As a result I was involved in

an unexpected dash up the M1 to Nottingham on a Friday afternoon! Servicebase Lite is at the time of writing on special offer at £49 plus VAT.

Installing the demonstration version of Servicebase Lite is easy. Read the installation notes before you attempt to load it. You will have to adjust your config.sys to FILES=255, otherwise the program will not run. You may have to alter your printer configuration if you wish to be able to print. The demo version does not come with an instruction book, but the full program does. There's an excellent technical back-up department to deal with any problems you may encounter. My queries and problems (mainly to do with the printer) were sorted out quickly and efficiently.

Working with the demo version allows you to see for yourself how easy it is to use Servicebase Lite and book jobs into the system. You can keep a check on how the job is progressing, from booking it in to ordering and receiving parts then completing the work, compiling an engineer's report for the customer (if required) and producing an invoice together with collection/delivery and payment notes. You can see at a glance which jobs have been completed, which jobs have been delivered/received and any that haven't been paid for.

The Full Program

If the program impresses you – it certainly impressed me – you will want to purchase the full version. Either phone PC Control Systems or return the slip together with your payment. You will then be sent the full program discs together with an instruction book. You will also be given a serial/licence number.

If you want to keep the data on jobs booked in on the demo version, you will have to make a back-up copy before you install the full package. If you don't, this data will be lost.

After successfully installing the program you will be asked to register with PC Control Systems Ltd. by entering your details and the serial/licence number. Once this has been done you can customise the program to suit your requirements.

Servicebase Lite is a DOS program that runs either through Windows 95 or MS-DOS 3.1. Because it's a DOS program you can't use a computer mouse. This is no hardship: simply use the four arrow-keys to move around the menu.

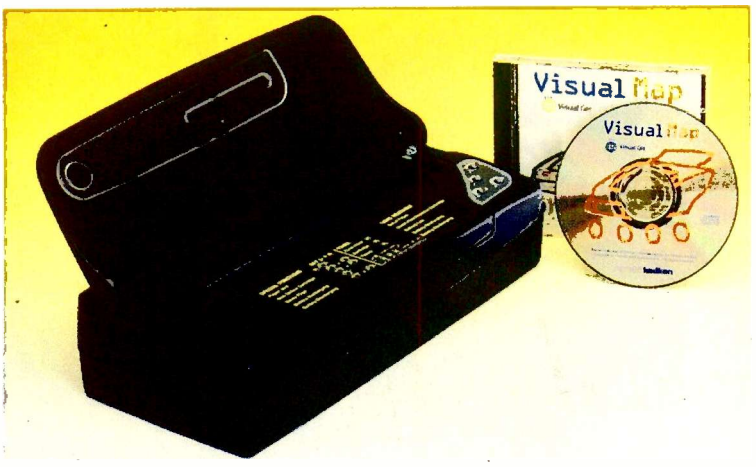
Printing

The fact that Servicebase Lite is a DOS program can cause problems with printers and the printer set-up. The program has been designed to suit four different types of printer: dot matrix, generic, laser and Panasonic. There's also a facility to turn the line feed on or off.

If you are using an inkjet printer, set the default printer to 'laser' and the LF to ON. The system works best with HP emulation printers. Other emulations such as Epson and Canon may require the parameters to be changed or may not work at all. Guess how I found out!

You can print out a receipt for a customer when taking equipment away for service, and you can print out an invoice. Your name and address head the invoice. It will show customer and product details and the method of payment, also a fault description, a list of all parts used, labour charges, a sub-total, the VAT and the final total. The result is very professional. Customers who have seen the print-out from my Olivetti JP90 have commented on this.

The VAT rate can be altered – Servicebase Lite comes with the rate set at 17·5 per cent. If you are not registered for VAT, set the rate at zero.



The Olivetti JP90 portable printer.

General Observations

One feature that I would have liked is a search by model/chassis number. This would enable you to refer to previous repairs, providing a fault database, without having to know the job number, customer name or serial number. Let's face it, you can't remember all the faults you've had!

It's worth mentioning that the software is year 2000 compliant.

The printer is used by British Gas engineers. As the ink cartridge is small, it can be used only thirty-forty times. So it's worth carrying a spare. The part no. is 278 2078 (pack of six).

Remember that under the Data Protection Act you will have to register the fact that you are using a database of this type – the Act covers any computer system that holds names and addresses. Taken literally, anyone who uses a computer with a wordprocessing package that stores names and addresses is required to register.

Acknowledgements

May thanks to Joseph Berry, sales manager, and his technical support team at PC Control Systems for their invaluable help while setting up and generally running the program, and to Lisa White, sales manager at Olivetti, who supplied me with essential information on the JP90 printer.

Sources

Servicebase Lite can be obtained from:

PC Control Systems Ltd.,
Hamilton House,
66 Palmerston Road,
Northampton NN1 5EX.
Telephone: 01604 601 677,
fax: 01604 601 676.
E-mail: pcccontrol@msn.com

The Olivetti JP90 can be obtained from computer retailers or direct from:

Olivetti Lexicon,
Featherstone Road,
Wolverton Mill,
Milton Keynes MK12 5RF.
Telephone: 01908 220 111,
fax: 01908 203 483.

Please mention *Television* when ordering from either PC Control Systems Ltd. or Olivetti Lexicon.

Letters

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

Purity

Despite many years' experience as a TLO it still surprises me how many sets are returned under the 30-day warranty period because of purity problems. Manufacturers are surely shooting themselves in the foot by not stressing to the user the importance of turning a TV set off at the mains switch or disconnecting it from the mains supply completely.

Instead, the customer gets the impression that the standby mode can be used permanently, without ever switching the TV set off. Obviously the degausing circuit then never comes into operation, and an increasing degree of screen impurity develops.

The EU is now making the point to manufacturers that power consumption in the standby mode should be reduced. This will compound the problem, as users will get the idea that the mains switch is totally unnecessary.

Mini neck (22mm) CRTs are much more susceptible to purity errors than standard neck (29mm) tubes.

Every effort should be made to tell customers to switch off the mains supply to a set whenever it's to be out of use for more than a quarter of an hour. Otherwise colour purity will not be maintained.

Denis G. Mott,
NEI, Leeds.

The Grundig G1000 Chassis

I very much enjoy reading Don Bullock's What a Life! column. In the August issue he mentions finding that the efficiency diode (D304) in a set fitted with the Grundig G1000 chassis was short-circuit. To get the set going he fitted a BY127 as a replacement, but he didn't tell us whether he left the diode there or replaced it with the correct BY133. A BY127 is a standard mains rectifier, not the fast-recovery type normally used in this position. The set might work for a while with a BY127, but the diode is almost certain to fail prematurely.

E.M. Beddow,
Milton Keynes.

Tap Changers

What a delight it was to read Pete Roberts' comprehensive article on the power supply system (July issue). In the section on tap changing however he says that to avoid short-circuiting the windings the contacts must be of the break-before-make type. This is only partly true.

Automatic tap changers have a contact arrangement that works as follows. The main contact breaks from the old tap, leaving a minor contact with a series resistor still carrying the load. A second minor contact with series resistor then connects the new tap. At this point the load is supplied by both minor contacts: the windings between the two taps are to some extent short-circuited, but the two resistors limit the current. The first minor contact next breaks, and the main contact makes with the new tap. This sequence takes about fifty milliseconds, or two and a half cycles, to complete.

I have obtained this information from the ABB Components web site. There are many variations on the theme: some use non-linear resistors, others use additional windings.

Of interest to TV enthusiasts is a new electronic tap changer design rated at 16·5kV, 50MVA. It uses thyristors that are triggered by infra-red pulses supplied via optical cables. These units can respond to either under- or over-voltage conditions within one cycle, and control each phase separately.

Alan C. Pickwick, M.Sc., FRAS.,
Sale, Cheshire.

South African Scene

I found Colin Knight's article (June issue) on servicing in South Africa most interesting. In the paragraph relating to a Tedelex set however he mentions a "2SC5028" line output transistor, and says there would be "no chance" of obtaining a replacement. I have to point out that this transistor type is not listed for any of our model ranges.

Tedelex has been in the audio, TV, VCR, microwave and appliance industry in South Africa for over fifty years, supporting Blaupunkt, Sony and other major brands. The company's Cape Town factory has been in operation since the start of TV transmissions here in 1975.

Spares are not a problem. We aim to give excellent customer service!

Jack Osher,
Tedelex Service Division.
Fax no. 27 11 683 3004.

Radio Hams

It's always a pleasure when a camel train arrives with my copy of *Television*. The last one brought me the June-August issues. In this rather remote part of the Middle East, with the nearest tarmac road 100km away, terrestrial television is not an option. TV has been available only since satellite transmissions started. But you need a man-sized dish rather than the puny dustbin-lid type used in the UK.

So I go to the Satellite Notebook and Satellite Workshop columns first. Imagine my shock when Jack Armstrong jumped out of his column in the June issue to kick me where it hurts – in his reference to "dabblers".

I'm a dabbler and admit it. From being a TV engineer/technician in the UK I now dabble in fibre optics, microwaves, VHF/UHF repeaters, PMR, digital telephone

switching, data, solar power, battery plant and whatever else it needs to keep the job going. Now, with the advent of SDH technology, I'm having to get to grips with using a laptop computer for servicing rather than the Avo/Simpson multimeter of the past. But I'm still a dabbler.

My change in life's direction came about partly through my hobby of amateur radio. I would guess that a fair proportion of TV engineers have had some interest in amateur radio at some stage in their past. The City and Guilds Radio Amateur exam is no great problem for the average TV engineer. I took mine in 1966. Electronic basics don't change, whatever the subject.

This introduced me to work on transmitters. The era was just arriving when you could buy a transmitter, but for anyone on a TV engineer's wages this was out of the question – you had to build your own. But the experience gives you an invaluable understanding of how things work. It's not only the building but trying, sometimes in great frustration, to persuade the thing to work. The same applied to any test equipment required. Digital electronics had to be learnt the hard way!

The final result of all this was that seventeen years ago, in 1981, I ended up in what had previously been a hobby plus sideline – looking after PMR equipment as a full-time job, overseas.

Jack Armstrong should have thought about it a little more before deriding "Geoff" and his fellow dabblers. In one way Geoff may be generating extra business, though man-made faults are often the worst ones to have to deal with.

My regards to former Rediffusion colleagues who are still around and holding-off from pushing up the daisies.

Bob Wilkinson, TMIIE(elec), MSCTE, G3VVT,
Dhahran.

The Minoka MK1498N

In the August TV Fault Finding column A.J. Roberts mentioned a dead MK1498N, the cause of the fault being on the digital daughter board. Over the past year I've had two of these sets (1498N and 1498T types) that presented the same symptoms and readings. In each case a permanent repair was carried out by resoldering pins 27-32 of IC703 on this board.

Recently another of these sets came along. This time the fault was intermittent field collapse. Again the cause was dry-joints on the daughter board and resoldering IC703 cured the trouble. It seems that this chip suffers from dry-joints. I intend to resolder it every time one of these sets comes in for repair.

Gerald O'Brien,
Burnley, Lancs.

I've had two of the 21in. versions of this chassis. They both exhibited exactly the same symptoms described in the August TV Fault Finding section. These sets provide very good picture quality and good sound and teletext at a very good price. They are therefore worth fixing.

Reports on the internet suggest that dry-joints develop on the digital daughter board. My experience confirms this. After much resoldering in the first set, I discovered that there was a faulty earth connection at IC703. Because of this there was approximately 3V on the reset line. Many functions were inhibited, as there was no line drive – the supplies for the field output and sound stages, the tuner etc. are derived from the line output stage. The cause of the dry-joints appears to be poorly cleaned component leads and jumpers. Some of the jumpers lie under the ICs and provide earthing to ground planes. I used a separate link to earth the IC and adjoining components, and all has been well since.

The rest of the chassis is remarkably robust. It seems to be a case of a good product being spoilt for a 'ha'p'orth of tar'.

Alan Short,
London.

Editorial note: We understand that the Akura technical line mentioned in our original report is no longer available.

Back Injury

My previous lawyers are now being sued for negligence regarding my TV trade back injury case against Radio Rentals (Thorn).

The last letter from me published in *Television* has started the ball rolling again, with letters from those injured, wanting advice and asking for copies of the Robens Institute Report on why you should not lift a TV set unaided. I can supply a copy of this report for £5 plus a large stamped, addressed envelope.

Thanks to all who have written. Don't be afraid to speak up if you are asked to lift sets alone. The law is on your side if there is any threat of the sack or victimisation.

The Robens report is dynamite for the TV trade. The danger to your spine cannot be emphasised enough.

Harry Todd, 12 Oakhurst Close, Snaresbrook, London E17 3PZ.

Painting Dishes

In the May issue Hugh Allison brought up the subject of painting satellite dishes. I've had some experience of this.

The first occasion was when a black mesh dish had to be fitted on a white-rendered chimney and the owner asked if it could be painted. I tried car primer white and noted no noticeable losses. The customer was advised to coat the dish with matt varnish, but I don't know whether he did.

Another customer had a legal problem about installing a dish and wanted it painted to hide it from view. I decided to check with our local friendly car spares shop, where I was offered a German-made, lead-free matt-finish spray paint called Belton deco-spray. The UK supplier is Auto-k-Paint, Peter Kwasry Ltd., Daventry, Northants NN11 5QJ. It's available in most colours. This paint was tried on a dish which was then tested and found to be OK. But it didn't solve the legal problem!

I have also tried a transparent dish face, which I bought at a rally and fitted to an old Amstrad dish in place of the white-coated face. This worked for four years without any problems. Then the signals became weak. The dish face had focused the sun's rays on to the LNB, whose cover had melted.

I have sprayed a 48cm dish with car white primer only. It continues to give sparklie-free pictures in the Midlands area.

These have been my dish painting experiences to date.

Pete Haylor, Billesley Satellite, Billesley, Birmingham.

Mesh satellite dish painted white to match a rendered chimney stack. See letter from Pete Haylor.

Testing Polarisers

Pete Haylor, G6DRN, has developed a couple of simple circuits for testing magnetic and mechanical satellite signal polarisers

In an article in the August 1997 issue of *Television* I presented a portable, battery-operated motorised-dish tester design. It seemed logical to follow up with modules for testing magnetic and mechanical polarisers. These are the subject of the present article. They can be added to the original unit singly or together.

Each module is self-contained, with a separate on/off switch. This saves battery power when the module is not in use.

Magnetic Polariser Module

Fig. 1 shows the circuit of the magnetic polariser test module. The circuit is very simple and the original was built on Veroboard. It was designed for use with a polariser that takes 50mA. VR1 provides adjustment if required. SW1 is the on/off switch while SW2 alters the polarisation.

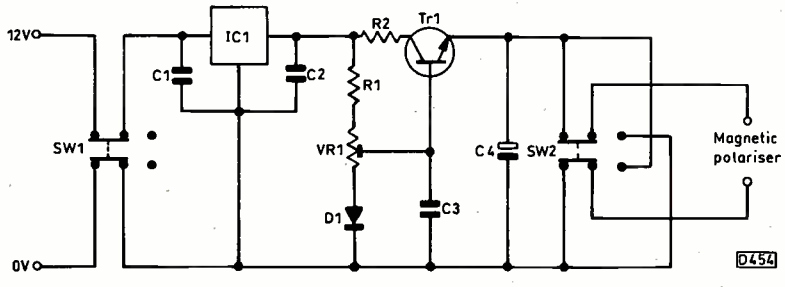


Fig. 1: Circuit diagram of the magnetic polariser test module.

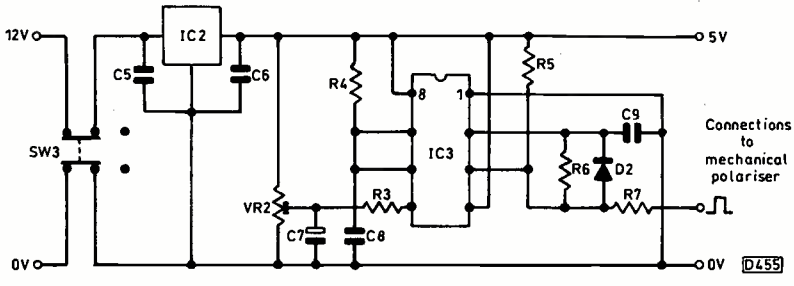


Fig. 2: Circuit diagram of the mechanical polariser test module.

The components required can be obtained as a kit from MODE Components (see later) – ask for kit ref. BILSAT1. If you want to obtain the components individually yourself, you will require access to Farnell or CPC for some of them. The transistor is a general-purpose npn power type – any similar device will do.

Mechanical Polariser Module

Mechanical polarisers, which use a servo motor to rotate the position of the signal pick-up probe, are more troublesome and less common. They require a pulse drive. Fig. 2 shows the circuit of the mechanical polariser test module. IC3 is used to generate the pulses – VR2 sets the pulse width.

The components required can again be obtained from MODE Components (kit ref. BILSAT2). There are two points to note. IC3 must be type LMC555: this is the CMOS type, and is used because of its low current consumption. The on/off switch SW3 is a biased-off switch. It will enable the polariser to stop when you want it to. The original was built on Veroboard.

Development was done using an old Echostar polariser. Movement was a little jerky, but as the module is used for only short periods while testing or setting up a dish this doesn't matter.

General Points

While the original modules were built on Veroboard, the simple circuitry means that production of PCBs would not be difficult. Figs. 3 and 4 show suggested layouts. The switches are not soldered to the board, being connected by short wires instead. This makes installation easier than using a PCB switch, and dry-joints are less

likely to develop. You could fit knobs to the small variable resistors, but this would be only for the sake of appearance.

If the 12V supply is derived from the original circuit, take it from across battery B2, not across the two batteries – the regulators would get very hot if they had to drop the excess voltage.

MODE Components is moving from the present address at Unit 19, 60 Regent Place, Birmingham B1 3NJ, but post and orders will be forwarded. The company's phone number is 0121 551 4191. Kit BILSAT1 costs £5.46, kit BILSAT2 £6. These prices include post and packing

Parts list

C1-3	10nF	R1	220Ω
C4	10µF, 25V	R2	100Ω
C5-6	10nF	R3	1kΩ
C7	50µF, 25V	R4	5·6kΩ
C8-9	220nF	R5	1kΩ
		R6	120kΩ
D1-2	1N4148	R7	100Ω
		All 0·25W	
IC1	8V, 1A reg.		
IC1	5V, 1A reg.	Tr1	BD243 or similar
IC3	LMC555 timer		
VR1-2	25kΩ linear, Farnell 614-129		
SW1-2	DPDT Farnell 273-363		
SW3	DPDT (biased) Farnell 607-435		

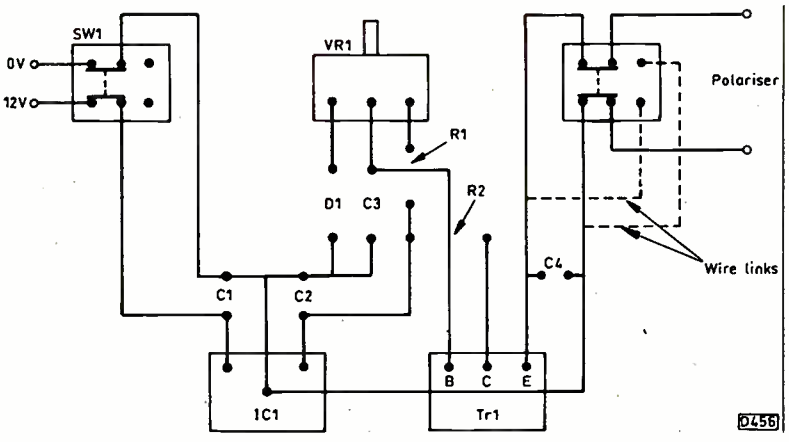


Fig. 3: Suggested PCB layout, print side, for the magnetic polariser module – not to scale.

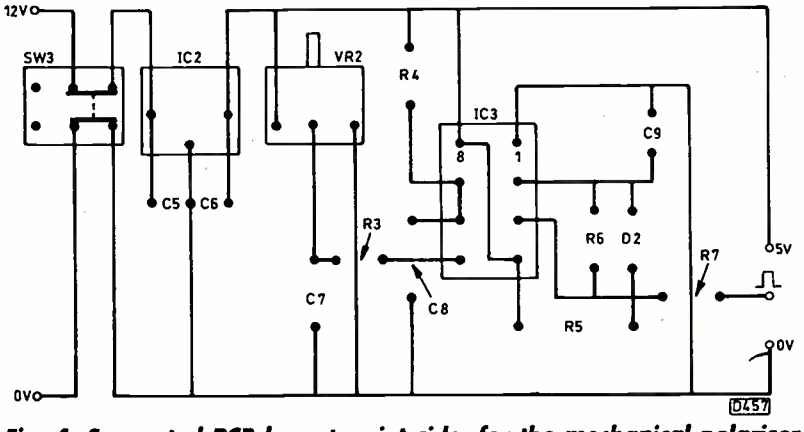


Fig. 4: Suggested PCB layout, print side, for the mechanical polariser module – not to scale.

Servicing Books

Newnes Service Engineer's Pocket Book, by Geoff Lewis and Ian Sinclair, published by Butterworth-Heinemann, Linacre House, Jordan Hill, Oxford OX2 8DP at £14.99. 300 pages, 190 x 90mm.

This is an ambitious project: to cover TV, video, satellite, audio and radio servicing within the confines of a modestly sized pocket book. So the question is how well have the authors succeeded in their task? The answer is surprisingly well. They have the benefit of considerable experience, both practical and in compiling clear technical information.

You won't find specific information on particular models: that's not the intention. What you so often need, with the current complex technology, is explanations of how systems work. The book provides this. It also provides sound guidance on basic fault-finding procedures, workshop practice and so on. Such subjects as safety may appear to be a bit dull, but you could be sorry if you don't have appropriate information to hand.

There's a great deal of handy reference material – basic units and formulae, equations, dB measurements etc. Workshop organisation and test equipment receive appropriate coverage. Information on the operation of most basic circuits is included. In fact there's good general treatment of all relevant topics, going as far as TV distribution systems.

A great deal of useful information has been squeezed into the pages of this book, making it a worthwhile addition to the workshop bookshelf.

Servicing Satellite TV Equipment, by Nick Beer, published by Butterworth-Heinemann, Linacre House, Jordan Hill, Oxford OX2 8DP. 224 large (234 x 156mm) pages, £30.

This new book fills a gap in the range of servicing publications available. The format is the same as that used by the well-known VCR (Steve Beeching), CD Player (Ken Clements), TV and Video (Eugene Trundle) and Audio/hi-fi (same author) servicing guides. It's a worthy addition to the series, providing an expert introduction to all aspects of satellite equipment servicing. The fault-finding coverage includes not only receivers but dishes, depolarisers, actuators and positioners and so on.

Receiver circuitry is dealt with section by section, with well-chosen circuit diagrams to provide practical examples. There's a particularly interesting and helpful section on decoders and descramblers. Digital satellite TV is briefly but adequately covered, since we've yet to get experience of the problems that may arise in practice.

Nick's practical know-how is evident in the section on repair techniques, which amongst other things provides guidance on dealing with dry-joints, liquid spillage and surface-mounted components; on the anti-static precautions necessary with certain types of devices; and on the use of variacs, bulbs and dummy loads.

There's a useful appendix that lists manufacturers and spares/equipment suppliers' addresses. In all it's a helpful, well thought-out and nicely presented publication.

Simple CCTV Monitor Conversion

Keith Cummins describes how to go about converting an old monochrome portable for use as a CCTV monitor

Small monochrome portable TV sets that are past their sell-by date can often be easily adapted for monitor use in a CCTV system. The simple modification described in this article involves fitting a switch to select TV or monitor operation and the provision of a 75Ω BNC socket to accept a standard 1V peak-to-peak positive-going video input.

Power Supply

Most older monochrome portables incorporate a transformer that isolates the chassis from the AC mains supply. This is an essential feature if a set is to be converted to monitor use. So, before you do anything else, check that the set has a mains transformer that provides isolation.

Portable TV sets can often be run from 12V DC as well as the AC mains supply. Since the small camera modules currently available also require a 12V supply, this makes it possible to assemble a mobile camera/monitor combination at minimal cost.

The Video Signal

Fig. 1 shows a typical video detector arrangement. The video and intercarrier outputs are developed across the load resistor R, the chassis side of which is biased positively to set the operating point for the following stages, which frequently employ DC coupling. There is usually a buffer stage followed by the output transistor.

As a typical video detector provides about 1V peak-to-peak of positive-going video, it's possible to break the circuit at this point and connect the raw output from a video camera here.

The tube is generally driven by a negative-going video signal at its cathode. So the video output transistor will require positive-going video at its base. If you don't have a circuit diagram, find the video output transistor by tracing the circuit back from the tube's cathode lead. Then, using a scope to observe the video polarity, amplitude and DC level, check back from the base of the video output transistor to the earlier stages. Without a circuit diagram, you may find it necessary to remove screening plates to follow the circuit. Note that the break point chosen for insertion of the signal from the camera must precede the take-off to the sync separator stage.

Having broken the circuit, check whether you've upset the biasing. If everything is OK, insert some components – see Fig. 2 – to feed in the camera signal and prove that the modification works. If all is well, a permanent modification can be implemented.

Differences between receiver designs may introduce complications, but the general arrangement outlined above should suit most sets. A circuit diagram is helpful – it will save time and increase confidence – but is not essential: a scope serves as a very effective means of discovering what's going on stage by stage.

There are two main possible snags in the video section, as follows:

(1) In breaking the circuit you may upset the video biasing arrangement. It may be necessary to add a potential divider across the main 11/12V rail and chassis as a new source of bias.

(2) If the video signal is negative-going at the only suitable break in the circuit, you may need to invert the signal from the camera. A suitable unity-gain inverter stage is shown in Fig. 3.

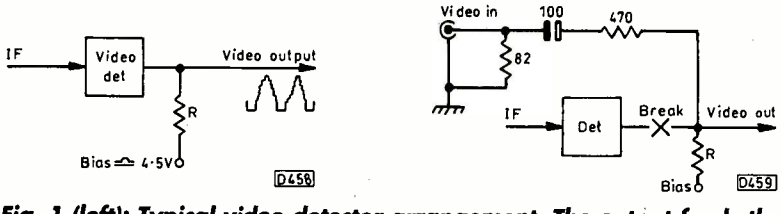


Fig. 1 (left): Typical video detector arrangement. The output feeds the video, sync and intercarrier sound circuits. Fig. 2 (right): Monitor test

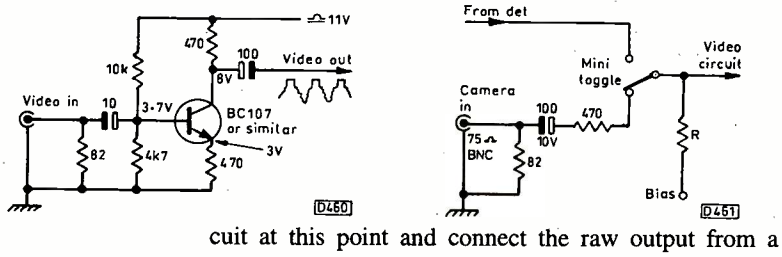


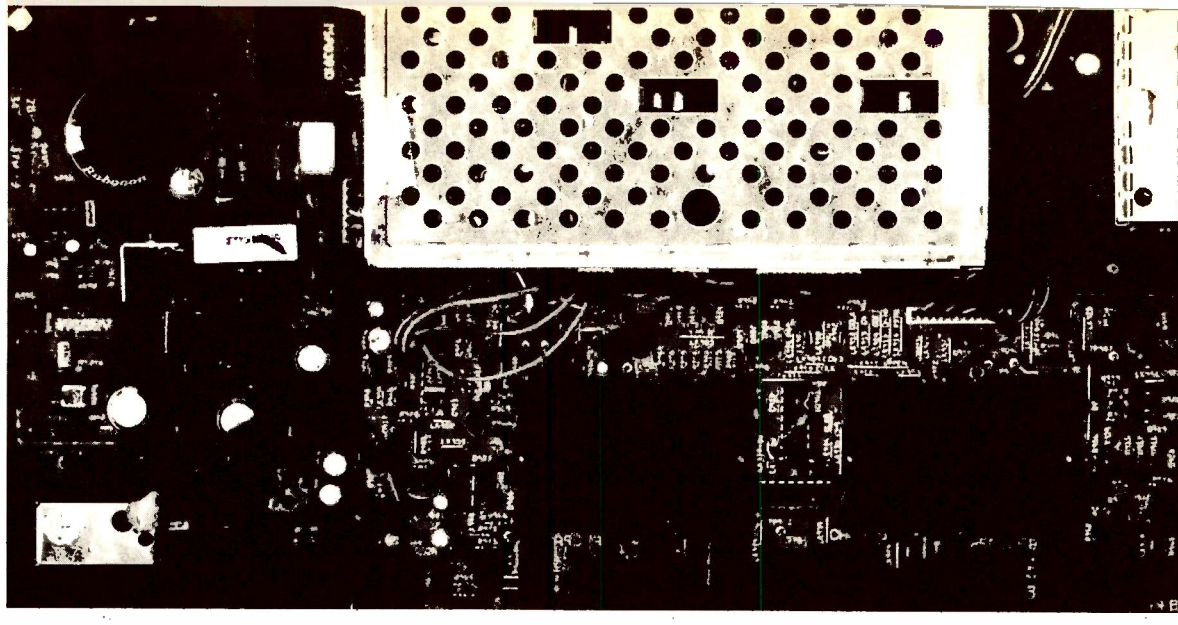
Fig. 3 (left): Suitable unity-gain inverting amplifier. Fig. 4 (right): Typical practical modification.

Practical Implementation

Many small TV sets have a pair of loop-aerial terminals in addition to the usual coaxial aerial feeder socket. You can remove these terminals and enlarge the vacated holes to accommodate the TV/video switch and the BNC socket. It's then just a matter of wiring, after which the job is done. The basic circuit is shown in Fig. 4.

The use of unscreened leads to the switch will minimise the stray capacitance present and any video response degradation. If the set is to be used exclusively as a monitor, the switch can be dispensed with.

Finally, if the set is fitted with a two-core mains lead it's advisable to fit a three-core lead instead, using the third wire to earth the chassis. This will provide solid BNC socket earthing, and safety will no longer depend on the transformer isolation alone.



Satellite Notebook

Reports from Hugh Cocks Pete Gurney, LCGI and Nick Beer

Feedhorn Problem

The owner of a Pace MSS100 receiver connected to a 1·2m prime-focus dish was having problems with sparklies on some channels. In this part of the world (Portugal) there are pronounced differences in the signal levels from the four analogue Astra satellites. 1B's horizontal channels are worst – they include UK Gold and Sky Sports 3. The vertical channels (CNN, Disney, VH1, Sports 1 and History) have always been strong. Later in the evening the horizontal channels become even weaker for a few hours, as the satellite footprint wobbles slightly.

After peaking the dish alignment – it had been fractionally off beam – UK Gold and Sky Sports 3 were on the edge of sparklies during an afternoon with a clear sky. An LNB change didn't help much. What was left?

I noticed that the prime-focus scalar feedhorn was an unusual type, with a relatively wide-bore tube – approximately 25mm. Most 11-12GHz feed tubes are less than this, 20mm being nearer the mark. If the tube is too wide the signal doesn't propagate down it very well and can even start to rotate, causing interference to signals of the opposite polarity.

The fact that the scalar feed rings were flush with the front of the tube, and were non-adjustable, probably made matters worse. With some feedhorns the rings are movable, locked in place with a grub screw. Best results are usually obtained with the rings a few mm back from the front of the tube.

I was familiar with the type of dish and its focal point. The feedhorn was in the correct position. It's usually best for the focal point to be about 5mm inside the front of the tube, about where the scalar rings normally sit. The scalar rings even out the imbalance between the electrical and magnetic components of the signal as it enters the round feed tube – it's best to consider the rings as a signal matching device.

I replaced the feedhorn with a prime-focus type made by IRTE. This produced a dramatic difference, curing the problem. It usually comes with a plastic polariser device in the tube. Remove this before installation, using a pair of long-nosed pliers. Otherwise strange effects will be seen – it's included to depolarise circularly-polarised signals.

To prevent humidity build-up I make a small hole at the bottom of the plastic cover at the front of the tube. Humidity can lead to the formation of aluminium oxide inside the tube, with a dramatic reduction in signal levels.

A good way to check for signal strength in the living room without recourse to a meter is to go to the receiver's tuning menu and note the higher frequency at which white sparklies appear – this is usually the same point at which the graphics begin to jitter slightly. Repeat the procedure at the low-frequency side, where black sparklies appear. With a Pace receiver there should be at least 10MHz where the graphics hold steady and not a sparklie is seen. The centre tuning position is of course the middle between the two frequencies. This is a useful test where dodgy cable is suspected of causing poor reception on some channels and you don't have a spectrum analyser to hand.

Dish alignment should always be done with a meter. You can do it with a TV set, noting the points where the graphics become jittery, but I'm not recommending this as an installation method. **H.C.**

LNB Trouble

A recent digital installation gave me a headache. The analogue signals were fine, but the digital ones were very poor – despite the fact that the receiver's installation signal-strength meter said the signal was good. This is normally just an AGC reading however.

The Nokia receiver concerned has a small bar on the front panel display, alongside the name of the received station, to indicate digital signal 'goodness'. The bar was barely elevated, which means very poor incoming signals.

No amount of LNB internal cover tightening (see September issue, pages 772-3) helped. Don't overdo this, as the screws may break! There were good signals once a new LNB had been installed. **H.C.**

Pace PRD and MSS Series

With these receivers there is always a very tight fit between the UHF modulator's RF output connector and the coaxial lead to the TV set. While this is all to the good from the RF performance point of view, impatient owners who want to disconnect the lead don't always see it that way! Several receivers in which the connector has been wrenched out of the back panel have come our way recently: the socket's PCB connection gets broken off in the process. More often the body of the coaxial lead connector parts company with its

moulding when the owner decides to start a tug-of-war with the unfortunate piece of equipment. We're seeing more of this problem now, as these receivers have been around long enough for owners to move them about when decorating, moving house, etc.

Rather than try to solder a connector back in place, I prefer to fit a coaxial lead through the hole used by the socket and terminate it outside. There is then nothing for the frustrated owner to wrench out. Lead length is not too critical: I use about 30cm. To reduce strain on the lead's soldered connection to the PCB, I apply a small amount of hot glue where the lead exits from the box.

The aerial input socket isn't quite such a tight fit, and rarely gives way when unplugging the lead. **H.C.**

Pace PSR800 Plus Sound Problems

This model is a non-decoder PRD800 Plus, with 199 channels. It's quite a rarity in the UK, but the following fault note could apply to any PRD series model: for ease of reference I've used PRD component reference numbers.

The receiver came to us, from a dealer farther down the coast, with a no-sound complaint. Could we fit a new UHF modulator sound coil (L7)? I suspect that the dealer had twiddled the coil and destroyed the ferrite screw slot, but he won't admit to this! The receiver had apparently never been used – the look of the PCB confirmed this.

I fitted a replacement coil from a scrap panel. Care is required when you remove L7 from a panel: the legs are very fragile, and easily part company with the body if excessive heat and force are used. When the coil was adjusted – gently – there was excellent sound and vision from the modulator. I reinstalled the PCB in the receiver's case and put the cover on. Time for a final test.

The picture was OK, but the audio output from either the scart socket or the modulator consisted of hiss. A tap on the case restored the sound briefly. Then all channels suddenly displayed the QVC German home-shopping programme, with just a hiss for sound!

Time to look inside again. At least the PCB's plastic securing rivets came out easily – they'd not suffered from being heated in use. The fault came and went when the board was flexed. But there were no signs of any hairline cracks. It began to dawn on me why this receiver had never been used!

I carried out a scope check, while bending the board, to see what happened to the 4MHz reference signal that should be present at pin 1 of the sound chip U11. Not an easy task! This established that when the fault was present there was no 4MHz signal here. There was no 4MHz signal at pin 12 of the Nicky chip U9 either. These inputs both come from Q98. It's connected to pin 2 of the microcontroller chip U2, where the 4MHz crystal is also connected. Once I'd got to Q98 the cause of the fault was obvious: its base connection had never been soldered to the PCB – the contact area was bare copper, having never been tinned!

Normal operation was obtained when this connection had been soldered. **H.C.**

Pace MSS200

There was no decoding and no "please insert card" message. The first thing to do is to check the contrast setting, which was OK. So there was clearly a decoder problem. As none of the decoder chips are available, there's not a lot you can do in this situation. I decided to check the sync pulse outputs from IC U302, line sync at pin 12 and field sync at pin 15. These must both be present for the decoder to work. As they were missing I checked at the ceramic resonator X301 (pin 17), which provides the reference signal for the phase-locked loop. This signal was also missing. A replacement resonator restored the decoding. **P.G.**

Pace SRD800

This receiver wouldn't decode the scrambled channels but was otherwise OK. I checked the AD and DA converters by linking test point TS2 to chassis while a clear channel was being received. If all's well, the picture should remain. It did.

So the cause of the problem was somewhere in the digital section, for which parts are not available. Before giving up I decided to check the supply voltages. Some odd readings around U28 and U25 suggested that a 5V supply was missing. But it took me some time to find the cause.

The supply was correct at L20, which is at the front of the PCB and sometimes goes open-circuit. It had vanished when I checked at L24, which supplies the on-screen graphics chip. I eventually discovered that C257, a 1,000µF capacitor at the front of the panel, between LEDs 3 and 4, had leaked a small amount of electrolyte that had rotted away a plated feedthrough (between the top and bottom side of the PCB) for the 5V supply. **P.G.**

Pace PRD Series

I've recently had a number of these receivers with complaints such as weak/no signals, whistles (time dependent) and taking ages to come on. The cause of the latter symptom will be well-known to anyone with experience of these receivers – the two 10µF electrolytic capacitors C7 and C8 and the 22µF one C5 on the primary side of the power supply. These capacitors are often the cause of power supply failure. They are now causing other symptoms as the voltages on the secondary side of the power supply rise because of poor regulation. For example the 13V LNB supply can be nearer 18V: the result is incorrect polarisation! The whistles also come from the primary side of the power supply.

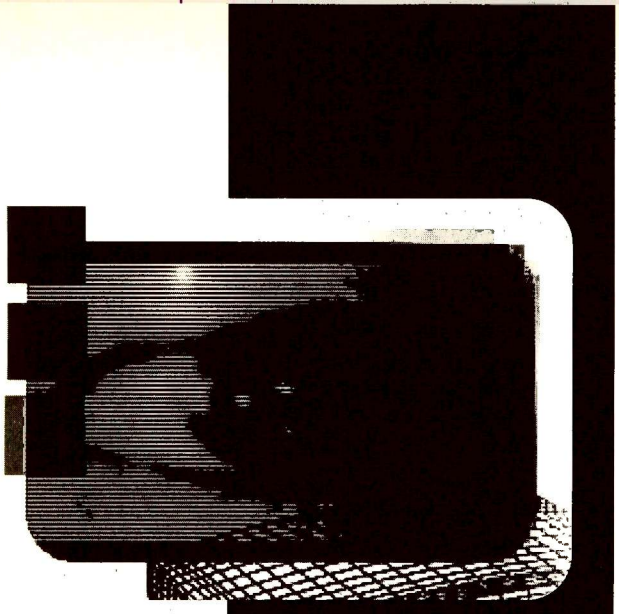
These capacitors are replaced when you fit a repair kit to get a blown-up power supply working. But note that they can also be responsible for these non-destructive faults. I was amazed to come across a number of receivers in which the original electrolytics were still present – I didn't think there could still be any out there!

It's sensible to replace the reservoir electrolytics on the secondary side of the circuit as well when one of these receivers comes in for repair. They are now causing many problems, as several contributors to these pages have mentioned. **N.B.**

Pace MSS200

The sound and vision and the menus were fine, but the receiver wouldn't decode VideoCrypt transmissions. There were no messages ("please insert card" etc.), and in addition the on-screen graphics present over vision (as opposed to the menus) floated gently from left to right and from top to bottom, i.e. they were not synchronised.

The output from the energy-dispersal clamp seemed to be awry, but no specific fault could be found here. When I bypassed the VideoCrypt section the OSGs were synchronised. The PTV110 chip U8 in the decoder was faulty. I was able to obtain a replacement from a scrap machine. **N.B.**



TV Fault Finding

Reports from
Philip Blundell, AMIIEelec
Maurice Kerry
Giles Pilbrow
Pete Gurney, LCGI
David Smith
C.J. Guy and
Michael Maurice

Philips CP110 Chassis

If the set appears to be dead but the mains fuse and the BUT11AF chopper transistor are both OK, one possibility is that the mains bridge rectifier's reservoir capacitor C2656 (150µF) is open-circuit. If the voltage across C2656 is in the region of 215V DC, its capacitance is certainly very low.

For an intermittently dead power supply, the chopper transformer could be going open-circuit intermittently. **P.B.**

Sharp 37AM12H

Poor picture and sound were the complaints with this colour portable. When I tried the set I got the impression that there was an IF fault – there was a rushing noise on the sound and the colour was noisy. When retuning was tried the tuning menu was found to be locked.

As the only 37AM12 I'd seen previously had an NVM (non-volatile memory) fault, I selected the service mode and checked the AGC and AFC settings. They were both set to FF. I don't know what the recommended settings are (the manual doesn't say), but maximum didn't seem likely! Setting them at half way improved the results, so a new pre-programmed NVM (part no. CH-IX1463CJHC) was fitted. Once the tuning, the picture geometry and grey-scale had been set up all was well. **P.B.**

Toshiba 140R4B

If one of these sets refuses to come out of standby, check resistors R811 (100kΩ) and R812 (120kΩ). They tend to go open-circuit. **P.B.**

Ferguson ICC7 Chassis

If there's a Venetian-blind effect of horizontal lines superimposed on top of the picture, the electrolytic capacitors in the IF module are suspect. In one case recently C123 (4·7µF) produced a low-capacitance reading when it was removed and checked with a bridge. To be sure of a lasting cure I replaced all five electrolytics in the module. **P.B.**

Bush 2857NTX

The symptoms were no sound then, after a short time, the set shut down – as when there's no signal. A check at pin 29 of IC601 showed that the amplitude of the ident signal was low at 4V. The cause was C135 (0·02µF) which had a 130kΩ leak. When a replacement capacitor had been fitted the ident signal rose to 8V and the set worked normally. **M.K.**

Mitsubishi CT28AV1BD (EE3 Chassis)

After about a minute the picture had crushed whites. When a grey-scale from the pattern generator was tuned in only the first few bars up from black could be seen: the rest were white. A scope check showed that the video waveform was clipped above the dark-grey bar. This could be observed at pin 20 of the scart socket.

When I looked at the circuit diagram I saw that this ruled out the CRT drive and colour decoder/timebase generator ICs, as the video signal first goes to the switching chip IC202: this feeds the scart socket and the colour decoder chip. IC202's supply was found to be low because the collector of the 8V regulator transistor Q952 was dry-jointed. Resoldering this cured the fault. The set used the modified arrangement with a larger transistor in the Q952 position, mounted on a heatsink in the centre of the main board. **M.K.**

Sharp DV5161H (4BSA Chassis)

When this set had warmed up there was field foldover and a bright raster with flyback lines. After a short while a rattle was heard from the LOPT, followed by collapse of the raster from the sides to a squiggle, then shut-down.

A scope check at pin 12 of the jungle chip IC801 showed that the line drive started to break up when the raster did, suggesting that IC801 might be faulty. But the cause of the trouble was the fact that the 26V supply was low at 19V. When the 26V rectifier D501 (DX0511BM) had been replaced the voltage was correct and the set worked normally. The low supply voltage had obviously upset the operation of IC801. **M.K.**

Sanyo C25EG95 (EC3-A25 Chassis)

Patterning in the background, similar to cross-modulation, can be caused by interference on the brightness control line. On several occasions I've found that C211 (0·01µF) wasn't fitted, though there's a position for it on the PCB. This capacitor decouples the brightness control line at pin 17 of the IF/colour decoder/timebase generator chip IC101. **M.K.**

Onwa K9228

This set wouldn't switch to standby properly: a bright raster was left. The cause was Q903, which failed

to turn off the HT switching transistor Q902. When I get this problem I replace both Q903 (2SA1013) and Q902 (2SD1545).

Another standby fault involves Q904 (2SD1015) and Q906 (2SD804) in the 27V supply to the sound section. The symptom is hum from the speaker in the standby mode. It's not always noticed in the workshop. **M.K.**

Sony KVX2562U (AE2 Chassis)

The message "teletext not available" appeared when text was selected. In addition the on-screen displays and menu screens were shifted to the right. Resistor R38 (750kΩ) on the text (V) PCB was found to be open-circuit. **G.P.**

Hitachi C1714T

There was no on-screen display because the field pulse at pin 27 of the microcontroller chip was incorrect. It's derived from the sandcastle pulse, which was found to be of excessive amplitude and wrongly shaped because D703 in the line output stage was open-circuit. **G.P.**

Sony KVG2915U (AE2B Chassis)

There was an intermittent rushing noise on satellite sound. The cause was traced to a dry-joint at crystal X3001 on the satellite (S) PCB. **G.P.**

Sharp DV5132H

At switch on a bright white raster appeared. This was followed by shut down. I found that there was no 200V HT supply at the CRT base panel. The cause was traced to a 100pF ceramic capacitor (C857) which had developed leakage. As a result the safety resistor R632 had gone open-circuit. **G.P.**

Sony AE2 Chassis

This set would occasionally shut down. Just before it went off, the picture became a broken up mass of lines while the LEDs at the front of the set would flash thirteen times. This indicates that there's a field protection problem. The cause of the trouble was found to be dry-joints at the field output chip IC1501. **G.P.**

Toshiba 218D9B

The cause of poor field linearity – the raster was stretched at the top – was capacitor C303 (2·2μF). It's mounted very close to the hot-running field output IC, and had developed leakage despite being a high-temperature type. I also replaced C313 and C317. **G.P.**

Hitachi C2114T

At switch on the EHT could be hear to come up. Then the set returned to standby. These sets have field protection that puts the set in standby if a short is detected across the 27V rail. The cause of the problem was the TA8427K field output chip IC601. **G.P.**

Philips GR1-AX Chassis

The chopper FET Tr7610 had gone short-circuit. In addition the two 1Ω resistors R3616 and R3680 that are connected in series with it had, as usual, failed. Replacing these items didn't restore the set to life however: the 10V zener diode D6610 in the FET's drive circuit was leaky, though it read OK. **G.P.**

Ferguson C51N (ICC8 Chassis)

The cause of no colour turned out to be a defective switch (SE50) on the text board. It looks like a preset potentiometer, and is accessible through a small hole in the back of the cabinet. **G.P.**

Toshiba 2140TB (C4 Chassis)

This set appeared to be stuck in standby. The power supply was working, but there was no line drive. A large, 52-pin chip, IC501 (TDA8361), carries out all the video/chroma processing and generates the timebase drive signals. When I checked this chip I found little at any of its pins. There are two supplies. One is derived from the line output stage. The other, at pin 36, comes from the chopper circuit via the 9V regulator transistor Q870. This obviously has to do its job for the set to get going.

Q870's base voltage is set by the 10V zener diode D878. There is also a shunt transistor here, Q871, to switch the regulator on and off. The zener diode had failed, with the result that Q870's emitter voltage was just 1·2V instead of almost 9V. **P.G.**

JVC C14E1

This 14in. portable, which is fitted with an Onwa chassis, refused to power up. At switch on the relay chattered for a second or two then the set shut down. A check to see if there was a short-circuit across the secondary side of the relay cleared this possibility, but the reading at the input side was 500Ω.

There is not much to check here. I soon found that C402 (4·7nF) in the snubber network across the HT rectifier D905 had become resistive. It's rated at 500V. I fitted a more substantial capacitor rated at 2kV.

When servicing these sets make sure that, in the interests of HT stability and safety, the power supply and over-voltage trip upgrades have been carried out. Refer to the February and September 1998 issues for further details. **P.G.**

Philips GR1-AX Chassis

"Half a picture" was the complaint with this set, and the effect was indeed quite strange. The scan appeared to start about half way across the screen and wrap round, so that what should have been the centre of the scan just started on the left-hand side.

A few scope checks around the TDA8305 chip IC7020, which contains the timebase generator circuits, showed that the line section of the sandcastle pulse was missing at R3529. The input to this resistor is routed around the outer edge of the PCB. There was a hairline crack in the print at the corner – I suspect that the side of the set had been knocked. A small wire link cured the problem. **P.G.**

Sanyo CBP2180A (A5 Chassis)

The customer said this set was dead. In fact it reverted to standby about five seconds after switching on. Suspecting a protection fault, I checked the voltage at pin 19 of the main microcontroller chip IC701. My initial thoughts were confirmed by the fact that there was only 2·9V here instead of 5V. The voltage at this pin can be pulled down by either over-voltage protection or the absence of any of the numerous supply lines.

Checks in the power supply before the set tripped produced largely correct readings, the HT voltage being spot on. Five seconds is not much time to look for missing voltages so, having proved that the cause of the trouble wasn't excessive voltages, I decided to disconnect the HT feed to the line output transformer (pin 3) and connect a lamp here as a load. This will prevent mishaps in the line output stage and show whether the power supply will run stably under load. To enable the power supply to operate, short-circuit the base of the standby switching transistor Q570 to its emitter.

When this had been done all the

supplies except the 12V at the front panel assembly were found to be correct. The latter was at only 2·5V. The source of this is the 78M12 regulator IC552 which had failed, producing an output of only 3V. **P.G.**

Panasonic TX2112 (U5N Chassis)

Intermittent loss of the picture, sound OK was the complaint. It was an extremely intermittent fault – the set would work for days or weeks then fail. The slightest tap would then restore the picture. The fault couldn't be instigated by tapping or freezing: it had to occur spontaneously.

The set had received previous attention for the fault, and virtually the whole of the signal panel had been resoldered to no avail. When the fault occurred, gently removing the back generally cleared it without providing any chance for measurements to be made.

Eventually the fault lasted just long enough for voltage readings to be carried out on the timebase board. This showed that some of the line output transformer-derived LT supplies were very low or missing. Scope checks then revealed that the cause of the trouble was high-resistance joints between the through-board rivets to which the line output transformer's pins are soldered and the print. The soldered joints looked perfect when examined using a magnifying glass, with the rivets soundly fitted in the print. But the scope showed AC at some pins and nothing at the print. The problem was cured by cleaning the print and complete resoldering. **P.G.**

Granada C51EZ5

This set produced a white raster with flyback lines. Routine checls on the supply line voltages failed to reveal anything amiss. So the CRT base panel was examined with a magnifying glass. I found minute hairline cracks in the print to the first anode connector and in the print that connects R6 to R24. Repairing them restored the picture. **D.S.**

Nikkai Baby 10

A new type switching regulator was fitted. They are very efficient and produce less heat. But when the set was switched on there was an almighty screeching racket. The cause of the problem was the RF choke in the regulator, with the tin screening plate acting as a diaphragm. All was well when the choke was relocated away from the plate. **D.S.**

Waltham 1410

If the picture is dark and lacks width, replace R812 (150kΩ, 0·5W). **D.S.**

ITT CP3126 (Monoprint B/MN Chassis)

The cause of no sound was eventually traced to the 470µF Philips electrolytic capacitor C304 which is connected to pin 5 of the TDA8196 audio control chip IC301. It had gone short-circuit. I was helped by the little LM386 outboard amplifier I use for audio hunting! **D.S.**

Bush 2059NTX

Although the HT supply was present this set remained dead. The cause was soon traced to R919 (0·68Ω) which was open-circuit, removing the LT supplies. It appeared to be intact, with no burn marks. The usual power supply upgrade to this Onwa chassis was carried out. **D.S.**

Tatung TN1901 (190 Chassis)

Incorrect operation of the front panel controls with this set, and others I've come across, was cured by replacing the HD401220A02S microcontroller chip IC702. The Tatung part no. is 19-8315-6. **D.S.**

GoldStar CI14A80

This set reverted to standby a few seconds after being switched on. It seemed that the microcontroller chip was sulking because the EEPROM chip wouldn't talk to it. A new 24C04 EEPROM cured the problem, after retuning and resetting the PP values – this set doesn't need a preprogrammed EEPROM. **C.J.G.**

Sharp DV51083 (D3000 Chassis)

Tripping, which was at first intermittent, was caused by C715 (2,200µF, 16V). It's one of the LT reservoir capacitors on the secondary side of the chopper power supply. Oddly its ESR was OK. It was just low at about 50µF. **C.J.G.**

Ferguson ICC7 Chassis

There was no blue in the display. Unusually, RT66 (1kΩ) which is in series with the tube's blue cathode had become open-circuit. **C.J.G.**

Bush 2020 etc (Indiana 100 Chassis)

As these sets age it's becoming quite common for customers to complain that the picture takes a long time to appear. This is caused by the tube's emission being too low for the auto grey-scale circuit to operate. The cure is to fit a 100kΩ resistor between the 'Auto' and 12V pins on the CRT base panel. The picture is then as good as ever. **C.J.G.**

Ferguson ICC5 Chassis

Loss of blue drive was caused by failure of the TEA5040 video processor chip IV21. Earlier sets need to be modified when IV21 is replaced. Details of the modification come with chips obtained from Willow Vale. **C.J.G.**

Sony AE1A Chassis

When I first went to repair this set I got the impression that someone had been playing with it. The EHT cable was not located properly, and other parts of the wiring looms had been left lying about rather than being tied up as they should be. The convergence, width and EW settings were also out.

As none of the controls would adjust the width and EW correction, I replaced the TEA2031A EW driver chip IC1501 (on board J1) and set up the picture.

A couple of weeks later the customer complained that the set went off intermittently. A check on the HT voltage revealed that it was alarmingly high – 175V instead of 135V. The cause was R522 (100kΩ) in the HT sensing circuit. It had risen in value to about 140kΩ. After replacing R522 and resetting the picture parameters the set worked normally. **M.M.**

Philips Anubis A Chassis

There was no audio output from this 17in. portable. It was in permanent mute because the BC848 transistor Tr7156 was leaky. A replacement restored the sound. **M.M.**

Nokia N Chassis

The picture varied in size and the degree of EW distortion depending on picture content. Turning down the contrast and/or brightness had the same effect. As a first step I checked the HT voltage, which was stable and correct at 150V. I then replaced the MC44000 digital jungle chip IF01. This made no difference. I checked and double-checked all the relevant outputs from, and feedback lines to, this chip.

Finally I did what I should have done at the beginning: I removed

and checked all the capacitors and diodes in the line output stage. Ch04 (27nF) turned out to be open-circuit. A replacement put things right.

The set was actually a **Finlandia** Model C51JZ2. **M.M.**

Matsui 1496

Apart from the buzz from the degaussing coils at switch on this set was dead. The 5N90 chopper FET Q101 was leaky source-to-drain, and the surge limiter resistor R101 (4·7Ω) was open-circuit. The power supply uses the well-known TDA4605 chopper control chip. It always pays to check the high-value resistors around this IC. In this case R109 (330kΩ) was open-circuit while R108 (220kΩ) read 270kΩ. When R101, R108, R109, IC101 (TDA4605) and Q101 had been replaced the set came back to life. **M.M.**

Daewoo DMQ2057

This set, which came to me via another dealer, had a bright, smeary picture. He had turned down the setting of the first anode control but this had made little difference. Pity he hadn't checked the 190V supply to the RGB output stages on the CRT's base panel – it was low at 46V. The reservoir capacitor C426 (3·3µF, 250V) was the culprit – there was brown stuff oozing from its legs. A replacement restored normal pictures – after resetting the A1 control. **M.M.**

ITT ST38767

The customer's first complaint was about field bounce and intermittent loss of colour. I resoldered some dry-joints at the 5V regulator: this cured the field bounce, but didn't cure the very intermittent loss of colour.

Some time later the customer reported that there was sound but no picture. After some chip swapping (they are mounted in sockets) I discovered that the cause was the TPU2732 teletext processor chip. This item and the 17·734475MHz crystal were replaced, but there was then no colour.

The service manual explains how to use the remote control unit to make adjustments, but the original one wasn't available – the customer was using a Philex type. By experimentation I was able to discover which button is used to select the chroma phase and, more importantly, how to store new settings. Once this had been done there were no further problems. **M.M.**

Sony KV27XRTU (SX Chassis)

A rental engineer doing a bit of work on the side told the customer that there had been a burn-up and that a new power supply was required. A chopper transformer burn-up is not unknown in these sets, but is very uncommon. When I called I found that there had been no burn-up. In fact if the 135V connector was unplugged the power supply ran with a light bulb as the load. The faulty item was the line output transformer. Once a replacement had been fitted the set came back to life. Incidentally the power supply PCB is not longer available from Sony. **M.M.**

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/for disposal: Require camcorder viewfinders, colour or black-and-white, working or not, for student project. Have for disposal a large quantity of TTL and memory chips – cal for lists/prices. Mike Goddard, Sarnia, Cemetery Road, Rhos, Wrexham LL14 2BY. 01978 843 547.

Manuals for sale: Ferguson FV10, FV11 FV13, FV14, FV21, FV26, FV30, 3V24, 3V29, 3V30, 3V32, 3V42, 3V44, 3V48 and 3V59. All complete and in very good condition. Also manuals for the Ferguson TX10, TX100 and TX90 chassis and various Philips manuals. All priced at £3 each plus postage. David Forfar, 65 Ormskirk Road, Old Skelmersdale, Lancs WN8 8TR. 01695 735 132.

Wanted/for disposal: Require mains transformer for the Pye 691/693 chassis; power supply for the Saisho VR1600/Hinari VXL4 VCR; power supply for the Akai VS5EK VCR; power supply for the JVC HRD750EK VCR; complete loading assembly for the ITT VR3906UK VCR; complete working chassis for the Hitachi Model C2558TN TV with Fastex and Nicam sound, also remote control unit; complete working chassis for the Dynatron 26 7475SK/05T teletext TV, also remote control unit. Have for disposal many Sony C7 and C5 VCRs for parts or repair, some complete; reel-to-reel tape recorders in various states; Philips G8 TV with spares; Decca 140 chassis CTV; box of Thorn 3000 chassis panels; Sony C20 and spare machine working; two NEI PVC744E VCRs; two JVC HR3660 VCRs; three Baird 8922 VCRs; an Hitachi VT33E VCR for spares only; three working VHS VCRs; many late TV panels etc. List available. Offers please. Buyers collect. Many 405-line LOPTs and old TV valves available. Philip Gay, 80A Milton Brow, Weston-Super-Mare, North Somerset BS22 8DE.

Wanted: Circuit diagram for the Bush Model 1500A with PCV 190-921303-03 – it's completely different from the -01 version shown in the service manual, with 42-pin ICs MN152451GWA and AN5601K and an AN5633 24-pin chip. Alternatively the pin connections for these ICs would help. There's an intermittent colour saturation fault. Laurie Watkinson, Telesonic, Week St. Mary, Holsworthy, Devon EX22 6UJ. 01288 341 254.

Wanted: Service manual or circuit diagram (photocopy OK) for the Sharp PC6641 notebook computer. A. Neilson, 23 Lydgate Road, Droylsden, Manchester. 0161 285 1984.

Wanted/for sale: Require a LOPT for the Fair T302 computer monitor, part no. TLF052-01-01, 2Y25, or a scrap set. Have for sale or exchange for computer hardware 112 copies of *Television* 1985-96 plus manuals and books £130; Muter BMR95 CRT analyzer/reactivator £440; Hameg HM303-4 scope £240. David Smith, 12 Rufus Gardens, Totton, Southampton SO40 8TA. 01703 870 051.

Wanted: Apologies to everyone who tried to contact me about a head motor for a Panasonic NVHD100B and a power supply for the Ferguson FV71LV. We have had to change our phone number. Please contact Andrew Osbourne on 01777 839 252.

Wanted: Circuit diagram or service manual (photocopy OK) for the AST Vision monitor Model 5LA. M. Sharpley, Hi Tech Services, 4 Leighton Road, Old Trafford, Manchester M16 9NX. 01706 621 015.

For disposal: We have inherited 25 volumes of *Newnes Radio and Television Servicing* dating back to 1959 – and a single-standard 405-line Decca TV set that works! For sentimental reasons we don't want to throw them out. So they are offered free to any enthusiast who will collect them from us in Birmingham. Anyone interested should call Richard Flowerday on 0121 426 1555 (fax 0121 426 4052).

Wanted/for sale: Require complete working power supply for the Panasonic Model NVFS1 VCR, a circuit diagram for the Sony Model KV2096UB and front flaps for the Ferguson FV33H and 14L2 (black). Have for sale or exchange a Gould OS300 20MHz dual-trace scope with leads and operating instructions, a Farnell LT30 power supply and a Marconi oscillator. Dave Elmer, Duo-Sat Satellite Services, Cliff Drive, Mudeford, Christchurch BH23 4EP. 01202 475 316 or 01425 274 104.

For sale: *Television* issues from Dec 1969 to Dec 1986, 199 copies total. Offers please. J.M. Ainscoe, 49 Lon Ceredigion, Pwllheli, Gwynedd, N. Wales LL53 5PP. 01758 613 790.

Wanted: MAA4002-3 microcontroller chip for the Salora K chassis. Arthur Hopkinson, 6 Swan Close, Dunholme, Lincoln LN2 3SB. 01673 860 990.

Wanted: Circuit diagram and operating instructions for the Sony triple-standard Model KV1434M3. H.S. Jeetley, 75 Hamsteadhall Road, Handsworth Wood, Birmingham B20 1HU. 0121 523 8992.

Wanted: Source of servicing information/spares for the Protech PRO 10 10in. 12/240V colour TV set. A.D. Spooner, 201 Thetford Road, Brandon, Suffolk IP27 0DG. 01842 814 160.

Wanted: LCD doe the Avo Model HSN DA116 – it's a 32-pin device with no identification no. Also a meter movement for a Megger insulation tester cat. no. 40050. A.J. Davenport, Edif. Cazorla, 5C Calle San Pedro, Los Boliches, 29640 Fuengirola, Malaga, Spain.

Wanted: Power supply/distribution board for the Panasonic NVMS50B

continued on page 883

TRANSISTORS/LINEAR ICs

Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
BC107	8p	BD434	30p	BU126	65p	BUV48AF	325p	MJ4502	300p
BC108	8p	BD435	31p	BU128	125p	BUV48C	250p	MJ10012	300p
BC109	8p	BD436	30p	BU133	125p	BUV50	425p	MJ11015	250p
BC109C	10p	BD437	28p	BU137	150p	BUV61	1000p	MJ11016	300p
BC140	20p	BD438	36p	BU180	100p	BUV70	200p	MJ11032	800p
BC142	20p	BD439	40p	BU184	100p	BUV90	175p	MJ11033	800p
BC143	20p	BD440	40p	BU204	65p	BUV93	375p	MJ15003	250p
BC147	8p	BD441	40p	BU205	70p	BUW11A	200p	MJ15004	300p
BC149	8p	BD533	50p	BU206	100p	BUW11AF	225p	MJ15015	250p
BC159	8p	BD534	38p	BU207	150p	BUW12	125p	MJ15016	350p
BC160	30p	BD535	38p	BU208	70p	BUW12A	150p	MJ15022	400p
BC171	10p	BD536	38p	BU208A	75p	BUW12F	250p	MJ15023	400p
BC172	10p	BD537	40p	BU208AT	200p	BUW13A	200p	MJ15024	400p
BC177	14p	BD538	40p	BU208B	200p	BUW32A	500p	MJ15025	700p
BC178	14p	BD643	50p	BU208D	130p	BUW48	550p	MJE340	25p
BC179	14p	BD645	50p	BU209	90p	BUW49	550p	MJE350	80p
BC182	7p	BD647	50p	BU225	120p	BUW50	400p	MJE520	30p
BC182L	7p	BD649	50p	BU226	120p	BUW81A	150p	MJE2955T	65p
BC183	7p	BD675	40p	BU312	90p	BUW84	75p	MJE3055T	65p
BC183L	7p	BD676	40p	BU325	55p	BUW85	85p	MJE13004	100p
BC184	7p	BD677	38p	BU326A	75p	BUX10	150p	MJE13005	60p
BC184L	7p	BD678	40p	BU406	60p	BUX11	200p	MJE13007	100p
BC212	7p	BD679	40p	BU406D	85p	BUX12	150p	MJE13009	100p
BC212L	7p	BD680	40p	BU407	55p	BUX20	350p	MJE15028	200p
BC213	7p	BD681	45p	BU407D	75p	BUX21	450p	MJE15029	200p
BC213L	7p	BD682	45p	BU408	60p	BUX22	450p	MJE15030	250p
BC214	7p	BD705	50p	BU408D	75p	BUX23	900p	MJE15031	400p
BC214L	7p	BD707	50p	BU409	85p	BUX37	220p	MJE18004	125p
BC237	7p	BD709	50p	BU412	175p	BUX39	450p	MJF18004	175p
BC238	7p	BD711	50p	BU413	175p	BUX40	210p	MJF18204	350p
BC239	7p	BD736	50p	BU414B	250p	BUX41	200p	OC28	350p
BC300	20p	BD826	50p	BU415A	170p	BUX42	200p	OC29	250p
BC301	20p	BD828	50p	BU426A	70p	BUX47A	220p	OC35	350p
BC302	20p	BD839	55p	BU433	120p	BUX48A	150p	OC36	250p
BC303	20p	BD897	60p	BU500	100p	BUX55	800p	S2000A3	175p
BC304	25p	BD899	50p	BU500D	225p	BUX80	180p	S2000AF	90p
BC327	7p	BD977	50p	BU505	90p	BUX81	160p	S2055A	175p
BC328	7p	BDX33	60p	BU505D	90p	BUX84	50p	S2055AF	175p
BC337	7p	BDX37	100p	BU505DF	90p	BUX85	50p	S2530A	100p
BC338	7p	BDX44	100p	BU506	100p	BUX86	50p	TIP29	15p
BC441	28p	BDX47	60p	BU506D	70p	BUX87	50p	TIP29A	22p
BC446	8p	BDX54C	75p	BU506DF	100p	BUX98A	350p	TIP29C	25p
BC477	18p	BDX62C	150p	BU508A	60p	BUZ71	75p	TIP29E	40p
BC516	22p	BDX63C	175p	BU508AF	60p	BUZ71AF	100p	TIP30	25p
BC537	25p	BDX64C	175p	BU508APH	60p	BUZ72A	100p	TIP30C	25p
BC546	8p	BDX65	80p	BU508D	75p	BUZ72AF	100p	TIP31A	22p
BC547	8p	BDX66C	175p	BU508DF	85p	BUZ73A	150p	TIP31C	27p
BC548	8p	BDX67C	275p	BU508DR	130p	BUZ73AF	80p	TIP32	24p
BC549	8p	BDX71	70p	BU508V	110p	BUZ76A	110p	TIP32A	21p
BC550	8p	BDX77	175p	BU508VF	100p	BUZ80	135p	TIP32C	28p
BC556	8p	BDX87C	175p	BU526	75p	BUZ80AF	200p	TIP33	50p
BC557	8p	BDX88C	150p	BU536	100p	BUZ83	200p	TIP33C	60p
BC558	8p	BDW24	55p	BU546	125p	BUZ90A	180p	TIP34	65p
BC559	8p	BDW93	50p	BU603	125p	BUZ91A	260p	TIP34C	60p
BC560	8p	BDW94	50p	BU606D	225p	BY448	20p	TIP35C	65p
BC637	20p	BDY29	225p	BU608D	120p	BYT11	25p	TIP36C	65p
BC639	20p	BDY56	225p	BU626	120p	IRF120	225p	TIP41A	20p
BC640	20p	BDY58	500p	BU705	130p	IRF130	475p	TIP41C	22p
BCY33	200p	BDY90	125p	BU706DF	175p	IRF140	550p	TIP42A	20p
BCY34	200p	BDY92	100p	BU706F	150p	IRF230	550p	TIP42C	22p
BCY70	16p	BF137	35p	BU724A	100p	IRF240	425p	TIP47	40p
BCY71	16p	BF167	30p	BU801	70p	IRF250	375p	TIP48	40p
BCY72	16p	BF181	18p	BU806	70p	IRF330	600p	TIP50	60p
BD115	30p	BF183	20p	BU807	60p	IRF340	325p	TIP51	80p
BD124P	50p	BF195	7p	BU807F	75p	IRF350	750p	TIP52	80p
BD131	25p	BF199	8p	BU808DF	210p	IRF450	650p	TIP54	85p
BD132	25p	BF200	16p	BU810	110p	IRF510	110p	TIP102	70p
BD133	50p	BF225	30p	BU824	60p	IRF520	110p	TIP105	65p
BD135	20p	BF240	16p	BU826	120p	IRF530	120p	TIP106	65p
BD136	20p	BF245	25p	BU826A	160p	IRF540	120p	TIP107	65p
BD137	20p	BF254	15p	BU902	110p	IRF610	120p	TIP110	40p
BD138	20p	BF255	12p	BU903	110p	IRF611	120p	TIP111	40p
BD139	20p	BF256	18p	BU910	80p	IRF620	160p	TIP112	35p
BD140	20p	BF257	18p	BU912	100p	IRF630	110p	TIP112H	50p
BD144	90p	BF259	18p	BU920	100p	IRF640	300p	TIP115	30p
BD157	38p	BF262	25p	BU922	110p	IRF642	200p	TIP116	30p
BD166	30p	BF270	18p	BU930	130p	IRF650	200p	TIP117	30p
BD175	30p	BF273	15p	BU932	175p	IRF710	150p	TIP120	37p
BD177	30p	BF311	21p	BU941	260p	IRF720	150p	TIP121	35p
BD179	32p	BF336	20p	BU2508A	100p	IRF730	125p	TIP122	30p
BD181	45p	BF337	20p	BU2508AF	110p	IRF740	125p	TIP125	30p
BD182	60p	BF338	20p	BU2508D	130p	IRF820	110p	TIP126	40p
BD184	60p	BF362	30p	BU2508DF	120p	IRF830	110p	TIP127	35p
BD187	30p	BF367	13p	BU2520AF	170p	IRF840	110p	TIP130	30p
BD201	33p	BF371	17p	BU2520DF	225p	IRF9140	1000p	TIP131	30p
BD202	38p	BF421	18p	BU2525A	325p	IRF9510	150p	TIP132	30p
BD203	42p	BF422	21p	BU2525AF	220p	IRF9511	150p	TIP136	40p
BD204	42p	BF423	25p	BU2527AF	400p	IRF9520	150p	TIP137	65p
BD222	31p	BF455	12p	BUF405A	200p	IRF9530	200p	TIP162	110p
BD225	31p	BF458	19p	BUH315	200p	IRF9531	200p	TIP141	65p
BD232	31p	BF462	50p	BUH315D	175p	IRF9540	240p	TIP142	75p
BD233	30p	BF471	28p	BUH515	200p	IRF9541	200p	TIP145	50p
BD234	32p	BF472	28p	BUH515D	250p	IRF9610	120p	TIP146	70p
BD235	28p	BF479	30p	BUH517	275p	IRF9620	110p	TIP147	80p
BD236	30p	BF494	16p	BUH517D	175p	IRF9622	200p	TIP150	90p
BD237	21p	BF495	16p	BUH715	425p	IRF9630	180p	TIP151	60p
BD238	24p	BF595	16p	BUT11A	35p	IRF9640	280p	TIP2955	50p
BD239	30p	BF596	16p	BUT11AF	35p	IRFD9220	100p	TIP3055	50p
BD240	40p	BF615	30p	BUT12	80p	IRFBC30	150p	TIPL760	100p
BD241A	40p	BF617	30p	BUT13	310p	IRFBC40	250p	TIPL762A	200p
BD243A	50p	BF760	40p	BUT18	80p	IRFP140	250p	TIPL763A	200p
BD244	50p	BF763	40p	BUT18AF	65p	IRFP150	300p	TIPL791A	80p
BD245	50p	BF870	22p	BUT30V	1700p	IRFP240	300p	2N2369	15p
BD246A	50p	BF871	22p	BUT56A	65p	IRFP250	280p	2N2646	40p
BD265	45p	BF960	38p	BUT76A	80p	IRFP350	325p	2N2904	20p
BD267	45p	BF961	35p	BUT90	1300p	IRFP450	325p	2N2905	20p
BD269	45p	BF964	38p	BUT92	1200p	IRFP460	775p	2N2906	18p
BD278	50p	BFQ232	75p	BUV18	650p	IRFP9140	1450p	2N2907	18p
BD311	100p	BFQ252A	60p	BUV20	650p	IRFP9240	350p	2N3019	28p
BD314	100p	BFR90	85p	BUV21	400p	IRFPC50	600p	2N3053	18p
BD315	150p	BFR91	99p	BUV23	475p	IRFRC20	250p	2N3054	40p
BD317	150p	BR100	14p	BUV24	350p	IRFZ20	65p	2N3055	38p
BD331	40p	BR103	37p	BUV25	110p	IRFZ42	275p	2N3055H	50p
BD332	40p	BR303	85p	BUV26	150p	IRFZ44	160p	2N3440	45p
BD361	60p	BU105	80p	BUV27	125p	MJ2501	100p	2N3441	175p
BD362	60p	BU108	100p	BUV28	110p	MJ2955	55p	2N3442	85p
BD370	30p	BU109	80p	BUV37	175p	MJ3000	100p	2N3771	85p
BD371	30p	BU110	90p	BUV46A	75p	MJ3001	100p	2N3772	90p
BD410	50p	BU111	100p	BUV47	120p	MJ4032	175p	2N3773	100p
BD433	28p	BU124	60p	BUV48A	175p	MJ4035	175p	2N3819	29p

Part	Price
4N35	50p

RECTIFIER DIODES

BY127	8p
BY133	8p
BY164	40p
BY179	35p
BY184	32p
BY206	11p
BY207	20p
BY227	19p
BY228	28p
BY298	15p
BY299	18p
BY329-1200	150p
BY448	20p
BYT11	25p
BYT13-1000	30p
BYV96E	25p
BYW96E	36p
BYX10	15p
BYX55/600	25p
IN4001	3p
IN4002	3p
IN4003	3p
IN4004	3p
IN4005	3p
IN4006	3p
IN4007	4p
IN4148	2p
IN5400	9p
IN5401	8p
IN5402	8p
IN5403	8p
IN5404	8p
IN5405	11p
IN5406	12p
IN5407	12p
IN5408	12p
RGP10	25p
RGP15	25p
RGP30	16p
SR2M	50p

I.C. SOCKETS

8 PIN	4p
14 PIN	5p
16 PIN	6p
18 PIN	9p
20 PIN	10p
22 PIN	12p
24 PIN	13p
28 PIN	13p
40 PIN	15p

ZENER DIODES

400 mWatts

2V7 to 39V	5p

1.3 Watts

2V7 to 39V	9p

VOLTAGE REGULATORS

7805	18p
7806	18p
7808	25p
7812	18p
7815	25p
7818	25p
7824	25p
7905	25p
7906	30p
7908	30p
7912	30p
7915	30p
7918	30p
7924	30p
78L05	24p
78L08	24p
78L12	24p
78L15	24p
78L18	24p
78L24	24p
79L05	35p
79L08	35p
79L12	35p
79L15	35p
LM309K	100p
LM317T	100p
LM323K	350p
78H08KC	800p
79H12KC	700p
79HGKC	800p

LEDs

3mm

RED	5p
YELLOW	8p
GREEN	8p

5mm

RED	5p
YELLOW	8p
GREEN	8p

RECTANGULAR LEDs

5mm x 2.5mm

RED	5p
YELLOW	8p
GREEN	8p

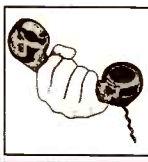
Part	Price
LINEAR ICs	
AN203	210p
AN210	165p
AN211	150p
AN214Q	170p
AN217P	95p
AN228	280p
AN252	150p
AN259	250p
AN262	140p
AN271	230p
AN274	250p
AN277B	400p
AN278	60p
AN301	330p
AN302	650p
AN303	250p
AN304	360p
AN315	210p
AN316	350p
AN337	600p
AN360	100p
AN362	140p
AN363	150p
AN366	150p
AN610	160p
AN3211K	375p
AN3215K	350p
AN3231K	300p
AN3236K	450p
AN3310K	325p
AN3312	350p
AN3313	300p
AN3320K	450p
AN3331K	450p
AN3792	300p
AN3794	325p
AN3814K	450p
AN3821K	600p
AN3822K	600p
AN3830K	800p
AN3990K	300p
AN3991K	400p
AN5010	250p
AN5011	225p
AN2020	80p
AN5025	250p
AN5033	400p
AN5034	400p
AN5070	125p
AN5071	100p
AN5111	450p
AN5132	250p
AN5135NK	400p
AN5138NK	350p
AN5150	400p
AN5151	200p
AN5210	875p
AN5215	100p
AN5222	200p
AN5250	160p
AN5256	150p
AN5260	300p
AN5262	175p
AN5265	80p
AN5315	600p
AN5352	600p
AN5411	450p
AN5421	150p
AN5429	425p
AN5431	275p
AN5435	125p
AN5436N	160p
AN5512	100p
AN5515	160p
AN5520	550p
AN5521	100p
AN5560	350p
AN5601K	750p
AN5612	200p
AN5613	200p
AN5615	300p
AN5620	250p
AN5622	275p
AN5625	400p
AN5630	375p
AN5633	350p
AN5635N	330p
AN5640	500p
AN5700	90p
AN5701	150p
AN5710	100p
AN5712	180p
AN5720	70p
AN5722	140p
AN5730	160p
AN5732	120p
AN5750	75p
AN5753	130p
AN5763	250p
AN5790	240p
AN5791	225p
AN5836	450p
AN5862K	225p
AN5900	130p
AN608P	125p
AN620	250p
AN6130	130p
AN6135	120p
AN6209	350p
AN6250	50p
AN6247	200p
AN6270	400p
AN6300	600p
AN6306	380p
AN6310	200p
AN6320	180p
AN6326N	250p
AN6332	320p

Part	Price
AN6340	600p
AN6341	200p
AN6342	325p
AN6344	440p
AN6345	400p
AN6346	350p
AN6350	610p
AN6352	450p
AN6356	300p
AN6359	500p
AN6360	320p
AN6362	400p
AN6363	375p
AN6367NK	400p
AN6368	275p
AN6371	350p
AN6387	480p
AN6550	100p
AN6551	50p
AN6552	45p
AN6554	80p
AN6555	50p
AN6605	35p
AN6612	60p
AN6650	45p
AN6651	45p
AN6652	45p
AN6671K	425p
AN6676	600p
AN6780S	80p
AN6870	450p
AN6875	150p
AN6878	65p
AN6879	225p
AN6880	75p
AN6882	300p
AN6884	200p
AN6888	150p
AN6889	100p
AN6913	60p
AN700	650p
AN7010K	250p
AN7025K	90p
AN7060	175p
AN7062	300p
AN7072	250p
AN7081K	200p
AN7105	170p
AN7106K	135p
AN7110	75p
AN7111	100p
AN7112	45p
AN7114	120p
AN7115	110p
AN7116	90p
AN7117	65p
AN7120	100p
AN7130	75p
AN7131	90p
AN7133N	325p
AN7134	300p
AN7140	170p
AN7141	70p
AN7142	80p
AN7145	195p
AN7146	210p
AN7147	180p
AN7148	140p
AN7149	160p
AN7154	180p
AN7156	240p
AN7158	310p
AN7159	350p
AN7161N	375p
AN7163	175p
AN7166	350p
AN7168	200p
AN7169	225p
AN7170	260p
AN7171K	400p
AN7172K	325p
AN7173K	450p
AN7177	375p
AN7178	180p
AN7205	35p
AN7213	40p
AN7216	175p
AN7218	60p
AN7220	85p
AN7222	75p
AN7223	105p
AN7224	75p
AN7225	175p
AN7254	150p
AN7255	250p
AN7273	75p
AN7310	60p
AN7311	90p
AN7312	70p
AN7315	40p
AN7330	110p
AN7362	200p
AN7363	225p
AN7410	150p
AN7411	50p
AN7414	275p
AN7415	70p
AN7420	100p
AN8053	200p
AN8275	250p
AN8370	1000p
AN8377	400p
AN8387	350p
BA222	65p
BA225	100p
BA314	40p
BA301	55p
BA311	80p
BA313	60p
BA333	80p

Part	Price
BA335	55p
BA338	80p
BA340	75p
BA343	60p
BA336	175p
BA401	60p
BA402	50p
BA511	145p
BA514	160p
BA516	150p
BA518	150p
BA521	100p
BA524	240p
BA526	180p
BA527	95p
BA532	100p
BA534	220p
BA536	150p
BA546	160p
BA612	120p
BA614	70p
BA618	55p
BA631	280p
BA656	110p
BA658	350p
BA681A	350p
BA682A	300p
BA683A	300p
BA684	400p
BA685	400p
BA715	45p
BA718	45p
BA728	55p
BA806	220p
BA843	130p
BA1310	160p
BA1320	75p
BA1330	120p
BA1332	60p
BA1350	130p
BA1355	125p
BA1356	100p
BA1360	160p
BA1404	120p
BA1604	125p
BA2266A	250p
BA3306	60p
BA3308	70p
BA3312	60p
BA3402	90p
BA3406AL	120p
BA3416BL	80p
BA3422	350p
BA3505F	140p
BA3506A	70p
BA3516	120p
BA3520	130p
BA3521	225p
BA3704	200p
BA3706	75p
BA3812L	80p
BA3822LS	80p
BA3824LS	75p
BA3920	300p
BA4110	75p
BA4210	85p
BA4220	60p
BA4234L	70p
BA4236L	110p
BA4402	45p
BA4403	220p
BA4405	80p
BA4412	50p
BA5101	350p
BA5102	140p
BA5115	75p
BA5115L	75p
BA5204	200p
BA5208AF	110p
BA5402	180p
BA5406	180p
BA5408	180p
BA5413	225p
BA6104	250p
BA6109	110p
BA6110	225p
BA6125	75p
BA6137	55p
BA6138	130p
BA6146	150p
BA6149LS	700p
BA6154	60p
BA6208	175p
BA6209	85p
BA6218	85p
BA6220	55p
BA6222	130p
BA6227	50p
BA6229	130p
BA6235	50p
BA6238A	130p
BA6239A	130p
BA6247	150p
BA6248	140p
BA6259	170p
BA6280AF	300p
BA6290A	200p
BA6294	250p
BA6302A	150p
BA6304	120p
BA6305	140p
BA6321	250p
BA6328	250p
BA6334	75p
BA6410	220p
BA6411	250p
BA6418N	100p
BA6435S	425p
BA6893	150p
BA7001	150p

Part	Price
BA7004	200p
BA7007	200p
BA7021	180p
BA7022	350p
BA7025L	100p
BA7107	475p
BA7212S	200p
BA7252S	150p
BA7604N	100p
BA7751LS	150p
BA7752	250p
BA7755	150p
BA7767AS	155p
BA8504	350p
BA15218	60p
CA3140E	38p
CNX62A	50p
CNX82A	60p
CNX83A	80p
CX136	600p
CX139A	750p
CX141	750p
CX145	725p
CX150B	325p
CX175	325p
CX187	825p
CX804A	775p
CX867	575p
CX868	525p
CX877	300p
CX7925B	550p
CX20015A	600p
CX20106A	75p
CX20109	140p
CX20187	700p
CXA1001AP	1600p
CXA1019P	150p
CXA1019S	225p
CXA1044P	550p
CXA1044BP	475p
CXA1081	275p
CXA1081M	250p
CXA1081S	300p
CXA1082AS	1000p
CXA1191M	250p
CSA1209P	400p
FT5754M	600p
FT5764M	250p
HA1124	125p
HA1125	120p
HA1137W	150p
HA1151	175p
HA1197	130p
HA1199	130p
HA1201	225p
HA1202	125p
HA1319	200p
HA1338	300p
HA1339A	350p
HA1367	300p
HA1377	120p
HA1384	600p
HA1388	320p
HA1389	210p
HA1392	120p
HA1394	170p
HA1396	650p
HA1397	200p
HA1398	175p
HA1406	120p
HA11123	350p
HA11211	170p
HA11215	350p
HA11219	280p
HA11221	180p
HA11225	130p
HA11235	100p
HA11244	375p
HA11247	375p
HA11251	120p
HA11412	600p
HA11414	300p
HA11423	110p
HA11440	250p
HA11485BN	400p
HA11702	330p
HA11703	400p
HA11706	280p
HA11710	500p
HA11713	250p
HA11715	250p
HA11716	480p
HA11718	700p
HA11741	650p
HA11741NT	950p
HA11744	330p
HA11745	330p
HA11749	350p
HA11751	1500p
HA11752	325p
HA11839NT	375p
HA11847	700p
HA12002	220p
HA12003	150p
HA12005	180p
HA12010	300p
HA12016	120p
HA12017	100p
HA12026	125p
HA12038NT	140p
HA12044	350p
HA12045	280p
HA12047	450p
HA12058	320p
HA12088	375p
HA12116	130p
HA12411	175p
HA12412	175p
HA12413	70p
HA12430	200p

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



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

LINEAR ICs

Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
HA13001	650p	LA2800	350p	LA7096	200p	LF353	48p	MC3302	50p	SAB3029	525p	STK3102 II	530p	STK5478	380p	STR16006	500p	TA7281	200p
HA13002	200p	LA3120	200p	LA7113	275p	LF355	60p	MC3401	45p	SAB3035	275p	STK3106	2500p	STK5479	300p	STR17006	500p	TA7282	160p
HA13006	400p	LA3150	200p	LA7116	125p	LF357	70p	MC3423P	100p	SAB3036	725p	STK3122 III	725p	STK5481	470p	STR20005	450p	TA7210	200p
HA13007	300p	LA3160	120p	LA7123	1300p	LF398	300p	MC3488AP	250p	SAB3037	700p	STK3152 II	900p	STK5482	285p	STR20012	450p	TA7283	200p
HA13108	280p	LA3161	40p	LA7210	60p	LH2426S	600p	MC34063AP	300p	SAB3042	825p	STK3156	500p	STK5483	440p	STR20015	450p	TA7284P	400p
HA13117	175p	LA3210	65p	LA7212	150p	LM301	26p	MN1220T	600p	SAB3064	130p	STK4017	400p	STK5486	450p	STR30110	330p	TA7288	220p
HA13118	140p	LA3226	60p	LA7214	150p	LM311	35p	MN1226	450p	SAB3209	225p	STK4019	480p	STK5487	525p	STR30115	275p	TA7291P	200p
HA13119	140p	LA3246	75p	LA7220	125p	LM319	165p	MN1228	600p	SAB3210	250p	STK4021	380p	STK5488	480p	STR30120	400p	TA7292P	325p
HA13127	350p	LA3300	140p	LA7222	110p	LM324	30p	MN1276	1300p	SAB6456	125p	STK4024 II	550p	STK5490	450p	STR30123	450p	TA7294P	450p
HA13128	400p	LA3301	110p	LA7224	150p	LM335Z	120p	MN1280	70p	SAB8048	225p	STK4025	530p	STK5632	450p	STR30125	550p	TA7299	200p
HA13130	450p	LA3361	100p	LA7225	250p	LM339	35p	MN3004	600p	SAB8051AP	700p	STK4026	480p	STK5720	400p	STR30130	250p	TA7302P	75p
HA13135	500p	LA3365	70p	LA7292	275p	LM348	50p	MN3005	2000p	SDA2003	450p	STK4028	550p	STK5725	450p	STR40090	360p	TA7303	70p
HA13139	600p	LA3370	70p	LA7294	200p	LM358	45p	MN3011	4000p	SDA2004	325p	STK4032 II	1050p	STK5730	450p	STR40115	600p	TA7307	100p
HA13150A	1150p	LA3373	70p	LA7295	160p	LM380	80p	MN3101	110p	SDA2005	700p	STK4034 X	925p	STK6316	300p	STR41090	330p	TA7310	100p
HA13151	875p	LA3375	300p	LA7297	120p	LM381	150p	MN3102	110p	SDA2007	300p	STK4036	470p	STK6324B	500p	STR43111	950p	TA7312	120p
HA13403	400p	LA3376	80p	LA7305A	350p	LM382	130p	MN3207	375p	SDA2008	400p	STK4038	680p	STK6327	1200p	STR44115	475p	TA7313	70p
HA13406W	400p	LA3380	300p	LA7308	70p	LM386	60p	MN3208	950p	SDA2112	450p	STK4040 II	650p	STK6328A	800p	STR45111	550p	TA7314	175p
HA13408	350p	LA3390	250p	LA7311	200p	LM387	100p	MN6030B	350p	SDA2120	200p	STK4042 II	800p	STK6431	850p	STR50020	350p	TA7315	200p
HA13412	600p	LA3400	250p	LA7320	120p	LM389N	105p	MN6163A	700p	SDA2131	225p	STK4044	950p	STK6607	400p	STR50092	650p	TA7317P	120p
HA13426	500p	LA3401	90p	LA7323	325p	LM393	45p	MTA001M	600p	SDA2208	450p	STK4046	950p	STK6722	725p	STR50103A	260p	TA7320P	200p
HA13432	400p	LA3410	150p	LA7330	350p	LM431	50p	NE555	20p	SDA4212	775p	STK4048	1280p	STK6732	1000p	STR50113	500p	TA7322	130p
HA13441	450p	LA3430	135p	LA7331	250p	LM710	45p	NE556	40p	SDA5241	725p	STK4050 II	1600p	STK6822	900p	STR50115	500p	TA7323	80p
HA17524	250p	LA3600	60p	LA7332	225p	LM723	40p	NE558	80p	SDA5243-2	450p	STK4060	510p	STK6922	1000p	STR51041	500p	TA7234	75p
KA2102	100p	LA3605	100p	LA7340	300p	LM741DIL	18p	NE565	110p	SDA5343	1450p	STK4065	650p	STK6932	525p	STR50213	500p	TA7325	90p
KA2130	150p	LA3607	125p	LA7376	150p	LM741MET	45p	NE567	115p	SDA5640	200p	STK4101	500p	STK6962	275p	STR53041	400p	TA7326	200p
KA2131	110p	LA4030	180p	LA7391	550p	LM747	55p	NE571	290p	SDA5642	450p	STK4111	500p	STK6972	490p	STR54041	320p	TA7328	110p
KA2206	150p	LA4031	140p	LA7520	200p	LM1017	200p	NE592	85p	SGSF444	500p	STK4112	500p	STK6981B	600p	STR55041	450p	TA7330P	80p
KA2209	125p	LA4032	140p	LA7530	200p	LM1035N	350p	NE5532P	140p	SGFS465	500p	STK4121	480p	STK6982	600p	STR56041	550p	TA7331P	80p
KA2210	230p	LA4051	160p	LA7535	175p	LM1040N	650p	SAA1000	350p	SLA4031	750p	STK4122	560p	STK6982H	600p	STR58041	250p	TA7333	100p
KA2212	65p	LA4100	85p	LA7545	160p	LM1203	225p	SAA1004	650p	SLA7020M	450p	STK4131	480p	STK7216	420p	STR58041	300p	TA7335	85p
KA2213	130p	LA4101	80p	LA7550	275p	LM1203AN	225p	SAA1005	325p	STA301A	200p	STK4132 II	600p	STK7217	400p	STR60001	525p	TA7336	180p
KA2214	100p	LA4102	100p	LA7555	150p	LM1875T	330p	SAA1006	300p	STA341M	180p	STK4133 II	750p	STK7225	500p	STR80145	475p	TA7337P	175p
KA2224	50p	LA4110	120p	LA7620	500p	LM1881N	375p	SAA1008	450p	STA401A	220p	STK4141 II	420p	STK7226	600p	STR81145	375p	TA7339P	175p
KA2244	75p	LA4120	270p	LA7680	675p	LM1886	250p	SAA1010	400p	STA403A	270p	STK4142	530p	STK7251	500p	STR90120	425p	TA7341	250p
KA2261	100p	LA4138	105p	LA7681	650p	LM1889	300p	SAA1024	250p	STA405A	280p	STK4147 II	1450p	STK7253	450p	STRD1206	500p	TA7342P	70p
KA2263	100p	LA4140	60p	LA7710	250p	LM1894N	200p	SAA1025	250p	STA431A	250p	STK4151	680p	STK7308	350p	STRD1406	600p	TA7343	120p
KA2264	100p	LA4142	65p	LA7800	90p	LM1895N	275p	SAA1026	400p	STA432A	220p	STK4152	650p	STK7309	400p	STRD1706	360p	TA7347P	120p
KA2284	75p	LA4145	65p	LA7801	100p	LM2901N	35p	SAA1027	400p	STA434A	270p	STK4161	650p	STK7310	470p	STRD1806	360p	TA7348P	125p
KA2309	175p	LA4160	100p	LA7802	300p	LM2902N	40p	SAA1029	150p	STA435A	270p	STK4162	550p	STK7348	400p	STRD1816	350p	TA7349P	175p
KA2401	150p	LA4162	110p	LA7806	260p	LM2903N	40p	SAA1042	325p	STA441C	220p	STK4164 II	1175p	STK7356	425p	STRD1906	550p	TA7354P	65p
KA2412	225p	LA4178	150p	LA7808	250p	LM3900	40p	SAA1043P	675p	STA451C	280p	STK4171	900p	STK7358	440p	STRD3035	300p	TA7357	340p
KA2912	125p	LA4180	150p	LA 7820	100p	LM3909	100p	SAA1044	400p	STA456C	240p	STK4172 II	680p	STK7402	560p	STRD4412	500p	TA7358	85p
KA2913A	175p	LA4182	180p	LA7823	200p	LM3911N	200p	SAA1056	300p	STA471	210p	STK4181	680p	STK7404	600p	STRD4420	550p	TA7359P	90p
KA2914A	200p	LA4190	300p	LA7824	130p	LM3914	160p	SAA1057	375p	STA901M	280p	STK4182 II	750p	STK7406	650p	STRD4512	400p	TA7361	125p
KA22427	100p	LA4192	140p	LA7830	90p	LM3915	160p	SAA1058	225p	STK0025	420p	STK4191	700p	STK7408	675p	STRD5441	475p	TA7362	150p
KIA6213S	60p	LA4200	130p	LA7831	85p	LM3916	270p	SAA1060	375p	STK0029	1000p	STK4192	700p	STK7410	1500p	STRD5541	450p	TA7364P	175p
KIA6210AH	400p	LA4201	120p	LA7832	130p	LM8363	320p	SAA1061	250p	STK0039	600p	STK4211 II	1000p	STK7458	1250p	STRD6008	575p	TA7366P	65p
KIA6281H	250p	LA4260	230p	LA7835	150p	LM8560	175p	SAA1062	250p	STK0040	520p	STK4211 V	800p	STK7554	600p	STRD6009E	450p	TA7368P	35p
KIA6283K	150p	LA4261	300p	LA7837	150p	LM13600	150p	SAA1063	250p	STK0049	510p	STK4221 II	1200p	STK7561	650p	STRD6018	450p	TA7373F	150p
KIA6299H	210p	LA4265	125p	LA7838	200p	LM13700	125p	SAA1064	275p	STK0050	440p	STK4231 II	1050p	STK7562	1000p	STRD6602	475p	TA7374	175p
KIA7227CP	200p	LA4270	300p	LA7850	225p	LM18293	600p	SAA1070	550p	STK0059	620p	STK4241	1050p	STK7563	800p	STRD6601	650p	TA7376P	100p
KIA7313	45p	LA4282	350p	LA7851	200p	M491BB1	800p	SAA1073	325p	STK0060	820p	STK4241 V	1250p	STK7573	400p	STRM6545	900p	TA7378P	60p
L149V	300p	LA4420	140p	LA7910	150p	M494B1	700p	SAA1075	350p	STK0070	1100p	STK4272	500p	STK7576	1500p	STRM6546	900p	TA7401	250p
L165V	250p	LA4422	130p	LA7913	90p	M5265P	200p	SAA1086	175p	STK0080	1000p	STK4273	550p	STK7703	1000p	STRM6549	500p	TA7402P	200p
L200	200p	LM4425A	200p	LA7930	350p	M50115P	320p	SAA1089	325p	STK011	330p	STK4301	500p	STK8050	1600p	STRS5741	800p	TA7403	325p
L272	200p	LA4430	130p	LA7940	200p	M50117P	500p	SAA1101	700p	STK015	440p	STK4311	650p	STK8250	500p	STRS5941	750p	TA7404	150p
L272M	110p	LA4440	200p	LA7953	300p	M50119P	525p	SAA1124	200p	STK016	760p	STK4332	385p	STK8260	1200p	STRS6307	600p	TA7405P	200p
L290B	225p	LA4445	200p	LA9200	300p	M50422P	750p	SAA1130	550p	STK025	650p	STK4352	500p	STK8280	1850p	STRS6308	600p	TA7411AP	150p
L291B	300p	LA4446	170p	LB1205	170p	M50461	350p	SAA1250	280p	STK050	1600p	STK4362	450p	STK73405 II	550p	STRS6309	600p	TA7415P	350p
L292	750p	LA4460	120p	LB1216	150p	M50784	300p	SAA1251	380p	STK077	520p	STK4372	600p	STK73410	350p	STRS6707	1000p	TA7417AP	225p
L293B	225p	LA4461	120p	LB1258	100p	M50786	500p	SAA1271	400p	STK078	1800p	STK4392	500p	STK7340 II	500p	STRS6708	575p	TA7421P	350p
L293C	325p	LA4466	225p	LB1268	70p	M50790	600p	SAA1274	280p	STK080	550p	STK4412	450p	STK73605	375p	TA7054	190p	TA7427P	225p
L293D	225p	LA4470	300p	LB1274	85p	M51014L	120p	SAA1290	750p	STK082	2000p	STK4432	600p	STK73907	700p	TA7061	115p	TA7428P	110p
L293E	250p	LA4475	225p	LB1290	120p	M51143AL	110p	SAA1293	550p	STK084	600p	STK4773	820p	STK78617	2400p	TA7062	200p	TA7429P	220p
L294	475p	LA4476	225p	LB1292	110p	M51161	300p	SAA1294	800p	STK085	900p	STK4793	800p	STR370	300p	TA7066	120p	TA7630	200p
L295	450p	LA4480	225p	LB1405	70p	M51161P	250p	SAA1300	200p	STK086	1000p	STK4803	1000p	STR371	400p	TA7075P	300p	TA7632	400p
L297	525p	LA4485	300p	LB1407	130p	M51162P	250p	SAA1310	200p	STK0100	900p	STK4813	800p	STR380	350p	TA7089	300p	TA7640	90p
L298	400p	LA4495	250p	LB1409	200p	M51164AL	80p	SAA1350	275p	STK0100II	1200p	STK4833	850p	STR381	390p	TA7102P	500p	TA7641	140p
L465A	525p	LA4496	250p	LB1412	300p	M51166P	300p	SAA1351	750p	STK420	400p	STK4843	720p	STR383	410p	TA7119	150p	TA7642	220p
L482	400p	LA4498	275p	LB1415	100p	M51182L	110p	SAA1900S	475p	STK430	500p	STK4853	1700p	STR384	350p	TA7120	55p	TA7644BP	480p
L497B	525p	LA4500	200p	LB1416	85p	M51191L	85p	SAA3004	400p	STK433	400p	STK4863	700p	STR440	800p	TA7124	250p	TA76545P	65p
L702B	400p	LA4505	220p	LB1426	125p	M51231P	200p	SAA3006P	225p	STK435	375p	STK4873	1100p	STR441	950p	TA7130P	85p	TA7658	100p
L702N	325p	LA4508	200p	LB1450	110p	M51308SP	550p	SAA3007P	130p	STK436	430p	STK4893	1000p	STR442	1600p	TA7137	60p	TA7659P	400p
L2720	150p	LA4510	100p	LB1615	270p	M51310AP	900p	SAA3008P	200p	STK437	600p	STK4913	900p	STR450A	700p	TA7140	100p	TA7660P	325p
L2722	175p	LA4520	170p	LB1620	210p	M51316P	300p	SAA3010P	300p	STK439	500p	STK5314	475p	STR451	800p	TA7141	825p	TA7666P	100p
L4960	325p	LA4550	200p	LB1622	220p	M51320	200p	SAA3027P	375p	STK441	680p	STK5315	500p	STR452	600p	TA7150P	250p	TA7668	100p
L6203	600p	LA4555	120p	LB1630	80p	M51356P	400p	SAA3049P	550p	STK443	700p	STK5322	500p	STR453	500p	TA7157	100p	TA7672	400p
L6210	250p	LA4557	150p	LB1639	300p	M51358P	150p	SAA4700	425p	STK457	470p	STK5323	600p	STR454	1300p	TA7172P	150p	TA7676AP	450p
L6221AS	300p	LA4558	125p	LB1640	150p	M51365P	350p	SAA5000	200p	STK459	580p	STK5324	450p	STR455	550p	TA7193	320p	TA7679	475p
L6506	300p	LA4570	130p	LB1641	75p	M51366P	360p	SAA5010	220p	STK460	660p	STK5325	370p	STR456	470p	TA7200	200p	TA7680AP	200p
LA1130	240p	LA4571	175p	LB1642	150p	M51381P	200p	SAA5012	400p	STK461	600p	STK5326	750p	STR457	600p	TA7205	1200p	TA7681AP	425p
LA1135	120p	LA4581	175p	LB1645	100p	M51384AP	750p	SAA5020	350p	STK463	950p	STK5330	850p	STR470	400p	TA7207	150p	TA7687AP	100p
LA1145	200p	LA4597	125p	LB1648	200p	M51387P	600p	SAA5030	440p	STK465	900p	STK5331	300p	STR1096	275p	TA7208	125p	TA7688	150p
LA1150	150p	LA4620	400p	LB1649	190p	M51392P	300p	SAA5040A	280p	STK501	550p	STK5332	180p	STR1195	350p	TA7210	200p	TA7689	400p
LA1170	90p	LA4630	325p	LB3500	125p	M51393AP	350p	SAA5040B	400p	STK561	450p	STK5333	650p	STR1229	325p	TA7214	220p	TA7690	100p
LA1177	130p	LA4700	350p	LC4966	65p	M51395AP	450p	SAA5041	550p	STK563	415p	STK5335	350p	STR2005	400p	TA7217	145p	TA7692	400p
LA1180	75p	LA4705	400p	LC7011	500p	M51397AP	425p	SAA5042	425p	STK583	500p	STK5336	350p	STR2012	400p	TA7220	220p	TA7699	600p
LA1185	150p	LA5005	90p	LC7060	600p	M51436P	350p	SAA5050	650p	STK760	600p	STK5337	500p	STR2013	300p	TA7222	90p	TA7705	300p
LA1186	35p	LA5112	200p	LC7120	350p	M51496P	275p	SAA5051	400p	STK770	400p	STK5338	295p	STR2015	550p	TA7223	210p	TA7709P	150p
LA1201	75p	LA5511	50p	LC7130	300p	M51533	300p	SAA5052	500p	STK772	650p	STK5339	400p	STR2024	675p	TA7225	300p	TA7710	200p
LA1205	75p	LA5512	50p	LC7131	260p	M51544	150p	SAA5054	500p	STK772B	480p	STK5340	350p	STR2105	600p	TA7226	290p	TA7720	200p
LA1207	120p	LA5522	45p	LC7132	400p	M51848	150p	SAA5230	850p	STK780	575p	STK5342	245p	STR2124	675p	TA7227	700p	TA7727P	125p
LA1210	140p	LA5523	150p	LC7137	450p	M54523P	200p	SAA5231	170p	STK795	450p	STK5343	380p	STR3105	525p	TA7230	100p	TA7737P	175p
LA1222	80p	LA5524	80p	LC7181	350p	M54563P	200p	SAA5240PA	600p	STK1039	460p	STK5353	400p	STR3113	225p	TA7232	95p	TA7739P	175p
LA1230	130p	LA5527	150p	LC7185	350p	M58484	500p	SAA5243PE	360p	STK1040	640p	STK5361	375p	STR3115	400p	TA7233	120p	TA7741	250p
LA1235	130p	LA5530	65p	LC7191	300p	M51516	260p	SAA5244AP	950p	STK1049	700p	STK5362	400p	STR3123	400p	TA7237	300p	TA7742	160p
LA1240	80p	LA5531	65p	LC7207	275p	M51518	200p	SAA5246AP	380p	STK1050	650p	STK5372	260p	STR3125	480p	TA7238	400p	TA7743	320p
LA1245	110p	LA5537	45p	LC7215	160p	M51995P	250p	SAA5246P	750p	STK1060	700p	STK5373	375p	STR3130	500p	TA7240	160p	TA7745	225p
LA1260	75p	LA5655	175p	LC7217	350p	M51977P	300p	SAA5250P	750p	STK1070	850p	STK5391	375p	STR3135	250p	TA7241	165p	TA7747	200p
LA1261	75p	LA5658	225p	LC7218	250p	M52307P	900p	SAA5351	375p	STK1080	940p	STK5392	500p	STR3212	275p	TA7242	190p	TA7748	400p
LA1265	125p	LA5665	250p	LC7230	700p	M54646AP	400p	SAA7000	550p	STK2025	620p	STK5421	450p	STR3214	275p	TA7243	320p	TA7749	600p
LA1266	130p	LA5667	200p	LC7267	550p	MB3708	275p	SAA7020	600p	STK2028	500p	STK5422	375p	STR3215	275p	TA7245	225p	TA7750	200p
LA1267	150p	LA5700	300p	LC7351	200p	MB3712	600p	SAA7210P	1300p	STK2029	480p	STK5431	550p	STR3315	275p	TA7245BPO	200p	TA7755	300p
LA1354	225p	LA6339	35p	LC7364	200p	MB3713	130p	SAA7220PA	550p	STK2030	1000p	STK5434	570p	STR4090A	650p	TA7248P	575p	TA7760	200p
LA1363	90p	LA6355	50p	LC7432	425p	MB3714	225p	SAA7274P	600p	STK2038	700p	STK5436	500p	STR4142	450p	TA7250B	325p	TA7762	200p
LA1364	200p	LA6510	150p	LC7522	350p	MB3715	250p	SAA7280P	1450p	STK2048	950p	STK5441	400p	STR4211	315p	TA7251BP	325p	TA7763	200p
LA1365	120p	LA6515	150p	LC7535	300p	MB3722	200p	SAA9050	450p	STK2058IV	1600p	STK5443	575p	STR4512	400p	TA7256P	225p	TA7764	200p
LA1368	220p	LA6520	175p	LC7537AN	400p	MB3730	900p	SAA9057	475p	STK2101	1050p	STK5446	350p	STR5015	500p	TA7259P	225p	TA7765	200p
LA1369	200p	LA6531	250p	LC7537N	450p	MB3731	220p	SAB0600	600p	STK2110	550p	STK5451	390p	STR5100	550p	TA7262P	400p	TA7767	200p
LA1385	170p	LA7007	400p	LC7560	750p	MB3732	240p	SAB0601	525p	STK2125	580p	STK5461	500p	STR5214	475p	TA7263P	325p	TA7769	130p
LA1503	120p	LA7011	220p	LC7565	300p	MB3735	400p	SAB0602	625p	STK2129	750p	STK5462	500p	STR5315	575p	TA7265AP	300p	TA7772P	150p
LA1805	175p	LA7016	45p	LC7582E	300p	MB3756	160p	SAB1009BP	225p	STK2139	675p	STK5464	300p	STR5412	280p	TA7267	220p	TA7784	250p
LA1810	130p	LA7018	100p	LC7800	175p	MB3759	200p	SAB1016	600p	STK2155	900p	STK5466	500p	STR6020	270p	TA7267BP	120p	TA7792P	250p
LA1851	300p	LA7019	130p	LC7815H	175p	MB3771	110p	SAB1046P	350p	STK2230	470p	STK5467	400p	STR7001	600p	TA7269	260p	TA7796P	75p
LA2000	150p	LA7033	400p	LC7818	280p	MB3773	110p	SAB2015P	525p	STK2240	740p	STK5468	300p	STR9005	400p	TA7270	170p	TA8101N	230p
LA2001	200p	LA7042	280p	LC7820	325p	MB8719	360p	SAB2016P	150p	STK2250	650p	STK5471	900p	STR9012	300p	TA7271	220p	TA8105N	140p
LA2101	270p	LA7046	300p	LC7821N	250p	MC1391	120p	SAB2022P	525p	STK3041	370p	STK5472	375p	STR10006	450p	TA7272	260p	TA8110AP	110p
LA2110	150p	LA7051	130p	LC7822N	160p	MC1455	45p	SAB3012	675p	STK3042	375p	STK5473	480p	STR11006	325p	TA7273	300p	TA8119P	70p
LA2200	190p	LA7053	130p	LC7881B	135p	MC1488	35p	SAB3013	200p	STK3044	950p	STK5474	500p	STR12006	450p	TA7274	210p	TA8122AN	250p
LA2205	150p	LA7054	350p	LC7881M	325p	MC1489	35p	SAB3017	320p	STK3062	500p	STK5476	350p	STR13006	500p	TA7279P	325p	TA8127N	100p
LA2211	350p	LA7060	150p	LF347	110p	MC1496	65p	SAB3021	450p	STK3082	550p	STK5477	450p	STR15006	500p	TA7280	190p	TA8132AN	200p

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

LINEAR ICs/JAPANESE TRANSISTORS

Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
TA8164P	100p	TDA1180	120p	TDA2760	400p	TDA4661	225p	TDA8391	675p	UPC1004C	130p	2SA771	90p	2SA1177	25p	2SB561	30p	2SC738	15p
TA8184P	350p	TDA1185A	190p	TDA2780	600p	TDA4670	475p	TDA8395	360p	UPC1009	950p	2SA773	50p	2SA1179	20p	2SB562	20p	2SC739	150p
TA8189P	130p	TDA1190	80p	TDA2791	275p	TDA4680	350p	TDA8405	550p	UPC1018	170p	2SA777	35p	2SA1182	20p	2SB564	15p	2SC761	110p
TA8200AH	325p	TDA1200B	80p	TDA2795	150p	TDA4685	275p	TDA8415	650p	UPC1020	200p	2SA778	100p	2SA1184	120p	2SB566	90p	2SC762	150p
TA8201AK	300p	TDA1220	50p	TDA2822M	60p	TDA4700A	750p	TDA8416	625p	UPC1023	60p	2SA781	150p	2SA1185	200p	2SB596	50p	2SC783	85p
TA8205	220p	TDA1235	300p	TDA2824	85p	TDA4714C	350p	TDA8417	550p	UPC1024H 2	75p	2SA786	25p	2SA1186	500p	2SB598	30p	2SC790	50p
TA8207K	175p	TDA1236	240p	TDA2840	200p	TDA4716C	450p	TDA8421	300p	UPC1025	230p	2SA794	50p	2SA1198	40p	2SB600	500p	2SC792	380p
TA8210	260p	TDA1251	150p	TDA3047	100p	TDA4718A	250p	TDA8425	500p	UPC1026	95p	2SA798	30p	2SA1201	40p	2SB601	60p	2SC805	225p
TA8211AH	200p	TDA1270	150p	TDA3048	130p	TDA4725	750p	TDA8432	550p	UPC1028	90p	2SA812	15p	2SA1202	25p	2SB605	25p	2SC828	20p
TA8214K	260p	TDA1327	200p	TDA3082	200p	TDA4800	300p	TDA8433	600p	UPC1031H	150p	2SA814	60p	2SA1204	225p	2SB631	40p	2SC829	15p
TA8215	300p	TDA1405	50p	TDA3083	200p	TDA4810	500p	TDA8440	300p	UPC1032	60p	2SA816	70p	2SA1206	60p	2SB632	45p	2SC839	20p
TA8216H	300p	TDA1410	220p	TDA3190	100p	TDA4814A	300p	TDA8442	200p	UPC1035C	110p	2SA817	20p	2SA1207	25p	2SB633	80p	2SC867	900p
TA8217P	120p	TDA1412	35p	TDA3301B	1600p	TDA4850	475p	TDA8443	350p	UPC1043C	125p	2SA825	20p	2SA1208	70p	2SB641	12p	2SC870	100p
TA8220AH	500p	TDA1506	275p	TDA3310	120p	TDA4851	325p	TDA8444	200p	UPC1158H	70p	2SA836	20p	2SA1209	100p	2SB647	20p	2SC897	175p
TA8221AH	600p	TDA1508	175p	TDA3410	150p	TDA4852	325p	TDA8451	325p	UPC1161	110p	2SA837	200p	2SA1210	120p	2SB648	45p	2SC900B	30p
TA8225H	475p	TDA1510	170p	TDA3420	200p	TDA4860	200p	TDA8452	200p	UPC1167	125p	2SA839	110p	2SA1215	600p	2SB649	35p	2SC930	15p
TA8225L	475p	TDA1512	140p	TDA3501	300p	TDA4866	275p	TDA8453	350p	UPC1170	150p	2SA841	20p	2SA1216	550p	2SB673	100p	2SC936	300p
TA8227	250p	TDA1514A	325p	TDA3502	360p	TDA4881	200p	TDA8461	950p	UPC1173	200p	2SA844	20p	2SA1217	100p	2SB676	85p	2SC941	15p
TA8229K	200p	TDA1515A	200p	TDA3504	300p	TDA4935	300p	TDA8490	225p	UPC1176C	120p	2SA847	25p	2SA1220	75p	2SB688	90p	2SC944	140p
TA8400P	200p	TDA1516Q	350p	TDA3505	275p	TDA4940	200p	TDA8540	250p	UPC1178H	250p	2SA854	30p	2SA1221	70p	2SB703	90p	2SC945	10p
TA8410K	200p	TDA1517	150p	TDA3506	260p	TDA4942	200p	TDA8702	275p	UPC1180C	200p	2SA861	45p	2SA1222	50p	2SB705	200p	2SC950	40p
TA8410P	200p	TDA1519	200p	TDA3507	450p	TDA4944	175p	TDA8703	500p	UPC185H2	400p	2SA872	25p	2SA1226	25p	2SB707	200p	2SC959	225p
TA8432	200p	TDA1519A	200p	TDA3510	200p	TDA4950	100p	TDA8708	600p	UPC1186	80p	2SA872A	50p	2SA1227	250p	2SB716	20p	2SC980	40p
TA8605N	350p	TDA1520	275p	TDA3520	250p	TDA5030A	100p	TDA8730	225p	UPC1187	150p	2SA879	30p	2SA1232	180p	2SB718	60p	2SC982	20p
TA8606N	350p	TDA1521	210p	TDA3530	250p	TDA5140A	200p	TDA8732	300p	UPC1188H	350p	2SA884	100p	2SA1237	25p	2SB727	100p	2SC983	120p
TA8607P	320p	TDA1522	110p	TDA3540	200p	TDA5330T	300p	TDA8735	175p	UPC1191	300p	2SA885	35p	2SA1238	30p	2SB733	75p	2SC1000	20p
TA8611AN	250p	TDA1524	200p	TDA3541	175p	TDA5331T	200p	TDA8740	625p	UPC1197	140p	2SA886	45p	2SA1239	30p	2SB734	35p	2SC1001	950p
TA8615N	480p	TDA1526	225p	TDA3560	260p	TDA5332T	150p	TDA8741	550p	UPC1198H	200p	2SA887	20p	2SA1240	45p	2SB737	20p	2SC1008	20p
TA8628N	350p	TDA1534	2000p	TDA3561	300p	TDA5500	400p	TDA8808T	325p	UPC1210	150p	2SA893	15p	2SA1242	80p	2SB739	22p	2SC1010	225p
TA8831	500p	TDA1540	420p	TDA3561A	300p	TDA5600	450p	TDA8809T	350p	UPC1215V	125p	2SA896	25p	2SA1244	120p	2SB744	55p	2SC1012	75p
TA8632N	550p	TDA1541	500p	TDA3562	260p	TDA5660P	250p	TDA9045	300p	UPC1222	130p	2SA899	40p	2SA1245	55p	2SB750	60p	2SC1013	170p
TA8644N	425p	TDA1542	250p	TDA3562TF	300p	TDA5700	200p	TDA9080	400p	UPC1225H	220p	2SA900	45p	2SA1246	80p	2SB753	100p	2SC1014	140p
TA8646	375p	TDA1543	200p	TDA3563	350p	TDA5701	200p	TDA9102C	250p	UPC1227V	225p	2SA904	20p	2SA1248	35p	2SB754	80p	2SC1030	160p
TA8653N	1500p	TDA1552Q	350p	TDA3564	325p	TDA5708	275p	TDA9403	130p	UPC1228HA	45p	2SA907	650p	2SA1249	100p	2SB764	30p	2SC1046	250p
TA8659AN	900p	TDA1553AQ	325p	TDA3565	220p	TDA5709	375p	TDA9500	750p	UPC1230	200p	2SA909	500p	2SA1252	20p	2SB765	70p	2SC1047	20p
TA8690N	700p	TDA1555Q	375p	TDA3566	280p	TDA5800	850p	TDA9503	550p	UPC1237HA	70p	2SA912	70p	2SA1253	30p	2SB772	25p	2SC1050	280p
TA8691N	450p	TDA1557Q	300p	TDA3567	350p	TDA5820	370p	TDA9513	225p	UPC1238	120p	2SA913	100p	2SA1256	30p	2SB774	50p	2SC1051	250p
TA8701AN	275p	TDA1558Q	300p	TDA3569	300p	TDA5832	125p	TDA9800	225p	UPC1241H	150p	2SA914	90p	2SA1257	30p	2SB775	100p	2SC1061	85p
TA8718N	550p	TDA1560Q	675p	TDA3570	375p	TDA5850	175p	TDA9821	200p	UPC1242H	150p	2SA915	30p	2SA1258	70p	2SB776	110p	2SC1069	175p
TA8720	525p	TDA1571	300p	TDA3580	300p	TDA5930	225p	TEA0652	150p	UPC1245V	130p	2SA916	30p	2SA1261	150p	2SB788	35p	2SC1070	65p
TA8739P	450p	TDA1572	175p	TDA3586	750p	TDA6100Q	150p	TEA0653T	80p	UPC1270H	250p	2SA921	40p	2SA1262	110p	2SB791	130p	2SC1079	300p
TA8872N	450p	TDA1574	125p	TDA3590	250p	TDA6101Q	120p	TEA0655	300p	UPC1274V	250p	2SA928A	25p	2SA1263	280p	2SB794	40p	2SC1080	225p
TAA550	25p	TDA1576	170p	TDA3591	360p	TDA6111Q	225p	TEA0665	300p	UPC1277	240p	2SA933	30p	2SA1264	280p	2SB795	45p	2SC1096	40p
TBA120S	40p	TDA1578A	210p	TDA3592A	300p	TDA6200	750p	TEA1002	650p	UPC1278	240p	2SA934	30p	2SA1265	200p	2SB810	15p	2SC1098	120p
TBA396	70p	TDA1579	130p	TDA3601Q	375p	TDA6600-2	700p	TEA1007	120p	UPC1288V	230p	2SA935	40p	2SA1283	50p	2SB816	160p	2SC1106	180p
TBA520	120p	TDA1589	275p	TDA3602	225p	TDA6610-2	1100p	TEA1009	100p	UPC1297CA	325p	2SA937	20p	2SA1284	60p	2SB817	175p	2SC1114	415p
TBA530	100p	TDA1591	275p	TDA3611	450p	TDA6612-2	900p	TEA1015P	110p	UPC1298	320p	2SA939	140p	2SA1286	60p	2SB819	60p	2SC1115	280p
TBA540	90p	TDA1596	200p	TDA3640	350p	TDA7000	170p	TEA1017	280p	UPC1313H A	100p	2SA940	50p	2SA1289	50p	2SB822	40p	2SC1116	290p
TBA560	90p	TDA1598	160p	TDA3645	400p	TDA7010T	120p	TEA1019	130p	UPC1316C	70p	2SA942	60p	2SA1290	150p	2SB824	60p	2SC1124	270p
TBA800	40p	TDA1600	200p	TDA3651	200p	TDA7020T	175p	TEA1024	150p	UPC1318	300p	2SA949	70p	2SA1293	110p	2SB825	135p	2SC1161	110p
TBA810AS	40p	TDA1602A	400p	TDA3652	500p	TDA7021T	200p	TEA1035	200p	UPC1330HA	80p	2SA950	18p	2SA1294	450p	2SB826	75p	2SC1162	30p
TBA820	55p	TDA1670A	200p	TDA3652-TX10	800p	TDA7050	100p	TEA1039	150p	UPC1335V	320p	2SA951	60p	2SA1295	500p	2SB827	200p	2SC1164	600p
TBA820M	35p	TDA1675	200p	TDA3653	85p	TDA7052	120p	TEA1045	300p	UPC1350	115p	2SA952	30p	2SA1301	260p	2SB828	200p	2SC1165	750p
TBA920	100p	TDA1701	500p	TDA3654	80p	TDA7053	200p	TEA1060	225p	UPC1352C	450p	2SA953	60p	2SA1302	300p	2SB829	200p	2SC1166	100p
TBA950	100p	TDA1771	200p	TDA3654Q	85p	TDA7056	200p	TEA1061	175p	UPC1360C	200p	2SA954	30p	2SA1303	400p	2SB835	75p	2SC1170	180p
TBA990	60p	TDA1870A	200p	TDA3710	300p	TDA7057Q	225p	TEA1062	250p	UPC1362C	250p	2SA957	185p	2SA1304	110p	2SB857	80p	2SC1172	150p
TC5020	200p	TDA1872A	275p	TDA3720	175p	TDA7072	100p	TEA1064	250p	UPC1363	190p	2SA958	60p	2SA1306	110p	2SB861	110p	2SC1173	33p
TC5081AP	80p	TDA1904	80p	TDA3724	300p	TDA7077	175p	TEA1067	150p	UPC1363C	300p	2SA963	120p	2SA1307	100p	2SB863	220p	2SC1195	210p
TC5082P	170p	TDA1905	80p	TDA3725	300p	TDA7211	100p	TEA1068	350p	UPC1364C	350p	2SA965	30p	2SA1309	50p	2SB865	25p	2SC1212	35p
TC5090A	230p	TDA1908A	90p	TDA3730	400p	TDA7220	65p	TEA1080P	170p	UPC1365	250p	2SA966	25p	2SA1315	100p	2SB882	180p	2SC1213	10p
TC9125BP	410p	TDA1910	160p	TDA3740	400p	TDA7222	100p	TEA1087	40p	UPC1366C	130p	2SA968	55p	2SA1317	30p	2SB885	45p	2SC1214	15p
TC9130P	150p	TDA1940	180p	TDA3750	400p	TDA7230A	150p	TEA1101	425p	UPC1370C	300p	2SA970	25p	2SA1318	20p	2SB891	35p	2SC1215	25p
TC9134	750p	TDA1941	300p	TDA3755	425p	TDA7231A	80p	TEA1330	65p	UPC1373	85p	2SA979	35p	2SA1319	25p	2SB892	25p	2SC1216	200p
TC9135P	125p	TDA1950	175p	TDA3760	350p	TDA7233	60p	TEA1511	150p	UPC1377C	200p	2SA984	25p	2SA1320	45p	2SB895	60p	2SC1222	15p
TC9137P	500p	TDA2002	50p	TDA3765V	225p	TDA7240	175p	TEA2000	500p	UPC1378	1000p	2SA985	60p	2SA1321	80p	2SB908	70p	2SC1226	75p
TC9138AP	150p	TDA2003	65p	TDA3771	460p	TDA7241	250p	TEA2014A	80p	UPC1379C	170p	2SA988	25p	2SA1327	130p	2SB926	30p	2SC1237	250p
TC9142	320p	TDA2004	150p	TDA3780	400p	TDA7245	225p	TEA2018A	80p	UPC1382	110p	2SA991	30p	2SA1329	200p	2SB941	60p	2SC1247A	35p
TC9143	300p	TDA2005	150p	TDA3791	200p	TDA7250	400p	TEA2019	600p	UPC1384	425p	2SA992	30p	2SA1346	20p	2SB950	180p	2SC1252	850p
TC9145	150p	TDA2006	70p	TDA3800	250p	TDA7255	400p	TEA2025B	75p	UPC1387C	250p	2SA993	50p	2SA1348	45p	2SB951	190p	2SC1278	110p
TC9148	200p	TDA2007	120p	TDA3803A	500p	TDA7256	400p	TEA2028	325p	UPC1394	120p	2SA995	60p	2SA1352	100p	2SB953	90p	2SC1279	30p
TC9149	225p	TDA2008	100p	TDA3810	200p	TDA7262	325p	TEA2028B	375p	UPC1397	350p	2SA999	30p	2SA1353	100p	2SB975	100p	2SC1308K	350p
TC9150	425p	TDA2009	160p	TDA3825	150p	TDA7272	170p	TEA2029A	650p	UPC1403CA	650p	2SA1005	25p	2SA1356	100p	2SB985	30p	2SC1312	40p
TC9151P	425p	TDA2010	150p	TDA3827	110p	TDA7273	80p	TEA2029C	270p	UPC1406HA	70p	2SA1006	90p	2SA1357	65p	2SB986	40p	2SC1318	10p
TC9152	425p	TDA2020	120p	TDA3840	200p	TDA7274	45p	TEA2031A	125p	UPC1420CA	450p	2SA1008	125p	2SA1358	130p	2SB1009	110p	2SC1325	400p
TC9153	300p	TDA2030	80p	TDA3842	200p	TDA7275	75p	TEA2037	200p	UPC1421CA	650p	2SA1009	200p	2SA1359	45p	2SB1010	25p	2SC1327	20p
TC9154AP	225p	TDA2030H	100p	TDA3843	200p	TDA7282	50p	TEA2114	200p	UPC1423CA	550p	2SA1010	225p	2SA1360	45p	2SB1012	55p	2SC1328	15p
TC9156	300p	TDA2040	140p	TDA3845	225p	TDA7284	100p	TEA2117	450p	UPC1470	200p	2SA1011	80p	2SA1362	25p	2SB1015	60p	2SC1342	15p
TC9158P	450p	TDA2048	600p	TDA3856	300p	TDA7302	450p	TEA2130	350p	UPC1474HA	75p	2SA1012	85p	2SA1370	50p	2SB1016	130p	2SC1343	200p
TC9162	275p	TDA2051V	450p	TDA3857	200p	TDA7310	800p	TEA2164	160p	UPC1484CA	300p	2SA1013	100p	2SA1371	100p	2SB1017	40p	2SC1345	15p
TC9163	375p	TDA2052V	525p	TDA3950	225p	TDA7313	650p	TEA2260	225p	UPC1488H	115p	2SA1015	10p	2SA1376	30p	2SB1018	130p	2SC1346	100p
TC9164	400p	TDA2054M	110p	TDA4001	250p	TDA7318	550p	TEA2261	185p	UPC1498H	500p	2SA1016	30p	2SA1380	75p	2SB1020	120p	2SC1358	270p
TC9167P	100p	TDA2107	250p	TDA4050	150p	TDA7330A	700p	TEA2262	275p	UPC1505C	400p	2SA1018	100p	2SA1381	100p	2SB1039	65p	2SC1359	15p
TC9172P	300p	TDA2148	325p	TDA4052	500p	TDA7350	300p	TEA3717DP	160p	UPC1513HA	70p	2SA1020	30p	2SA1382	120p	2SB1066	40p	2SC1360	70p
TC9174P	325p	TDA2151	375p	TDA4060	500p	TDA7359	300p	TEA3718S	175p	UPC1514CA	200p	2SA1021	35p	2SA1385	180p	2SB1068	160p	2SC1364	25p
TC9176P	500p	TDA2170	1300p	TDA4092	250p	TDA7360	700p	TEA5030	135p	UPC1515CA	250p	2SA1023	60p	2SA1386	400p	2SB1077	180p	2SC1368	75p
TC9177P	225p	TDA2220	200p	TDA4100	150p	TDA7361	175p	TEA5040	650p	UPC1520CA	250p	2SA1026	90p	2SA1387	75p	2SB1098	80p	2SC1382	40p
TCA9940	100p	TDA2270	250p	TDA4173AF	325p	TDA7370V	325p	TEA5101A	175p	UPC1521HA	120p	2SA1029	60p	2SA1396	120p	2SB1099	75p	2SC1383	25p
TCEP100	100p	TDA2320	80p	TDA4180	145p	TDA7374V	350p	TEA5110	175p	UPC1536C	550p	2SA1036	60p	2SA1399	25p	2SB1109	40p	2SC1384	20p
TD62308AP	200p	TDA2501	300p	TDA4190	180p	TDA7770	140p	TEA5114A	200p	2SA329	75p	2SA1037	50p	2SA1400	150p	2SB1123	50p	2SC1393	20p
TD62382	200p	TDA2502	175p	TDA4200	300p	TDA8114	225p	TEA5115	220p	2SA467	40p	2SA1038	40p	2SA1423	30p	2SB1133	50p	2SC1394	15p
TD62506	200p	TDA2503	200p	TDA4210	160p	TDA8115	200p	TEA5116	220p	2SA473	29p	2SA1048	25p	2SA1428	35p	2SB1134	65p	2SC1398	55p
TD62705	250p	TDA2504	200p	TDA4260	250p	TDA8116	350p	TEA5170	200p	2SA483	90p	2SA1051	300p	2SA1441	110p	2SB1135	60p	2SC1399	100p
TD6304AP	300p	TDA2505	220p	TDA4280	320p	TDA8120B	400p	TEA5500	325p	2SA484	80p	2SA1052	15p	2SA1442	110p	2SB1140	45p	2SC1400	50p
TD6306P	350p	TDA2506	400p	TDA4282	360p	TDA8124	250p	TEA5501	225p	2SA489	50p	2SA1060	120p	2SA1443	130p	2SB1143	40p	2SC1403	500p
TD6350P	200p	TDA2507	450p	TDA4283T	450p	TDA8134	225p	TEA5550	150p	2SA490	45p	2SA1061	300p	2SA1450	30p	2SB1151	75p	2SC1407	50p
TD6359P	300p	TDA2507T	450p	TDA4290	125p	TDA8135	225p	TEA5560	130p	2SA493	25p	2SA1069	150p	2SA1459	40p	2SB1162	400p	2SC1413	150p
TDA1001	200p	TDA2510	450p	TDA4400	175p	TDA8136	225p	TEA5570	85p	2SA495	40p	2SA1073	375p	2SA1462	25p	2SB1163	370p	2SC1419	50p
TDA1002	200p	TDA2514A	500p	TDA4420	120p	TDA8137	200p	TEA5580	165p	2SA496	30p	2SA1076	230p	2SA1469	100p	2SB1168	50p	2SC1426	700p
TDA1003	150p	TDA2515	450p	TDA4421	300p	TDA8138	200p	TEA5581	200p	2SA505	120p	2SA1077	300p	2SA1475	95p	2SB1182	40p	2SC1429	50p
TDA1005A	175p	TDA2530	300p	TDA4426	170p	TDA8138A	130p	TEA5591	200p	2SA509	35p	2SA1080	125p	2SA1488	150p	2SB1185	50p	2SC1431	400p
TDA1010A	80p	TDA2532	100p	TDA4427	200p	TDA8138B	200p	TEA5620	300p	2SA537	170p	2SA1081	80p	2SA1489	300p	2SB1202	45p	2SC1444	275p
TDA1011	75p	TDA2540	150p	TDA4431	150p	TDA8139	200p	TEA5630	225p	2SA539	20p	2SA1082	80p	2SA1490	225p	2SB1203	45p	2SC1445	350p
TDA1012	120p	TDA2541	70p	TDA4433	100p	TDA8140	200p	TEA5640E	750p	2SA544	650p	2SA1083	20p	2SA1491	300p	2SB1204	45p	2SC1446	55p
TDA1013A	110p	TDA2542	110p	TDA4437	125p	TDA8143	160p	TEA5701	650p	2SA550	150p	2SA1084	100p	2SA1492	260p	2SB1205	40p	2SC1447	70p
TDA1015	85p	TDA2543	210p	TDA4439	220p	TDA8145	120p	TEA6000	400p	2SA562	30p	2SA1085	75p	2SA1493	500p	2SB1223	60p	2SC1449	120p
TDA1016	140p	TDA2544	200p	TDA4440	180p	TDA8146	200p	TEA6100	350p	2SA564	15p	2SA1091	100p	2SA1494	450p	2SB1243	40p	2SC1450	200p
TDA1020	110p	TDA2545	120p	TDA4442	240p	TDA8160	125p	TEA6200	225p	2SA571	650p	2SA1093	180p	2SA1516	280p	2SB1274	40p	2SC1454	250p
TDA1022	330p	TDA2546A	200p	TDA4443	250p	TDA8170	170p	TEA6300	500p	2SA603	100p	2SA1094	190p	2SA1519	20p	2SB1282	300p	2SC1470	120p
TDA1023	130p	TDA2548	200p	TDA4445	220p	TDA8172	200p	TEA6310T	425p	2SA606	200p	2SA1095	300p	2SA1523	45p	2SB1318	40p	2SC1472	40p
TDA1024	160p	TDA2549	300p	TDA4450	225p	TDA8173	175p	TEA6414A	425p	2SA608	15p	2SA1096	80p	2SA1535	175p	2SB1375	45p	2SC1473	15p
TDA1025	320p	TDA2556	175p	TDA4452	250p	TDA8174	200p	TEA6415B	525p	2SA614	150p	2SA1102	130p	2SA1538	55p	2SB1382	350p	2SC1474	45p
TDA1028	175p	TDA2556	230p	TDA4453	275p	TDA8175	300p	TEA6420	360p	2SA628	20p	2SA1103	130p	2SA1540	50p	2SB1468	100p	2SC1501	70p
TDA1029	200p	TDA2557	225p	TDA4480	280p	TDA8178	650p	TEA8172	125p	2SA634	50p	2SA1104	140p	2SA1598	220p	2SC182	75p	2SC1505	55p
TDA1035	160p	TDA2558	400p	TDA4481	215p	TDA8179S	750p	TL431	45p	2SA636	50p	2SA1105	250p	2SA1599	220p	2SC372	25p	2SC1507	45p
TDA1038	500p	TDA2574V	350p	TDA4482	200p	TDA8185	180p	TL494	100p	2SA639	60p	2SA1106	160p	2SA1600	250p	2SC380	10p	2SC1509	35p
TDA1041E	250p	TDA2575A	100p	TDA4500	300p	TDA8190	200p	TLO61	40p	2SA640	60p	2SA1111	90p	2SA1601	200p	2SC388A	25p	2SC1514	35p
TDA1041P	180p	TDA2577A	200p	TDA4501	280p	TDA8191	425p	TLO64	80p	2SA642	50p	2SA1112	150p	2SA1625	40p	2SC394	60p	2SC1515	60p
TDA1044	110p	TDA2578A	200p	TDA4502	400p	TDA8192	200p	TLO71	38p	2SA643	25p	2SA1115	30p	2SA1626	90p	2SC403	25p	2SC1520	45p
TDA1047	200p	TDA2579A	210p	TDA4503	325p	TDA8196	120p	TLO74	80p	2SA673	15p	2SA1120	40p	2SA1640	100p	2SC454	15p	2SC1541	110p
TDA1048	200p	TDA2582	130p	TDA4505A	300p	TDA8205	1250p	TLO83	55p	2SA677	35p	2SA1123	40p	2SA1652	70p	2SC458	10p	2SC1545	120p
TDA1053	300p	TDA2590	170p	TDA4505E	275p	TDA8213	175p	TLO84	70p	2SA678	26p	2SA1124	60p	2SA1667	175p	2SC460	10p	2SC1567	40p
TDA1054	180p	TDA2591	110p	TDA4505K	450p	TDA8214B	225p	TMP47C-434N	1250p	2SA683	25p	2SA1127	50p	2SA1668	180p	2SC461	15p	2SC1568	35p
TDA1057	60p	TDA2591Q	150p	TDA4505M	1000p	TDA8215H	300p	TPU2732	800p	2SA684	25p	2SA1133	120p	2SA1671	310p	2SC495	45p	2SC1569	55p
TDA1059B	40p	TDA2593	80p	TDA4510	200p	TDA8217	225p	TPU2735	500p	2SA699	100p	2SA1135	130p	2SA1673	425p	2SC496	25p	2SC1570	40p
TDA1060	140p	TDA2594	300p	TDA4532	200p	TDA8303	250p	UC3524	100p	2SA705	70p	2SA1141	200p	2SA1680	40p	2SC497	85p	2SC1571	50p
TDA1062	140p	TDA2595	200p	TDA4555	275p	TDA8304	400p	UC3842N	60p	2SA706	140p	2SA1142	100p	2SA1706	25p	2SC515	100p	2SC1573	25p
TDA1068	75p	TDA2600	400p	TDA4556	370p	TDA8305	500p	UC3843	125p	2SA708	50p	2SA1143	15p	2SB175	45p	2SC535	30p	2SC1576	550p
TDA1072	150p	TDA2611A	100p	TDA4557	200p	TDA8340	150p	UC3844	70p	2SA711	280p	2SA1145	40p	2SB324	40p	2SC536	20p	2SC1580	600p
TDA1074	280p	TDA2616	250p	TDA4560	270p	TDA8341	250p	UPC20C	220p	2SA715	50p	2SA1146	200p	2SB337	150p	2SC605	100p	2SC1583	25p
TDA1077	250p	TDA2630	300p	TDA4565	150p	TDA8349A	350p	UPC554	130p	2SA719	50p	2SA1151	30p	2SB474	250p	2SC619	100p	2SC1586	540p
TDA1082	275p	TDA2640	350p	TDA4566	250p	TDA7350Q	275p	UPC555	60p	2SA720	20p	2SA1152	150p	2SB492	80p	2SC641	80p	2SC1617	340p
TDA1083	95p	TDA2653A	350p	TDA4568	225p	TDA8351	200p	UPC556H	80p	2SA725	80p	2SA1153	30p	2SB511	55p	2SC644	10p	2SC1619	170p
TDA1085	170p	TDA2654	200p	TDA4570	200p	TDA8360N3	800p	UPC571	220p	2SA726	20p	2SA1154	22p	2SB525	65p	2SC647	300p	2SC1623	50p
TDA1087	60p	TDA2658	300p	TDA4580	400p	TDA8361N3	900p	UPC574	60p	2SA733	15p	2SA1156	90p	2SB527	130p	2SC681	250p	2SC1624	60p
TDA1092	100p	TDA2670	150p	TDA4600	200p	TDA8362AN	1200p	UPC575C2	90p	2SA740	90p	2SA1162	30p	2SB531	400p	2SC683	35p	2SC1626	55p
TDA1097	475p	TDA2690	100p	TDA4600II	160p	TDA8362N3	1200p	UPC577	64p	2SA742	450p	2SA1163	15p	2SB536	80p	2SC708	100p	2SC1627	15p
TDA1151	40p	TDA2710-1	400p	TDA4601	120p	TDA8366N2	1500p	UPC592	95p	2SA747A	425p	2SA1169	500p	2SB537	90p	2SC710	15p	2SC1628	75p
TDA1154	50p	TDA2721	200p	TDA4605	190p	TDA8372A	1650p	UPC595	190p	2SA748	60p	2SA1170	500p	2SB544	22p	2SC711	15p	2SC1634	50p
TDA1170	85p	TDA2730	200p	TDA4610	370p	TDA8380	200p	UPC596	190p	2SA764	200p	2SA1173	60p	2SB546	45p	2SC730	350p	2SC1667	450p
TDA1170N	85p	TDA2740	300p	TDA4650	300p	TDA8385	275p	UPC1001	220p	2SA769	80p	2SA1174	25p	2SB549	50p	2SC732	40p	2SC1669	100p
TDA1175	175p	TDA2750	200p	TDA4660	200p	TDA8390A	650p	UPC1004C	130p	2SA770	200p	2SA1175	30p	2SB560	25p	2SC735	40p	2SC1674	15p

GRANDATA LTD Tel: 0181 900 2329 Fax: 0181 903 6126

JAPANESE TRANSISTORS

Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
2SC1675	90p	2SC2261	700p	2SC2719	25p	2SC3263	280p	2SC3798	220p	2SD257	195p	2SD880	40p	2SD1327	150p	2SD1763A	60p	2SK312	750p
2SC1678	80p	2SC2267	90p	2SC2721	120p	2SC3264	390p	2SC3807	120p	2SD287	250p	2SD882	25p	2SD1328	60p	2SD1764	70p	2SK315	70p
2SC1683	100p	2SC2270	60p	2SC2724	15p	2SC3269	50p	2SC3808	70p	2SD291	250p	2SD889	35p	2SD1330	50p	2SD1765	70p	2SK320	120p
2SC1684	30p	2SC2271	25p	2SC2738	200p	2SC3270	50p	2SC3811	80p	2SD313	25p	2SD892A	75p	2SD1347	70p	2SD1769	110p	2SK323	130p
2SC1685	30p	2SC2274	15p	2SC2749	350p	2SC3271	75p	2SC3831	250p	2SD315	75p	2SD894	35p	2SD1348	65p	2SD1773	100p	2SK332	175p
2SC1729	900p	2SC2275	50p	2SC2750	300p	2SC3277	280p	2SC3832	135p	2SD325	30p	2SD895	100p	2SD1350	150p	2SD1776	70p	2SK359	40p
2SC1730	10p	2SC2278	70p	2SC2751	270p	2SC3279	30p	2SC3833	250p	2SD330	65p	2SD896	200p	2SD1376	60p	2SD1783	70p	2SK363	50p
2SC1735	70p	2SC2283	700p	2SC2752	75p	2SC3280	200p	2SC3851	100p	2SD348	300p	2SD898B	225p	2SD1378	60p	2SD1785	160p	2SK364	40p
2SC1740	10p	2SC2290	1800p	2SC2767	300p	2SC3281	200p	2SC3852	80p	2SD350	320p	2SD900	400p	2SD1379	100p	2SD1789	210p	2SK367	40p
2SC1741	35p	2SC2291	40p	2SC2769	400p	2SC3284	600p	2SC3853	220p	2SD357	40p	2SD905	450p	2SD1380	100p	2SD1796	120p	2SK369	30p
2SC1755	90p	2SC2298	35p	2SC2773	700p	2SC3293	85p	2SC3855	220p	2SD358	40p	2SD916	130p	2SD1382	60p	2SD1802	75p	2SK373	40p
2SC1756	35p	2SC2307	300p	2SC2774	500p	2SC3298	50p	2SC3857	500p	2SD359	50p	2SD917	300p	2SD1384	50p	2SD1806	75p	2SK374	45p
2SC1758	30p	2SC2308	10p	2SC2785	40p	2SC3299	120p	2SC3858	550p	2SD361	100p	2SD921	320p	2SD1390	350p	2SD1812	45p	2SK386	600p
2SC1760	70p	2SC2312	300p	2SC2786	20p	2SC3300	400p	2SC3866	275p	2SD362	100p	2SD923	360p	2SD1391	250p	2SD1815	50p	2SK389	115p
2SC1775	10p	2SC2314	70p	2SC2787	10p	2SC3303	100p	2SC3868	100p	2SD371	240p	2SD946	120p	2SD1392	85p	2SD1825	60p	2SK400	700p
2SC1781	20p	2SC2316	150p	2SC2791	500p	2SC3306	130p	2SC3870	200p	2SD380	650p	2SD947	100p	2SD1395	80p	2SD1827	120p	2SK405	450p
2SC1789	100p	2SC2320	10p	2SC2792	220p	2SC3307	600p	2SC388A	25p	2SD381	50p	2SD950	300p	2SD1396	120p	2SD1843	70p	2SK414	550p
2SC1809	40p	2SC2324	120p	2SC2793	700p	2SC3309	150p	2SC3883	210p	2SD382	75p	2SD951	200p	2SD1397	100p	2SD1846	350p	2SK415	500p
2SC1810	250p	2SC2328A	50p	2SC2808	40p	2SC3310	125p	2SC3884A	200p	2SD386	70p	2SD957A	520p	2SD1398	120p	2SD1847	275p	2SK423	75p
2SC1815	10p	2SC2310	25p	2SC2810	360p	2SC3316	280p	2SC3885	250p	2SD388	150p	2SD958	60p	2SD1399	300p	2SD1849	280p	2SK427	50p
2SC1819	70p	2SC2315	175p	2SC2812	40p	2SC3317	350p	2SC3885A	290p	2SD389	60p	2SD965	35p	2SD1400	280p	2SD1850	325p	2SK430	200p
2SC1826	60p	2SC2329	480p	2SC2814	40p	2SC3326	50p	2SC3886A	275p	2SD400	14p	2SD970	170p	2SD1402	120p	2SD1853	40p	2SK511	450p
2SC1827	60p	2SC2230	300p	2SC2824	75p	2SC3327	60p	2SC3890	150p	2SD401	50p	2SD972	40p	2SD1403	225p	2SD1856	40p	2SK513	325p
2SC1829	500p	2SC2331	50p	2SC2825	900p	2SC3328	50p	2SC3892A	250p	2SD402	120p	2SD973	60p	2SD1405	80p	2SD1857	75p	2SK526	160p
2SC1833	27p	2SC2333	200p	2SC2826	200p	2SC3330	20p	2SC3893	225p	2SD414	45p	2SD973A	70p	2SD1406	60p	2SD1858	40p	2SK531	350p
2SC1834	50p	2SC2334	80p	2SC2827	130p	2SC3331	25p	2SC3895	325p	2SD415	55p	2SD982	90p	2SD1407	60p	2SD1863	35p	2SK534	700p
2SC1841	12p	2SC2335	55p	2SC2832	300p	2SC3333	120p	2SC3896	400p	2SD424	350p	2SD985	120p	2SD1408	125p	2SD1864	85p	2SK537	900p
2SC1844	50p	2SC2336A	125p	2SC2834	280p	2SC3345	100p	2SC3897	400p	2SD426	150p	2SD986	120p	2SD1409	170p	2SD1877	175p	2SK538	350p
2SC1845	15p	2SC2344	150p	2SC2837	250p	2SC3346	130p	2SC3907	250p	2SD427	350p	2SD998	70p	2SD1411	85p	2SD1878	160p	2SK539	1100p
2SC1846	35p	2SC2347	35p	2SC2839	40p	2SC3352	200p	2SC3927	250p	2SD438	35p	2SD1010	40p	2SD1412	75p	2SD1879	275p	2SK544	30p
2SC1847	45p	2SC2353	120p	2SC2853	70p	2SC3353	280p	2SC3940	40p	2SD467	15p	2SD1012	40p	2SD1413	60p	2SD1880	360p	2SK552	250p
2SC1855	85p	2SC2360	120p	2SC2873	60p	2SC3355	50p	2SC3943	75p	2SD468	15p	2SD1020	40p	2SD1415	190p	2SD1881	350p	2SK553	225p
2SC1856	25p	2SC2361	150p	2SC2877	120p	2SC3356	120p	2SC3944	80p	2SD471	20p	2SD1021	120p	2SD1417	75p	2SD1884	300p	2SK555	320p
2SC1865	700p	2SC2362	50p	2SC2878	20p	2SC3358	50p	2SC3950	120p	2SD476	100p	2SD1022	250p	2SD1425	260p	2SD1886	300p	2SK556	500p
2SC1870	700p	2SC2365	280p	2SC2879	3200p	2SC3376	300p	2SC3953	50p	2SD525	50p	2SD1024	850p	2SD1426	135p	2SD1887	225p	2SK557	400p
2SC1871	425p	2SC2369	100p	2SC2882	60p	2SC3377	50p	2SC3955	60p	2SD526	70p	2SD1027	850p	2SD1427	160p	2SD1894	300p	2SK559	600p
2SC1875	220p	2SC2371	25p	2SC2883	60p	2SC3378	120p	2SC3964	100p	2SD545	18p	2SD1030	75p	2SD1428	180p	2SD1895	225p	2SK560	580p
2SC1881	70p	2SC2373	210p	2SC2898	200p	2SC3379	1200p	2SC3972	250p	2SD549	120p	2SD1031	70p	2SD1430	280p	2SD1910	175p	2SK566	475p
2SC1890	15p	2SC2383	50p	2SC2899	50p	2SC3381	130p	2SC3973	210p	2SD551	300p	2SD1036	600p	2SD1431	200p	2SD1911	300p	2SK606	70p
2SC1895	500p	2SC2389	45p	2SC2909	60p	2SC3383	80p	2SC3975	210p	2SD554	225p	2SD1046	200p	2SD1432	400p	2SD1913	50p	2SK612	80p
2SC1904	125p	2SC2407	110p	2SC2910	25p	2SC3393	80p	2SC3987	160p	2SD555	500p	2SD1047	180p	2SD1433	300p	2SD1929	50p	2SK684	950p
2SC1906	15p	2SC2408	120p	2SC2911	80p	2SC3397	20p	2SC3996	600p	2SD556	225p	2SD1051	130p	2SD1438	60p	2SD1930	50p	2SK685	1150p
2SC1907	20p	2SC2412K	50p	2SC2912	120p	2SC3399	50p	2SC3997	1250p	2SD558	200p	2SD1055	60p	2SD1439	165p	2SD1933	45p	2SK699	100p
2SC1909	250p	2SC2440	200p	2SC2921	650p	2SC3400	35p	2SC3998	800p	2SD560	50p	2SD1060	130p	2SD1441	220p	2SD1939	60p	2SK719	300p
2SC1913	90p	2SC2458	10p	2SC2922	480p	2SC3401	50p	2SC4006	100p	2SD571	20p	2SD1062	150p	2SD1442	80p	2SD1941	350p	2SK724	500p
2SC1914	30p	2SC2459	50p	2SC2923	75p	2SC3402	40p	2SC4020	150p	2SD575	530p	2SD1063	200p	2SD1445	200p	2SD1944	50p	2SK725	550p
2SC1921	15p	2SC2466	55p	2SC2928	550p	2SC3405	130p	2SC4023	325p	2SD592	25p	2SD1064	250p	2SD1446	300p	2SD1958	80p	2SK726	425p
2SC1922	175p	2SC2486	275p	2SC2929	280p	2SC3409	400p	2SC4029	350p	2SD596	25p	2SD1065	160p	2SD1450	60p	2SD1959	210p	2SK727	475p
2SC1923	10p	2SC2492	50p	2SC2934	75p	2SC3416	30p	2SC4043	45p	2SD600	30p	2SD1069	150p	2SD1451	200p	2SD1978	50p	2SK739	400p
2SC1929	180p	2SC2470	65p	2SC2937	250p	2SC3417	90p	2SC4046	40p	2SD601	40p	2SD1073	350p	2SD1452	275p	2SD1984	60p	2SK758	300p
2SC1940	110p	2SC2481	120p	2SC2939	400p	2SC3419	120p	2SC4056	200p	2SD602	60p	2SD1088	150p	2SD1453	140p	2SD1991	50p	2SK769	500p
2SC1941	27p	2SC2482	20p	2SC2944	300p	2SC3420	80p	2SC4059	400p	2SD612	50p	2SD1094	375p	2SD1455	250p	2SD1994	200p	2SK786	200p
2SC1942	350p	2SC2483	120p	2SC2958	50p	2SC3421	45p	2SC4064	140p	2SD613	70p	2SD1110	225p	2SD1457	165p	2SD1996	45p	2SK787	800p
2SC1944	350p	2SC2484	185p	2SC2962	800p	2SC3422	75p	2SC4106	150p	2SD617	300p	2SD1111	20p	2SD1458	50p	2SD2006	75p	2SK791	225p
2SC1945	350p	2SC2485	400p	2SC2979	160p	2SC3423	60p	2SC4107	175p	2SD633	70p	2SD1113	225p	2SD1459	60p	2SD2010	250p	2SK792	300p
2SC1946	1500p	2SC2491	200p	2SC2987	250p	2SC3425	65p	2SC4123	230p	2SD636	10p	2SD1128	200p	2SD1468	40p	2SD2011	60p	2SK793	300p
2SC1947	450p	2SC2498	50p	2SC2988	150p	2SC3446	150p	2SC4124	200p	2SD637	15p	2SD1133	65p	2SD1487	225p	2SD2012	50p	2SK794	315p
2SC1953	45p	2SC2500	25p	2SC2995	60p	2SC3447	130p	2SC4125	275p	2SD638	15p	2SD1135	75p	2SD1494	150p	2SD2018	65p	2SK796	600p
2SC1957	70p	2SC2502	140p	2SC2999	50p	2SC3456	200p	2SC4137	40p	2SD639	20p	2SD1138	40p	2SD1496	300p	2SD2033	80p	2SK809	850p
2SC1959	10p	2SC2503	600p	2SC3001	1400p	2SC3457	125p	2SC4138	200p	2SD640	350p	2SD1140	40p	2SD1497	230p	2SD2061	100p	2SK812	150p
2SC1962	175p	2SC2512	20p	2SC3019	320p	2SC3459	180p	2SC4157	400p	2SD655	18p	2SD1142	350p	2SD1497-02	350p	2SD2066	250p	2SK817	325p
2SC1967	1300p	2SC2517	120p	2SC3020	1450p	2SC3460	130p	2SC4159	100p	2SD661	60p	2SD1145	25p	2SD1505	90p	2SD2125	180p	2SK851	550p
2SC1969	160p	2SC2519	60p	2SC3022	1850p	2SC3461	275p	2SC4161	125p	2SD666	25p	2SD1148	175p	2SD1506	50p	2SD2136	85p	2SK872	650p
2SC1970	100p	2SC2527	300p	2SC3025	500p	2SC3466	225p	2SC4169	60p	2SD667	20p	2SD1153	30p	2SD1508	60p	2SD2144	35p	2SK875	475p
2SC1971	400p	2SC2534	150p	2SC3026	450p	2SC3468	70p	2SC4199	400p	2SD669	35p	2SD1159	65p	2SD1509	100p	2SD2151	175p	2SK903	500p
2SC1972	600p	2SC2535	300p	2SC3030	300p	2SC3481	300p	2SC4204	60p	2SD673	350p	2SD1160	150p	2SD1511	75p	2SD2255	175p	2SK904	500p
2SC1973	150p	2SC2538	100p	2SC3037	125p	2SC3482	275p	2SC4231	250p	2SD676	250p	2SD1163A	220p	2SD1519	250p	2SD2331	250p	2SK951	275p
2SC1975	120p	2SC2540	1900p	2SC3038	125p	2SC3486	275p	2SC4235	300p	2SD717	180p	2SD1164	75p	2SD1521	70p	2SD2333	150p	2SK952	275p
2SC1980	30p	2SC2542	300p	2SC3039	80p	2SC3502	50p	2SC4236	450p	2SD718	85p	2SD1168	270p	2SD1525	450p	2SD2340	225p	2SK955	450p
2SC1983	75p	2SC2545	55p	2SC3040	260p	2SC3503	50p	2SC4237	500p	2SD722	240p	2SD1169	280p	2SD1526	100p	2SJ48	425p	2SK956	400p
2SC1984	150p	2SC2546	25p	2SC3042	300p	2SC3504	120p	2SC4242	120p	2SD725	200p	2SD1173	350p	2SD1541	350p	2SJ56	700p	2SK962	700p
2SC1985	100p	2SC2547	65p	2SC3052	30p	2SC3505	240p	2SC4278	175p	2SD726	275p	2SD1185	280p	2SD1545	275p	2SJ74	60p	2SK1023	550p
2SC1986	100p	2SC2550	50p	2SC3057	150p	2SC3506	250p	2SC4288A	650p	2SD731	250p	2SD1186	400p	2SD1546	350p	2SJ76	220p	2SK1036	450p
2SC2001	15p	2SC2551	70p	2SC3068	60p	2SC3507	650p	2SC4300	200p	2SD732	250p	2SD1189	55p	2SD1548	400p	2SJ77	350p	2SK1057	600p
2SC2002	15p	2SC2552	60p	2SC3070	35p	2SC3509	750p	2SC4301	300p	2SD734	15p	2SD1191	120p	2SD1554	170p	2SJ79	225p	2SK1058	800p
2SC2003	20p	2SC2553	200p	2SC3071	25p	2SC3514	170p	2SC4304	225p	2SD741	120p	2SD1192	90p	2SD1555	150p	2SJ103	75p	2SK1081	700p
2SC2004	20p	2SC2555	120p	2SC3073	100p	2SC3518	120p	2SC4313	600p	2SD743	130p	2SD1196	150p	2SD1556	225p	2SJ109	200p	2SK1082	450p
2SC2022	110p	2SC2562	90p	2SC3074	200p	2SC3519	250p	2SC4381	150p	2SD757	120p	2SD1197	150p	2SD1565	75p	2SJ113	1050p	2SK1102	375p
2SC2023	180p	2SC2563	200p	2SC3075	150p	2SC3526	45p	2SC4382	200p	2SD760	70p	2SD1198	60p	2SD1571	170p	2SJ114	1150p	2SK1117	250p
2SC2026	30p	2SC2568	120p	2SC3077	120p	2SC3528	750p	2SC4386	275p	2SD762	100p	2SD1207	40p	2SD1572	100p	2SJ116	1200p	2SK1118	225p
2SC2027	200p	2SC2570	30p	2SC3086	150p	2SC3531	225p	2SC4387	425p	2SD763	140p	2SD1210	280p	2SD1575	200p	2SJ117	550p	2SK1120	550p
2SC2036	50p	2SC2571	350p	2SC3089	130p	2SC3549	200p	2SC4408	50p	2SD768	180p	2SD1211	120p	2SD1576	150p	2SJ119	700p	2SK1190	350p
2SC2037	50p	2SC2577	110p	2SC3101	750p	2SC3552	270p	2SC4429	275p	2SD772	200p	2SD1213	220p	2SD1577	250p	2SJ162	680p	2SK1191	800p
2SC2053	120p	2SC2578	170p	2SC3112	35p	2SC3568	200p	2SC4431	90p	2SD773	20p	2SD1218	75p	2SD1579	80p	2SJ175	200p	2SK1197	700p
2SC2055	150p	2SC2579	110p	2SC3114	40p	2SC3577	275p	2SC4466	325p	2SD774	30p	2SD1223	75p	2SD1589	60p	2SJ182	150p	2SK1217	700p
2SC2058	20p	2SC2580	175p	2SC3116	75p	2SC3584	200p	2SC4467	175p	2SD777	400p	2SD1225	70p	2SD1590	100p	2SJ200	625p	2SK1220	350p
2SC2060	40p	2SC2581	225p	2SC3117	120p	2SC3591	200p	2SC4468	250p	2SD784	650p	2SD1227	40p	2SD1591	310p	2SJ307	175p	2SK1221	200p
2SC2061	75p	2SC2588	600p	2SC3122	50p	2SC3595	220p	2SC4517	200p	2SD786	100p	2SD1229	250p	2SD1593	125p	2SK19	45p	2SK1275	275p
2SC2068	60p	2SC2590	40p	2SC3148	145p	2SC3597	75p	2SC4517A	225p	2SD787	20p	2SD1237	300p	2SD1595	70p	2SK33	40p	2SK1296	350p
2SC2071	140p	2SC2591	50p	2SC3149	180p	2SC3599	140p	2SC4531	450p	2SD788	30p	2SD1238	300p	2SD1608	210p	2SK40	50p	2SK1299	450p
2SC2073	40p	2SC2592	200p	2SC3150	100p	2SC3600	175p	2SC4532	1000p	2SD789	20p	2SD1244	25p	2SD1609	45p	2SK55	100p	2SK1317	900p
2SC2075	60p	2SC2603	10p	2SC3151	175p	2SC3606	100p	2SC4542	400p	2SD792	400p	2SD1246	20p	2SD1632	320p	2SK68	100p	2SK1338	250p
2SC2078	95p	2SC2610	60p	2SC3152	130p	2SC3607	150p	2SC4742	275p	2SD794	33p	2SD1247	40p	2SD1637	50p	2SK73	75p	2SK1341	500p
2SC2085	100p	2SC2611	30p	2SC3153	175p	2SC3608	65p	2SC4744	350p	2SD795A	140p	2SD1251	180p	2SD1647	40p	2SK97	200p	2SK1342	500p
2SC2086	60p	2SC2621	70p	2SC3156	350p	2SC3616	45p	2SC4745	550p	2SD798	175p	2SD1254	55p	2SD1649	260p	2SK106	40p	2SK1350	200p
2SC2092	100p	2SC2625	190p	2SC3157	200p	2SC3636	280p	2SC4747	375p	2SD799	150p	2SD1263	90p	2SD1650	150p	2SK107	40p	2SK1377	150p
2SC2094	1200p	2SC2626	600p	2SC3158	260p	2SC3642	225p	2SC4757	200p	2SD809	45p	2SD1264	55p	2SD1651	150p	2SK109	150p	2SK1400	250p
2SC2097	2300p	2SC2630	1800p	2SC3159	200p	2SC3657	400p	2SC4762	300p	2SD811	450p	2SD1265	75p	2SD1656	250p	2SK117	50p	2SK1404	290p
2SC2099	2500p	2SC2631	20p	2SC3164	270p	2SC3659	600p	2SC4769	220p	2SD819	300p	2SD1266	180p	2SD1663	350p	2SK118	50p	2SK1461	220p
2SC2118	1100p	2SC2632	35p	2SC3169	150p	2SC3668	120p	2SC4770	250p	2SD820	250p	2SD1267	55p	2SD1666	50p	2SK125	100p	2SK1462	425p
2SC2120	10p	2SC2634	10p	2SC3170	300p	2SC3675	100p	2SC4820	225p	2SD821	550p	2SD1271	55p	2SD1667	120p	2SK133	650p	2SK1487	250p
2SC2122A	300p	2SC2636	40p	2SC3173	180p	2SC3678	280p	2SC4826	70p	2SD822	290p	2SD1271A	225p	2SD1668	90p	2SK147	160p	2SK1507	300p
2SC2131	550p	2SC2637	120p	2SC3175	150p	2SC3679	140p	2SC4891	800p	2SD826	30p	2SD1272	200p	2SD1669	85p	2SK152	40p	2SK1529	700p
2SC2141	60p	2SC2640	1800p	2SC3178	125p	2SC3680	380p	2SC4923	400p	2SD829	375p	2SD1273	50p	2SD1677	200p	2SK161	30p	2SK1537	400p
2SC2153	40p	2SC2653	100p	2SC3179	70p	2SC3685	450p	2SC4924	250p	2SD836	50p	2SD1274	80p	2SD1680	225p	2SK163	40p	2SK1544	900p
2SC2166	80p	2SC2654	180p	2SC3180	175p	2SC3687	300p	2SC4927	500p	2SD836A	50p	2SD1275	50p	2SD1683	45p	2SK168	40p	2SK1767	275p
2SC2168	120p	2SC2655	50p	2SC3181	200p	2SC3688	550p	2SC5002	300p	2SD837	55p	2SD1276	60p	2SD1684	70p	2SK170	50p	2SK2038	295p
2SC2188	70p	2SC2656	550p	2SC3182	120p	2SC3692	150p	2SC5003	350p	2SD838	500p	2SD1277	190p	2SD1706	325p	2SK184	35p	2SK2039	750p
2SC2200	250p	2SC2660	100p	2SC3198	30p	2SC3715	480p	2SC5027	100p	2SD841	110p	2SD1279	600p	2SD1707	400p	2SK192	45p	2SK2134	225p
2SC2209	50p	2SC2665	200p	2SC3199	40p	2SC3717	120p	2SC5048	300p	2SD844	200p	2SD1288	175p	2SD1708	375p	2SK193	40p		
2SC2216	50p	2SC2668	10p	2SC3202	25p	2SC3729	450p	2SC5044	250p	2SD850	170p	2SD1289	250p	2SD1710	200p	2SK195	150p		
2SC2221	650p	2SC2671	100p	2SC3209	120p	2SC3746	100p	2SC5086	250p	2SD856	48p	2SD1291	280p	2SD1718	275p	2SK197	140p		
2SC2228A	60p	2SC2681	170p	2SC3210	550p	2SC3747	120p	2SC5129	300p	2SD858	250p	2SD1292	60p	2SD1729	230p	2SK212	35p		
2SC2229	15p	2SC2682	70p	2SC3211	220p	2SC3748	100p	2SC5148	300p	2SD863	23p	2SD1293	70p	2SD1730	275p	2SK214	170p		
2SC2230	80p	2SC2688	27p	2SC3212	260p	2SC3752	250p	2SC5149	300p	2SD864	200p	2SD1297	300p	2SD1732	250p	2SK216	200p		
2SC2233	100p	2SC2690	60p	2SC3225	50p	2SC3781	150p	2SC5250	300p	2SD866	120p	2SD1302	20p	2SD1739	180p	2SK223	50p		
2SC2235	60p	2SC2694	3500p	2SC3242	30p	2SC3782	75p	2SD188	350p	2SD866A	140p	2SD1306	45p	2SD1740	125p	2SK240	140p		
2SC2236	20p	2SC2705	40p	2SC3244	45p	2SC3783	300p	2SD198	140p	2SD867	350p	2SD1308	80p	2SD1748	90p	2SK241	30p		
2SC2237	540p	2SC2706	250p	2SC3246	50p	2SC3787	100p	2SD199	195p	2SD868	260p	2SD1309	140p	2SD1756	275p	2SK246	30p		
2SC2238	45p	2SC2710	50p	2SC3259	350p	2SC3788	60p	2SD200	180p	2SD869	150p	2SD1310	140p	2SD1758	60p	2SK300	25p		
2SC2240	15p	2SC2712	20p	2SC3260	220p	2SC3789	75p	2SD201	260p	2SD870	140p	2SD1311	65p	2SD1760	80p	2SK301	40p		
2SC2258	30p	2SC2714	20p	2SC3261	230p	2SC3790	120p	2SD213	250p	2SD871	260p	2SD1313	1000p	2SD1761	60p	2SK303	40p		
2SC2259	60p	2SC2716	50p	2SC3262	280p	2SC3795	140p	2SD234	90p	2SD879	60p	2SD1326	200p	2SD1762	50p	2SK304	25p		

REPLACEMENT VIDEO HEADS

Model	Price
AKAI	
VS105, 112, 115, 116, 120, 125, 126, 201, 202, 205, 220, 240, 244, 245, 247, 248, 250, 301, 303, 304, VSP8,	
VSP82	850p
VP7100, VS9300, VS9500	650p
VP7200, VS9700, VS9800	900p
VS1	900p
VS2	900p
VS3	900p
VS10	1350p
VSP1	900p
VS33,35, 37, 38, 38EOG MKII, 53, 55, 66, 765, 766, 767, 768, 865, 867,	
VSF30, 33, 4, 400, 410, 420, 430, 440, 441, 450, 455, 480, 490, 497,	
VSG51, 54, 55, VXS450,	
VXS470	1600p
VS512, VS515, VS516	2250p
VS462, 465, 467, 467EOG2, VSF12, 15EK, 15EOH, 300, 301, 310,	
VSF320, 330, 340, 350, VSG30,	
33, 34, 35	2300p
VS11, VS12	1000p
VS6, VS8, VS9	2400p
VSX9	2250p
VSA1100, 1110, 650, VSF500, 510, 550, 560, 580, 590, 600, 650,	
VSG60, 64, 65, VSG70, 73, 74, 75,	
VSX560, 580	3600p
VS155, VS165	2300p
VS20, 22, 23, 24, 25, 26, 27, 422, 425, 426, 427, 485, VSF10, 11, 180, 190	
VSF200, 210, 220, 221, 222, 230, 240, 260, 261, 262, 265, 270, 275, 280,	
VSF290, 510, 550, VSG20, 204, 205, 206, VSG21, 211, 212, 215,	
VSG217EOG , 23, 24, 25, 405, 411, 415, 417, VSP 100, 100EM, 110,	
VSP88, 88KC, 8111, VSP9, VSR100, 100EDG, 100EM, 110, VSX400	1250p
VSR9	1300p
VS 109, VS603, VS606, VS607	2500p
VS75	2500p
VS965, VC967	3450p
VSF400, 410, 420, 430, 440, 441, 450, 45S, 480, 490, 497, VSX450, 470	2850p
VSG20, 204, 204, 205, 206, 20, 21, 211, 212, 215, 217, 225, 23, 24, 25,	
VSP100, 110, 88, VSR100, 110, VSX400	1300p
VSG415, VSG415EA, VSG425	2800p
VS75, VSA77	2700p
VSF1000, VSF1010, VSF1030	5800p
ALBA	
VDR3000, VCR4000, VCR5000, VCR6000	1650p
VTV10	1000p
VCR7000, 7800, 8000, 8800	1100p
AMSTRAD	
VCR4500, VCR5200, VCR9000, TVR1	900p
VCR7000	1000p
VCR1000, 2000, 6000, 61000, 62000, 8600, 8602, 8700, 9005, DD8900, DD8904, TVR4	1100p
TVR2, TVR3, VCR4600, VCR4600 MKII, VCR400	1100p
VCR8800, VCR8804, VCR9340	2100p
VCR8603, VCR8604, VCR8704, VCR8714	1350p
VCR9140, VCR9142	2550p
VCR9340	3650p
VCR9244	3450p
UF020, 22, VCR3000, 3002, 9500	1750p
FISHER	
FVHP420, 510, 520, 530, 615, 618, 620, 622, 710, 711, 715, 716, 720,	
FVHP721, 722, 730, 830, 905, 906, 907, 908, 910, 911, 915, 916, 918,	
FVHP5000, 5001, 5005, 5050, 5075	1100p
VBS3500, 7100, 7500, 7600, 9900, VBR330	1800p
VBS7000, VBS7100, VBS9000	2000p
FVHP500, 711, 715, 721, 722, 730, 830, 5100, FVHD720	1100p
FVHP725, FVHP830, FVHP980	2500p
FVHP990	2700p
FVHP975	2400p
FVHD407, FVHD140, FVHP1, FVHP10, FVHP20	1150p
FVHD230, FVHP1100, 1200, 130, 1340, 1410, 2000, 200, 210, 300,	
FVHP310, 410, 420	1800p
FVHD250, 270, 370, FVHP1500, FVHP250	2700p
FVHP132, 1400, 1440, 320, 440, 445	3550p
FVHP470S, FVHP475HV	4800p
FVHP1250, FVHP430S	1950p
GOLDSTAR	
8000 3HSSDB, GHV121, RQ2011, 2031, 2051	1900p
GVH51, GVH122, VCP4000, VCP4100, VCP4200	1100p
GHV1232, 1233, 1241, 1242, 1243, 1244, 1245, 1246, 1266, 1290, 1291	
GHV1295, 1296, 1891, 8210, 8215, 1221, 1240, 1241, 1247, 1248, 2145	
VCP400, VCP4130, 4300, 4301, 4305, 4306, 4310, 4311, 4315, 4316,	
VCP4320, 4321, 4325, 4326	900p
C211, GHV1392P, 1393P, 19OOP, 1290, 1291PQ, 12931Q, 1295P,	
GSE1295PQ, GSE1296, 1297, 1891, 1910, 20005, 2000, GSEC200,	
GSEC205, 211, 2301, GSEG2301,	
GSEQ12, 204, 20, 22, P416P, P500P	
QUISY22, QUISY24, RC205P, RG11P, RG20, RG2001, RQ20,	
RQ204HP, RQ241, VCP100P, GSEG10	1300p
GHV4400, 4400, GSE-Q404P, QUISY40, RC405P	2350p
GSEQ121, RQ2011, RQ2031, RQ2051	1950p
G.E.C.	
4000H, 4001H, 4002H	1200p
V4001H, V4004, V4100	1200p
V4005H	1500p
GRANADA	
CSI, DS2	1600p
VHSAH1	1100p
VHSAH3	2400p
VHSAN3	800p
VHSAY3	1200p
VHSBH1, VHSCH1	2100p
VHSBP1	850p
VHSBY3	2600p
VHSD52	1600p
VHSEH2, VHSDH2	1600p
VHSEY1, VHSEY2	1400p
VHSFS1, VHSFS2	1300p
VHSFG2, VHSFG4, VHSF63, VHSFB3	1300p
VHSTJ1, VHSTJ2, VHSTJ3, VHSWJ3, VHSYJ2	700p
VHSVH4, VHSWH1, VHSXH1, VHSYH2	1600p
VHSWJI VHSXJ3	700p
GRUNDIG	
VS410, 415, 435, 450, 456, 460, 500, 505, 510, 520, 521, 530, 546	1600p
BARCELONA, MVS5400, 440, 500, 600, SE5100, 6100, 6110, 9100	
TVR4500, 4510, 5510, VS400, 440, 441, 500, 505, 510, 518, 600, 610,	
VS5180, VS6190, 700, 900, 901, 902, 9091, GV200, 201, 2092,	
SE2100, 5110	1400p
MADRID, SE5140, VS540, VS5480	3000p
MVS550, 620, VS550, 620, 630, 640, 790, 930, 940	2400p
VS120	2300p
VS680, GV280	4800p
VS160, VS740	4400p
VS170	4800p
MVS660, SE6160, VERONA, VS660, VS6690	3500p
GRUNDIG	
MVS710, 720, 910, SE7120, 9120, VS710, 716, 720, 800, 810, 910, 920,	
VS922, 9291, GV210, 211, 220, 2292, MV2105, 2115, SE2120	1700p
HINARI	
VXL2, 3, 4, 20, 25, 35	1000p
VXL5, V20H	1050p
VXL6	1200p
VXL7	1300p
VXL8, 9, 10, 11, 19, 90, VCR34H, VTV 100, 200	1100p
HITACHI	
VT11, 14, 15, 16, 30, 33, 34, 330, 340, 503, 640, 5030, VTP10, 30	850p
VT7, VT17, VT18, VT19	1600p
VT35, VT350, VT38, VT39	1800p
VT100, 110, 111, 112, 113, 115, 118, 120, 125, 128, 220, 225, 400, 405,	
VT410, 413, 414, 415, 416, 418, 510, 515, 517, 518, 520, 525, 526,	
VTM625, 626, 725, 210, 211, 215, 726, 727, 728, 820, 821, 825, 920, 921	1100p
VT3000	550p
VT4000, VT4200, VT5000, VT5500, VT5600	1100p
VT77, 680, 6500, 6700, 6800, 7000, 8000, 8030, 8040, 8100, 8300, 8500	
VT8700, 9000, 9300, 9500, 9700, 9900	850p
VT8, 9, 56, 57, 570, 575, 576, 580, 585, 588	2500p
VT65	1800p
VT130, 135, 138, 145, 250, 255, 258, 420, 425, 426, 428, 430, 431, 435	
VT438, 535, 536, VTL30, 301, VTM630, 635, 636	1400p
VT52, VT60, VT61E, VT62E, VT63, VT64, VT640	850p
VT168, VT150, VT260, VT450, VT498 (4 HEAD)	1900p
VT530	1400p
VT522, VTM212, 620, 622, 720, 722, 822, 922, 925	1300p
VT660E	2600p
VT570, VT575, VT580, VT585, VT588, VTF70	2500p
VT540, 545, 546, 548, VTD660, 665, VTM598, 640, 645, 646,	
VTM730, 731, 735, 736, 740, 745, 746, 748, 753, 754, 830, 831, 835, 838, 840,	
VTM841, 845, 930, 931, 935	1800p
VTF770, 774, 775, 860, 861, 865	4100p
VT85, VT86, VT88	2000p
VTF780, VTF785	4800p
VTF180, VTF185, VTF280	8500p
VTF350, VTF351	5150p
VTM220, VTM220E, VTM220UK	3000p
VTS390E	5150p
J.V.C. & FERGUSON	
HR2200, 3300, 3320, 3330, 3350, 3360, 3660, 3750, 3860, 4100	
3292, 8900, 8901, 8902, 8903, 8906, 8922, 8928, 3V01, 3V06, 3V22	550p
HR3660, 7600, 7610, 7650, 7700, HRD110, 111, 120, 121, 220, 225,	
HRS100, 8904, 8923, 8924, 8925, 8929, 8935, 8941, 8943, 8944,	
3V16, 3V233V24, 3V31, 3V35, 3V36, 3V38, 3V39, 3V49	550p
BR1600, HRD140, 141, 142, 143, 150, 152, 156, 157, 158, 160, 5101	
HRS10, 8947, 8948, 3V42, 3V44, 3V45, 3V46, 3V47, 3V52, 3V54, 3V55, 3V56, 3V57	900p
HRD154, 170, 171, 210, 211, 217, 310, 320, 321, 350, 521, 522, 525, 526,	
HRD527, 540, 550, 560, 590, 770,	
HRDX20, HRDX22, 8950, 8951, 3V64, 3V65, FV10, FVII, FV20, FV21, FV26	900p
HRD565, HRD566, 3V48	1800p
HRD725, HRD755, 3V43, 3V53	1800p
8930, 8931, 8933, 8940, 3V29, 3V30	550p
8945	2400p
3V00, 8902, 8903, 8909, 8912, 8922	1000p
FV31, FV41R	1150p
FV37, FV43H, HRD860	2000p
BR7000E, BR7000S, BR7030, BR7030/40H, BR7040	2100p
HR7200, 7300, 7350, 2650, BR6200	600p
HRD455	1600p
HRD520	1400p
HRD300, 400, 580, 600, 620, 640, 650	1500p
HR4100	1000p
HRD750, HRD830, HRD860	1900p
HRD250, HRD257	1800p
3V32, 8942, HR7655	1800p
HRD180, 190, 230, 610, 3V59, FV12L, FV20B, 26, 30, 32, 33, VC141L	1600p
HRD370, HRD430, HRD470, 3V58, FV13H	1800p
HRD530, HRD700, HRD840, HRD870, HRD910, FV14T, FV57H	2300p
GRC1, GRC2, 3 V41	2800p
BR9060, HRD330, 337, 440, 441, 637, 641, 660, 670, 720, 730, 740, 820	
HRFC100, SR3300MS, FV44L	1600p
HRD950, HRD960, HRD980, FV46	4500p
HRS5000, HRS5500, 5800, 9000, FV395.BRS600, SRS368E	5550p
FV22L	1400p
FV42	2600p
VR182LV, VR202LV	1950p
FV67HV, FV68TX, FV77	3800p
R2000 SERIES	4500p
FV61LV, FV62LV, FV67HV	4000p
FV42L	£101.00p
VP160L, VR172L	1950p
HRJ200, HRJ205	3300p
HRJ600EG, HRJ600EK, HRJ605EG, HRJ605UK, HRJ610EK	7100p
HRJ300, HRJ305, HRJ315, HRJ316EG,HRJ318E	3750p
HRJ615, HRJ715, HRJ815	9200p
HRJ400, HRJ405, HRJ407MS, HRJ41 OEK, HRJ415, HRJ416	4500p
MATSUI	
VX500E, 800A, 810A, 820, 80A, 770B, 773B	1200p
VCRL3, VX730, VX750	1450p
VX735, VX755, VX990	1500p
VX735A, VX765, VX850	1750p
VX600	1100p
VX900	2650p
MITSUBISHI	
HS303, HS304, HS320, HS700	1100p
HS306, HS318, HS710	1100p
HS307	1900p
HS319	1900p
HS330	2000p
HS400	2800p
HS349, HSE27, 31, 32, HSB27, 31, 32, HSM33, 34, 35, 37G	1650p
HS411	2400p
HSE30, HSB30	1600p
HS338	1600p
HSE10, HSE11, HSE20, HSE21, HSE41, HSB10, HSB20	1500p
HS300, HS301, HS302, HS310, HS273, HS550Q	1000p
HS200	550p
HS337, HS347	1000p
HSB12, HSE12, HSE22, HSM16G, 18, 23, 25, 30, MX1	1700p
HS411EZ, HS411GZ	2100p
HSB11, HSB21	1600p
HSB52, HSE50, 52G, HSM36, 50, 54, 55, 57, 58, 60	3100p
HSE51	2600p
HS410	3000p
HS412, HS421GZ	3100p
HS5300, HS5424, HS5600	2500p
HSM20, HSM55	1900p
HSM40	2350p
HSM59, HSM68E	6050p
NV300, 322, 332, 333, 340, 390, 2000, 2010, 3000, 7000, 7200.7500, NV7800, 7850, 8170, 8200, 8400, 8600, 8610, 8620	625p
NV777, NV330	1150p
NV8050, NV8051	2500p
NATIONAL PANASONIC	
AG1000, 1050, NV250, 260, 280, 450, 460, 465, 470, 480, 650	1100p
AG6010, AG6015	2000p
AG6840	2000p
NV100, NV200, NV370, NV380, NV630	675p
NVD80, NVH65	2600p
AG5150, AG5250, NVF65, NVH75, NVH77	2600p
NVF51	4200p
NVGI9	2300p
NVJ30, NVHJ33, NVL10, 20, NVL21, NVG30, 31, 40, 130, NVJ37, 40, 42,	
NVSD30, 10EE, 11, 2, 30, 35	1000p
NVJ35, NVG46	1400p
NVM1, NVM3, NVM5	4200p
AG2100, AG2200	700p
NV430, NV431, NV433, NVSD2, NVSD22, NVSD25, NVSD3	800p
NV730, NV730F, NV770 4 HEAD	1150p
NV366	1700p
NV21 HQ, NV 180, NVD48	1700p
NV7881	1700p
NV810, NV8301	1800p
NV850, NV950	2000p
NV870, NV890, NV970	2400p
AG6024, NVG33, 46, NVL23, 25, 28, NVJ47,	
49, 700PX, NVSD20EE, 400, 44, 45	1200p
NVG10, 11, 12, 14, 16, 120, NV250, 280, 450, 465	1100p
NVG18	1400p
NVG20, 21, 22, 25, 28, 200, NVD48	1200p
NVG50, NVG300	1600p
NVG45	1100p
NVH70	2400p
NV688	1650p
NV600	1050p
AG6800, AH6810, AG6820	2100p
AG6100, AG6200, AG6300	2100p
NVG7, NVG9, NV230	700p
NV780	2000p
NVG 15, NVG400	2600p
NVM7, NVMC20	3800p
NVF70	5200p
NVJ45, NVJ47	1200p
NVSD40	1050p
NVF75, NVF77	4300p
NVF55	2800p
NVFS200, NVFS88, NVSF90, NW8000	3600p
NVHD90, NVHD 100, NV HD 101, NVHF 100	2300p
NVSD1	1000p
AG7330, AG7350, AG7355, AG7450	5000p
NVFS 100	4500p
NVFS1	4200p
N.E.C.	
N9011, 9012, 9013E, 9014E, 9014G, 9015, 9016, 901A, 902A, 9033, N9034, 9040, 9053, 9054, 9055, 9056, 9063, 9065, 9066, 906, 9077,	
N9096, DX1000, 1600, PX1200	850p
N911A, 914C, 915A, 916A, 917, 9110, 9120	2400p
PVC600, 740, 744, 754, 763E, 764, PV2300, 2400, 760, 794, 770, 774	1650p
N380, N381, N830, N831, N832, N833, N834, N835, N836	550p
82611AH1 (FOR MODEL DX3000), DX4000, N9610, NS7000	2400p
N895	1800p
N9052, N9530, DX2000	3400p
VCP1	1700p
PVC2300, 2400, 740, 744, 760, 764	1400p
DS6000	3500p
D5600	3500p
VH3, VH555, VH600, VH700, VH844, VH900,	
VH1000 (ALL MODELS)	1100p
VH1, VH2A	700p
D1000, D1100	1600p
D1000X, D1500X, D4500, VPCD100, D1200, D2000X, D5000	1600p
VR6460, VR6520, 64VR60, VR6420	725p
VR6711 4 HEAD	1800p
VR6440	2500p
VR6441, VR6540, VR6541, VR6640, VR6642	1300p
DV761, VR512, 522, 5229, 63SB7, VR6760, VR6761, VR6762, VR63SB7 7172	7200p
VR6920	2750p
41DV2, 4SB11BVR412, 415, 6485, 6490, 6880	1600p
VR6948	4850p
20DV1, 20DV2, 20RW7, 21DVI, 21DV2, 21DV3, 2SB01, 02, 11, 12, 30DV2, 31DVI, 31DV2, 31DV3, 3SB02, 03, 05, 11, 12, 13, 68SB4, 71SB4, 86SBI, 91SB2, 92SB2,	
DV186, 190, 291, 292, 468, 471, VR201, 202, 203, 2115, 212, 213, 223, 231, 232, 302, 303, 305, 311, 312, VR313, 3210, 3219, 322, 3229, 323, 501, 6180, 6182, 6185, 6290, 6291, VR6293, 6362, 6367, 6467, 6468, 6470	4600p
VR3260, 6349, 6442, 663, 6448, 6449, 6542, 6643	1250p
VR601	1800p
49SB6, VR6548, VR6648, VR6843	2750p
SAISHO	
VR100, 605, 705, 805, 905, 1000, 1100, 1200, 1600	1200p
VR3300X, VR3600X, VR3650X, VR3800	1400p
VR3200, VR3500	1400p
VR2000, VR3300, VR3600	1400p
VR2500	2650p
VRS5000X, VX6000A, VXL12X	1500p
SALORA	
6500, 6600	1600p
SV7300, SV8200, SV8300, SV9200	1500p
SV7400, SV8400	1600p
SV8100	1200p
SV900, SV9900	3450p
SV601, SV611, SV6910	1500p
SV800, SV810	2800p
SV6700, SV8710, SV8750	1500p
623N, SV6800, SV6900, SV8850, SV8870, SV8970	1750p
SV88110, SV8910	2650p
823N, SV8920	3500p
923N	4500p
SV8600, SV8700	1650p
SV8420	2400p
SV8620	2100p
SV9300	2500p
SV8830	2200p
SV8720	2250p
SV8520	1900p
SAMSUNG	
SV8500	1500p
SVX301, VB900, 910, VVT510, VT320, 5600, VX510, 511, 520.616, VX626, 627 717, 614, 619, 629, 710, 712, 720, 730, 970, 971, 972, SV716, 717, SVX303, 305, VB510, 520, 610, 616, 617, 619, 620, 626, 627, 629, 710, 971, V1520, 616, 621, 626, 900, 910,	1200p
SVX319, VB770, V1710, 730, 731, 735, 750, 751, 770, VB750, VK8220, VX750, VX7330, VK770, VK8225, VR1730, 1735, XR20	1900p
V11560, VN1560, VN1561, VX1530, VX1560, VX1561, VX1580	2200p
PL30LR, PX3031, 31R, 32R, 990, 992, 991, PXP30, PXR30, VX 1260, SVX503, SX3230, 3231, 3260, 3261, VK30, 300, 1230, 1260, 1261, VK30R, 31R, 32R, VXK300, 301, 306, 320, 321, 326, 336	1900p
S11230, 1240, SVX600, SX1230, 1231, 1260, 1261, 7120, 7121, 7220, SX7221, 7230, 7301	1900p
SANYO	
VTC5000, 5400, 600, 6000, 6010, 6500, VPR5000, VTC 1500, VTCM 10, 11, 20, 21 VTCM25, VTC2000, 5100, 5150, 5300, 5400,	
VTC5350, 5370, VTCNX10, VTCNX15, 20, 30, VPR5800	1800p
VTC5500, 5550, 9100, 9300, 9350, 9355, 9455, 9500	1700p
VHR1110, VHR1150, VHR1300, VHR1700, VHR2300, VHR2370	800p
VHR3200, 3270, 3100, 3110, 3150, 3300, 3400, 3310, VHRD500	1100p
VHR1500, VHR2500, VHR3330	1500p
VHR2700	2450p
VHR7900	3000p
VHR5700, VHR7700E, VHRD4710	2700p
VHR150E, 153, 154, 1501R, 240, 250, 251, 27, 350, 474, 5350E, 7500, VHR7530, 7540, 8500SP, 8800, VHRD5350E, 5450E, 6550	1800p
TLS1000P, TLS1001P, TLS1100	3100p
VHR120, 130, 14, 141, 143G, 14SP, 151, 15, 16, 171, 220, 23, 244, 274, VHR310, 330, 4100, 4105, 4200, 430, 4300, 4400, 4500, 5080, 5100,	
VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHRD4400, 4410, 4500, 4600,	
VHRD4610, 6700, 4800	3100p
TLS2000	4250p
VHR5300, VHR6500, VHR7400	4500p
VHR3500EX	2150p
VHR16, 235, 335E, 4150, 4160, 4350, 7250, 7260, 8250	1950p
VTC3000	1400p
SHARP	
VC390, VC393, VC496	2750p
VC488	4200p
VC779	1800p
VC789, VC790	2900p
VC200, 220, 300, 381, 383, 384, 385, 386, 387, 388, 471, 477, 481, 482, VC483, 486, 3300, 8381, 9100, 9300, 9400, 9500, 9600, 9700	850p
VC108, 208, 382, 402, 405, 408, 500, 550, 571, 573, 581, 582, 583, VC5W20E, 600, 651, 674, 681, 684, 6V3, 750, 780, 781, 683, 684, 402,	
VC500, 571, 573, 580, 584, 600, 682, 693, 700, 772, 7810, 782, 7822, VC783, 8481, 8581, VCA10, 100, 102, 103, 1031, 103, 104, 105, 106,	
VCA111, 113, 116, 131, 140, 202, 203, 211, 234, 244, 254, 255, 30, 35, VCA40, VCB311N, 320, VCD801, 802, VCM73, VCT212, 310, 410, VCT510, 72, VCT1314, VCTS313	850p
VC6000, 6200, 6300, 7300, 7700, 7750, 8000, 8300	1800p
VC793	3000p
VC473, VC785, VC786	1600p
VC699, VCA501, VCA602	2400p
VC585, VC685	1700p
VC90ET	3900p
VFH815	2800p
VC800, VCH851, VCH852, VCH882	2700p
VCH80, VCH81, VFH815	2800p
VCA33, VCA36, VCA43, VCA44, VCA46, VCA49	1500p
VCA55, VCA63	1800p
VC570	2800p
SONY	
DSR-19R FOR SL-T 9ME	3100p
DSR-21 R FOR SLC 8-C9	2600p
DSR-35R FORC20, C30, C40, SLF1UB, SLF1E2 PIN, SLC24PS, 33E, 34, 44PS, SLF11, 30PF, 35, 60PS, SLK85, SLT20ME, 30ME, SL100	1500p
DSR-43R FOR SLC7 RANGE, SL5000, SL5100, SL3000 1 PIN, SLC6E, SL36ES, SL37E	1300p
SL3000, SL8000, SL8080, SLC5E, SLT7ME	1600p
SLV201, SLV202	1500p
SLK95, SLT50ME	2900p
SLV275, SLV373VB, SLV410, SLV412, SLV427, SLV474	1900p
DSR49R, SLHF100P, SLHF100UB	3000p
SLV656, SLV715, 725, 727, 757, SLV777, SLV815, SLV825	4100p
SLV353UB	2100p
CCDF340E, CCDF500E, CCDV90E, CCDV95E, CCDSP5E	4800p
SLV801, SLV802	2500p
SLV310, SLV315, SLV325, SLV335	1200p
SLV210, SLV212, SLV270, SLV273, SLV285, SLV300	950p
SLV125, 213, 225, 252, 255, 262, 280,	
SLVX1, 20, 3	1150p
SLV363, SLV416, SLVX50, SLVX55	2000p
SLVX75, SLVX90, SLVX95	3000p
SLV282, SLVX30, SLVX35	2025p
SLHF100P, SLHF100UB	3400p
SLVE7, SLVE8, SLVE9	3600p
SLVE90	6150p
SLV615, SLV625, SLVE600, SLVE700, SLVE800	3450p
TOSHIBA	
V63	1500p
V9680	3400p
V8600, V8650, V8700	3000p
V21, V31, V32, V33, V50, V51, V52, V53, V9600	1100p
V55, V57	550p
V71, V73, V74, V75, V77, V80, V81, V82, V83, V841V85, V86, V87, V88	1050p
DV90, 96, 97, NM3, V108, 109, 199, 200, 202, 205, 207, 209, 80, 93, 94	1150p
V5470, V5480	1300p
V600	2350p
V880MS	2600p
V700G	3700p
V500G, V509G	2500p
V9680	2900p
V300G, V301, V305, V306, V309G	2550p
V61, V63	1200p
V110, V120, V130, V140, V210, V211, V212,	
V220, V221, V222	1100p
V711, V880	2700p
VCPB1E, VCP2C2	1000p
V65, V66, V6	950p
V312, V322, V412	2600p
V91G	4600p
V609, V610V610B, V610UK, V611, V659F, V660, V660F	2200p
V312, V403T, V413G	9200p
V703W, V813G	4000p
V95G	8000p

ALL TV & VIDEO PARTS SOLD ARE REPLACEMENT PARTS

VCR BELT KITS

Model	Price
AKAI	
VP7100, VS9300, VS9500, VS9700, VS9800	120p
VS1, VS2, VS3, VS5, VS12, VS15, VP88	70p
VS10	65p
VSX9, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 240, 244, 245, 247, 248, 250, 512, 515, 516	200p
VS22, VS23, VS25, VS35, VS37, VS38, VS53, VS55, VS66	80p
VS4, VS6, VS8, VS9	95p
VSA77	120p
VSS99	105p
ALBA	
VCR40000	130p
VCR5000, VCR6000	105p
VCR161, VCR222	100p
VCR3000X, VCR4000, VCR4000X	75p
VCR7000, VCR7800, VCR8000,VCR8800	110p
VTV10	105p
AMSTRAD	
TVR123, VCR4600, VCR4700, VCR5200	80p
VCR7000	80p
VCR1000, 2000, 6000, 6100, 6200, 8600, 8602, 8603, 8604,	
VCR8700, 8704, 8714, 8800, 8804, 9000, 9005, 9244, 9340,	
DD8900, DD8904, TVR4	100p
TX3650, UF20, 22 24, VCR3000, 3002, 4000, 9500	75p
VS1004	105p
BLAUPUNKT	
RTV100	200p
RTV200, RTV222, RTV224	90p
RTV202, RTX200	150p
RTV322, RTV248	100p
RTV306, 307, 309, 310, 311, 312, 328, 414, 434, 444, 707	135p
RTV211, RTV214	140p
RTV324, RTV32565p	
RTV315, RTV316, RTV319, RTV320, RTV317	50p
RTV301, RTV333, RTV338, RTV404, RTV424	85p
FERGUSON	
3292, 3V00, 3V01, 3V16, 3v22, 8900, 8901, 8902, 8903, 8904,	
8906, 8909, 8912, 8922	120p
3V23, 8923, 8924, 8929	50p
3V29, 3V30, 8930, 8931, 8933, 8940	65p
3V31, 3V32, 8941, 8942	60p
3V35, 3V36, 3V38, 3V39, 3V49, 8943, 8944	60p
3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V57,	
8945, 8947, 8948	45p
3V58, 3V43, 3V44, 3V59, 3V64, 3V65, 8950, 8951, FV10, FV11, FV12, FV13, FV14, FV20,	
FV21, FV22, FV26, FV32, FV39, VC141L	45p
FV31R	110p
FV61L, FV62, FV67, FV68, FV70, FV71, FV72, FV74, FV77	50p
FV43H, FV44L, FV46T, FV57H	125p
FV37H	80p
3V52	55p
FV41R, FV42L	100p
FIDELITY	
HQS200, VCR1000, 2000, 600, 6000, 6100	180p
VCR100	160p
VTR1000, VTR1001	100p
TX3650, VCR3000, VCR3002, VCR9500	75p
FISHER	
VBS7000	245p
VBS9000	120p
FVHP520, FVHP530, FVHP420	60p
FVHP615, 618, 620, 622, 710, 711, 715, 720, 721, 722, 725, 730,	
FVHP830, 840	60p
FVHP905, 906, 907, 908, 910, 911, 915, 916, 918	75p
VBR330, VBS7500, VBS7600,	
VBS9900	100p
VBS3500	75p
FVHD140, FVHD40, FVHD55, FVHP1, FVHP10, FVHP20	110p
FVHD230, 250, 270, 370, FVHP1100, 1200, 1250, 130, 132,	
FVHP1340, 1400, 1410, 1440, 1500, 2000, 200, 210, 250, 3, 300,	
310, 320, 2000, 410, 420, 430, 440, 445, 470, 475, FVSD2905	85p
FVHP5000, 5005, 5050, 5075, 5100, 975, 980, 990	95p
G.E.C.	
4005	150p
V4004	100p
V4007	80p
GOLDSTAR	
GHV1221, 1232, 1233, 1240, 1241, 1242, 1243, 1244, 1245,	
GHV1246, 1247, 1248, 1250, 1266, 51, 8000, 8200, 8210, 8215,	
VCP4100, VCP4130	80p
GHV1290, 1291, 1295, 1296, VCP4000, 4200, 4300, 4301,	
VCP4305, 4306, 4310, 4311, 4315, 4320, 4321, 4325, 4326	120p
GRANADA	
VHSH1, VHSAH3	100p
VHSVH4, VHSWH1, VHSXH1	60p
VHSYH2	50p
VHSBH1, VHSCH 1	150p
VHSBP1	135p
VHSAN3	110p
VHSDS2	125p
VHSAY3	125p
VHSBY3	100p
VHSEY1, VHSEY2	70p
VHSCC1	100p
GRANADA	
VHSDP1, VHSFV2	80p
VHSTJ1, VHSTJ2	150p
VHSTJ3	65p
VHSWJ1, VHSWJ2	120p
VHSXJ3	85p
VHSYJ2	80p
VHSFJ2	140p
VHSFS1, VHSFS2	130p
VHSFG1, VHSFG2, VHSFG3, VHSFG4, VHSF63	180p
GRUNDIG	
MVS400, 440, VS400, 410, 415, 435, 440, 441, 450, 456, 460	55p
VS180, 200, 220, 226, 262, 265, 267, 2X40800, 0850, 0880,	
1600, 2000, 2080, 2200, 2280,	
MVS200RC	90p
VS150	160p
VS310, 311, 315, 320, 326, 340, 345, 380, 385, 445	85p
VS150	75p
LC290N, LC295SN, SVS 180, VS 170	70p
VS 160, BARCELONA, FLORENZ, GV4000, 4000, 4001,	
GV4002, 400, 401, 4010, 402, 403, 404, 405, 406, 407, 4092, 410, GV411, 412, 414, 415, 416, 417, 4192, 4200, 420, 430, 434, 435, GV437, 440, 450, 4592, 460, 464, 470, 500, 501, 5050, 5095,	
GV5105, 511, 530, 5395, 540, 560, 5695, MV4005, 4105, SE4100, 4104, 4120, 5102, 5104, 5106, TVR37001	70p
HINARI	
VXL2	80p
VXL7, VXL8, VXL9, VXL10, VXL11, VXL19, VXL90, VCR34, VTV 100, 200	100p
VXL4, VXL35, VTV300	70p
VXL5, VXL6	100p
VXL3, VXL20	90p
HITACHI	
VT11, 14, 16, 17, 19, 33, 330, 34, 35, 350, 38, 39, 88, 165, 5030	75p
VT5000, VT5500, VT18	120p
VT7000, VT8000, VT8030, VT8040, VT8300, VT8500, 8700	60p
VT680, VT6500, VT6800, VT9300, VT9500, VT9700, 9900	75p
VT52, VT57, VT61, VT62, VT63, 64, 65, 85, 86, 640	60p
VT3000	120p
VT100, 110, 111, 113, 115, 118, 120, 125, 128, 130, 135, 138,	
VT145, 150, 168, i70, 175, 220, 225, 250, 255, 258, 260, VTL30	80p
VM500 VM600	90p
J.V.C.	
HR3300, HR3330, HR3360, HR3660, HR4100	130p
HR7200, HR7300	50p
HR7350, HR7600, HR7610, HR7650, HR7655	50p
HR7700	50p
HRD110, 111, 120, 121, 220, 225, BP6000	60p
HRD140, 141, 143, 150, 152, 157, 158, 160, 190, 250, 257, 310, HRD455, 565, 566, 725, 755, HRP50	45p
HRD170, 171, 180, 210, 21 1, 217, 230, 300, 320, 321, 330, 337, HRD350, 370, 400, 430, 440, 44 1, 500, 530, 700, 750.950,	
HRS5000, 5500, 8000, 9000, BR9060, BRS600, 605, 920, 925	45p
HRD227, 520, 52 1, 522, 527, 600, 610, 620, 637, 641, 650, 830,	
HRD840, HRDX20, 22, HRJ200, 205, 300, 305, SR330, HRS10	125p
HRD840, 550, 560, 580, 590, 640, 660, 670, 720, 730, 740, 770, HRD820, 860, 870, 880, 910, 960, 980, HRDX20, 25, HRJ2 10,	
HRJ215, 315, 316, 318, 400, 405, 407, 410, 411, 415, 416, 507, HRJ6 10, 615, 715, 97,	
HRS4700, 5800, SR3200, SRS368E	60p
HRJ600	40p
LOGIK	
VR955	180p
MATSUI	
VX600, 730, 735, 750, 755, 765, 850, 6000, VS888	75p
VX1000, VX2000, VX2500, VX3000, VX6000	80p
VX800	70p
MITSUBISHI	
HS200	200p
HS300, 301, 302, 307, 310, 337, 338, 347, 349, 411, 412, 421, 480, HSB10, 20, 30, HSE10, 20, 30, 70	80p
HS303, HS304, HS306, HS307, HS330, HS400, HS700	110p
HS318, HS319, HS410	110p
HSM1000, 16, HSM23, 25, 33, 34, 35, 37, 54, 55, 57, 58, 59, 68	55p
N.E.C.	
N830, N831, N832, N833	100p
N895	80p
PVC2300, PVC2400	180p
DX1000, 1600, 1800, 2000, 3000, N9012, 9013, 9014, 9016, N9033, 9034, 9053, 9054, 9055, 9056, 9066, 9096, 9110, 9120,	
N9510, 9520, 9530, 9610	80p
NATIONAL PANASONIC	
NV300, NV330PX, NV332, NV333 NV340, NV366	100p
NV777, NV788	100p
NV2000, NV2010, NV3000	80p
NV7000, NV7200, NV7800	75p
NV8600, NV8610, NV862	145p
NV230, 250, 280, 430, 431, 433, 450, 460, 465, 470, 650, 730, NV770, 810, 870, 890, 970, AG 1000, 1050	85p
NV370, NV380, NV480, NV630, NV780, NV830, NV850	70p
NV600, NV688, AG6010, AG6015	85p
NVG7, 9, 10, 11, 12, 14, 15, 16, 18, 30, 130, 400, NVH70	50p
NVFV1, NVM10, 3000, 3300, 40, 7, 9000, 9900, NVMS1, 4	70p
NVM 1, NVM3, NVM5	70p
PHILIPS	
VR6460, VR6920	170p
VR6540	100p
VR6442, VR6542	70p
VR2025, VR2580	100p
DV186, 190, 286, 291, 292, 468, 471, 562, 571, 761, VR201, 202, 203, 211, 2115, 212, 213, 223, 311, 312, 313, 3210, 3219, 322, 32, 29, 323, 535, VR20DV1, 20DV2, 20RW7, 21DV1, 21DV2, 21D, V3, 25BO1, 25BO2, 11, 12, 302, 303, 305, 31DVI, 31DV2, 31D, V3, 3SB11, 3SB12, 3SB13, 72SB8, VR30DV2, 35BO2, 35BO3, 635B7, 715B4, 715B5, 715B8, VR865B2, 915B2, 925B3, VR6180, 6182, 6185, 6285, 6290VR6291, VR6293, 6362, 6367, VR6390, 6391, 6393, 6467, 6468, 6470, 6561, 6570, 6581, 6670, VR6676, 6710, 6760, 6761, 6762, 6870, 6970, 6975, VR68SB4, 86SBI, 92SB3	75p
VR445B9, VR445B920, VR445B922, VR6443, 6843, 6843, VR6943	100p
VR3260, 6349, 6448, 6449, 6548, 6648, 49SB820, 644869S, 49SB6	110p
VKR6850, VKR6855	70p
VR501	110p
VKR6800, VKR6810, VKR6820	70p
SE4104, VR231, 2310, 2319, 231, 232, 2329, 237, 23, 241, 2410, 2419, 242, 243, 245, 2469, 247, 2479, 251, 252, 256, 257, 258, 33, 19, 332, 3329, 333, 337, 339, 3419, 342, 343, 3469, 347, 3479, 35, 1, 352, 357, 358, 422, 4229, 432, 437, 442, 4229, 432, 437, 442, 44, 5, 4469, 447, 4479, 451, 452, 457, 458, 459, 512, 522, 5229, 6379, 642, 647, 722, 7229, 723, 7379, 747, 8389, 948, 9489	70p
SAISHO	
VR2000, VHL3	90p
VR3800, 3200, 3300, 3500, 3600, 3650, VRS4400, 5000	75p
VR3400	100p
SAMSUNG	
SV716, 717, V1616, V-621, V1626, VX616, VX617, VX619, X626, VX627, VX629, VX714	75p
VB520, 510, 610, 616, 617, 619, 620, 626, 627, 629, V1510, 520, V1611, 616, 621, 626, VX510, 511, 520, VT320, 5600	80p
VB900, VB910, V1900, V1910	110p
PX980, 981, 982, SE9001, SV9001, SVX307, 319, 322, VB750, 770, 8220, 8225, V1770, 790, 8220, 8225, VK8220, VPX31, VX750, VX770, 790, 8220, 8225, SE9000, 9001	90p
SVX301, 303, 305, SX7301, VB710, 971, V1710, 730, 750, 970, VX710, 712, 720, 730, 970, 971, 972	100p
VX9880	110p
SX7121	95p
SANYO	
VTC5000, 5150, 6000, 6500, VTCM10, 11, 20, 21, 30, 31, 50	65p
VTC5300, VTC5350, VTC5400, VPR5800	80p
VTC5500	70p
VTC9100, VTC9300	140p
VTC1100, 1300, 1500, VHR1100, 1110, 1150, 1200, 1300,	
VHR1500, 2370, MVR220	80p
VHR2100, VHR2300, VHR2500, VHR2700	100p
VHR3100, 3110, 3150, 3300, 3310, 3400, 3500, 3700, 3800, VHRD500, 700, TLS1000, TLS1001	65p
VHR120, 130, 14, 141, 143, 14, 150, 151, 153, 154, 15, 16, 171, VHR194, 220, 23, 235, 240, 244, 250, 251, 274, 297, 310, 330,VHR335, 390, 4100, 4105, 4150, 4200, 430, 4300, 4350, 474, VHR4770, 5080, 5100, 5200, 5300, 5350, 5700, 6850, 7100, VHR7200 7250, 7260, 7300, 7400, 7500, 7520, 7530, 7630, VHR7540, 7700, 774, 7800, 7810, 8000, 8100, 8200, 8250, 8500,VHR8800, 8801, VHRD4400, 4410, 4500, 4600, VHRD4610, 4710, 4890, 6700	60p
VMD66, VMD68P	80p
VTR1000	70p
VTC6010	75p
SHARP	
VC200, 381, 384, 385, 386, 388, 390, 393, 838, 9100, 9300, 9500, VC9700	80p
VC7300, VC7700, VC7750, VC7800, VC8000	110p
VC8300	115p
VC300, 387, 471, 473, 481, 482, 483, 486, 488, 496, 8481	80p
VC402, 500, 571, 573, 581, 582, 583, 584, 585, VCSF3, VC8581	80p
VC108, 405, 408, 550, 600, 651, 674, 681, 682, 682, 684, 685, 693	
VC700, 750, 783, VC6F3, VC6V3	70p
VC208, 671, 772, 779, 780, 781, 782, 785, 786, 787, 793, 800,VC7810, 7822, VCA100, 102, 103, 104, 131, 140, 170, 202, 03, VCA234, 501, 502, 602, 5011, VCB311, 361, VCD801, 802, VCH851, 852, 882, VCM73, VCT72	65p
VCA10, 103, 105, 106, 113, 11613, 211, 234, 244, 254, 30, 33, 35, VCA36, 37, 40, 43, 454, 48, 50, 505, 51, 52, 53, 54, 55, 56, 57, 58, VCA60, 605, 615, 67, 68, 1031, VCB320, VCBS97, VCD805, VCD806, 810, 815, VCH80, 81, 85, 665, 910, VC51000, VCT212, 310, 410, 610, VCT1314, VCTS312, 313, VC790ET	80p
VCC10	70p
SONY	
SLC6, SLJ10, SLT6ME	140p
SLC5, SLC7, SLJ7, SLJ9, SLT7ME	140p
SLC9, SLB000, SLB080, SLT50	165p
SL8000E, SL8080E, SL8200, SL8600	175p
SLV255, 125, 213, 225, 262, SLVX1, 20, 3	95p
TOSHIBA	
V65, V57	85p
V33, V31, V32, V51, V52, V53, V9600, V9680	85p
V61, V63, V65, V66, V67	150p
DV80B, DV80D, V71, 73, 74, 75, 77, 81, 83, 85, 86	80p
V108, 109, 110, 120, 130, 140, i99, 209, 210, 211, 220, 221, 411,V421, 609, 610, 611, 659, 660, 711, 880	120p
V91 G, V95G	115p
V212, 213, 22-2, 3i2, 322, 403, 412, 413, 610, 703, 813	50p
VCPB1E	110p

REPLACEMENT IDLERS & PULLEYS

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
Order Code: IDL01		**Price 100p**
Hitachi	VT680, 6500, 6800, 9300, 9500VT9700, 9900	Play Idler 6861482 6861481
Order Code: IDL02		**Price: 180p**
Blaupunkt	RTV301, 306, 307, 309, 311, 312, 315, 316, 317, 319, 320, 404, 414, 424, 434, 444, 478, 707	Idler
Goldstar	GHV1221, 1232, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, GHV1248, 8000, 8200, 8210, 8215, GVHP51, VCP4100, 4130	Idler
Grundig	MVS400, 440, VS400, 410, 440VS450, 460	Idler
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, 1500, 1810, AG2100, 2200, NVH65, 70	Idler Arm VXP 0521
Philips	VR6460, VR6520, VR6920	Idler Arm 40340162
Order Code: IDL08		**Price 100p**
Amstrad	VCR7000	Idler 150280
Sharp	VC200, 381, 383, 384, 385, 386, VC388, 390, 393, 3300, 8381, 9100, 9300, 9500, 9700	Idler NIDL0005GEZZ
Order Code: IDL10		**Price: 100p**
Philips	VR6540	Idler
Sharp	VC300, 387, 402, 471, 473, 477, VC481, 482, 483, 486, 488, 496, 500, 571, 573, 581, 582, 583, 584, 585, 8481, 5F3, 5W20E	Idler NIDL0006GEZZ
Order Code: IDL11		**Price: 100p**
Akai	VS10	Reel Idler
Ferguson	3V23, 3V29, 3V30, 3V31, 3V323V35, 8923, 8924, 8929, 8930, 8931, 8940, 8941, 8942	Reel Idler PU48967
J.V.C.	HR7200, 7300, 7350, 7600, 7610, 7650, 7655, 7700	Reel Idler PU48967
Order Code: IDL20		**Price: 175p**
Ferguson	3V39, 3V30, 3V31, 3V32, 3V353V36, 3V38, 3V39, 3V49, 8930, 8931, 8933, 8940, 8941, 8942, 8943, 8944	Take Up Idler PU 51402
J.V.C.	HR7200, 7600, 7650, 7655, 7300, 7350, 7610, HRD110, 111, 120, 121, 225	Take Up Idler PU 51402A
Order Code: IDL22		**Price 100p**

Make	Models	Description
Ferguson	3V39, 3V30, 3V31, 3V32, 3V353V36, 3V38, 3V39, 3V49, 8930, 8931, 8933, 8940, 8941, 8942, 8943, 8944	Take Up Clutch PU 51380
J.V.C.	HR7200, 7600, 7650, 7655, 7300, 7350, 7610	Take Up Clutch PU 53462A PU 51380
Order Code: IDL23		**Price: 200p**
Philips	DB532, VR6520, 6843, 644	Reel Idler
Sharp	VC600, 651, 681, 682, 684, 685, 693, 699, 700, 783, 6FR, 6V3, 6F3	Idler Assembly NPLYV0107GEZZ
Order Code: IDL88		**Price: 615p**
Philips	VR6843, 6943, 44SB9, VR44SB920, 44SB922, 6943	Reel Drive Unit
Sharp	VC772, 780, 781, 782, 785, 786, VC787, 800, 793, 799, 7810, 7822, VCA100, 102, 104, VCA131, 140, 170, 202, 203, 234, 501, VCA602, 5011, VCD801, 802, VCH851, 852, VCH882, VCM73, VCT72, VC782MK11	Idler NPLTV0111GEZZ
Order Code: IDL90		**Price: 700p**
N.E.C.	N911, 915, 916, 917, 9012, 9013N9014, 9016, 9033, 9034, 9053, N9054, 9055, 9056, 9066, 9096, N9110, 9120, 9510, 9520, 9530, N9610, DX1000, 1600, 2000, DX3000, PX1200	Idler Arm Assembly
Order Code: IDL245		**Price: 270p**
Philips	DV186, 190, VR211, 2115, 212, 213, 223, 286, 291, 292, 311, 312, 313, 3210, 3219, 322, 3229, 323, 535BO, VR486, 471, 562, 582, 571, 761, 201, 202, VR203, 302, 303, 305, 6180, 6182, 6185, 6285, 6290, 6291, 6293, VR6362, 6367, 6390, 6391, 6393, 6467, 6468, 6470, 6561, 6570, 6581VR6670, 6676, 6710, 6760, 6761, 6762, 6870, 6970, 6975, 86B1, 63SB7, 68SB4, 71SB4, 71SB5, 72SB8, 72SB8, 92SB31, 20DV1, 20DV2, 20RW7, 21DV1, 21DV2, 2SB01, 2SB02, 2SB11, 2SB12, 30DV2, 31DV1, 31DV2, 31DV, 33SB02, 3SB03, 3SB05, 3SB11, 3SB12, 3SB13	Pressure Roller Assembly PS403-40205
Toshiba	V91, V95	Pressure Roller Assembly PS403-40205
Order Code: PR232		**Price: 300p**

REPLACEMENT IDLER TYRES

Akai	M32773	IT01	**Ferguson**	PU51380	IT07		VXP0433	IT15
	MZ366960J2	IT02		PU51402A	IT08		VXP0463	IT16
Goldstar	VXP0521	IT17		PU55373	IT09		VXP0521	IT17
Hitachi	6861471	IT03		PU55374	IT10		VXP0581	IT18
	6861482	IT04	**National**	VXP0329	IT11	**Sanyo**	1430662T15620	IT19
	6886971	IT05	**Panasonic**	VXP0343	IT12	**Sharp**	NIDL0005GEZZ	IT20
JVC	PU48697B	IT06		VXP0344	IT13		NIDL0006GEZZ	IT21
				VXP0401	IT14		NPLY0107GEZZ	IT22

Price:
20p each
16p each pack of 5
13p each pack of 10

Packs are for each model

SPECIAL OFFERS!!!! See Page 882 SPECIAL OFFER!!!!

PINCH ROLLERS

Model	Price
AKAI	
VS10, VS9300, VS9500, VS9700, VS9800, VP7100, VP77	140p
VS1, VS2, VS3, VS4, VS5, VS6, VS8, VS9, VS12, VS15	140p
VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, 240, 244, 245, VS247, 248, 250, 512, VS515, 516, VSX9	140p
VS201, 301, 303, 304, 603, 606, 607, VSP8, VSP82, VP58, VP82	140p
VS125, VS155, VS165, VS220, VS240, VS250, VS512	140p
VS22, 23, 25, 35, 37, 38, 53, 66, 75, 422, 425, 426, 427, 462, 465, 467, VS485, 765, 766, 767, 768, 865, 867, 965, 967, VSA77, VSA650, VSF10, 11, 12, 15, 180, 190, 200, 210, 220, 221, 222, 230, 240, 30, 33	140p
VSF330, 4, 500, 550, VSP88, VSR100, VSX400, 450, 470	140p
VSF260, 261, 262, 265, 270, 274, 275, 280, 290, 340, 350, 410, 420, 43C	
VSF441, 440, 450, 455, 480, 490, 497, 510, 560, 580, 590, 599, 600,	
VSG20, 21, 23, 24, 25, 30, 33, 34, 35, 51, 54, 55, 60, 64, 65, 70, 73, 74, 75,	
VSP110, VSX560, VSX580	140p
VS17, 20, 22, 23, 24, 25, 26, 27, 35, 37, 38, 53, 55, VSA77	775p
PINCH ROLLER ASSEMBLY VS422, 425, 426, 427, 462, 465, 467, 485, 498, 765, 766, 767, 768, 865, 867, 965, 967, VSA650, VSF10, 11, 12, 14, 15, 180, 190, 200, 210, 220, 221, 222, 230, 240, 30, 300, 301, 310, 320, 33, 330, 4, 500, 510, 600,	
VSR110, VSX100, 400, 450, 470	800p
PINCH ROLLER ASSEMBLY VSS99	140p
ALBA	
VCR3000X, VCR4000	140p
VCR5000, VCR6000	140p
VCR161, VCR222	140p
VCR7000, VCR7800, VCR8000, VCR8800	140p
VTV10	140p
AMSTRAD	
VCR1000, 2000, 4500, 4600, 4700, 5200, 6000, 6100, 6200, 8600, VCR8602, 8603, 8604, 8700, 8704, 8714, 8800, 8804, 9000, 9005, VCR9244, 9340, DD8900, 8904, TVR1, 2, 3, 4	140p
VCR7000	140p
DD8900, DD8904, VCR6000, 6100, 6200, 8600, 8602, 8603, 8604, VCR8700, 8800, 900>9, 9140, 9244, 9340	700p
PINCH ROLLER ASSEMBLY PART NO: 153148 TX3650, UF20, VCR3000, VCR3002, VCR4000, VCR9500	300p
PINCH ROLLER ASSEMBLY PART NO: 2554966 DD9900, 9904, TX3650, UF20, 22, 24, VCR3000, 3002, 9500	140p
VS1004 VS1104	140p
FERGUSON	
3V00, 3V01, 3V16, 3V22, 3V23, 3V24, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909, 8912, 8922, 8923, 8924, 8925, 8929	140p
3V29, 3V30, 3V31, 3V32, 3V52, 8930, 8931, 8933, 8940, 8941, 8942	140p
3V35, 3V36, 3V38, 3V39, 3V42, 3V43, 3V44, 3V45, 3V48, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 3V58, 3V59, 3V65, FV10, FVII, FV12, FV14, 8943, 8944, 8945, 8947, 8948	140p
3V52	140p
8950, 8951, FV10B, 11R, 13H, 14T, 20B, 21R, 22L, 26D, 31R, 32L,FV33H, 39S, 41R, 42L, 50B, 51R, 52L, VC141L	140p
FV37H, FV44L, FV46T, FV43H, FV57H	140p
3V35, 3V36, 3V38, 3V39, 3V49, 8943, 8944	1100p
PINCH ROLLER ASSEMBLY 3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8945, 8947, 8948	1350p
PINCH ROLLER ASSEMBLY FV37, FV57, FV58	350p
PINCH ROLLER ASSEMBLY FV31R	140p
FV41L, FV42L	925p
PINCH ROLLER ASSEMBLY 3V58, 3V59, 3V64, 3V65, FV10, 11, 12, 13, 14, 20, 21, 22, 26, 30, 32, 33	
FV39, VC141L	875p
PINCH ROLLER ASSEMBLY FV43H, FV44L, FV45X, FV46T	700p
PINCH ROLLER ASSEMBLY FV61, FV62, FV67, FV68, FV70, FV71, FV72, FV74, FV77	775p
PINCH ROLLER ASSEMBLY	
FISHER	
FVHP420, 520, 530	140p
FVHP615, 618, 620, 622, 710, 711, 715, 716, 720, 721, 722, 725, 730,	
FVHP810, 830, 840	140p
FVHP905, 906, 907, 908, 910, 911, 915, 916, 918, 970, 975, 980, 990, FVHP 5000, 5005, 5050, 5075, 5100	140p
VBR330, VBS3500, 7000, 7100, 7500, 7600, 9000, 9900	140p
FVHD230, 250, 270, 370, 2000D, FVHP3, 210, 250, 300, 310, 1100,	
FVHP1200, 1250, 130, 132, 1340, 1340, 1400, 1410, 1440, 1500, 200,	
FVHP320410, 420, 430, 440, 445, 470, 475,	
FVSP290S, 495, 2905	140p
FVHD140, FVHD40, FVHD55, FVHP1, FVHP10, FVHP20	140p
FVHD140, 40, 55, FVHP1, 10, 25, 30, 40, 4000,	
FVHS10, 30	1350p
PINCH ROLLER ASSEMBLY	
GOLDSTAR	
GHV51, 1221, 1232, 1233, 1240, 1241, 1242, 1243, 1244, 1245, 1246,140p	
GHV1247, 1248, 1250, 1266, 1290, 1291, 1295, 1296, 1392, 1393,	
GHV1891, 1900, 2145, 3000, 3010, 4400, 4410, 51, 8000, 8200, GHV8210, 8215, 8430	
GHVP1240, 1241, 1247, 1248, 1290, 1291,	
GHVP1295, 1296, VCP4000, 4100, 4130, 4200, 4300, 4301, 4305, VCP4306, 4310, 4311, 4315, 4316, 4320, 4321, 4325, 4326, 4350, GSE1290, 1291, 1295, 1296, 1297, 1891, 1910, 20005, 2000	140p
HITACHI	
VT7, 11, 14, 16, 17, 18, 19, 33, 34, 35, 350, 38, 39, 88, 330, 680, 4200,	
VT5000, 5030, 5500, 6500, 6800, 7000, 8000, 8300, 8500, 8700, 930, VT9500, 9700, 9900, VM600	140p
VT8, 52, 57, 61, 62, 63, 64, 65, 85, 86, 88, 100, 110, 111, 113, 115, 118,	
VT120, 122, 125, 128, 130, 135, 138, 145, 150, 168, 170, 175, 220, 225.	
VT250, 255, 258, 260, 400, 405, 410, 413, 414, 415, 416, 418, 420, 425	
VT426, 428, 430, 431, 435, 438, 450, 498, 510, 515, 517, 518, 520, 525,	
VT526, 530, 535, 536, 540, 545, 546, 548, 570, 575, 576, 580, 585, 588	
VT640, 830, VTF660, 665, 70, 770, 774, 775, 780, 785, 860, 861, 865,	
VTL30, 1000, 2000, VTLC50, VTM598, 620, 622, 625, 626, 630, 635	
VTM636, 640, 645, 646, 720, 722, 725, 726, 727, 728, 730, 731, 735,	
VTM736, 740, 745, 746, 748, 753, 754, 820, 821, 822, 825, 830, 831,	
VTM835, 838, 840, 841, 845, 920, 921, 922, 925, 930, 931, 935,	
VTS80, 85, 890, 895VM200, 2300, 2380, 3200, 3280, 500, VMS7200	140p
VT3000	140p
VT410, 420, 428, 430, 450, 498, 518, 520, 522, 530, VTF770, 780,	
VTM598, 622, 722, 740, 748, 753	650p
PINCH ROLLER ASSEMBLY VTF150, 155, 180, 185, 250, 255, 260, 265, 280, 285, 350, 351, 355,	
VTF360, 365, VTM140, 141, 145, 145, 210, 211, 212, 215, 220, 221,	
VTM230, 231, 235, 284, VTS390	140p
HINARI	
V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, VTV100, 200	140p
VXL2, VXL3	140p
VXL4, VXL20, VXL35	140p
VTV100, VXL10, VXL11, VLX9, VXL90	700p
PINCH ROLLER ASSEMBLY V20H, VXL5, VXL6 MOD KIT	275p
J.V.C.	
HR2200, 3300, 3330, 3360, 3660, 4100, 7700	140p
HR2650, 7200, 7300, 7350, 7600, 7610, 7650, 7655	140p
HRD110, 111, 120, 121, 140, 141, 142, 143, 150, 152, 156, 157, 158,	
HRD160, 220, 225, 250, 257, 445, 455, 565, 566, 725, 755, HRP50, BP5000, BR7000, BRS611, 811	140p
HRD520, 540, 550, 560, 580, 600, 610, 620, 637, 640, 641, 650, 660,	
HRD670, 720, 730, 740, 770, 820, 830, 840, 860, 870, 880, 910, 960,	
HRD980, HRDX20, 22, 25, HRJ200, 205, 210, 215, 300, 315, 316, 318	
HRJ400, 405, 407, 410, 411, 415, 416, 507, 600, 605, 610, 615, 715, 815	
HRJ97, HRS4700, 5800, 5900, 6800, 6900, SR3200, 330, 368	140p
HRD170, 171, 180, 210, 211, 217, 230, 300, 320, 321, 330, 337, 350,	
HRD370, 400, 430, 440, 441, 470, 500, 530, 700, 750, 950,	
HRS5000, 5500, 8000, 9000, BR7030, 7040, 9060,	
BRS600, 605, 747, 777, 920, 925	140p
HRS10	140p
BP5000, HRD110, 111, 120, 220, 225, 455	1100p
PINCH ROLLER ASSEMBLY HRD140, 141, 142, 143, 150, 152, 157, 158, 160, 565, 566, 725, 755, HRP50	1350p
PINCH ROLLER ASSEMBLY HRD1520, 510, 520, 521, 522, 525, 527, 560, 600, 610, 620, 637, 641,	
HRD650, 720, 830, 840, 910, HRJ205, HRS5800	350p
PINCH ROLLER ASSEMBLY BR7030, BRS600, HRD160, 170, 171, 180, 190, 210, 211, 217, 227,	
HRD230, 271, 300, 310, 320, 321, 330, 337, 350, 400, 430, 440, 441,	
HRD470, 500, 530, 700, 750, 950, HRS5000, 5500, 9000	875p
PINCH ROLLER ASSEMBLY HRD540, HRD550, HRD580, HRD660, HRD860, HRD960	700p
PINCH ROLLER ASSEMBLY HRJ600, HRJ605, HRJ815, HRS9200	875p
MATSUI	
VX6000, 730, 735, 750, 755, 765, 800, 850, VS888	140p
VX1000, VX2000, VX2500, VX3000, VX6000A	140p
MITSUBISHI	
HS12, 5300, 5424, 5600, HSB11, 12, 16, 21, 27, 31, 32, 41, 51, 52, 82,	
HSE12, 16, 17, 21, 22, 27, 31, 32, 41, 51, 52, 82, HSM1000, 110, 120, 15	
0, 16, 170, 190, 210, 23, 25, 250, 27, 33, 34, 35, 36, 37, 370, 380, 45, 450, 5	
4, 55, 555, 57, 58, 59, 68, HSMS2, 9, HSS11, 14, 15, 17, 19, 25, 5600, HV	
F125, 150, 303, 85, SV8900, 8930	750p
PINCH ROLLER ASSEMBLY PART NO: 948D020010	
HSE11, 12, 16, 17, 21, 22, 27, 31, 32, 41, 51, 52, 5300, 5424, 5600, HSB11, 12, 16, 21, 27, 31, 32, 41, 51, 52, 82, HSM1000, 110, 120, 150, HSM16, 170, 18, 190, 210, 23, 25, 250, 27, 30, 33, 34, 35, 36, 37, 370, 38, HSM380, 40, 45, 450, 50, 54, 55, 555, 57, 58, 59, 60, 68, HSMS2, 9, HSMX1, 18, 19, 2, HSS11, 12, 14, 15, 17, 19, 21, 25, 5600, HVF125, HVF150, 303, 85, SV8900, 8930	140p
HS200, HS300, HS301, HS302, HS303, HS304, HS310, HS320, HS330, HS360, HS700	140p
HS306, HS307, HS318, HS319, HS337, HS338, HS347, HS349, HS400, HS410, HS411, HS412, HS421, HS480, HS710, HSB 10, HSB20, 30, HSE 10, 20, 30, 70	140p
NATIONAL PANASONIC	
NV100, 180, 300, 330PX, 332, 333, 340, 366, 600, 688, 777, 788, 3321,	
AG6010, 6015, 6100, 6200, 6400, 6800, 7450	140p
NV230, 250, 260, 280, 370, 380, 430, 431, 433, 450, 460, 465, 470, 480	
NV630, 650, 730, 770, 780, 810, 830, 850, 870, 890, 2000, 2010, 3000,	
NV7000, 7200, 7800, 8050, 8150, 8170, 8200, 8300, 8400, 8500, 8600	
NV8610, 8620, NVG11, 14, 16, NVG7, 10, 12, 15, 18, 30, 130, 400,	
AG 1000, 1050, 1200, 1500, 2100, 2200, 6500, 6810, 7500, 7510,	
NVH70	140p
NVG9, NVG120	140p
AG6840, 6720, 7150, 7330, 7350,	
7355, 7650, NVH65, 75, NVJ30, NVL20, 23, 25, 28, NVG300, NVF65, NVF70, NVFS1 NVFS 100, NVG 19, 20, 25, 33, 40, 50,	
NVV8000	140p
NVD48, NVD80, NVG21 NVG45	140p
NVJ700PX	140p
NVHD100, NVHD101, NCHD90, NVSD30, NVSD40	1125p
PINCH ROLLER ASSEMBLY AG5150, 5250, 5700, 6024, NVD38, 48, 80, NVF55, 65, 70, 75, 77,	
NVFS1, 100, 200, 88, 90, NVG 19, 20, 21, 22, 25, 28, 300, 33, 40, 45, 46,	
NVG50, NVH65, 75, 77, NVJ30, 33, 35, 37, 40, 42, 45, 47,	
NVL20, 23, 25, 28, NVW 1	300p
PINCH ROLLER ASSEMBLY	
N.E.C.	
N830, 831, 832, 833, 895	140p
PVC2300, 2400, 740, 744, 746, 760, 764, 766	140p
DX1000, 1600, 1800, 2000, 3000, N9012, 9013, 9014, 9016, 9033	
N9034, 9053, 9054, 9055, 9056, 9066, 9096, 9110, 9120, 9510, 9520,	
N9530, 9610, PX 1200	140p
DS6000G, DX4000, N9077	
NS7000	140p
ORION	
VH1, VH2	140p
VC150, 180, VH3, 33, 200, 201, 205, 212, 250, 254, 288, 300, 303, 312,	
VH404, 555, 700, 704, 712, 770, 780, 844, 900, 1000, 2948, 3030, 3312	
VHF2A, VP2948	140p
COMB 15000, 16000, HV03, LVH50, NEVH, NEVHM, NEVHML,	
TVP230RC, VCP, VH04, 30, 103, 300, 358, 360, 362, 400, 416, 512,	
VH530, 532, 535, 536, 600, 630, 635, 640, 666, 730, 735, 744, 774, 790	
VH800, 820, 850, 886, 893, 900, 930, 940, 942, 974, 1012, 1040, 1050,	
VH1060, 1070, VH1100, 1120, 1204, 1440, 1500, 1660, 1800, 2004,	
VH2151, 2308, 22042400, 2500, 2600, 2700, VH2960, 2970, 3050,	
VH3060, 4000, 4008, 4010, 4012, 4015, 4015, 4020, 4300, 5020,	
VP 10, 200, 220, 225, 245, VR821, 925, 1032, 2949, 2959, 2957, 2966, 2979, 2980, VTV300, VXL20, 25, 30	140p
PHILIPS	
VR6460 VR6920	140p
VR2020, VR2021, VR2022, VR2023, VR2024	140p
VR6711	140p
VR6540	140p
DV856, 586, VR702, 703, 6485, 6585, 6589, 6785, 6880, 6948	140p
VR445, VR6442, VR6542, VR6643, VR6843, VR6943, 44SB9	140p
DV464, 662, VR2220, 2300, 2324, 2330, 2334, 2340, 2350, 2414, VR2480, 2485, 2486, 2489, 2490, 2498, 2840, 6462, 6463, 6464, 6560,	
VR6660, 6860, 6861, 6862, 6863	140p
N-1700, VR2870	140p
VR2025, VR6580, VR6581	140p
49SB6, VR3260, 6349, 6448, 6449, 6548, 6648	140p
PRESSURE ROLLER ASSEMBLY PS403-40205	
DV186, 190, VR211, 2115, 212, 213, 223, 286, 291, 292, 311, 312, 313,	
VR3210, 3219, 322, 3229, 323, 535BO, 486, 471, 562, 582, 571, 761,	
VR201, 202, VR203, 302, 303, 305, 6180, 6182, 6185, 6285, 6290,	
VR6291, 6293, 6362, 6367, 6390, 6391, 6393, 6467, 6468, 6470, 6561	
VR6570, 6581VR6670, 6676, 6710, 6760, 6761, 6762, 6870, 6970,	
VR6975, 86BI, 63SB7, 68SB4, 71SB4, 71SB5, 72SB8, 72SB8, 92SB31, 20DV1, 20DV2, 20RW7, 21DVI, 21DV2, 2SB01, 2SB02, 2SB11, 2SB12, 30DV2, 31DVI, 31DV2, 31DV33SB02, 3SB03,	
3SB05 3SB11 3SB12 3SB13	280p
VR231, 232, 332, 422, 4229, 512, 5229, 722, 7229, 723	140p
VR501	PR38 140p
SANYO	
VHR1100, 1110, 1150, 1200, 1300, 1500, 2100, 2300, 2370, 2500,	
VHR2700, 3330, MVR220	140p
VTC5000, 5150, 5300, 5350, 5400, 5500, 6000, 6010, 6500, 9100,	
VTC9300, VTCM10, 20, 11, 21, 30, 31, 40, 50, VPR5800	140p
VHR3100.3300, 3310, 3400, 3500, 3700, 3800, VHRD500, 700	140p
VTC3000	140p
VHR120, 130, 14, 141, 143, 14, 150, 151, 153, 154, 15, 16, 171, 194, 22	
0VHR23, 235, 240, 244, 250, 251, 274, 27, 297, 310, 330, 335, 350, 390, VHR4100, 4105, 4150, 4200, 430, 4300, 4350, 4400, 474, 4770, 5080,	
VHR5100, 5200, 5300, 5350, 5600, 5700, 6850, 7100, 7200, 7250,VHR7260, 7300, 7400, 7440, 7500, 7520, 7530, 7540, 7700, 774, 780,	
0VHR7810, 8000, 8070, 8100, 8200, 8250, 8500, 8800, VHRD4400, 4410, 4500, 4600, 4610, 4710, 4890, 6700, VHRS700	140p
VCR100	140p
VHR120, 135, 150, 190, 4150, 4160, 4350, 5200, 5240, 5350, 7200, 7250, 7260, 7700, VHRD4410, 4610, 4710, 4890, 5450, VHRS700	975p
PINCH ROLLER ASSEMBLY VHR3100, 3200, 3300, 3310, 3400, 3700, 3800, VHRD500, 7000	1350p
PINCH ROLLER ASSEMBLY	
SHARP	
VC200, 381, 383, 384, 385, 386, 388, 390, 393, 800, 2300, 3300, 6000,	
VC6200, 6300, 7300, 7700, 7750, 7800, 8300, 838, 9100, 9300, 9400,	
VC9500, 9600, 9700, 9800	140p
VC300, 387, 402, 471, 473, 477, 481, 482, 483, 486, 488, 496, 500, 571,	
573, 581, 582, 583, 584, 585, 8481, VC5F3, VC5W20E, VCA1031	140p
VC108, 208, 405, 408, 550, 600, 651, 671, 674, 681, 682, 684, 685, 693,	
VC6~9, 700, 772, 750, 779, 780, 781, 7810, 782, 782MK2, 7822, 783,	
VC785, 786, 787, 793, 800, 7810, 7822, VCT72, VC6F3, VC6V3, VCA 100, 102, 104, 131, 140, 170, 202, 203, 211, 234, 303, 501, 502,	
VCA602, 5011, VCD801, 802, 851, 852, 881, 882, VCM73, VCT73, VCT72,	
VCB361	140p
VC220	140p
VCA10, 30G, 60, 103, 105, 106, 111, 113, 131, 211, 244, 254, 33, 35, 36,	
VCA37, 39, 40, 42, 454, 46, 47, 48, 50, 505, 51, 52, 53, 54, 55, 57, 58, 505,	
VCA60, 605, 615, 62, 63, 67, 68, 1031, 11613,	
VCB311, 320, VCBS97, VCD805, 806, 810, 815,	
VCH80, 81, 865, 910, VCS 1000, VCT310,	
VCT410, 610, VCT 1314, 5313, VC790	140p
VC780, 790, VCA10, 103, 1031, 105, 106, 211, 244, 254, 255, 30, 35,	
VCA340, 43, 47, 50, 60, 605, 615, VCD806, 815, VCH80, 81, 83, 85,	
VCH865, 87, 910, VCS 1000, VCT212, 310, 410, 510, 610, VCTI314,	
VCTS313	525p
PINCH ROLLER ASSEMBLY	
SAISHO	
VHL3, VR1000, 2000, 2500, 3200, 3300, 3500, 3600, 3650, 3800, VRS4400, VRS5000	140p
VR3400	140p
SAMSUNG	
SV716, 717, VB510, 520, 610, 616, 617, 619, 620, 626, 627, 629, 900,	
V910, V1510, 520, 611, 616, 621, 626, 900, 910, VX510, 520, 616,	
VX617, 619, 626, 627, 629	140p
SVX301, 303, 305, 307, 319, 322, VB710, 713, 750, 770, 971, 8220, VB8225, V1710, 730, 750, 770, 790, 8220, 8225, 970, VX710, 712,	
VX720, 730, 750, 770, 790, 825, 8225, 970, 971, 972, 8220, PX980, 981, 982, SE9000, 9001, SX7120, 7121, 7220, 7221, 7230, SX7301, VK8220,	
VPX31	140p
VX9880	140p
PX31 R, 32R, PXR30, SV80, SX3230, 3231, 3260, 3261, VS390, VX30, 31, 32, 3560, 3561, 370, 375, 380, VXK300, 301, 306, 307, 320, VXK321, 326, 330, 331, 336, 337, 350, 351, 356	140p
PX990, 991, 992, S11230, 1240, SVX4000, 503, 504, 600, SX1230,	
SX1231, 1260, 1261, 1566, V11560, VPK43, VX1230, 1260, 1261, VX1560, 1561, 1850	140p
SONY	
SLC5, 6, 7, SL3000, 8000, 8080, 8200, SLJ 10, SLT6ME, SLT7ME	140p
SLC9, 20, 24, 30, 33, 44, SLHF100, SLF1, 11, 20, 25, 30, 35, 60, 100,	
SLF200, SLF60PS, SLF90E, SLFH150, 850, SLK88, 95, SLT20ME, SLT30ME, SLT50ME	140p
BMC 100, BMC200, BMC500	140p
SLV201, 202, 301, 302, 401, 402, 801, 802	140p
SLV210, 270, 273, 275, 300, 353, 373, 410, 415, 474, 656, 715	300p
SLV757, 777	140p
SLV255	140p
SLV275, 282, 315, 325, 353, 363, 373, 410, 415, 416, 474, 625, 656, SLV715, 725, 727, 757, 777, 815, 825, SLVX30, 50, 55	140p
SLV125, 213, 225, 252, 255, 262, SLVXI, 20, 3	140p
SLV215, 216EE, 275, 282, 315, 325, 353, 363EE, 373, 393, 410, 415,	
SLV416EE, 474, 494EE, 555UC, 559, 575UC, 579, 585HF, 595HF, SLV60W, 615, 625, 656, 676UC, 686HF, 696HF, 715, 725, 727, 757, SLV767B, 777, 815, 825, SLVE7, 8, 9SLVX30AS,	
SLVX35AF, SLVX50AS, SLVX55DH, SLVX65BR, SVO140, 160	1250p
PINCH ROLLER ASSEMBLY PART NO: X37277701	
SLV210, 212, 270, 273, 275, 285, 300, 310, 335, 425, 427	350p
PINCH ROLLER ASSEMBLY SV6700.8750, 9700, VHR3100, 3200, 3300, 3310, 3400, 3700, 3800, VHRD500, 700	1350p
PINCH ROLLER ASSEMBLY SL100, 200, SLC20, 30, 33, 34, 40, 44, 80, 88, 9, SLF1, 20, 25, 30, 35, 45, SLF60, 65, 73, 90, SLHF100, 150, 950, SLK85, 95, SLO1700, SLS550, SLT0, 30, 50	300p
PINCH ROLLER ASSEMBLY	

VIDEO LAMPS

Models & Description	Order Code	Price
UNIVERSAL VIDEO LAMP 9V 80mV (310mm WIRES)	VL01	25p
PANASONIC VIDEO LAMPS	VL02	30p
SHARP VIDEO LAMPS	VL02	30p
HITACHI 5381682 (VT63, VT64) VIOEO LAMPS	VL04	135p
AKAI (VS10),GRANADA (VHSXJ3), TT (VR3993,3994), JVC (HR2650, 7600, 7610, 7650, 7655), TELEFUNKEN (VR530, 535, 539, 550, 630, 650), THOMSON (V309, 316, 357, VK309, 411,TX8000), FERGUSON (3V31, 8941, 8942)	VL06	40p
AIWA, AKAI, ALBA, AMSTRAD, BLAUPUNKT, FERGUSON, FIDELITY, FISHER, FUJITSU, FUNAI, G.E.C., GOLDSTAR, GRANADA, GRUNDIG, HINARI, HITACHI, ITT, JVC (HRD SERIES), MATSUI, MITSUBISHI, NEC, ORION, NATIONAL, PHILIPS, SAISHO, SALORA, SAMSUNG, SANYO, SHARP, SIEMEN, SONY, TELEFUNKEN, THOMSON,TOSHIBA	VL05	100p
GRANAOA (VHSAY3),SHARP (VC200, 381, 384, 385, 386, 388, 390, 393, 9300, 9500, 9700)	VL08	45p
AKAI, GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)	VL01	25p
BLAUPUNKT, ORION (VH1, 2A), NATIONAL (NV200,2010, 3000, 7000, 8150, 8200, 8400, 8600, 8610, 8620), SHARP (VC2300, 6000, 6200, 6300, 7300, 7700, 8300)	VL02	30p
AUTHENTIC (N850), DECCA (VR8300), GRANADA (VHSTJ3, WJ1, WJ3), ITT (VR3913, 3914, 3963) JVC (HT7200, 7300, 7350, 7700) TELEFUNKEN (VR450, 520, 529, 540, 549, 620, 640, 920, 1920), THOMSON (V4100, VK308, 309, 312, 410), FERGUSON (3V23, 29, 30, 8923, 8924, 8929, 8930, 8931, 8940)	VL07	40p

VIDEO SERVICE KITS

AMSTRAD
VCR700
Contents
BELT SET. PINCH ROLLER. REEL IDLER. VIDED LAMP
Order Code: SK41 **£5.50**

FERGUSON & JVC
3V42/43
HRD455/HRD725

Contents	*Economy Kit Contents*
BELT SET, PINCH ROLLER, CLUTCH MECHANISM, TENSION BAND	BELT SET, PINCH ROLLER SUPPLY CLUTCH, TAKE UP CLUTCH
Order Code: SK37 **£16.00**	**Order Code: SK38** **£9.00**

3V58/59/64/65
HRD170/180/210/230/300/320/370/400/430/530/700/750
HRS5000
Contents
BELT SET, PINCH ROLLER, IDLER ARM, TENSION BAND
Order Code: SK44 **£7.00**

3V29/3V30
HR7200/7300/7350
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
Order Code: SK05 **£5.00**

3V35/36, 38/39/49
HRD110/111/120/225
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
Order Code: SK04 **£5.00**

3V31/3V42
HR7600/7610/7650/7655

Contents	*Economy Kit Contents*
BELT SET, T/U REEL TABLE TYRE. PINCH ROLLER. REEL IDLER. T/U CLUTCH. T/U IDLER. TENSION BAND. VIDED LAMP	BELT SET, T/U REEL TABLE TYRE. PINCH ROLLER. REEL IDLER TYRE. T/U IDLER TYRE. T/U CLUTCH
Order Code: SK33 **£11.00**	**Order Code: SK34** **£5.00**

3V35/36/38/39/49
HRD110/111/120/121/225

Contents	*Economy Kit Contents*
BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. T/U CLUTCH. T/U IDLER. REEL IDLER. TENSION BAND	BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. T/U CLUTCH. T/U IDLER TYRE. REEL IDLER TYRE
Order Code: SK35 **£10.00**	**Order Code: SK36** **£5.50**

3V29/3V30
HRD7200/7300/7350

Contents	*Economy Kit Contents*
BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. REEL IDLER. T/U IDLER. TENSION BAND. VIDED LAMP	BELT SET. T/U REEL IDLER TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. REEL IDLE TYRE. T/U IDLER TYRE. T/U CLUTCH
Order Code: SK31 **£10.00**	**Order Code: SK32** **£5.00**

3V44/45/48/53/54/55/57
HRP50/HRD140/150/158/160
HRD250/257/565/566/755

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. CLUTCH MECHANISM. TENSION BAND	BELT SET. PINCH ROLLER
Order Code: SK39 **£15.00**	**Order Code: SK40** **£9.50**

FISHER
FVHP905/906/907/908/910/911/916/918

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. IDLER. GEAR IDLER UNIT. TENSION BAND	BELT SET. PINCH ROLLER. IDLER TYRE
Order Code: SK57 **£13.00**	**Order Code: SK58** **£5.00**

FVHP615/618/620/622/710/711/715/716/720/721/722/725/730/830/840

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. IDLER. GEAR IDLER UNIT. TENSION BAND	BELT SET. PINCH ROLLER. IDLER TYRE
Order Code: SK68 **£11.00**	**Order Code: SK69** **£300**

HITACHI
VT11/VT33
Contents
BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRES
Order Code: SK08 **£5.00**

VT11/VT33

Contents	*Economy Kit Contents*
BELT SET. T/UP REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. FF/REW IDLER. CLUTCH PLATE. TENSION BAND	BELT SET. PINCH ROLLER. FF/REW IDLER TYRE. T/UP REEL TABLE TYRE. SUPPLY REEL TABLE TYRE
Order Code: SK45 **£13.00**	**Order Code: SK46** **£3.75**

VT52/61/62/63/64/65/85/86/640

Contents	*Economy Kit Contents*
BELT SET, PINCH ROLLER, FF/REW ARM. CLUTCH PLATE. TENSION BAND	BELT SET, PINCH ROLLER FF/REW IDLER
Order Code: SK49 **£14.00**	**Order Code: SK50** **£3.00**

VT400/405/410/13/14/15/18/420/25/26/28/430/31/35/48/450/498/510/520/25/26/530/35/36/540/545/46/48/570/75/576/580/85/88
Contents
TIMING BELT. PINCH ROLLER. FF/REW ARM. CLUTCH BASE. TENSION BAND
Order Code: SK52 **£9.75**

VT100/110/111/113/115/118/120/125/128/130/135/138/145/150/175/220/225/250/255/258/260/VTL30
Contents
BELT SET. PINCH ROLLER. FF/REW ARM. CLUTCH PLATE. TENSION BAND
Order Code: SK51 **£14.00**

PANASONIC
NV2000/NV2010NV7000/NV7200/NV7800

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRES	BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRES
Order Code: SK03 **£5.00**	**Order Code: SK02** **£5.00**

NV300/NV330/NV333/NV340/NV366
Contents
BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRE
Order Code: SK01 **£5.00**

NV2000/NV2010

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. FF IDLER. PLAY IDLER. TENSION BAND. VIDED LAMP	BELT SET. PINCH ROLLER. IDLER TYRE. PULLEY TYRE
Order Code: SK13 **£6.00**	**Order Code: SK14** **£3.50**

NV7000/NV7200/NV7800

Contents	*Economy Kit Contents*
BELT SET, PINCH ROLLER, IDLER UNIT. PLAY IDLER. TENSION BAND	BELT SET, PINCH ROLLER IDLER TYRE. CLUTCH TYRE
Order Code: SK11 **£8.50**	**Order Code: SK12** **£3.25**

NV300/NV330/NV333/NV340/NV366

Contents	*Economy Kit Contents*
BELT SET, PINCH ROLLER, IDLER UNIT. PLAY IDLER. TENSION BAND	BELT SET, PINCH ROLLER IDLER TYRE. PLAY IDLER
Order Code: SK15 **£7.00**	**Order Code: SK16** **£3.25**

NVG7/NVG9/NVG10/NVG11/NVG12/NVG14/NVG15/NVG16/NVG18/NVG30/NVG120/NVG130/NVG400/NVH65 (PX/AC)/AG1810 (P/K)

Contents	*Economy Kit Contents*
LOADING BELT. CAPSTAN BELT. PINCH ROLLER. IDLER TENSION BAND	LDADING BELT. CAPSTAN BELT. PINCH ROLLER. IDLER. TYRE
Order Code: SK27 **£6.00**	**Order Code: SK28** **£3.00**

NV332

Contents	*Economy Kit Contents*
BELT SET, PINCH ROLLER, PLAY IDLER. FF/REW IDLER. TENSION BAND. FF/REW TYRE	BELT SET, PINCH ROLLER PLAY IDLER TYRE. FF/REW IDLER TYRE
Order Code: SK29 **£12.00**	**Order Code: SK30** **£5.10**

NV230/250/260/280/430/450/460/470/650/810/890/AG1200PK/AG1500PK

Contents	*Economy Kit Contents*
BELT SET, PINCH ROLLER, IDLER. TENSION BAND	BELT SET, PINCH ROLLER IDLER TYRE
Order Code: SK23 **£6.00**	**Order Code: SK24** **£3.25**

NV600/NV688

Contents	*Economy Kit Contents*
BELT SET, PINCH ROLLER, PLAY IDLER. FF/REW IDLER, TENSION BAND	BELT SET, PINCH ROLLER PLAY IDLER TYRE. FF/REW IDLER TYRE
Order Code: SK25 **£12.00**	**Order Code: SK26** **£6.00**

NV730/NV770

Contents	*Economy Kit Contents*
SLOT IN BELT. LOADING BELT PINCH ROLLER. IDLER UNIT. TENSION BAND	SLOT IN BELT. LOADING BELT. PINCH ROLLER. IDLER TYRE
Order Code: SK19 **£5.50**	**Order Code: SK20** **£3.00**

NV370/NV380/480/630/780/830/850/AG2100PK/AG2200PK

Contents	*Economy Kit Contents*
BELT SET, PINCH ROLLER, IDLER. TENSION BAND	BELT SET, PINCH ROLLER IDLER TYRE
Order Code: SK21 **£5.00**	**Order Code: SK22** **£2.75**

NV777/NV788

Contents	*Economy Kit Contents*
BELT SET, PINCH ROLLER, IDLER UNIT. TENSION BAND	BELT SET, PINCH ROLLER IDLER TYRE
Order Code: SK17 **£6.00**	**Order Code: SK18** **£4.00**

SHARP
VC381

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. REEL IDLER. TENSION BAND. VIDED LAMP	BELT SET. PINCH ROLLER REEL IDLER TYRE
Order Code: SK47 **£8.00**	**Order Code: SK48** **£3.25**

VC500/VC571/VC581/VC582/VC583/VC584/VC5F3

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. REEL IDLER. TENSION BAND	BELT SET. PINCH ROLLER REEL IDLER
Order Code: SK60 **£9.50**	**Order Code: SK61** **£5.00**

VC781/VC7810/VC7822/VC785/VC786/VC793/VC800/VCA100/VCA102/VCA104/VCA202

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. REEL DRIVE UNIT. TENSION BAND	BELT SET. PINCH ROLLER REEL DRIVE UNIT TYRE
Order Code: SK64 **£13.50**	**Order Code: SK65** **£3.75**

VC681/VC682/VC684/VC685/VC693/VC699/VC6F3/VC700

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. REEL DRIVE UNIT. TENSION BAND	BELT SET. PINCH ROLLER REEL DRIVE UNIT TYRE
Order Code: SK62 **£13.50**	**Order Code: SK63** **£5.00**

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

SERVICE KIT & UPGRADE FOR ONWA TV CHASSIS

FAILURE OF ZD401 (ZD401 ON THE 20/21 CHASSIS) IS NOT UNCOMMON.

THIS KIT HAS BEEN ASSEMBLED AS A REPAIR KIT FOR COMPONENT FAILURES AND AS AN UPGRADE FOR THE POWER SUPPLY.

THE KIT CONSISTS OF ALL THE REQUIRED COMPONENTS AND COMES COMPLETE WITH FULL INSTRUCTIONS AND CIRCUIT DIAGRAM.

THE KIT IS DESIGNED TO FIT THE FOLLOWING MAKES AND MODELS.

* ALBA / BUSH
* AKAI
* GOODMANS
* HINARI
* JVC
* MATSUI

ORDER CODE : ONWAKIT **PRICE: 1200p**
* SOME MANUFACTURERS HAVE ALREADY TAKEN STEPS TO UPGRADE THE POWER SUPPLY

REPLACEMENT VIDEO CASSETTE HOUSINGS

Name	Models	Code	Price
AKAI	VS35, VS53, VS55, VS56, VS75	CH18	3200p
GRANADA	VHSDP1	CH05	1100p
	VHSYJ2	CH01	2800p
GOLDSTAR	GHV1290P, 1291P, 1295P, 9400, 73401, GSE1295P, GSE1891P, 20001Q, 20051Q, VCP4200, 4300, 4301, 4305, VCP4306, 4311, 4315, 4316, 4320, 4321, 4325	CH25	2000p
	GHV51, 1221, 1232, 1240, 1241, 1242, 1244, 1246, 1248, GHV8000, 8200	CH26	2900p
FERGUSON & J.V.C.	3V38, 3V39, 8943, 8944, 8951, 3V35, 3V36, 3V49, HRD 110, 111, 120, 121, 225	CH01	2800p
	3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V57, 8945, 8947, 8948, HRD 140, 141, 150, 157, 158, 160, 250, HRD257, 455, 565, 566, 725, 755	CH02	2800p
	8948, 8950, FV10B, 12L, 13H, 14T, 20B, 21R, 22L, 26, 395, HRD230, 430, 530	CH03	2800p
	3V58, 3V59, 3V64, 3V65, FV11R, 8950, 8951, HRD170, HRD180, HRO370	CH04	2800p
	FV31R	CH19	4300p
	HRD515, 520, 527, 540, 550, 580, 600, 610, 620, 660, 670, HRD830, 840, 850, 860, 4050, 6600, FV37H	CH20	2200p
	HRD540, 580, 830, 860, 910, 960, HRD970, HRDX20,		
FERGUSON	FV57H	CH27	2400p
I.T.T.	VR3605, VR3905	CH01	2800p
	VR3916, 3926, 3946, 3948, 3976, 3986, 3995, 3997, 6948	CH02	2800p
	VR3916, 3926, 3946, 3948, 3976, 3986, 3995, 3997, 6948	CH02	2800p
NATIONAL PANASONIC	NV730	CH06	4300p
N.E.C.	N830EG, N831EG, N831EG, N832, N833EG	CH01	2800p
	N895	CH02	2800p
PHILIPS	CASSETTE LIFT ASSEMBLY (69120366) OV186, 190, 286, 471, 562, 761, VR6180, 6182, 6185, 6285, VR6290, 6291, 6293, 6362, 6367, 6393, 6467, 6468, 6470, VR6561, 6670, 6760, 6761, 6870, 6970	CH05	1100p
	VR6443	CH22	2900p
	VR6448	CH23	2500p
	49SB6	CH24	2500p
SHARP	VCA100, VCH851, VCH852	CH22	2900p
	VCA103, 103GV, 106, 106GVM, 254GVM	CH23	2500p
	VCS211, 244, 5055, 605, VCB230, VCD806G, 810G, VCT212, 310, 410G, 610	CH24	2500p
TELEFUNKEN	VR2970	CH02	2800p
THOMSON	V320, 321, 323, 326, 4200, 4300	CH01	2800p
	V342, 343, 352, 353, 360, 364, 368, 4210, 4230, 4260, 4400, V5500, 6000, 8540	CH02	2800p
TOSHIBA	V55, V57	CH01	2800p
	V65, V66	CH02	2800p

AMSTRAD MOD KIT

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

PRICE : £2.25 + VAT each

MODE SWITCH

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

AUDIO CONTROL HEADS

AMSTRAD ORIGINAL NO: 150751
Used on: AMSTRAD TVR1, 2, 3, VCR4600, 4600MKII, 4700, FUNAI VS2, VCR4600, 4800, 5200, 5600, 6600, VIP3000, 5000
Also fits: FIDELITY, FUNAI, HINARI, PROLINE, SCHNEIDER, TOWADA, UNIVERSUM **ORDER CODE: AH01 PRICE: 1350p**

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

Replacement Audio Control Video Sound Head for National Panasonic

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

VIDEO TOOLS

VIDEO CLEANING STICKS

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

VIDEO MAINTENANCE TOOLS

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

UNIVERSAL HEAD EXTRACTOR

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

VCR ALIGNMENT KIT

CONTAINS: SET OF 7 HEAD & TAPE PATH ALIGNERS
- RCA TYPE AUDIO & CONTROL HEAD POSITIONING TOOL
- RCA ADJUSTMENT TOOL FOR TAPE GUIDE POSTS
- RCA TYPE BACK TENSION TOOL
- TENSION ADJUSTMENT TOOL FOR VARIOUS USES
- VCR ADJUSTMENT TOOL

SET OF 8 ALLEN KEYS
0.77mm 0.90mm
1.27mm 1.50mm
1.60mm 2.00mm
2.40mm 3.00mm

3 REVERSIBLE SCREWDRIVERS **CIRCLIP PLIERS**
SPRING HOOK **MICRO SCREWDRIVER**
VCR HEAD EXTRACTOR
Order code: TOOL 10, Price 2900p

TRANSPARENT REPAIR/ADJUSTMENT CASSETTE

This transparent videocassette replaces a normal videotape during measurements, adjustments and inspection. The mechanical parts come into sight and become accessible.
Order code: TOOL 23, Price 500p

BACK UP BATTERIES

PHILIPS
Part Nos: 138 - 101138, 138 - 10313 1.2v 90mAH
Order Code: BB01 Price: 70p
Part Nos: 138 - 10229, 2.4v 100mAH
Order Code: BB02 Price: 135p

FERGUSON
Part No: 00E6 - 067 - 001 1.2V 100mAH
Order Code: BB03 Price: 90p
Part Nos: 00E6 - 606 - 8001 2.4V 100mAH
Order Code: BB04 Price: 150p

SATELLITE PSU REPAIR KITS

MAKE & MODEL	CODE	PRICE
PACE PRD800, PRD900	SATPSU1	600p
PACE SS9000, 9200, 9010, 9210, 9220	SATPSU2	550p
AMSTRAD SRD510, SRD520	SATPSU3	600p
AMSTRAD SRD500	SATPSU4	600p
AMSTRAD SRX340, SRX345, SRX350	SATPSU5	600p
PACE D100/150	SATPSU6	650p
CHURCHILL D2MAC	SATPSU7	650p
PACE MSS100	SATPSU8	1100p

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

SATELLITE TUNERS

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

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

SWITCH MODE TRANSFORMERS

PACE 9000
ORDER CODE: PACE9000 PRICE: 800p

PRD800/PRD900
ORDER CODE: PRD800 PRICE: 550p

SATMETER

The Satmeter is a professional portable satellite strength meter designed for the installation and maintenance of satellite TV systems. The Satmeter can be used as stand alone with powering the LNB as well as in loop.
Through operation with satellite RX powering the LNB.
* Acoustical signal: On signal strength *LED indicator: Vert/Hori
* Frequency Range: 900 to 2050 Mhz *Input impedence: 70 Ohm
* Power amplifier: 18db *Detection Range: –60 to –10 DBM
* Max. input signal: –10 DBM

ORDER CODE: TOOL22 PRICE: 8500p

REPLACEMENT TV SWITCHES

GRUNDIG

PART No: 29703, 29102
USED ON:
C7500, C8500. C8502, C8712 . . .ETC
Order Code: SW1 Price: 100p

PHILIPS

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

SONY

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

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

SONY

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

SONY 2 PIN FUNCTION SWITCH

Order Code: SW9 Price: 35p

FUSES

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

CERAMIC PLUG TOP

CURRENT RATING	ORDER CODE	PRICE
3A	FUSE33	100p
5A	FUSE34	100p
13A	FUSE35	100p

32 mm CERAMIC SLOW BLOW

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

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

20mm CERAMIC TIME LAG

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

38mm CERAMIC TIME LAG

CURRENT RATING	ORDER CODE	PRICE
10A	FUSE48	825p

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

VOLTAGE TESTER

A terminal screwdriver incorporating continuity & voltage with Euroslot

ORDER CODE: TOOL11 **PRICE: 220p**

SPRING HOOK

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

ORDER CODE: TOOL20 **PRICE: 265p**

FAULT FINDING / COMPARISON BOOKS

Satellite Fault Finding Guide Issue 1. Listing about 1,000 faults for over a range of 24 different brands. Order Code: BOOK05.
Price £8.50 – No VAT.

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

TELEVISION Edition 6
Lists more than 8,450 faults with 460 pages covering 58 different brands
Price: 1600p only – no VAT. Order Code: BOOK02

Satellite Repair Manual Edition 4

A comprehensive guide to receiver reviewing, featuring stock faults and installation tips.
Price £15.00 Only No VAT Postage 100p
Order Code: BOOK03

SEMICONDUCTOR COMPARISONS 1997/8
Listing more than 31,600 Semiconductors with suitable alternative complete with descriptions and base information.
Price: £15.50 – No VAT. Order Code: BOOK04

SEMICONDUCTOR COMPARISONS 1997
The new 1997 Jaeger Semiconductor with 952 pages packed with information on over 80,000 semiconductors in much greater detail plus marketing data on SMD devices and a separate generic table of all type designations.
Price: £40.00 only – No VAT (+ £5 Postage).
Order Code: BOOK06

SERVICE AIDS

DESCRIPTION	VOLUME	CODE	PRICE
VIDEO HEAD CLEANER	75ML	SP01	145p
SWITCH CLEANER	176ML	SP02	155p
SILICONE GREASE	200ML	SP03	180p
FREEZE IT	170ML	SP04	295p
FREEZE IT	400ML	SP16	580p
FOAM CLEANER	400ML	SP05	180p
ANTI-STATIC	200ML	SP06	180p
AEROKLEANE	200ML	SP07	200p
AERO DUSTER	200ML	SP08	340p
AERO DUSTER	400ML	SP17	580p
PLASTIC SEAL	200ML	SP09	250p
GLASS CLEANER	250ML	SP10	170p
COLDKLENE	250ML	SP13	235p
EXCEL POLISH 80	250ML	SP18	180p
ADHESIVE 120	400ML	SP19	225p
LABEL REMOVER 130	200ML	SP20	260p
REFURB 140	400ML	SP21	260p
TUBE SILICON GREASE	50 GRAMMES	SP11	225p
TUBE SILICON SEALANT WHITE	75ML	SP22	250p
TUBE SILICON SEALANT CLEAR	75ML	SP23	250p
TUBE HEAT SINK COMPOUND	25 GRAMMES	SP12	150p
DRIVE CLEANER	200ML	SP24	150p
SCREEN CLEANER	200ML	SP25	145p
COMPUTER CARE KIT	–	SP26	2100p

All the above items are manufactured by Servisol
If you purchase more than one Servisol Product, postage & package will be charged as follows:
300p for 2- 5 cans **500p** for more than 5 cans

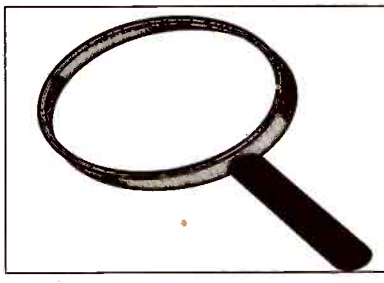
SOLDERING ACCESSORIES

DESCRIPTION	CODE	PRICE
ANTEX SOLDERING IRONS		
25 WATT 240 VAC (XS25W 240V)	S101	900p
15 WATT 240 VAC (XS15W 240V)	S102	900p
25 WATT SPARE ELEMENT	S103	450p
15 WATT SPARE ELEMENT	S104	450p
SOLDERING STAND & SPONGES		
SOLDERING STAND (MADE BY ANTEX)	S108	350p
SPARE SPONGE	S109	55p
SOLDER		
18 SWG 500 GRAMMES	S110	500p
20 SWG 500 GRAMMES	S111	650p
22 SWG 500 GRAMMES	S112	700p
DESOLDERING AIDS		
SOLDER MOP STANDARD GAUGE 1.2MM X 1.5M	S107	100p
SOLDER MDP 1.2MM X 10M	S113	420p
DESOLDERING PUMP	S105	320p
SPARE NOZZLE	S106	60p

I.C. PROTECTORS

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

PRICE: 30p EACH ONLY



CAN'T FIND WHAT YOU'RE LOOKING FOR?
RING US...AS THIS IS ONLY A SELECTION OF THE ITEMS THAT WE STOCK

GRANDATA LTD Tel: 0181 900 2329 Fax: 0181 903 6126

GRANDATA LTD

Tel: 0181 900 2329

CASSETTE DC MOTORS

6V MOTOR	170p
9V MOTOR	170p
12V CW MOTOR	170p
12V CCW MOTOR	170p
13.2V MOTOR	290p

CASSETTE TAPE HEADS

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

CD PICK UPS

Models & Description	Order Code	Price
AIWA		
XC007	KSS151A	1900p
DX-990A, DX-DIA	KSS152A	1600p
CXL60, CXL66G, CXL80, CXN3100, CXN320, CXN3300, CXN360, CXN400, CXN430, CXN540, CXN550G, CXN990, CXN999, CXNV20, CXSL70, DXZ9100M, FDN636, FDN6636, FDN939, LCX60, LCX66G, LCX70M, LCX80, M7400, M75, NSX320, NSX360, NSX400, NSX430, NXS990, NSX992, NSX999, NSXD636, NSXD939, NSXV20, SXFN550.SXFN520, XC300, XC550, XC750, XC900, XC950, XCN992, XG320, XG360, XG400, XG990, ZD3000M, ZD3100M	KSS152A	1600p
CXAP1, CXL7, CXL8G, CXLC50P, CXZ58, DXM740, DXM75, DXM76, DXM77, LCX50, LCX7, LCX8G, LCXAP1, XC002, XC004, XC005, XC777	KSS210B	2000p
XP31, XP33, XP55, XP80G	KS220A	2500p
XP6,XP7	KSS331A	3400p
AKAI		
CD73, DC93	KSS151A	1900p
CD25, CD26, CD27, CD32, CD36, CD37, CD52, CD55, CD57, CD650, CD670, CD69, CD750, CD79, CDM480, CDM600, CDM670, CDEM770, CDM959, MX550, MX570, MX650, MX670, MX750, MX950	KSS210A	1300p
DENON		
DCD1500II, DCD1520, DCDE3520	KSS151A	1900p
DCD1400, DCD600, DCD800	KS152A	1600p
DCD1420, DCD520, DCD610, DCD620, DCD660, DCD810, DCD820, DCD860, DCD910, DCD920	KSS210A	1300p
DCD1015, DCD1290, DCD2060, DCD2060G, DCD315, DCD480, DCD580, DCD615, DCD715, DCD825, DCD890, DCD895, DN2000F	KSS240A	2000p
GOLDSTAR		
CD952A, CD952AJ, CD952LJ, CD952SJ, FFH101KL, FFH101WL, FFH222A/L, FFH272L, FFH333L, FFH373K, FJ606, FR606L	KSS210A	1300p
CD320A/L, CD630S/L, FFH212A/L,FFH212E	KSS210B	2000p
GRUNDIG		
CD360, CD435	HOPM3	2150p
CCD300, CD101MCD904, MC10, NEW ORLEANS CD	KSS210A	1300p
KRCD100, RR1900CD, RR3100CD, RR4000CD, RR610CD, RR700CD	KSS210B	2000p
CDP60, CDP90	KSS220A	2500p
CDP65	KSS331A	3400p
CD905	OPTIMA5	1600p
HITACHI		
DAW560	HOPM3	2150p
FX-10	KSS210A	1300p
AXC10	KSS210B	2000p
J.V.C.		
1990-1992, LATE 1987-1988 - XLE300BK, XLE31BK, XLE51BK, XLE900BK, XLME91BK, XLV101BK, XLV211BK, XLV222BK, XLV311BK, XLV333BK, X-Z1010TN, XLZ411BK, XLZ444BK, XLZ555BK, XLZ611BK	OPTIMA3	4000p
CDRADIO CASSETTE, MINI SYSTEMS - MODELS 1990-1992	OPTIMA4S	5000p
CA-C33, CA-MX30BK, CA-MX33BK, UX-A5, UX-A6, XL-M309, XL-M403BK, XL-M408, XL-M409, XL-M504BK, XL-M505TN, XL-M508, XL-M509, XL-M705TN, XL-V131BK, XL-V151TN, XL-V221BK, XL-V241TN, XL-242BK, XL-V251TN, XL-V252BK, XL-Z1050TN, XL-Z551TN, XL-Z552BK	OPTIMA5	1600p
1994 ONWARDS - CAE48BK, CAMCG7, CAMXG9, CAS20BK, CAS30BK, VAS50, CAS60RBK, MXS20, MXS30, MXS60, PCX105, PCX130, PCX95, RCX230, RCX320, RCX520, RCX620, RCX720, UXA4, UXA5, UXA55, UXC7, UXT1, UXT3, XLF115, XLF116, XLF215, XLF216, XLMC100/M, XLMXG7, XLMXG9, XLV163TN, XLV164BK, XLV174, XLV263TN, XLV264BK, XLV274BK, XLZ463TN, XLZ464BK, XLZ574, XLZ674, XTMXG7, XTMXG9, XTS60	OPTIMA6S	1600p
KENWOOD		
DP47, DP660SG, DP8020, DP87, L1000D	KSS152A	1600p
DP1030, DP1510, DP2010, DP2030, DP3010, DP3030, DP3050, DP4030, DP491, DP5010, DP5030, DP5040, DP520, DP7030, DP7040, DP7050, DP730, DP920, DP930, DP950, DPM650,DPM6630, DPM7730, DPM850, DPM991, DX6620, M225, M25, M450, M850, PD3030, PDM991, RDX25, RXDC3, RXDC3L, UD202, UD302	KSS210A	1300p
DPC42, DPC72, DPC77, DPC80, DPC92	KSS220A	2500p
DP1050, DP2050, DP3060, DP501, DP5060, DP722, DP76, DPB5, DPB9, M77A, PD3060, UD502, UD70, UD701, UD90, XE5	KSS240A	2000p
DPC321, DPC521, DPC531, DPC631K, DPC721, DPC731	KSS331A	3400p
DP1060, DP2060. PART No: RCTRH8136AFZZ	RH8136A	4500p
PANASONIC		
SLP177A, SLP202A, SLP212A, SLP222A, SLP277A, SLP377A, SLP477AK, SLP477A, SLPG100A, SLPG200A, SLPG400A, SLPG500AK, SLPG500AS, SLPJ24A, SLPJ26A, SLPJ27A, SLPJ28A, SLPJ325A, SLPJ325A, SLPJ37A, SLPJ38A, SLPJ46A	691-30209	5500p
SAD30, SLCH9, SLP150, SLP170, SLP200, SLP202, SLP222, SLP230, SLP250, SLP333, SLP370G, SLP400C, SLP555, SLP777, SLP999, SLPA10, SLPC20, SLPC25, SLPJ25, SLPJ26, SLPJ27, SLPJ37, SLPJ45, SLPK25, SLPK26, SLPS50, SLPS70, SLPS700, SLPS840, SLPS900	SDAAD70A	2350p
PHILIPS		
AZ8304, CD070, CD080, 690, 910, 920. PART NO. 4822-691-20768	4822-691	3100p
CD100, CD130, CD1380, CD1482, CD200, CD204, CD210, CD300, CD303, CD304, CD380, CD480, CD482, CD500, CD502, CD582, CD583, CD584, CD610, CD620, CD630, CD780, CD781, CD782, CD840, CD883, CD960, CDF104, CDM4/19, FCD185	691-30209	5500p
AS440, AS445, AS540, AS640, AZ8048, AZ8640, CD070, CD080, CD091, CD163, CD165, CD690, CD710, CD720, CD732, CD740, CD750, CD910, CD920, CD935, FW17, FW21, FW26, FW330, FW36, FW360, FW380I, FW40, FW41, FW46, FW56, FW66, FW68	CDM12.1	1800p
CD1210/40	CDM12.4	2200p
AZ8006	KSS210B	2000p
FW11	OPTIMA6S	1600p
PIONEER		
PDM400, PDM410, PDM500, PDM510, PDM600, PDM610, PDM700, PDM710, PDM730, PDT303, PDT403, PDT503, PDX940M, PDX950M. PDZ560T, PDZ72T, PDZ73T, PDZ81M, PDZ82M, PDZ83M, PDZ960M, XDZ53T, XDZ64T	KSS151A	1900p
N32, N90M, PD101, PD201, PD32, PD41, PD4500, PD4700, PD52PD5700, PD65,I PD6500, PD6700, PD7700, PD8700, PD970, PDCP420, PDCP520M, PDCP520T, PDJ400T, PDJ500T, PDJ800M, PDJ900M, PDM430, PDM450, PDM550, PDM630, PDM650, PDM750, PDM901, PDP710T, PDP720T, PDP910M. PDP920M, PDS501, PDS601, PDS701, PDS701G, PDS901, PDT310, PDT510, PDZ, PDZ570T, PDZ74T, PDZ84M, PDZ970M, PXA1349, S125CDT, S135CDT, S303CDM, S303CDT, S505DM, S505DT, S707DM, S707DTM, S909DM, S990DT, XCP410M, XCP410T, XDZ54T, XDZ55T, XDZ64M, XDZ84T, XRP310, XRP320	PEA1030	4400p
PDM400, PDM410, PDM500, PDM510, PDM600, PDM610, PDM700, PDM710, PDM730, PDT303, PDT403, PDT503, PDX940M, PDX950M, PDZ560T, PDZ72T, PDZ73T, PDZ81M, PDZ82M, PDZ83M, PDZ960M, XDZ53T, XDZ54T, XDZ55T, XDZ62, XDZ62M, XDZ630, XRZ82	PWY1009	4800p
SAMSUNG		
CD20	HOPM3	2150p
CD1200, CD1310, SCM-6000, SCM6900	KSS210A	1300p
RCD1200, RCD1300, RCD1350, RCD1600, RCD2600, RCD990, RCD995, SCM6900	SOH90T4N	3800p
SANYO		
DCFS3, DCT55, DCX502, DCX701, DCX702, DCX802, DCX891, DCX891N, MCDZ10. PART No. 6142186855	614218	2300p
DCFS5, MCD450K, 660K, MCDZ30L, 60F. PART No. 6142205006	614220	5600p
DCX1000MD, DCX1003, DCX900MD, DCX903, DCX915	KSS210A	1300p
DCD10, DCD11U, DCD20, DCD30, DCD30AT, DCD6, DCD8U, DCMS1, DCX110, DCX120, DCX210, DCX220, DCX993, DCX994, MCDMS40L, MCDMS50L, MCDMS660L, MCDZ1L, MCDZ2L, MCDZ3L. PART No. 6142391303	614239	3300p
DCD12. PART No. 6450055966	645005	3700p
MCDZ31L, MCDZ41L, MCDZ61L, MCDZ71L	KSS210B	2000p
SHARP		
CD-111, CD-301, CD-302, CD-304, CD-310, CD-C3, CD-L700, CD-L800, CD-U1, CD-U10, CD-X10, CD-X12, CD-X15, CD-X16, CD-X17, CD-X20, CD-X9, CKL650, CMS95CD, DX-150, DX-160, DX-450, DX-460, DX-461, DX-650, DX-660, DX-999, DX-A3, DX-N45, DX-R554, DX-R7, DX-R75, DX-R750, DX-R77, DX-R770, DX-R820, DX-R840, DX-Z100, DX-Z1000, DX-Z1500, GFCD55, QT-30CD, QT-33CD, QT-350CD, QT-37CD, QT-38CD, QT-CD20, QT-CD33, RS95, SC-77CD, SC-99CD, SC-RS95, SG-A1, SG-W1CD, SG-W2CD, SYS302, ZCD7CD. PART No. RCTRH8122AFZZ	RH8122A	5750p
QT-60CD, QT-60CD, QT80CD. PART No. RCTRH8124AFZZ	RH8124AF	2900p
DXR-840B. PART No. RCTTRH8130AFZZ	RH8130AF	2900p
CDS360E, 360H, 370, 450H/E, CMS150CDH, CMSR400CDH, CP150, CPR400, CPS360, 370. PART No. RCTRH8136AFZZ	RH8136AF	4500p
SONY		
KSS240A	KSS240A	2000p
KSS121A	KSS121A	3500p
KSS151A	KSS151A	1900p
KSS210A	KSS210A	1300p
KSS210B	KSS210B	2000p
KSS220A	KSS220A	2500p
KSS331A	KSS331A	3400p
KSS360A	KSS360A	2600p
TECHNICS		
SLP200, SLP230, SLP250, SLP333, SLP555, SLP777, SLP999,SLPA10, SLPC20, SLPJ25, SLPJ45, SLPS700, SLPS900	SOAD70A	2350p

REMOTE CONTROLS

Description	Code	Price
AKAI		
RC-V10A	RC876	650p
RCV 37 B	RC891	650p
V25A	RC896	650p
DECCA		
C70	RC894	650p
HER		
95B	RC879	650p
ADA		
RSAL TEXT	RC309	650p
T, 70155G, 70115G, 70133G	RC880	650p
S	RC882	650p
94	RC884	650p
GRU		
TP16	RC107	650p
TP200,	RC380	650p
TP400	RC401	600p
TP590-6L	RC600	650p
TP390, TP	RC610	650p
TP621	RC612	650p
TP630, TP65	RC650	650p
TP666	RC660	650p
TP661	RC661	650p
HITACHI		
CLE800-CLE830	RC140	650p
A617402/655602	RC1920	650p
A512120/230	RC900	650p
A514790	RC901	650p
A5088470	RC902	650p
A518612	RC903	650p
SCL002	RC904	650p
C2096	RC905	650p
A511940	RC906	650p
655602H	RC1920	650p
ITT		
IFB13, 14, 15	RC143	650p
FS4	RC148	650p
RG305	RC305	650p
RG306	RC306	650p
FS9/1-10/1	RC307	650p
VS5 RUK	RC308	650p
VS4-1	RC308	650p
MULTICONTROL (17C20)	RC311	650p
LOEWE		
DC11	RC146	650p
MATSUI		
010270601	RC889	650p
VX770	RC892	650p
NOKIA		
SATELLITE	RC550	650p
ORION		
RC53	RC892	650p
PANASONIC		
EUR51200	RC200	650p
TC2200	RC204	650p
VSQ0357/NV730	RC202	650p
TNQ1621	RC203	650p
PHILIPS		
RC5002,5154	RC134	650p
KT3 NON TEXT	RC135	650p
69117032	RC178	650p
69117194	RC180	650p
RC5991-UNIV	RC300	550p
RC38	RC301	650p
KT3 TEXT	RC5301	650p
RC5352	RC5352	650p
RC5375	RC5375	650p
RC5 STANDARD	RC300	550p
RC5903	RC5903	650p
SALORA		
SERIES L	RC190	650p
86173	RC882	650p
SANYO		
RC218, RC222, RC228, RC238	RC140	650p
JXGE	RC878	650p
JXDE	RC884	650p
VHR2300	RC890	650p
RC628	RC865	650p
SHARP		
G0121CESA, 123CESA, 204, 251	RC140	650p
SONY		
RM604, RM605, RM606	RC140	650p
32 CHANNEL	RC140	650p
RM613	RC141	650p
RM632, RM636	RC160	600p
TATUNG		
FXA	RC877	650p
RC70	RC883	650p
FX70 FASTTEXT	RC894	650p
TELEFUNKEN		
FB632	RC632ST	650p
FB639	RC639	650p
THORN/FERGUSON		
3V35-42	RC342	600p
3V31-32	RC344	650p
3V57-58	RC628	650p
TX10 TEXT	RC732	575p
TX10 STEREO TEXT	RC738	575p
TC9-90-100	RC740	600p
3V55, FV11	RC783	650p
TX100 FASTTEXT	RC789	650p
TX100 ST, FASTTEXT	RC789	650p
PROFESSIONAL	RC790	650p
TOSHIBA		
CT937	RC950	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

SALE PRICE

PRICE: 1000p + 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

REPLACEMENT LINE OUTPUT TRANSFORMERS

Part No.	Code	Price
AKAI		
45150344	LOT56	1650p
101-214017-03	LOT278	1300p
101-220005-03A	LOT72	1600p
D 050/37	LOT27	1450p
D 053/37	LOT207	1550p
D 056/37	LOT56	1650p
D 059/37	LOT200	1400p
D 069/37	LOT56	1650p
FCM 2015 AL	LOT78	1500p
FERGUSON		
00 D-3-508-001	LOT38	1250p
00 D-3-508-002	LOT38	1250p
00 D-3-508-003	LOT276	1400p
00 D-3-515-001 PL1	LOT276	1400p
00 D-4-208-001	LOT79	1600p
00 D-4-208-002	LOT79	1800p
00 D-4-235-002	LOT240	1250p
00 D-4-235-002 HTI	LOT81	1350p
00 D-4-235-00201G	LOT81	1350p
00 D-4-260-004 HTI	LOT38	1250p
00 H-0-701-2400	LOT182	1450p
06 D-3-083-001	LOT82	1250p
06 D-3-083-002	LOT82	1250p
06 D-3-084-001	LOT23	1400p
06 D-3-087-001	LOT23	1400p
06 D-3-088-001	LOT84	1450p
06 D-3-093-001	LOT204	1600p
06 D-3-095-001	LOT87	1000p
06 D-3-095-002	LOT87	1000p
06 D-333-512-001	LOT204	1600p
FETX 100 90 DEG	LOT04	1500p
FETX 90 WHITE	LOT06	1650p
FETX 100 100 DEG	LOT34	1500p
GRUNDIG		
29201.008.01	LOT153	1750p
29201.014.01	LOT140	1500p
29201.015.01	LOT149	1400p
29201.017.01	LOT60	1250p
29201.018.01	LOT163	1300p
29201.018.02	LOT61	1700p
29201.019.01	LOT62	1250p
29201.019.02	LOT62	1250p
29201.022.01	LOT63	1700p
29201.022.02	LOT166	1600p
29201.022.03	LOT165	1350p
29201.022.04	LOT165	1350p
29201.022.04A	LOT165	1350p
29201.024.01	LOT65	1500p
29201.024.04	LOT164	1400p
HINARI		
154 138 K	LOT24	1500p
51 13914 1	LOT24	1500p
51 14184 1	LOT24	1500p
CF 44 A	LOT24	1500p
HM51-1411834-1	LOT24	1500p
HITACHI		
2424593	LOT44	1050p
2432101	LOT79	1600p
2432461	LOT169	1500p
2432611	LOT80	1800p
2432651	LOT80	1800p
2432761	LOT169	1500p
2432981	LOT37	1200p
2432981	LOT37	1200p
2432982	LOT37	1200p
2433011	LOT171	1650p
2433012	LOT171	1650p
2433014	LOT171	1650p
2433212	LOT168	1500p
2433291	LOT172	1350p
2433301	LOT246	1600p
2433441	LOT188	1900p
2433442	LOT191	1600p
2433451	LOT81	1350p
2433452	LOT82	1250p
2433453	LOT82	1250p
2433455	LOT234	1600p
2433521	LOT85	1600p
2433581	LOT22	1250p
2433721	LOT83	1400p
2433751	LOT01	1300p
2433752	LOT01	1300p
2433752	LOT250	1350p
2433891	LOT23	1400p
2433892	LOT84	1450p
2433893	LOT23	1400p
2433952	LOT33	1000p
2434002	LOT200	1400p
2434141	LOT33	1000p
2434141	LOT33	1000p
2434274	LOT44	1050p
2434274	LOT44	1050p
2434453	LOT86	1600p
2434455	LOT234	1600p
2434593	LOT44	1050p
2435062	LOT296	1400p
2435121	LOT87	1000p
2435131	LOT251	1450p
2435141	LOT282	1300p
2435301	LOT88	1450p
2435671	LOT89	1600p
2436201	LOT109	1200p
2436202	LOT109	1200p
2432101-2	LOT79	1600p
2433451H	LOT81	1350p
2433453H	LOT82	1250p
2433891H	LOT23	1400p
2433892G	LOT84	1450p
I.T.T.		
4515 01 08	LOT113	1400p
4515 01 15	LOT136	1600p
4515 01 16	LOT139	1675p
4515 01 17	LOT139	1675p
4515 01 19	LOT169	1500p
4515 01 24	LOT137	1600p
4515 01 46	LOT136	1600p
4515 03 01	LOT169	1500p
4515 03 02	LOT180	1550p
4515 03 04	LOT169	1500p
4515 03 05	LOT180	1550p
4515 03 06	LOT168	1550p
4515 03 08	LOT22	1250p
4515 03 09	LOT178	1500p
4515 03 10	LOT168	1550p
4515 03 13	LOT30	1250p
4515 03 14	LOT174	1400p
4515 03 15	LOT22	1250p
4515 03 18	LOT192	1550p
4515 03 19	LOT30	1250p
4515 03 20	LOT190	1650p
4515 03 22	LOT196	1550p
4515 03 24	LOT194	1550p
4515 03 25	LOT22	1250p
4515 03 26	LOT198	1550p
4515 03 28	LOT27	1450p
4515 03 29	LOT193	1550p
4515 03 30	LOT179	1550p
4515 03 31	LOT207	1550p
4515 03 34	LOT56	1650p
4515 03 35	LOT193	1550p
4515 03 38	LOT27	1450p
4515 03 40	LOT200	1400p
4515 03 41	LOT56	1650p
4515 03 43	LOT196	1550p
4515 03 44	LOT56	1650p
4515 03 46	LOT201	1550p
4515 03 50	LOT27	1450p
4515 03 51	LOT27	1450p
4515 03 75	LOT56	1650p
4516 16 01	LOT22	1250p
MITSUBISHI		
731003	LOT51	1550p
276-16399	LOT49	1500p
334 B 07803	LOT50	1450p
334 B 078030	LOT50	1450p
334 B 08104	LOT74	1600p
334 B 08108	LOT295	1600p
334 P 18506	LOT51	1550p
334 P 18507	LOT75	1500p
5908-05008A-AA	LOT70	1500p
D 108/37	LOT49	1500p
DCF1577	LOT273	1700p
DCF2077A	LOT272	1300p
KFS 60226B	LOT279	1550p
MSH-1FBW08	LOT78	1500p
NIKKAI		
BABY10	LOT67	1450p
ORION		
3714002	LOT02	1500p
PANASONIC		
TLF 14512 F	LOT39	1850p
TLF 14520 F	LOT40	1500p
TLF 14521 F	LOT39	1850p
TLF 14567 F	LOT39	1850p
TLF 14568 F	LOT40	1500p
TLF 14584 F	LOT41	2000p
TLF 14586 F	LOT42	1800p
TLF 15606 F	LOT256	2000p
TLF 70012	LOT78	1500p
TLF 70012 F	LOT78	1500p
TLF 70012A	LOT78	1500p
TLF 70018	LOT274	1550p
TLF 70018 F	LOT274	1550p
TLF 70161	LOT278	1300p
TLF 70162	LOT72	1600p
TLF 70162A	LOT72	1600p
TLF 70162B	LOT72	1600p
TLF 70162G	LOT72	1600p
TLF 77001 B	LOT274	1550p
PHILIPS		
4822 140 10142	LOT142	1800p
4822 140 101145	LOT134	1450p
4822 140 10146	LOT112	1700p
4822 140 10151	LOT102	1700p
4822 140 10161	LOT103	1250p
4822 140 10171	LOT104	1500p
4822 140 10176	LOT114	1150p
4822 140 10194	LOT105	1500p
4822 140 10198	LOT116	1600p
4822 140 10201	LOT104	1500p
4822 140 10236	LOT118	1550p
4822 140 10246	LOT111	1500p
4822 140 10247	LOT105	1500p
4822 140 10254	LOT107	1450p
4822 140 10263	LOT117	1550p
4822 140 10269	LOT210	1350p
4822 140 10271	LOT208	1650p
4822 140 10274	LOT123	1450p
4822 140 10282	LOT122	1300p
4822 140 10283	LOT104	1500p
4822 140 10294	LOT125	2150p
4822 140 10306	LOT110	1200p
4822 140 10325	LOT132	1500p
4822 140 10326	LOT122	1300p
4822 140 10328	LOT124	1450p
4822 140 10349	LOT106	1250p
4822 140 10353	LOT284	1450p
4822 140 10356	LOT284	1400p
4822 140 10367	LOT286	1400p
4822 140 10369	LOT109	1200p
4822 140 10381	LOT128	1300p
4822 140 10384	LOT127	1550p
4822 140 10395	LOT116	1600p
4822 140 10406	LOT73	1150p
4822 140 10421	LOT109	1200p
4822 140 17078	LOT103	1250p
SANYO		
094-00020/0.9	LOT113	1400p
094-00035/0.2	LOT162	1350p
094-01020/0.7	LOT59	1400p
094-01021/0.6	LOT59	1400p
094-01027/0.0	LOT186	1825p
094-01038/0.7	LOT245	1900p
094-01052/0.8	LOT186	1825p
094-01057/1.1	LOT285	1450p
610.018.6620	LOT189	1650p
610.018.6637	LOT215	1800p
SHARP		
RTRNF 1220 CEZZ	LOT39	1850p
RTRNF 1783 BMZZ	LOT202	1800p
RTRNF 1783 CEZZ	LOT202	1800p
RTRNF 1786 BMZZ	LOT211	1850p
RTRNF 1786 CEZZ	LOT211	1850p
RTRNF 2000 BMZZ	LOT214	1600p
RTRNF 2002 BMZZ	LOT307	1450p
RTRNF 2002 CEZZ	LOT307	1450p
RTRNF 2003 BMZZ	LOT308	1350p
RTRNF 2004 BMZZ	LOT307	1450p
RTRNF 2005 BMZZ	LOT308	1350p
RTRNF 2006 BMZZ	LOT308	1350p
RTRNF 2007 BMZZ	LOT307	1450p
RTRNF 2023 BMZZ	LOT310	1500p
SONY		
3753100	LOT275	1500p
1-439-243-00	LOT91	1600p
1-439-243-11	LOT91	1600p
1-439-243-12	LOT91	1600p
1-439-243-31	LOT229	1700p
1-439-243-32	LOT229	1700p
1-439-243-41	LOT229	1700p
1-439-244-00	LOT48	1600p
1-439-244-11	LOT48	1600p
1-439-244-21	LOT48	1600p
1-439-244-31	LOT48	1600p
1-439-256-00	LOT45	1650p
1-439-256-11	LOT45	1650p
1-439--256-21	LOT45	1650p
1-439-256-22	LOT45	1650p
1-439-276-21	LOT230	1700p
1-439-280-00	LOT92	1600p
1-439-280-13	LOT92	1600p
1-439-286-00	LOT46	1300p
1-439-286-11	LOT46	1300p
1-439-286-12	LOT46	1300p
1-439-286-13	LOT46	1300p
1-439-286-21	LOT46	1300p
1-439-288-00	LOT228	1750p
1-439-288-12	LOT228	1750p
1-439-289-00	LOT47	1400p
1-439-289-21	LOT47	1400p
1-439-289-22	LOT47	1400p
1-439-289-31	LOT47	1400p
1-439-294-00	LOT93	1450p
1-439-294-11	LOT93	1450p
1-439-294-21	LOT269	1550p
1-439-303-00	LOT94	1300p
1-439-303-11	LOT94	1300p
1-439-303-31	LOT94	1300p
1-439-303-32	LOT94	1300p
1-439-311-00	LOT95	1550p
1-439-311-11	LOT95	1550p
1-439-311-13	LOT95	1550p
1-439-311-31	LOT95	1550p
1-439-311-32	LOT95	1550p
1-439-331-22	LOT96	1550p
1-439-331-41	LOT98	1550p
1-439-332-00	LOT99	1600p
1-439-332-11	LOT9	1600p
1-439-332-21	LOT99	1600p
1-439-332-41	LOT100	1500p
1-439-332-42	LOT101	1450p
1-439-332-52	LOT100	1500p
1-439-333-00	LOT270	1550p
1-439-333-11	LOT270	1550p
1-439-333-12	LOT270	1550p
1-439-363-11	LOT268	1400p
1-439-363-21	LOT268	1400p
1-439-387-11	LOT311	1450p
1-439-387-21	LOT311	1450p
1-439-416-11	LOT255	1600p
1-439-416-12	LOT255	1600p
1-439-416-21	LOT255	1600p
1-439-416-23	LOT255	1600p
1-439-416-41	LOT255	1600p
1-439-416-51	LOT255	1600p
1-439-430-21	LOT271	1550p
154125A	LOT275	1500p
TOSHIBA		
37010	LOT131	1450p
37011	LOT131	1450p
37012	LOT131	1450p
37013	LOT131	1450p
37014	LOT131	1450p
37015	LOT131	1450p
37016	LOT131	1450p
37017	LOT131	1450p
37018	LOT131	1450p
37019	LOT131	1450p
1810951	LOT55	1400p
2433751	LOT01	1300p
2433752	LOT250	1350p
23236023	LOT281	1300p
23236052	LOT131	1450p
23236098	LOT288	1400p
23236198	LOT288	1400p
23236255	LOT289	1500p
23236424	LOT129	1400p
23236425	LOT288	1400p
23236428	LOT289	1500p
3122113837011	LOT131	1450p
150F6D	LOT131	1450p
TFB 4039 AD	LOT293	1550p
TFB 4048 AD	LOT281	1300p
TFB 4048 BD	LOT281	130 0p

NIKKAI BABY 10 REGULATOR

ORDER CODE : BABY 10
PRICE: £10.00

Universal Pre-Programmed Brand Replacement Remote Controls

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

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

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

SPECIAL OFFERS!!

CD PICK UPS

	WAS	NOW
KSS 210A	~~£18.00~~	£13.00
KSS 240A	~~£25.00~~	£20.00
KSS 213B	~~£19.00~~	£15.00
OPTIMA 6S	~~£26.00~~	£16.00
OPTIMA 5	~~£30.00~~	£16.00

8 WAY UNIVERSAL REMOTE CONTROL

A single remote control to operate Televisions, Videos and Satellite Receivers... plus an Auxiliary option

OLD PRICE	NEWPRICE
~~£14.50~~ + vat	£10.00 + vat

SEE BOTTOM OF PAGE 881 FOR MORE DETAILS

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

Help wanted continued from page 870

camcorder. Malcolm Pugh, 25 Lindbergh Close, Gosport, Hants PO13 8EU.
Wanted: 8in. speaker with 400Ω speech coil for the JVC 4TR-99U(M) radiogram. Geoff Davies (Radio), 13 Bowen Road, Rugby CV22 5LF. 01788 574 774.
Wanted: Sony SLC9UB VCR or an SR11UB power supply module for it. Alan Stubbins, 7 Church Road, Saxilby, Lincoln LN1 2HH. 01522 583 373 days, 01522 702 601 evenings/weekends.
Wanted: Nicam board for the B&O 8902 TV. Call Chris on 01707 892 842 (Hatfield, Herts).
Wanted: Any field timebase modification details to remove teletext lines in the top half of the screen with a Sony KV1340UB. D.H. Kidston, 102 Fergus Avenue, Livingston, W. Lothian EH54 6BG. 01506 433 371.
Wanted: Chopper transformer for the Philips/Pye Model 10CX1120/ 25KX1201. R. Anderson, 33 Broadmanor, North Duffield, Selby, N. Yorkshire YO8 5RZ. 01757 288 660.
For disposal: *Radio and Television Servicing* vols. I, II, III, IV and 1953-4, 1955-6, 1956-7, 1957-8, 1958-9 and 1963-4. All ten for £30 plus carriage or to collect. F. Nedza, 40 Brynhyfryd, Glynneath, Neath SA11 5BA. 01639 720 429.
Wanted: Service manual/circuit diagrams for the B&O 7102 colour TV. Brian Nield, 21 Sandrock Road, Christleton, Chester CH3 7BH. Phone/fax 01244 335 298.
Wanted: Has anyone a scrap Tashiko LVF971 and a Pansonic NVG21 VCR. I need them for spares. Sam TV Services, 117 Francis Avenue, Ilford, Essex IG1 1TT.
Wanted: Power supply transformer for the Alba 6700 VCR, part no. TPW4167D. Would also consider complete power supply or VCR. David Holdsworth, 61 Windhill Avenue, Mexborough, S. Yorkshire S64 0DW. 01709 590 329.
Wanted: Circuit diagram for the BPL Model KLR9402. B. Milne, 22 Aldwych Place, Blackburn, Lancs BB1 9QP. 01254 246 127 or 0973 510 295.
Wanted: Scan coils for a Matsui 14in. portable. Marked DSE1422. Circuit diagram/service manual for the Finlandia CD66JZ5E and Sharp VCT510HM. RC handsets for the Toshiba V423B and Amstrad UF30. Chopper transformer and RC handset for the Mitsubishi CT21A2STX. Advance TV, 88 Newark Road, Lincoln LN5 8QA. 01522 513 013.
Wanted: User instructions, circuit diagram and service data for the Infotec 6012 fax machine. Photocopies OK. Douglas Biggar, 27 Audlea Road, Beith KA15 2DA. 01505 502 118.
Wanted: RC handsets for the Ferguson FV31R/FV32L VCRs. Working or not – required for spares. Steve Burgess, 2 New Coppice, Woking, Surrey GU21 1US. 01483 480 283.
Wanted: Head drum for the Panasonic NVFS1B VCR or a scrap deck/VCR with working drum. New replacement too costly for economic repair. Ed Cocks, 86 St. John's Road, Hedge End, Southampton, Hants SO30 4DF. 01489 782 885.
Wanted: Circuit diagram (photocopy OK) for the Technics SU71000K stereo amplifier. T.P. Cook, 27a Riverside, Driffield, E. Yorkshire YO25 6PA. 01377 252 498.
Wanted: AC adaptor for the Panasonic NV100B VCR or details of the adaptor multipin connector. R. Hannah, 21 Kilmaurs Road, Knockentiber, Kilmarnock, Ayrshire KA2 0DA. 01563 531 559.
For disposal: Working vintage Bush BC1122 colour receiver (A823 chassis) in walnut veneer cabinet. Also similar non-working model in white cabinet. Service manual and spare PCBs available. H. Baker, 11 Bluebridge Avenue, Brookmans Park, Herts AL9 7RY. 01707 646 604.
Wanted: Circuit diagram for the Apricot 14in. SVGA monitor Model XJ52178. W.E. Halliwell, 54 Moore Drive, Haydock, St. Helens, Merseyside WA11 0NG.
Wanted: Circuit diagrams for the following computer monitors: Opus CM1438, Samsung CVM4967PL and Qume QM835. Geoff Southern, 27 Eldred Road, Childwall, Liverpool L16 8NZ. 0151 281 2184.
For disposal: Telequipment D54 10MHz, double-beam scope in good working order (very little use). Offers around £40. Large selection of TV and VCR manuals at £3 each plus postage. Phone for details. *Television* from 1978 to present, 180 copies in all, some issues missing, £30 the lot plus carriage. David Forfar, 65 Ormskirk Road, Old Skelmersdale, Lancs WN8 8TR. 01695 735 132.
For sale: Microchannel 486 memory expansion card 5021816-01 B01, with eight 72-pin SIMM slots, unused £40. Maxicamera A gamma camera signal processor type 46-406040G10, made by General Electric Nuclear Medical, £50. Eight genuine branded Bernoulli 44Mb removable discs, at least three unused, £40. Julian Bohan, 30 Stanley Street, Lincoln LN5 8NG. 01522 514 241 or 0958 771 319.

DTT Testing

The TV Transmitter Adjustment Programme

Adjustments and changes are being made to some analogue TV transmitters to allow for the introduction of the new digital terrestrial TV (DTT) services.

Test broadcasts from new digital transmitters are also now under way in some parts of the country. To comply with the requirements of the licences issued for DTT, a TV Transmitter Adjustment Programme (TV TAP) has been set up. This will enable any interference to existing analogue reception caused by the digital terrestrial transmissions to be identified and dealt with.

In areas where it has been predicted that existing TV reception might be affected, householders are being informed, before the tests take place, by a mail shot which gives a Freephone number to ring. If digital interference is verified, a technician from the TV TAP will be sent to sort out the problem – at no cost to the householder.

The TV TAP will not be contacting householders in transmitter areas where no interference to existing TV reception is expected. But there is a very small risk that the test broadcasts in these 'low-risk' areas may affect some TV sets. If local TV retailers or service technicians receive reports of digital interference to reception, they should pass the details to the special trade-only Freephone number below. Arrangements will then be made to send out a technician from the TV TAP.

The terms of the Digital Terrestrial Licences do not require the TV Transmitter Adjustment Programme to deal with possible digital interference on the outputs from VCRs and satellite decoders. Thus any householders that experience this particular difficulty will need to arrange for the necessary adjustment to be carried out by a suitable TV retailer or service technician.

Note that the TV Transmitter Adjustment Programme can deal with only TV picture problems caused by the test transmissions, also that the presence of digital interference does not necessarily mean that a householder will be able to receive satisfactory digital TV broadcasts once the set-top decoders become available.

To begin with, test transmissions run typically from 9 a.m. to 7 p.m. daily. The test period will be extended to 24 hours a day later. More details about the TV Transmitter Adjustment Programme are available to the TV retail trade at the TV TAP web site:

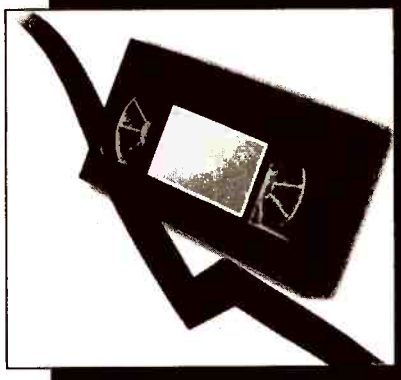
www.tvtap.mcmail.com

Details of the digital TV channel allocations are available at the ITC's web site:

www.itc.org.uk/divisions/eng div/dtt freq plan/

For **trade enquiries only**, the TV Transmitter Adjustment Programme can be contacted on

Freephone 0800 092 0080.



VCR Clinic

Reports from
Eugene Trundle
C.J. Guy
Andy Barkley
Ronnie Boag
David A. Chaplin
Paul Hardy
Mike Orr and
Chris Watton

Hitachi VTF645E

The picture was intermittently corrugated, with a whine or squeal that came from within the machine. This could happen in either the record or the play mode, in the former case leaving a permanent record of the fault symptom on the tape. The usual cause of this is a vibrating sleeve on one of the tape guides, but in this case the back-tension pole was responsible. Its part no. is KX11531. **E.T.**

Daewoo V22

If the cassette intermittently jams while front loading it is likely that the little tension spring has disappeared from the flap-opener trigger in the FL cradle. It's item 11 in the exploded view diagram in the manual, part no. 97S 3001 700. It is vital to ensure that the escaped spring is not lying loose on the PCB, where it could cause havoc – especially in the power supply section! **E.T.**

Philips VR312

The fault report read "failure to record sound". As the machine worked all right on test we returned it to the customer and asked him to provide us with a tape that showed the fault next time it occurred. In due course the machine came back with a tape whose sound track was completely silent, suggesting failure of the bias/erase oscillator. In addition there was an odd 'hunting' effect on the picture. Our recording over it didn't produce this effect, and the sound was OK.

We then discovered that changing channel produced the fault effect on the E-E picture, while the sound muted until the machine was switched off then on again, after which the fault cleared. The cause of the trouble turned out to be an open-circuit track along the right-hand edge of the PCB. It carries the AFC signal from the IF chip to the processor. **C.J.G.**

Daewoo V22

There were almost no signs of life except for a brief head spin at power up. Checks showed that the reset pin of the front-panel mounted microcontroller chip was at about 1V. The cause was C703 (0·01µF), which was leaky. It appears to be the same infamous type of capacitor used by Panasonic, so watch for this one! **C.J.G.**

Matsui VXA1100

This machine appeared to be dead, but there was 3V on the 5V line. Where it came from I never fathomed out, since ICP501 in the 5V feed on the secondary side of the power supply was open-circuit. A replacement restored normal operation. **C.J.G.**

Amstrad VCR6100

This machine had wowy sound. The phantom 'repairman' had fitted the flywheel belt so that it ran on the wrong part of the motor pulley. **C.J.G.**

Sharp VCA39

Our customer returned this machine a few days after we'd fitted a new upper drum. He complained that the machine behaved erratically – it would stop at random for example. We had forgotten to replace the small (5mm x 2mm) spring that provides earth continuity to the drum. Replacing it cured the problem. It fits in the untapped hole in the brass bush on the drum assembly. Before you drop it in, make sure that the equally small carbon brush is already there. **A.B.**

Sharp F360E

This machine would drop out after a few seconds in the play/record modes. The cause was a layer of grease on the take-up reel optical sensor. As a result, the control system thought the reel wasn't rotating. This particular machine seemed to have been well endowed with grease, either during manufacture or a previous repair. **A.B.**

Sharp VCM29

There was no E-E picture and the playback picture was in black and white. We found that crystal X501 wasn't oscillating. Resolding it cured the fault. **R.B.**

Akai VSG745

Tape was intermittently left out of the cassette on eject. There was also intermittently no fast forward or rewind. A new mode switch cured the problem. **R.B.**

Toshiba V854

This machine wouldn't accept tapes. We found that the cam lever beneath the main cam was broken. A replacement lever and mode switch cured the fault. **R.B.**

Sharp VCMH64

Playback was marred by intermittent background hiss. The cause was a dry-joint at pin 4 of plug AU on the main PCB. **R.B.**

Ssangyong SVR101

This VCR is very like the Amstrad VCR6000 etc. The initial fault was no E-E or playback output. On investigation I discovered that the test pattern switch in the RF converter had been mutilated. I removed the RF unit, took out the damaged switch and wired across it to omit the test pattern. Once the RF unit had been refitted there was normal reception most of the time, but the

signals disappeared intermittently.

After much testing I found that a track to the RF unit, on the main PCB, occasionally went open-circuit. This was discovered by using a scope – I couldn't see the break, even with a magnifying glass after narrowing its position down to a half inch of track. **D.A.C.**

Ferguson 3V35/39 etc

One of these machines wouldn't accept a cassette. On investigation I found that protector CP1 (0·6A) was open-circuit. So I removed the cassette carriage and tested the loading motor, which drew about 850mA off load. Under the same conditions a new motor draws about 25mA. Once the motor and fuse had been replaced cassettes loaded normally. **D.A.C.**

Hitachi VT120E

There was a cassette that couldn't be ejected in this machine, and none of the other deck functions worked. Checks in the power supply showed that the 12V output at pin 7 of the STK5471 chip IC851 was missing. A replacement chip restored normal operation. **D.A.C.**

Panasonic NVG40

The cause of severe patterning on the E-E and playback pictures turned out to be C19 (330µF, 10V) in the power supply. It had fallen in value and in addition had been leaking physically. **D.A.C.**

JVC HRJ400

When this machine was switched on a slight squeak came from the power supply then it shut down. Zener diode D40 (5·1V) in the power supply was short-circuit. It had failed because Q2 was dry-jointed. After resoldering the transistor and replacing the diode I gave the machine a good soak test. This proved that the fault had been cured. **D.A.C.**

Sony SLV270UB

This machine failed to work. The customer said that it had been all right until the local electricity company had done some work – he thought this had caused damage. Fortunately this was not the case. All that was necessary was to replace C1325 and C1326 in the power supply. **P.H.**

Goodmans GVR3450

There was a fully loaded tape in this machine and the loading motor had jammed – it seemed that the motor had failed to stop on completion of the loading sequence. As there was no obvious break in the gear train and the timing was correct, the mode switch was suspect. This can be obtained from Daewoo, and comes complete with the loading motor, its loading bracket and a connection PCB. Unfortuately the connectors on the PCB were not compatible with the ones in the machine, so I had to transfer the mode switch on its own. This solved the problem. **P.H.**

Panasonic FS88B

This S-VHS Nicam stereo machine wouldn't accept a cassette. When a cassette was inserted it would immediately be ejected. The mechanism was found to be correctly timed, and worked when driven manually. The cause of the trouble was a sticking eject button on the control door. **P.H.**

Ferguson FV81LV

This machine was supposed to be dead. In fact if it was left on long enough the display would appear. Then, some time later, the machine would initialise. All this took about half an hour, after which the machine worked normally. Capacitors CP007 and CP008 in the power supply were both low in value. **P.H.**

Philips VR6290

This VCR needed a mechanical rebuild, which had been declined by the customer initially as he thought he could do it himself. He made a start then thought better of it. I found that a Philips service kit had been fitted, but at power up the deck immediately tried to take in the cassette housing even though there was no tape present. It accepted a cassette when operated from an external 9V supply, and worked when tried in another machine. So the deck was OK. As the power supply is easy to change I tried another one, but the mechanism continued to misbehave.

I then found that the microcontroller IC7140 was very hot, with only 2·5V at pin 40 though there was 5V at the other side of L5002. When a replacement chip had been fitted the machine accepted a tape but the threading operation was intermittent and, when the tape was fully loaded, there was only temporary capstan rotation. A scope check at the L293B motor control chip's supply pin revealed that significant hash was present. The cause of the trouble was traced to C2003, which was open-circuit – it decouples the supply to the chip.

This was not the end of the matter. Playback was very snowy, though the machine's recordings played back all right via another one. The playback head amplifier board was faulty. One from a scrap machine completed the repair. **P.H.**

Hitachi VTF150E

There was a slightly misleading symptom with this machine. The capstan motor was noisy, and the noise could be stopped by touching the motor. But a replacement motor made no difference. Checks on the various rails showed that the 12V supply dropped to 10V when the capstan motor was turning. The cause of the problem was C12. **M.O.**

Toshiba V110B

There was no display and none of the functions worked. This can be caused by a faulty microcontroller chip, but its 5V supply was missing. It's not easy to find the source of this supply. 12V is fed to pin 11 of IT46, whose 5·58V output at pin 10 is fed to the 5V switch transistor TT52. The cause of the trouble was dry-jointed connections to this transistor. We've had the fault on several occasions, so it could be a common problem. **M.O.**

Mitsubishi HSB27

There was poor video response, with a jumping picture, in the E-E mode. Playback was OK. The video signal at the PCB output and at pin 8 of IC2A1 was normal. At pin 6 of IC2X1 it was crushed. The cause was C2X2 (10µF, 50V), a replacement curing the problem. **M.O.**

JVC HRJ600

The mains supply had been disconnected for a few hours, after which the machine wouldn't start. C12 (2·2µF) in the power supply had deteriorated. **C.W.**

Matsui VX2000

There was no record colour, though playback colour was fine when a test tape was tried. Fortunately we had a circuit diagram, which made matters easier. A scope check at the head amplifier module pin marked REC-C produced a good waveform. We then traced along to the IC and found that the waveform was lost at the wiper of potentiometer REC-C, which was open-circuit. As we had no electrical adjustment guide we set the replacement by trial and error, ensuring that while the colour locked it didn't overload in heavily saturated areas of the picture. **C.W.**

Servicing the Panasonic Euro-1 Chassis

John Coombes on possible fault conditions with this chassis, which was used in the first Panasonic sets to feature digital signal processing

The Panasonic Euro-1 was the first TV chassis from Panasonic to feature digital signal processing. It went into production in 1993. Most of the standard circuitry (power supply, line and field output stages etc.) is arranged on a mother board at the base of the cabinet: the digital signal processing circuitry, which includes generation of the timebase drive signals, is on a separate vertically-mounted panel at the rear of the chassis.

The following Models use this chassis: TX25A3, TX25W3, TX28W3, TX29A3 and TX29W3.

Power Supply Problems

The chassis uses a chopper circuit based on the TDA4601 control chip (IC611). Fig. 1 shows the circuitry on the primary (non-isolated) side of the chopper transformer T639, Fig. 2 the circuitry on the secondary (isolated) side.

If the mains fuse F6101 (3·15AT) has blown or blows intermittently, the degaussing posistor R6102 is suspect. Check it by replacement.

Other causes of a blown mains fuse are a short-circuited bridge rectifier (D613, type RBV408), chopper transistor (Q624, type S2000AF) or control chip (IC611, type TDA4601). Shorted turns in the chopper transformer T639 is another possibility.

If the TDA4601 chopper control chip doesn't start up, check whether one of the start-up feed components R621 (4·7kΩ, 2W) or posistor R622 is open-circuit. Alternatively C622 (100µF, 25V), the reservoir capacitor for the

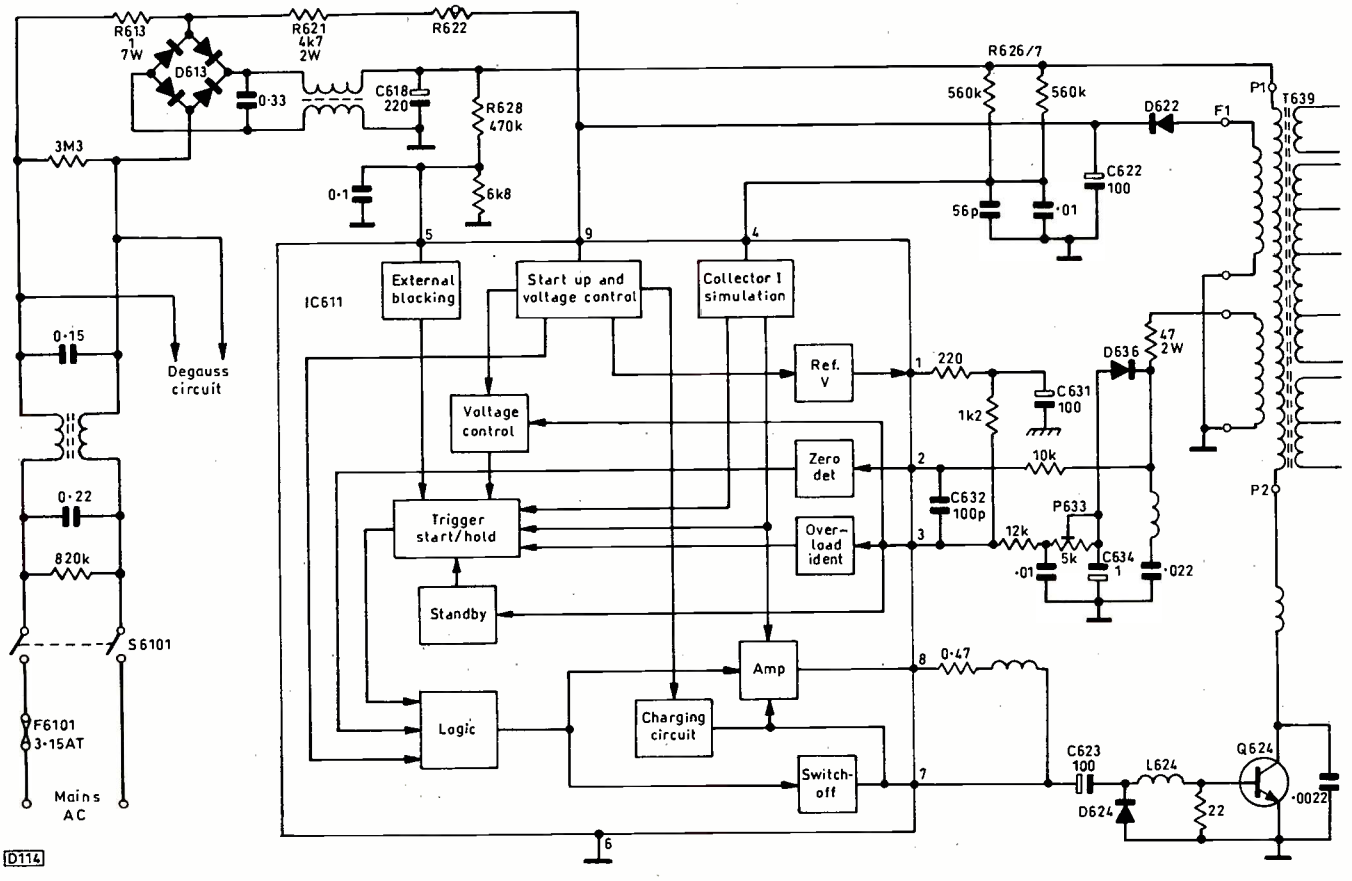


Fig. 1: The circuitry on the primary side of the power supply. See Table 1 for semiconductor device types.

chip's supply, could be either short- or open-circuit. Another possibility is R628 (470kΩ) which can go open-circuit.

The start-up circuit supplies pin 9 of IC611. A low voltage (less than 12V) suggests that C622 is open-circuit. If the voltage is less than 7·5V there could be an overload on the secondary side of the circuit. If there are no obvious shorts in the line output stage, disconnect coil L651 and connect a 60W bulb across the HT reservoir capacitor C651 (47µF, 250V). If the bulb lights up, the power supply is working correctly. If it doesn't light up, check the over-voltage diode Q651 (TFD312S) which could be short-circuit and the HT rectifier D651 (RU4) which could be open-circuit. If there are no 150V HT supply faults, check the LT lines on the secondary side of the circuit.

If there's no 12V supply, check fuse F661. This will blow if C662 (470µF) is short-circuit. Alternatively, the 12V supply will be missing if IC666 (TL431A) is short-circuit. See also the note on standby switching later.

If still in trouble, check for dry-joints at the chopper transformer T639. Poor connections here can cause intermittent cutting out or just no results.

Failure of the TDA8175 field output chip IC561 will also produce the no results symptom.

For a buzzing or whistling power supply Panasonic suggests changing the value of C632 from 100pF to 1,000pF. This capacitor is between pins 2 and 3 of IC611. In addition, add a 1,000pF capacitor between pins 3 and 6.

The cause of failure to start or no results can be in the control circuit or elsewhere on the digital board. Pin 62 of the microcontroller chip IC1801 (CCU3000) should go low when the remote control unit is used to switch from standby. When this happens Q697 (2SA1309ATA) should switch on, in turn switching on Q663 (BUZ71A) via R667. The 12V supply then appears. If Q663 is faulty or Q697 open-circuit there will be no 12V supply. If pin 62 of IC1801 does't go low, check the chip by replacement. This must be done with care, using appropriate equipment.

Loss of the 10V supply on the digital board will produce the no results condition. This supply is produced by the regulator transistor Q1011 from the 12V line. Q1011 (2SC3940) could be faulty, its base bias zener diode D1012 (MA8110) could be short-circuit or its feed resistor R1012 (4·7Ω) open-circuit.

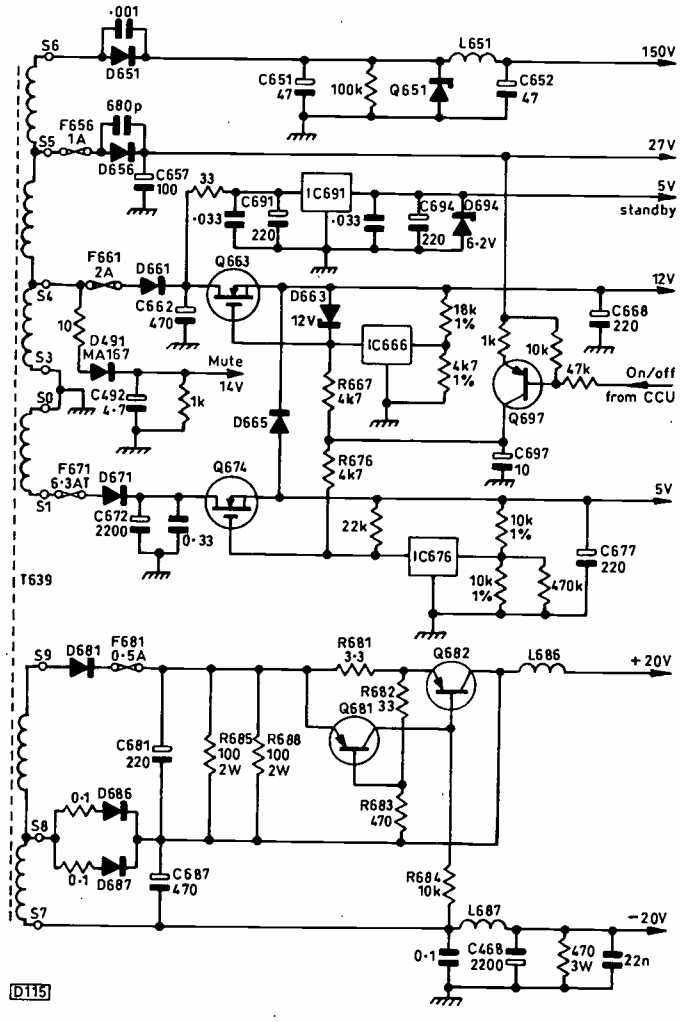
Failure of the multisound processor chip IC1401 (MSP2401) on the digital board can be responsible for no or intermittently no results. This can obviously be a difficult fault to locate. For a clue, monitor the 5V supply at pins 15 and 39 of this chip. The supply is also used by other chips on the board.

If there's no sound or picture and the set reverts to standby after a few seconds, check whether R561 (1·5Ω, 0·5W safety) is open-circuit. This resistor is in series with the 27V supply to the field output chip IC561.

The Line Timebase

As with any chassis, line output stage failure will produce the no results symptom. If the 150V HT supply is missing, check as described above to find out whether the fault is in the power supply or the line output stage. Ensure that the feed resistor R531 (10Ω, 10W) is intact. If it's open-circuit, the S2000AF line output transistor Q534 could be short-circuit or the line output transformer T531 could have shorted turns.

Low HT could mean that Q534 is leaky or short-circuit. If so, it could have been damaged by dry-joints on the line driver transformer T528 or shorted turns on the line output transformer T531. If the output transistor is OK, check the EW correction diodes D536 (ERB06-15) and



D537 (RU2M) which can go short-circuit.

If there is no line drive at the base of Q534, check for 27V at the collector of the line driver transistor Q526 (2SC3944RLB). If this voltage is missing, T528 could be dry-jointed or R521 (3·3Ω, 0·25W safety) open-circuit. In the latter event check whether C521 (100µF) is short-circuit.

Fig. 2: The circuitry on the secondary side of the power supply. See Table 1 for semiconductor device types.

The next step is to check for drive pulses at the base of Q526. These come from pin 13 of the DPU2553 deflection processor chip IC1501 on the digital panel. If there are no pulses here the chip could be faulty, but first ensure that the 5V supply is present at pin 14 and the 5V standby supply at pins 10, 17, 18 and 19. The line drive pulses pass from the digital panel via transistor Q1536 (2SD601)

Table 1: Power supply semiconductor devices.

D613	RBV408	IC611	TDA4601
D622	BY298	IC666	TL431A
D624	ERC08	IC676	TL431A
D636	BY298	IC691	AN78L05
D651	RU4		
D656	BYW98	Q624	S2000AF
D661	RU3N	Q651	TFD312S
D663	ZDP12	Q663	BUZ71A
D665	MA165TA5	Q674	BUZ71AF
D671	MA750A	Q681	2SA1309A
D681	BA157	Q682	BC638
D686	RU30	Q697	2SA1309ATA
D687	RU30		
D694	EQB6·2V	D491	MA167

which could be open-circuit. If it's necessary to replace IC1501 this must be done with great care.

The Field Timebase

The most common problem is field collapse, which can obviously be caused by the TDA8175 field output chip IC561. For replacement purposes there's a modification kit that consists of the chip and an MA2100 diode. This should be fitted in place of link B51, with its cathode to pin 3 of the chip and its anode to pin 5. If the fault is intermittent, IC561 and/or its 27V supply feed resistor R561 (1·5Ω) is suspect. An alternative cause of field collapse is failure of the flyback boost capacitor C563 (220µF, 40V). It tends to go open-circuit.

If the receiver comes on with a blank raster, check whether there is a field flyback pulse at pin 6 of IC1501. The pulse may be missing because of a dry-joint at pin 3 of IC561. This activates the protection circuit in IC1501.

If the receiver is working but the only result is teletext lines at the top of the raster, replace IC561. The chip can also be the cause of top compression.

For intermittent increase in height, check the MCU2600 master clock chip IC651 by replacement. It's on the digital panel.

Digital Chip Faults

Fault finding on the digital panel is not easy. The chips can cause faults for reasons that are not obvious. The following notes summarise experience in this area. Chip replacement should be done with great care to avoid damage to the print and adjacent components.

If dark, shadowy parts of the picture become dotty, the DTI2223 digital transient improvement chip IC1661 is suspect. The fault can be very intermittent. This chip can also be responsible for a blacked out picture with the sound OK, and distorted, noisy colour.

The TPU2735 teletext chip IC1771 can be responsible for some odd faults. There may be a normal picture that flashes to a white raster; no teletext with just a blue screen; or loss of the on-screen menus with random numbers/characters instead. If the blue screen fault is not caused by the chip, check C1776 (47µF, 16V) which can go short-circuit.

The SAD2140 analogue-to-digital converter chip IC1601 can be troublesome. Here are some of the symptoms it produces when faulty: a monochrome picture that goes negative; a white raster; a dark picture with weak sync; an intermittently light raster with no sync; a solarised picture; a weak monochrome picture with poor sync.

The DPU2553 delfection processor chip IC1501 can be responsible for lines on the picture over teletext and a picture that intermittently turns to a white raster.

The ACVP2205 adaptive comb filter/video processor chip IC1631 can be the cause of a dark, blank raster.

In addition to sound problems (see later) the MSP2410 multisound processor chip IC1401 can be responsible for a dark raster with no sound and for the line drive cutting out after a short period of operation.

Sound Faults

Many sound faults are caused by chips on the digital panel. If there's distorted sound and popping, the ACP2371 audio control chip IC1301 is suspect. Alternatively the 10pF capacitors C1332/3 could be the cause – check them by replacement. IC1301 can cause rustling and crackling on sound, also no sound. For the latter fault, first check that the 5V supply is present at pins 1 and 44 of IC1301.

The MSP2410 multisound processor chip IC1401 is suspect for loss of or distorted Nicam sound. Before replacing it, check for dry-joints and that the 5V supply is present at pin 39. If there is slight distortion with a Nicam transmission, check the 7pF capacitors C1423/4 by replacement. If the distortion is on one channel only, the relevant capacitor (C1423/4) could be dry-jointed.

Poor Nicam sound can also be caused by the AMU2481 audio multiplex chip IC1431.

Colour Faults

If there's loss of one colour, check for dry-joints at the transistors in the relevant output stage – Q3393/4/7 red, Q3383/4/7 green and Q3373/4/7 blue. The dry-joints could also be at the CRT tube base – pin 8 red, pin 6 green, pin 11 blue. Alternatively the relevant feedback resistor could be open-circuit or high in value. These are R3394 red, R3384 green and R3374 blue. The value varies with model – usually 91kΩ or 100kΩ.

For intermittent loss of colour check crystal X1656 (17·7MHz) on the digital board – its connected to pins 12 and 13 of the MCU2600 master clock chip IC651.

Remote Control

The remote control unit gives very few problems apart from the battery connections, which are a common cause of faults with all remote control units. Check for corrosion and bent connections, i.e. poor contact.

If necessary dismantle the unit and check for sticky button contacts because of grease from fingers.

No operation can be caused by the LED being dry-jointed or incorrectly positioned.

Diagnostic Interface and Memory Pack

The Panasonic LUCI diagnostic interface has been available for a couple of years or so. There are versions for the Euro-1, -2 and -3 chassis. It connects the chassis to a PC to enable adjustment and control to be carried out via the PC using a service remote control unit. The system is particularly helpful when dealing with intermittent faults. The minimum PC requirements are a 286 or higher processor, 4Mb of RAM, 500Kb of hard-drive free space and a COM1-4 serial port. The service remote control unit is part no. TZS2EK004.

In the service mode, all TV functions can be set up using the remote control unit and PC menu options. Various diagnostic tests show whether the data bus lines in the TV set are correct and check individual ICs. The most useful type of test is called a cycle test, which helps in the search for the cause of intermittent faults. It monitors the major ICs in the receiver and reports when a failure has occurred, with an elapsed-time indication.

There is also a memory pack, part no. TZS2EK002, that gives access to the set's memory. This facility enables tuning information, customer preferences and service data to be transferred to and from the TV set. The receiver has two 21-pin scart connectors. Use the lower one for copying: plug in the memory pack, then enter the service mode. When feeding data in, the screen will display PROGRAM EXTERNAL >> TV. Press the TV set's store button and the tuning information will be stored in its memory – the screen will display LOADING while this takes place. The process takes about three minutes, after which OK! is displayed. The same basic process can be used in reverse, the screen displays being PROGRAM TV >> EXTERNAL and STORING. To get out of the service mode, simply switch the receiver off. If a problem occurs the screen will display PROGRAM ERROR! In this event switch the receiver off and try again. If necessary, check the connections between the TV set and the memory pack or check the pack's 9V battery.

P.V. TUBES

108 ABBEY STREET, ACCRINGTON, LANCS. BB5 1EE
Tel: 01254 872500/390936 Fax: 01254 872166

Trade Counter

OPEN MONDAY TO FRIDAY 9-5, SATURDAY 9.30-12.30

The PV1 multi purpose degaussing wand is a compact and cost effective unit intended for use with a 240 volt mains supply. This unit will be of particular interest to TV Service Departments, TV Manufacturers, Rental Companies, TV Broadcasting Authorities, Universities and Colleges, The Armed Forces, Aviation and Computer Companies.

Order by Mail Order today for only £32.50

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 accessories, 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.

Daewoo VCR, 6 Head, Twin Speed, Nicam.....£150
LG N301 VCR Twin Speed, Remote.....£110
Crown 14" Remote Colour TV.....£100
Crown 21" Remote Colour TV.....£152
Pace MSS 1000 Satellite Receiver.....£258
Standard/Enhanced Cambridge LNB's.....£24.95

If what you need is not listed – Ask!
Ring Andy, Mark or Linda

Please add VAT to all prices. We accept payment by cheque, cash, Access, Visa. Add £2 pp for all orders up to 1 kilo. Heavier parcels add £4. Next day delivery on Parceline. Consignments POA. Goods will be despatched on the day we receive your order. If we are out of stock we will inform you ASAP. Please allow up to 28 days for delivery.

WE OFFER SOMETHING SPECIAL!

HUGE RANGE OF SPARES AND ACCESSORIES FOR TV – VIDEO – AUDIO – SATELLITE MONITORS – MICROWAVE CRTs A SPECIALITY!

Computer accessory catalogue now available

AND SPECIAL OFFERS!

BU508A PHILIPS .60 ea/.50 ea in 50s
Fly lead 1.5m coax plug to coax socket
.20 ea/.15 ea in 100s*

Offer subject to availability – must end 31st October 1998

Free post on orders over £25 (UK only)

WIZARD DISTRIBUTORS

EMPRESS MILL, EMPRESS STREET
MANCHESTER M16 9EN
TEL: 0161 872 5438, 0161 848 0060
FAX: 0161 873 7365
E-mail sales@wizard-distributors.co.uk

*Prices + VAT at 17½%

I.C.H.E.

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

END OF SUMMER SALE!!

UP TO 20% OFF ALL LISTED SCHEMATICS !

WELTREND ICs DOWN IN PRICE, ALL PART NUMBERS SAME PRICE !!

Qty 1 - 9 £15.00ea Qty 10 - 49 £12.75ea
Qty 50+ 9.75ea
(+V.A.T. & CARRIAGE)

"ALWAYS THE FRIENDLY PROFESSIONAL SERVICE"

Servicing in 1956

Austin Fairchild got his first job in the radio/TV repair trade in 1956. Then as now, it was a time of change. This account tells you what it was like in that earlier era

With all the microprocessors, digital equipment, computers and the like that surround us today, I thought it would be interesting to wander back to a gentler age, when TV engineers were a revered race. God-like, almost.

The year is 1956, the year I left school. There was no real career training in those days, but there was virtually full employment. In fact there was more likely to be a shortage of manpower then. We were still in the post-war recovery era.

A Start

When I left school I had to find a job for myself. Having an interest in electronics, I naturally made a beeline for the nearest radio and TV repairer. As luck would have it, there was a notice in the window. "Improver required" it said. This meant that whoever got the job was expected to improve! It was a bit like an apprenticeship without the formalities. The training would of course be only as good as the engineer who provided it, and the amount of time he could manage to spend on it.

I got the job. The engineer who interviewed me was impressed with my basic knowledge, so that was it. I was taken on at the princely sum of two pounds ten shillings a week (£2.50 in modern money). I remember giving a pound to my mum, and living for a whole week or more on the rest. I should mention that I was paid cash-in-hand, so there were no deductions for income tax and the like. It was quite common then.

The Sets

An interesting point about the period was that one gained first-hand knowledge of pre-war, 1936-9 vintage sets, many of which were still in use. It was some weeks before I could work without supervision, but I was eventually left to get on with things.

One of the first jobs I had was to replace the tube in a Philips projection TV set. Yes, they had them then! It was an horrendous beast, all valves of course, and produced a 405-line black-and-white display. Because of the cost of tubes in those far-off days, TV pictures tended to be 9-12in. in size. Anything larger was expensive by the standards of the time.

The Philips set was a back-projection type. It produced, on a prismatic screen, a picture with a diameter of about 16in. The source was a 3in. Mullard MW6-2 CRT which ran at an EHT of 25kV. Viewing had to be in total darkness! It was a noisy set in operation. As it used the 405-line system the line timebase worked at 10,125Hz, just within the range of human hearing – and pretty audible if you were youngish. This was true of all the sets of the period. But this projection model had one other annoying feature.

In those days there were a number of ways of generating the EHT – not all sets used flyback EHT, though this was shortly to become standard. The Philips projection set used a 1kHz oscillator as part of the EHT generator section. With the noise of that, beating against the line oscillator, well you can imagine!

If one of these sets suffered from field or line collapse, there would be a bright horizontal or vertical line respectively. This would immediately burn the tube, which would require replacement. What, no protection? Well, there was a safety circuit of sorts. If I remember correctly, it used an EB91 double diode. The circuit worked, but cowboy engineers invariably removed the valve. This made fault-finding much easier!

Tube replacement was difficult to say the least. It was encased within the optical projection unit, a series of front-aluminised mirrors. There was a glass shroud around the tube's EHT connection. It made the EHT lead difficult to remove. Anyway, having eventually fitted a replacement, it was switch-on time. It took two minutes or more for the set to warm up. I waited expectantly. Then a fuzzy line appeared on the screen. I had a fit of horrors as I realised that in my enthusiasm to fit the tube I'd not dealt with the original fault. The result? Another burnt tube. The boss was not impressed.

I survived this setback, and subsequently had to replace another tube – I became quite good at doing this.

The set was a large, pre-war Marconi one. It had an Emiscope tube with a very long neck – so long that the tube had to be mounted vertically in the cabinet! There was a mirror in the cabinet top, which locked at an angle to enable the picture to be viewed. With Alf's help, I was able to stand on some steps to feed the new tube into the deflection coil assembly. After that it was plain sailing.

Incidentally we were able to replace the tube only because we had another one of these sets in the workshop. It had been damaged during an air raid, and I was told that it had been sitting there since the business resumed fully some time in the early Fifties. Fortunately its tube was intact.

Then there was the Philips Model 520A, a combined radio/TV set. Invariably the drive cord broke, so the radio couldn't be tuned. In those days radios used variable capacitor or, sometimes, variable reactance tuning – definitely not the PLL arrangement employed in today's sets. Readers old enough to remember those beasts will squirm in horror at the thought of that drive-cord arrangement! Somehow I muddled through and got my first one working. But it didn't seem to have the orignal smooth tuning action.

Because CRTs were so expensive, the sets had quite small pictures. A way to make them larger was to attach a magnifier to the front of the set. It consisted of a plastic lens that was filled with liquid paraffin. Sometimes, through accident, a customer would lose the liquid paraffin. Guess who had the job of filling up again?!

Band III

One of the reasons why my boss had advertised was the advent of Band III TV. This was the start of commercial television, which became known as ITV. In the London area it used Channel 9. The additional channel per area meant that a lot of converting had to be done to enable older sets to receive a Band III signal as well. The converter units took many forms, and names like Brayhead and Cyldon come to mind. They were manufacturers of turret-type tuners that could be used to convert most types of receiver.

At that time there were still a number of TRF (tuned radio frequency) sets around. As there had originally been only one station (BBC) in each area, it hadn't been necessary to produce superhet TV receivers. With the advent of the new channel we finally said goodbye to the TRF receiver.

The purpose of the Band III converter was to convert the frequency of the ITV signal to that of the local BBC channel. Anyone who wanted to view ITV with an older set would have to have a converter fitted. Our recent experience of Channel 5 beating with the output from VCRs etc. is similar to the sort of trouble technicians experienced in the Fifties with their "front-end" converters.

Odd Devices

There were some rather odd devices around at the time. One was the 'converted oscilloscope'. You could get a kit which converted an early oscilloscope into a 405-line TV set, albeit with a green picture! These devices existed because the price of TV sets was beyond the means of the average person.

Prices were often quoted in guineas. The smallest type of set would be priced at around 59gns, which was £61-19-0d (£61.95p). Since wages were around £10 a week and TV was on only from late afternoon till about 10 p.m., buyers were not exactly beating a path to the door of the shop! But the converted oscilloscope made it possible for an average working-class family to sample the delights of the BBC-only service.

How TVs looked in the Fifties.

Oscilloscopes could be bought from the many government surplus shops that sprang up at about this time to offload no longer wanted war-time equipment. Some kits came complete with a scope and all the necessary parts. If you wanted the sound as well you could pick it up via a separate tuner designed for sound only, or from the medium-wave band. But you had to make the tuner yourself!

Another odd device that found its way into our workshop was a wire recorder. This device, which could record sound only of course, was used in some allied aircraft and by some support units, and probably had other uses during the war. It consisted of some very simple electronics, a large bobbin of wire that moved at a hell of a pace, and an electric motor. The wire would sometimes break. If it did, you just tied a reef knot in it and away it went. Maximum response was up to 5kHz!

Radio Sets

In those days radio sets were of the four- or five-valve superhet type. They were often designed for AC/DC operation – there was still quite a lot of DC around at the time. As the DC varied from area to area, either a dropper resistor, with a series of taps on it to adjust for different input voltages, or a 'line cord' was used. The latter was a mains lead that had a given resistance per unit length. It could thus be cut to provide the required voltage drop to match the mains input to the receiver.

Because the line cord was used to reduce the voltage, it got warm. If hidden beneath a carpet, it could catch fire. Very often the owner would shorten the lead to make it neater. Next time the set was switched on all the valve heaters would blow! The line cord wouldn't pass safety standards today.

Stereo radio had just recently been introduced. But I never saw a receiver until the early Sixties.

Then and Now

Back then we repaired anything and we enjoyed doing it. We were highly regarded as well. Yes, believe it or not, it was a prestige career in those days. Since then almost every aspect of electronics has changed.

The single most important development was the invention, in 1947/8, of the transfer resistor, or transistor as we know it today. It didn't change things immediately: in fact I didn't see a transistorised device until the early Sixties. But it made a tremendous difference, eliminating the power-hungry valve, reducing the size of everything very considerably, and paving the way for the microprocessor, without which there would be no computers.

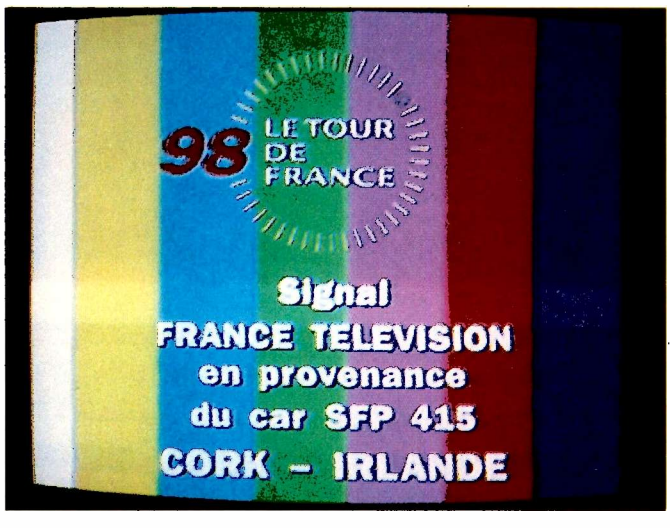
Looking back, those days were simpler and quieter times. They are now fading into the pages of history.

DX and Satellite Reception

Terrestrial DX and satellite TV reception and news. A useful preamplifier design for the TV bands. Roger Bunney reports

Terrestrial DX-TV reception during July hit an all time low. Those who have written in have all reported a flat month with little by way of encouragement. But, as I bang the keyboard on the evening of August 5th, Sporadic E propagation seems to have returned, with strong though 'muddy' signals from the Adriatic region across channels E3-4. The monthly report is a short read this time:

5/7/98	RAI (Italy) chs. IA and B; TVE (Spain) chs. E2, 3; NRK (Norway) E2, 3; PTP (Russia) R1; HRT (Croatia) E3; RTS (Serbia) E3.
15/7/98	RAI IA; HRT E4; TVE E3.
17/7/98	RAI IA, B; TVE E3; RTP (Portugal) E3; ARD (Germany) E2, 3.
18/7/98	HRT E4
27/7/98	SVT (Sweden) E2; NRK E3.
30/7/98	HRT E3, 4; RTL-Klub (Hungary) R2.
4/8/98	TVE E3.
5/8/98	RAI IA, B; RTS E4.



This year the Tour de France started in Cork, Ireland. This signal is via the Telecom 2B satellite at 5°W.

The late May-June period was very active, with some interesting reports of 50MHz amateur radio contacts. There was transatlantic reception on May 24th and June 4th, including the Canadian beacon VE8BY. On June 10th at 1800 hours the Cornish beacon GB3MCB was heard for ten minutes by VE1IW.

A reader has sent me a videotape that shows reception of digital TV test material transmitted from Crystal Palace on ch. E28. There's an up-market promotion showing the good life with digital TV, multimedia operation, thousands of channels, interactive TV and so on. For me the best shots were those that showed TV activites at Alexandra Palace in the pre- and post-war 405-line era!

Satellite Sightings

The Orange marches hit the headlines from July 5th. SNG trucks started to roll in at Drumcree from around the 6th – the media had been allocated a road by the military to set up its uplink trucks and scaffold towers. On one side there was a potato field, on the other were the army, ambulances, tents and so on, obviously entrenched for a fair duration. The Orangemen's camp was farther along the road, with banners and, rather incongruously, an ice-cream van in the middle.

There were inserts for national and regional news, the Telecom satellites at 3°E and 5°W being particularly active with outgoing feeds. The occasional camera shot during a scaffold tower rerig might show the neighbouring SNG truck/tower with reporter, floor manager plus camera and sound operators clustered together atop the small platform.

The Orange march through Belfast on the morning of July 13th was carried by Intelsat K. UKI120 and UKI76 were both busy with the marches, mainly on the 13th. A new uplink identification, UKI31 (ITN Mobile Edit), was seen via 3°E at 12·612GHz vertical with live two-way coverage from Drumcree.

On the 6th a new SNG truck, BBC-UKI234, was seen feeding a live insert from Aberdeen to the BBC Scottish magazine programme, again via Telecom 2C at 3°E, this time at 12·650GHz. The broadcast was to mark the 10th anniversary of the Piper Alpha oil drilling rig disaster.

A spectacular night-time concert from beneath the Eiffel Tower, Paris on July 10th was seen via Intelsat K (21·5°W), first with a caption that read "test for the three tenors concert". The following performance was magnificent, with Pavaroti and the rest singing on an open-air stage. The lighting effects were fantastic, as were the shots of the Tower after the concert. The feed was to the USA at 11·624GHz vertical (NTSC). The BBC transmitted the concert some nights later.

Sports predominated as usual during the summer months. There was plenty of golf, from Illinois via PAS-3R and via Telecom 2C with the Standard Life Loch Lomond and the British Open Golf tournaments. Interesting that TV Osaki took the latter from the start of play at 0900 hours via PAS-3R (UKI35) at 12·708GHz horizontal with NTSC colour.

We also had the traditional July

Tour de France, which this year started in Cork, Ireland on the 13th. UKI294 was used, with transmission via Telecom 2B at 5°W. The Tour is noted for dramatic OB coverage from the air, from cars and motor-cycles and from the kerbside. As ever the technical quality was excellent, with crisp pictures.

Roy Carmen (Sandown, Isle of Wight) comments on Libyan TV via NileSat-1 at 7°W. It seems to occupy as much transponder capacity as CNN. Col. Gaddafi is often seen via 7°W, 1°W, 16°E and 30·5°E fronting the Peoples Revolution TV. That and Saddam Hussein's sabre rattling (early August) provided news for those interested in Middle Eastern politics.

On a personal note I've just brought back into operation my old 1·5m dish, with a 17°K C-band LNB. This gives remarkable noise-free reception from Arabst at 26°E and fair mono quality reception of TV Mauritania at 30·5°E, using a 7dB threshold manually-tuned receiver. It proves that for reasonable band C results you don't need a 20ft dish and a high-secification, low-threshold receiver. More on this next month.

Terrestrial News

Middle East: The ERP of the Syrian ch. E2 SRT-2 transmitter at Homs is 80kW. All the Lebanese ch. E2 transmitters are now off air. Careful measurements in the Netherlands suggest that there's a ch. E2 transmitter in operation at Tehran, Iran carrying the IRIB-2 service – at the same location as the ch. E4 IRIB-1 transmitter. During recent SpE openings Ruud Brand measured two Iranian ch. E2 transmitters, at 48·2401 and 48·2606MHz, using an Icom R7000 receiver.

Equatorial Guinea: The ch. E2 Malabo transmitter has been received recently. Programmes are transmitted from 1445-2300GMT at 1kW ERP with horizontal polarisation and PAL colour. The transmitter is at 3km ASL at Pico Basile, south of Malabo town. The vision carrier frequency was measured and found to be 48·2504MHz. A logo, TVGE, is sometimes present at the corner of the picture.

Sri Lanka: The commercial Independent Television Network has been transmitting selected English-language programmes from the Deutches Welle satellite service for six hours weekly since July 14th. The feed comes via AsiaSat-2 as a digital signal.

Spain: Terrestrial digital TV test transmissions have started – George Gaskin (Gibraltar) has been monitoring the ch. E29 signals, from an unknown transmitter, since early May. There are colour bars with the caption "Emision Experimental Prueba DTT" inlaid – prueba means test.

Australia: The government passed legislation in early July confirming that digital terrestrial TV and data-casting will start in January 2001. From that time all three commercial networks are expected to offer HDTV.

Taiwan: A public service TV channel has come into operation. The UHF transmissions must also be carried by cable services.

Botswana: A national TV service is to start next summer, in competition with the present single commercial station.

Switzerland: A new private, German-language TV channel is to come on air this October, called Tele 24.

Latvia: A majority holding in Station 31 has been bought by a Scandinavian broadcaster. The service is to be relaunched as TV3 Latvija.

UK: The Isle of Wight RSL station TV12 has yet to start its service. Frequency clearance is apparently being held up by the French. The Chillerton Down transmitter is likely to be used.

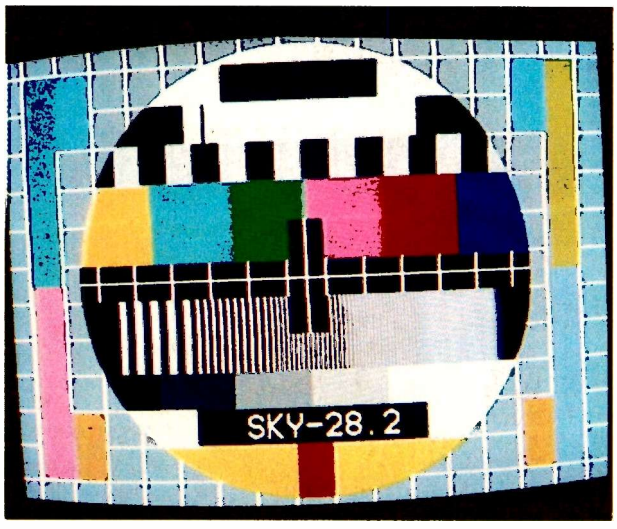
Satellite News

Eutelsat is still arguing over the 29°E slot, pointing out that SES/Astra at 28·2°E is also in breach of ITU regulations. A new satellite called RESSAT has been ordered from Matra Marconi Space to guarantee service continuity in the event of a launch failure of one of the new W series satellites – the first of these is to be launched next month (October). It will be delivered in December 1999 for use at 7, 10, 16 or 36°E. Based on the Hot Bird design, it will have 28 transponders.

Good news about AsiaSat-3, which went into incorrect orbit last December, becoming an insurance write-off. Hughes Space, in partnership with the insurance company, first attempted to recapture the HS601HP satellite last May, by firing on-board rockets then using the Moon to adjust its trajectory. The results were so successful that a second attempt was tried in late June. This resulted in the satellite achieving a satisfactory geostationary orbit. It's now slotted over the central Pacific, awaiting clients. It also has a new name, HGS-1 (for Hughes Global Services). A remarkable operation.

Less happy news from Hughes. A 'primary control processor' aboard three different satellites, Galaxy VII (May 13th), Galaxy IV (June 13th) and DBS-1 (July 4th), has failed. Back-up systems have

The BBC digital test sequence from Crystal Palace on ch. E28.



An analogue test pattern is required to align dishes for SkyDigital's services.

enabled operations to be maintained. Satellites in production are being modified to overcome suspected causes of the problem.

World Television News (WTN) is likely to disappear as an on-screen log following WTN's takeover by Reuters, leaving just APTV as a commercial rival. Reuters is increasing its daily news/media service to the West Pacific/Asian market. APTV has signed a deal with NHK Tokyo to supply news until 2001.

The economic problems in SE Asia are delaying satellite deliveries. Delivery of Telenor's Thor-4 satellite (1°W) has been put back to 2000. Thor-3, at the same position, has adequate capacity for the present.

A new digital service has been started by Canal+ Polska and Polsat TV, in competition with Entertainment Wizja TV. It will broadcast from 13°E initially, with nine channels.

The three French digital TV services AB Sat, CanalSatellite and Television par Satellite now have over three million subscribers, exceeding the cable networks' customer total. Subscription turnover should exceed $US250m this year.

Arabsat is to use Hot Bird 4 (13°E). The organisation's receiving facility at Tunis will accept channels from North Africa/the Middle east and uplink the package to Hot Bird for free delivery to the Arabic community across Europe.

Intelsat 805 is now in operation at 55·5°W with three 52dBW Ku band and 28 41·5dBW C band transponders, giving direct links between Europe and the Americas.

The Howes SPA4 Amplifier

Various aspects of signal phasing to provide co-channel interference reduction have been discussed in recent columns. The Howes SP4A amplifier kit, which is relatively cheap, was used in one phasing system. It's actually an ideal aerial-signal preamplifier design for TV/FM-DX or scanner applications. Provided the instructions are followed, you can't go wrong.

The SPA4 kit consists of two ready-etched PCBs, all the components required and full instructions. One PCB is used for the head-end amplifier, which is powered at 12V via the coaxial downlead cable from the indoor interface PCB. The latter provides 12V DC injection, at 20mA, and switchable 0-10dB attenuation: the choice of a box in which to house it is left to the constructor.

The head amplifier PCB is small, just 40 x 28mm. Its housing is also left to the constructor. A section of 1·5in. PVC water pipe is suggested, though Howes can supply a weatherproof box as an extra.

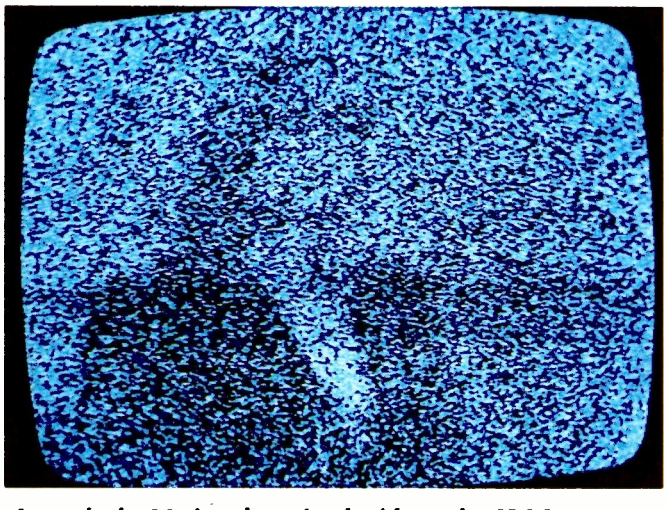
My own need was for a couple of indoor preamplifiers. I housed them in a diecast box, using traditional Belling-Lee sockets, with switched DC supplies to each amplifier PCB. The accompanying photograph shows it all. I didn't need the interface PCBs, which were discarded. Construction is simple, but take care to avoid splattering the IC amplifier with static.

My interests lie across the TV spectrum, from about 48MHz upwards. Previous experience has shown that a VHF choke should be fitted across the input to avoid MW/SW breakthrough and overloading from nearby transmitters. In this case I used the RS 1A type as I had access to some, but you could use say twelve turns of 20-26g enamelled wire wound on a ferrite core.

The amplifier design was modified slightly for indoor operation from an external DC power supply, but the changes make use of components supplied with the kit. Fig. 1 shows at (a) and (b) the original and modified design, using the Howes kit component reference numbers.

Once built, both amplifiers worked immediately. There were no problems and the results were impressive. Two accompanying photographs show before and after results using a Band I aerial for ch. 66 reception.

The gain figure quoted by Howes is 15dB minimum over the bandwidth 4-1,300MHz, "with useful results outside this range". The



A weak ch. 66 signal received without the SPA4 preamplifier.

The same signal received with the SPA4 preamplifier in circuit.

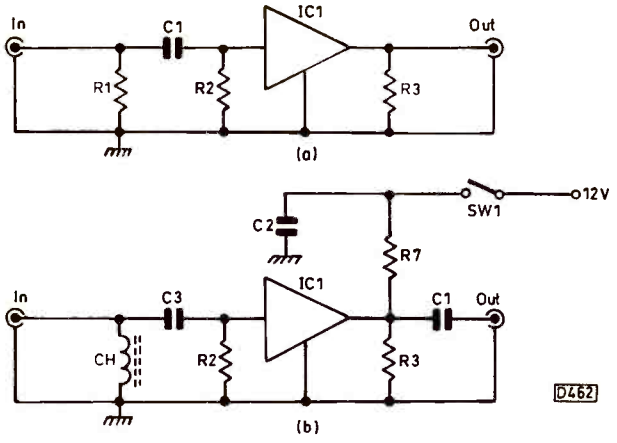
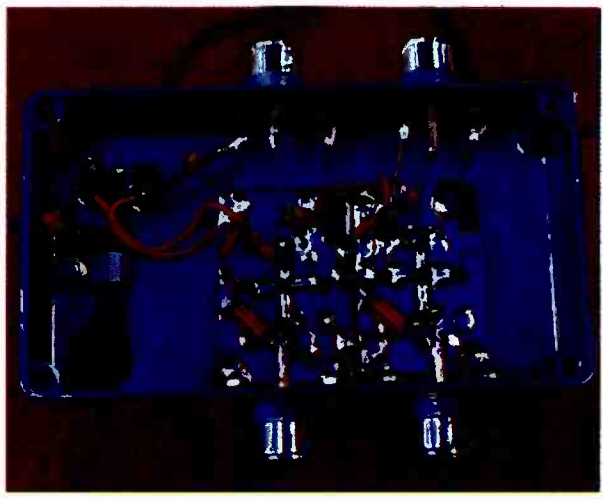


Fig. 1: (a) The basic Howes SPA4 preamplifier circuit for masthead use. Powering is via the downlead. (b) Modified circuit for use as an indoor TV preamplifier – component reference numbers are those for the actual kit. R7 could be replaced with L1 from the kit as supplied. See text for details of choke CH.

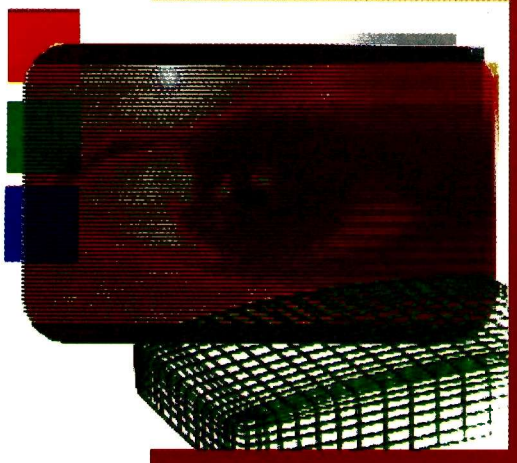


Two Howes SPA4 preamplifiers fitted in a diecast box.

noise figure quoted is less than 3dB rising to 3·2dB at 1,300MHz. I cannot measure noise figures, but the voltage gains checked out OK across the TV bands: 19dB from 40-60MHz, 21dB at 80MHz, 25dB at 100MHz, 26dB at 150MHz, 22dB at 200MHz, 25dB at 250MHz, 18dB at 470MHz, 21dB at 600 and 720MHz and 20dB at 860MHz. The peak over 100-250MHz is interesting: it may have been caused by the VHF choke inserted at the input and the lower-value coupling capacitor used.

In conclusion it's a simple project that provides worthwhile results. The SPA4 preamplifier kit costs £15.90 plus £1.50 post and packing to UK destinations, VAT included. The address is C.M. Howes Communications, Eydon, Daventry, Northants NN11 3PT, telephone 01327 260 178. The company has a 1998 radio kit catalogue that's available on request, but two 26p stamps should be included.

Having used other kits from Howes' quite extensive though radio-orientated range successfully, I can recommend the company's products.



Monitors

Reports from
Ian Field
Gerry Mumford
Adrian Spriddell
Russ Phillips and
Nick Beer

Fujitsu/ICL Ergo Pro 141V

There was a dim picture because the tube's emission was low. I was able to cure this by reactivating the tube's cathodes. The way I do this is to disconnect the control grid pin then advance the setting of the first anode control. Once the emission has recovered I leave the monitor for 24 hours on soak test with a peak-white test pattern to stabilise the cathodes.

After doing this I traced the heater lead back to the chopper power supply and replaced the two electrolytic capacitors I found here – to ensure that the heater supply was not degraded. **I.F.**

Compaq 420T

This monitor was dead. I discovered that brown glue had lead to tracking between the chopper transistor's snubber network diode and R29 (10Ω) in its base drive circuit. Fortunately the only damage was to R4 (0·56Ω, 1W fusible) and burn marks on the PCB.

Once this damage had been repaired the monitor worked, but there was wildly erratic brightness. More brown glue, this time on the CRT base panel, caused leakage to the first anode connection.

I think the T suffix means that production was shifted to the place where they put brown glue on anything likely to track across! **I.F.**

Capetronic PMA1404

There was no display because the CRT's heaters were out. The feed follows a roundabout path via the screened video output module, which is bolted to one corner of the chassis. A flat cable between the main PCB and this module carries most of the connections to the CRT base panel, as in the AST LR14. The heater supply is at the fifth conductor from the rear of the monitor, working from the opposite end of the flat cable to the 'pin 1' red tracer. The feed from the chopper transformer is via R63 (0·22Ω, 3W), which was OK, and D64 (30DF) which had pulses at its anode but nothing at its cathode. This diode read OK when out-of-circuit, but was unable to pass sufficient current to light the heaters. A replacement restored the display. **I.F.**

CTX 1565D

The top few millimetres of the picture were very slightly expanded and liney. When the frame output waveform was checked with a scope, a small pulse burst could be clearly seen on the ramp. The frame output IC, the flyback boost capacitor and diode were replaced, but the cause of the fault was eventually found to be C808 (0·1µF, 25V), which is part of the usual *RC* network in the frame scan circuit. It had become leaky. **G.M.**

Dell D1428HS

There was bad bowing and excessive width, neither of which could be controlled via the on-screen menu system. The cause of the fault was the 2SD1138 pincushion correction output transistor Q335 which was short-circuit. **G.M.**

Gateway 2000 CS1776LE

If one of these monitors is dead and clicking, check the 2SC4747 line output transistor Q109. You will probably find that it has gone short-circuit because C123 (1µF, 50V) in its base drive circuit has fallen to about half the correct value. It is also advisable to check the IRF740 FET chopper transistor Q116 and its 1Ω, 0·5W feed resistor R177. In about fifty per cent of cases a short-circuit line output transistor will destroy these components. **G.M.**

Dell D1526THS

As there was a virtual short across the HT line, this Sony-based monitor was dead with its power supply tripping. The cause was none of the usual suspects however. It was eventually tracked down to D204/5, two small-signal diodes on the video PCB! They are both unmarked, but two 1N4148 diodes solved the problem. **G.M.**

IBM 8512-002

When one of these monitors is dead you will usually find that the 2SD1739 line output transistor Q202 has gone short-circuit because its base drive coupling capacitor C222 (10µF, 50V) has dried up.

For power but no EHT, check C226 (1µF, 200V) in the line output stage.

For bad EW bowing check C225 (22µF, 50V), which is also in the line output stage. **G.M.**

EMC EM1428

When this monitor had been on for about half an hour line tearing would start. It would then get progressively worse, until the picture would collapse completely. On investigation I found that the 7805 5V regulator IC502 was running very hot. It's not mounted on a heatsink, so the 400mA it was supplying was obviously excessive. A few checks revealed that IC601 (74LS86) was drawing 300mA! A replacement cured the problem.

Note that this monitor is also badged **MTC**. **G.M.**

Samsung CQA4147L

Whenever one of these monitors comes in for repair, C609, C616

and C618 in the power supply should be replaced. They are often the cause of a dead monitor. D407 in the line timebase has also been known to fail.

A word of warning however. Before plunging in and replacing things, take a good look at the green hybrid HV2 (IC402). You may find that there are dark brown patches on it. If so you will need a new IC in addition to anything else that has gone bang.

We know of no source of these ICs other than possibly Samsung. **A.S.**

Idek MF5315

This monitor's line timebase was out of action because D946, type MTV32-400A, was short-circuit. As we were unable to find a source of an exact replacement we fitted a UF5408, which is available from Farnell. **A.S.**

Wyse WY50

If one of these terminals is dead, in the over-current mode, check the line output transistor. We've had a couple of instances of this failure recently. It's a Darlington device with an integrated diode, and is therefore best checked by substitution.

Before powering up, check the non-polarised electrolytic capacitor C206. Its value varies from 3·3µF to 4·7µF, and we've come across different working voltages and temperature ratings. In the two cases we've had recently it was open-circuit. **A.S.**

Mitac M1458

There was very slight raster wobble. C826 on the secondary side of the chopper power supply was eventually found to be faulty, though the original read OK when checked with a capacitance meter. **R.P.**

IBM 8512-002

There was no line sync – the line timebase in this monitor will still run when there are no line sync pulses from the computer. The cause of the fault was traced to a 74LS86 IC that's used as a shaper/buffer. **R.P.**

Viglen MT1428LE

There was a very dim display with no contrast control operation. R475 (200kΩ) had risen in value to 3·3MΩ. **R.P.**

AOC 4NIR

If there's flickering in the high-resolution mode, check C422, C419 and C432. It's more liky that the cause will be dry-joints at P401 and Q708 however. **R.P.**

V-Tech EM1430K

This monitor was reported to be dead, but the fault was actually no vision. Although I didn't have a circuit diagram, the general arrangement was fairly obvious. The power supply was working: there was an HT output, but this didn't reach the collector of the line output transistor or pin 2 of the transformer. L508 in the feed was badly dry-jointed – as was much of the rest of the monitor. **N.B.**

The KDS KD1700V Monitor

This Korean monitor appears under various guises including the Orchestra Tuba 2 and the Princetown Graphics Ultra 17+. Here's a recommended rework procedure:

(1) Remove the cover and base. Remove the top and metal cover. Remove the bottom metal chassis and the main board frame. Pull out the main board and disengage it from all the metal frames.

(2) Change the line driver transformer T401 from type KDS2036 to type KDS2036A*.

(3) Remove black-substrate HIC401, R444, Q413, R460 and BC401. R444 and Q413 are removed permanently.

(4) Change HIC402-PT1 to HIC402-PT1A* if not already fitted.

(5) Install a 22Ω, 0·25W resistor in position R460.

(6) Fit an 0·68Ω, 1W resistor in position BC401 (previously removed).

(7) Change D814 from type 1N4937 to type D2L or UF5406.

(8) Change D420 from type UF4005 to type S2L60 or UF5406.

(9) Change D419 from type UF4007F to type RGP02-16E or NTE5067.

(10) Cut the track to the centre pin of Q416 (2SK2341) and add a 1Ω, 0·25W fusible resistor across the cut.

(11) Add a 100kΩ, 0·25W resistor in parallel with R920, on the solder side of the board.

(12) Add the expansion board (daughter board)* to location HIC401, component side facing the LOPT.

(13) Connect a 27cm jumper wire between HIC401 L1 and the junction of R420 and J464.

(14) Connect a 25cm jumper wire between HIC401 L2 and the junction of Q416 and BC401.

(15) Connect a 16cm jumper wire between the collector of Q413 and the junction of T403 and R416.

(16) Secure each jumper wire to the board with silicone gel. Do the same with the neck PCB. Ensure that the jumper wires don't foul any screws when the board is reinstalled. Reinstall the main board.

(17) Apply power and adjust VR901 for 26kV. Do this with care. Check the A1 and focus control settings and adjust where necessary.

(18) Reassemble the monitor.

This procedure can also be used to upgrade a working monitor to prevent failure of Q414, Q415, Q416 and T401.

*These items are available from I.C.H.E., PO Box 142, Nottingham NG9 3RX. Telephone no. 0115 932 0152, fax 0115 944 4004.

Possible Faults

No video: Check whether ZD402 is fitted. If not, add a 1kΩ resistor in this position.

Video jitter: Add a ferrite bead at J402 (use the one removed from location BC401).

Q414 and Q416 short-circuit, D418 and D419 open-circuit: Cause is defective T401. Replace all these items.

Notes

One of the problems with these monitors is that when some SVGA cards change modes they put out a very fast rise-time spike which kills the MJM16212 line output transistor. The cure is to add a ferrite bead at the transistor's base connection.

In some of these monitors the line and field sync signals to IC107 from the 9-pin DIN video input socket at the back are reversed. The monitor will come on then tell you that the video signal is missing.

Acknowledgement

The above information was provided by Bob Yount of MI Technologies Inc.

What a Life!

Curious faults and curious customers. Some TV sets and other items that have come Donald Bullock's way this month

I've done away with my Very Cruel Shocking Machine – it gave me more Vicious Shocks and dancing lessons that I've had from a lifetime in this trade.

The turning point came when Greeneyes screamed blue murder from the kitchen. I scrambled from my writing hut to help her, got tangled up in the wires yet again and finally tottered in to find her standing on a chair gibbering at a spider.

The dogs nevertheless bring me compensations. Whenever they annoy me and I get stroppy Greeneyes makes me one of her excellent bacon and vegetable pies to sweeten me. To make sure that they work, I reach for my giant wineglass.

I've had a couple of these pies recently. One was presented to me a week or so ago after I'd struggled up our front drive with Father Docherty's TV set and trod in a huge dog-bowl full of water and fallen down. Father Docherty heard me bawl a Very Naughty Word. He crossed himself and clicked his tongue seven times before he scampered off.

An ICC7 Chassis

His set, which was dead, was a Ferguson Model B59F (ICC7 chassis). I soon found that the mains fuse had blown, so I checked for shorts, fitted a replacement and gazed intently at the chassis as I held my breath and switched on. There was a huge and instant EHT flashover between the tube's anode cap and its earthed Aquadag coating.

The cause turned out to be one of the tuning capacitors in the line output stage, CL21. Its value is 11·5nF, with a voltage rating of 1·6kV. The value varies with different tubes and is critical. Fit only an identical replacement.

We've had flashovers before with this chassis. They sometimes cause IC damage, the TEA5101A RGB drive chip IT01 on the tube's base panel being particularly vulnerable. The usual symptom when this IC fails is loss of one colour.

The Akura Tourer CX10/Nikkai Baby 10

Father Docherty was so pleased with our efforts that he recommended us to a fellow cleric. So a few days later Father O'Sullivan rolled up with an Akura Tourer CX10. This ten inch set is the same as the Nikkai Baby 10, the Alba CTV10 and the Samsung C1210R.

"I'm told that you're a man who likes a good romp with his dogs, Mester Ballock" he said. "Well I likes dogs too. What would we do without them?!"

It was another dead set. After ensuring that the bridge rectifier was developing 16V at the DC fuse F402, we bridged the relay switch RLY401 to pass the supply to the regulator IC402. The voltage fell to 11V, and IC402 could muster only 9V at its output.

The line output transistor was running hot but tested all right. Our checks on the supply to the line output stage brought us to the heavyweight FR605 diode D410 which was dead short. It feeds pin 8 of the LOPT. A replacement cured the trouble.

It was the jovial Father O'Malley who came to collect the set. Greeneyes' dogs ran a friendly sortie around him. He spun around a bit then fell down.

"Oh, er – they've never done this to anyone before" I faltered, feeling my thigh and hip as I helped him up.

"Makes no difference t' me" he said, "personally I hate dogs. Every one of them. Especially those!"

There was a bacon pie for tea.

The NEI 2891FTXN

Mrs Whiner asked me to bring in this monster set (another Nikkai chassis) from her car. She complained that the picture was slightly cramped and sometimes bounced. But when I plugged the set in and switched it on, in front of her, it exploded. This made her squeak a bit and dab at her eyes. But I managed to raise a false laugh and said that I'd have it right in no time. She pulled herself together and left.

I was almost afraid to take the back off but, being a stiff upper-lip type, I managed it. The top of the TDA8380 chopper control chip IC100 had blown clean away.

This was back in England, and Steven was hovering behind me. I turned to him. "Feel it's time for a cup of tea" I said, preparing to slink off, "do you?"

While in the kitchen I felt peckish and cut myself a slice from a huge polony-type thing I found in the fridge. It tasted horrible and was gritty. I scanned the label and discovered that it was dog food. My accusations of attempted murder duly brought me another bacon pie.

When I returned to the workshop I found that Steven had replaced the chip. He switched the set on and it blew up again.

"Can't go on like this" he said, "we'll have to ring NEI – they've got a very helpful technical chap."

We were told that this does sometimes happen and that there's a power supply repair/modification kit. It costs about £20 – and did the trick.

Here's what you get: the TDA8380 chip IC100; the TCDT1101 opto-coupler IC101; the SGSIF344 chopper transistor TR100; the 5·1V zener diode D104; R109 (13·7kΩ); R102 (0·22Ω); C107 (10nF, 50V); C108 (33pF, 50V); C122 (22µF, 100V); also a 3·3µF,

50V capacitor to replace C109, which was originally 2·2µF.

While Steven was at it he checked and replaced C122 (220µF, 35V) which had fallen in value to 200µF, also all the resistors – they are lightweight and look vulnerable.

Having got the power supply working, Steven pulled the scope over to check on the field bounce problem. This took him to the IF strip, where he discovered that there was sync pulse crushing. The cause of the trouble was C9 (10µF, 50V). For the slightly reduced height he simply adjusted the vertical amplitude potentiometer.

"Mrs Whiner won't be too amused" he said as he settled down to write out the bill. "Incidentally I feel peckish after all that work. Anything in the fridge?"

"Try a hunk of the polony" I said, "it's tasty".

A Matsui 209T

Just then a chap ambled in carrying a 20in. Matsui set – Model 209T. He plonked it down on my hand. I tried my fingers: they still worked.

"By the way" he said, "the picture's faulty."

"Name?" I asked, drawing over a job card.

"Matsui" he replied. "By the way, the picture's faulty."

I wrote "Mr Prat" on the card. "What's wrong with the picture?" I asked.

"Ah, it's faulty" he said.

I waved him out and pulled the set on to the bench. The picture was cramped, with foldover. The field output stage uses a pair of transistors, and I saw at once that C303 (3·3µF, 160) was bulging and ready to burst. The circuit diagram says 4·7µF, so I fitted a capacitor of this value, rated at 250V. It cured the set's trouble.

Another Matsui

Our next caller, a tall, thin woman, also brought in a Matsui set. She strode in as though she owned the place. Although she was a bit dowdy, she had this posh voice.

"Its pictyah gows braight whaite – with laines across it" she pronounced as she placed the set on the counter. I like gentlefolk. So I pulled over a job card and smiled.

"Name?" I asked.

She gave me a toothpaste smile. "Hodder" she sang out.

Then she gave me a sideways look. " 'Odder – Ann 'Odder. Gollit?" she said.

I looked up sharply. "We'll try to get it done by Friday" I said, backing away a bit.

She looked at me and grinned. "Okey-dokey matey" she said. "I ain't mad, mind."

As I moved the set over she prowled out. The set was a TVR141, which is a combined TV/VCR unit. Steven found that it had a fault in each section.

The screen would intermittently flash to peak white, with flyback lines across it. We traced the cause to a poorly crimped wire at connector CP803 on the tube base panel. It provides an HT feed.

Paul took over to deal with the VCR fault. When a cassette was inserted it went in an inch then the deck reverted to standby. After switching on again the cassette travelled in another inch. If you repeatedly switched the machine back on the cassette would eventually disappear inside and play normally. The cause of this curious behaviour was the mode switch, which was dirty. It's under the deck, and is quite easy to take out and clean.

The Ann Hodder that came to collect it was the back-street one – until she'd paid and picked up the set.

"Good-bay and thenk you very much, gentlemen" she sang. "Aim veray grateful."

A Monitor

An Eco Scan 15 VGA monitor, Model AL5064PD, was sent to us by the local solicitors Dewey, Squeezem and Howe. It was made by Mitac International. We were told that the display had gradually become darker and darker over the past year. This was another one for Steven.

"Most monitors are set to work at full contrast to produce a sharp image at low brightness" he commented as he pulled it on to his bench. "Bright screens can cause headaches and migraine. This one's four years old. I reckon the tube might be flat."

But when he switched it on there was no blue in the display. The blue bias preset on the tube base had no effect. A further check showed that it had no connection to chassis. R714, a 51kΩ, 0·25W resistor, was open-circuit. Simple fortunately. A replacement put an end to the problem.

Ribby Ellis

Ribby Ellis likes a good laugh – at the expense of others. "Who ran into your car?" he asked, jerking his thumb in the direction of the door. "That'll cost a few quid to put right."

"Father Docherty heard me say a very naughty word."

I ran out, fearing the worst. But the car was perfectly all right. I returned to find Ribby creased up with laughter.

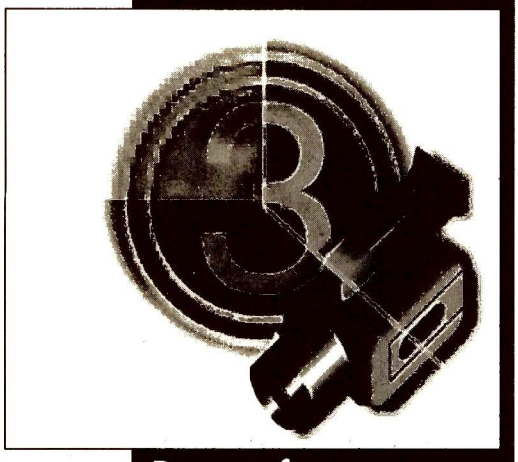
"OK Pratty" I said, "what brings us the pleasure of your company this time?"

He fetched a GoldStar RQ205 VCR from his car. It looked new. "Doesn't play right" he said. "Seems jerky and inconsistent, and switches to standby when it gets warm. Then it won't start again till it cools down."

There's a separate power panel on the left inside this machine. The KIA7806 6V regulator (IC101) on this panel provides the 6V always supply, which is very critical. When it falls slightly the microcontroller chip shuts the machine down.

We soldered a wire to the 6V always supply, boxed the machine up and ran it with a DC voltmeter connected between the wire and chassis to monitor the voltage. Sure enough as the machine warmed up the voltage fell and the tape transport faltered in sympathy. After a while the machine switched to standby. A replacement KIA7806 regulator cured the fault.

With manuals at today's prohibitive prices, we don't have the luxury of a comprehensive stock of them. Our suspicion is that in this model the capstan motor depends on the 6V always supply. Anyway we keep a few of these regulators in stock, as we've had them play up before in these machines.



CamCorner

Reports from
Steve Beeching
and
David Woodnott

Auto-focus Lenses

The subject of auto-focus lenses came up in this column recently (Sanyo VMEX280P, August). There's rather more to it than was suggested.

The lenses used in early video cameras and camcorders were quite long, with the focus elements at the front and the zoom elements at the rear. Zoom/focus tracking, which determines the quality of the lens, was set optically during manufacture.

To achieve a wider zoom range and faster auto-focus operation with a small overall length, more modern camcorders use an 'optical block' with the focus elements at the rear and the zoom elements at the front. Optical zoom/focus tracking is not possible, and is therefore set by a microcontroller/EEPROM arrangement. For this to work, the optical block includes encoders that sense the position of the zoom and focus elements. The zoom encoder must *never* be undone: the focus encoder should not be undone unless you have the software to set it again. These encoders usually consist of variable resistors, but LED/optical or Hall-effect devices may be used. The latest digital camcorders have a linear focus motor that moves along two shafts: its position is sensed by a Hall-effect variable resistor.

The zoom encoder sends information on the position of the zoom elements to the microcontroller chip, which then adjusts the focusing in accordance with a zoom/focus tracking curve (see Fig. 1) that's held in the EEPROM.

There's a set-up facility for correct tracking in the manual mode. It has nothing to do with auto-focusing. The set-up involves obtaining correct focus at each end of the zoom/focus curve, wide and tele, plus some adjustment along the curve. The latter (centre tracking) can be adjusted either by moving the focus encoder then readjusting the values at the wide and tele ends, or by storing software data values – by testing the tracking against a reference curve. What all this means is that no two optical blocks are the same, nor is the data stored in the EEPROM.

To check the manual tracking the auto-focus must be turned off. Select an object at infinity, say a tree 20m or more away, though across the room is OK for test purposes. Zoom in to tele, focus on the object manually, then zoom out. The chosen object should remain in focus throughout the zoom. Small focus corrections can sometimes be seen as the microcontroller chip adjusts the focusing to correspond with the zoom/focus curve stored in the EEPROM. The curve is much steeper at the tele end, so the errors will be greater here – an error will show up if there is one. At the wide-angle end the back focus may in particular be incorrect, the whole scene going out of focus.

If the auto-focus is on, it will try to correct for tracking errors. If these are present it will work much harder than it should do. You might think that the optical block is OK, as focusing is maintained. But this may not be so. In such a case the zoom/focus tracking errors will cause auto-focus delays – with some scenes the system will struggle and take longer than normal to settle. If the back focus is too far out, the correction may never be right at the extreme wide-angle end of the curve.

As zoom ranges increase (we are not talking about digital zoom of course), alignment becomes more critical, particularly the x10 and x16 ranges. Auto-focus won't cover up for swapped EEPROMs.

Some camcorders are difficult and fiddly to set up. With other models I fit a collimator with an infinity Siemens star, hit the computer's start button and have a cup of coffee while the software sets up the optical block and stores the values in the EEPROM. **S.B.**

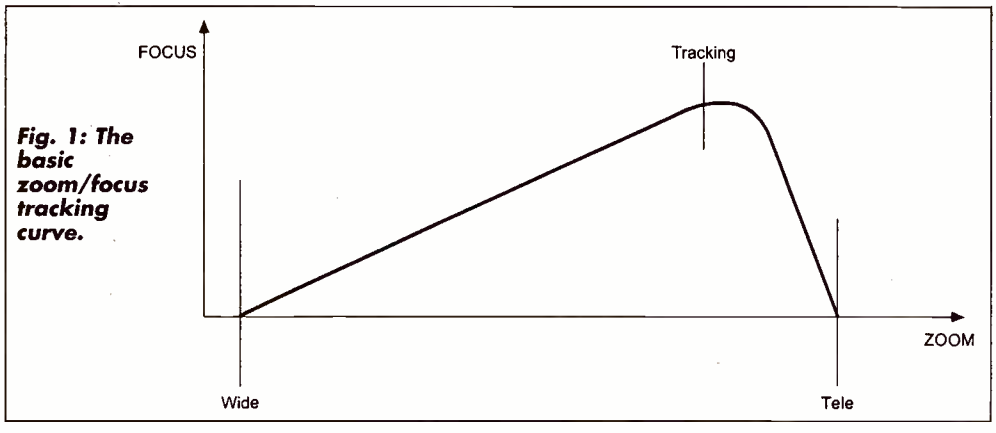


Fig. 1: The basic zoom/focus tracking curve.

Panasonic NVM7B

This machine would play back only in black-and-white: the E-E camera picture was OK. The cause of the fault was traced to the chroma amplifier transistor Q8006. A replacement and service restored the unit to normal working order. **D.C.W.**

Sony CCDF450E

One of these popular camcorders arrived with a report that said "poor playback colour; intermittent, weak E-E colour". The cause of the problem was four faulty capacitors, C310, C311 and C263 on board VA46P and C411 on board VS67. Unusually, there were no other faulty capacitors. **D.C.W.**

Answer to Test Case 430

– see page 855 –

It wasn't lightning that had killed the JVC TV Model C21ET1EK – the local storm was just a little diversion thrown in by Zeus to confuse the issue. As if our workshop technicians weren't confused enough already by the increasingly difficult problems that come our way and the very taxing matter of trying to reach correct diagnoses.

In fact the cause of the blow-ups and breakdowns with the JVC set arose from problems within the set, specifically failure of the electrolytic capacitors C909 and C911. The former is the reservoir capacitor for the feedback supply on the primary side of the chopper circuit, while the latter is the chopper transistor's drive coupling capacitor. To make our difficulties more embarrassing, it turns out that this is a well-known fault. It is to us as well now. It shows how useful it is to check with the setmaker's technical department, look through technical bulletins – or, of course, pay proper attention to the contents of *Television*! When these capacitors are defective the power supply regulation is impaired: the output voltages can rise dramatically, stressing the power supply, the line output stage and other parts of the circuitry.

For this specific problem there are parts kits to improve the reliability of the power supply – different kits for the 21 and 14in. versions of the chassis. They are available from JVC and from component distributors. In addition to the troublesome electrolytics, the kits contain several other components – and a sticker to put on the back of the set once you've fitted them all. It's as well to replace a couple of zener diodes as well, as Cliff Martin pointed out last month. As I write this the sky is darkening over Crowdown . . .

NEXT MONTH IN TELEVISION

Workshop Supplement

When did you last review your workshop needs – service equipment, tools, servicing accessories and aids? Needs keep changing, and there's always something that will make life easier. Next month's guide surveys the latest servicing products and lists suppliers.

Digital TV Servicing

Early days perhaps, but it's never too soon to get to know how to tackle new technology. This introductory article by K.F. Ibrahim outlines the ways of testing the various sections of a digital TV receiver/decoder. Essential reading!

Review: The JBC Advanced Soldering Station

The latest consumer electronics products, especially digital, use high-density PCBs. This means problems with soldering – unless you have the right equipment. The JBC Advanced Soldering Station is a third-generation design that uses a new method of soldering iron tip temperature control, enabling a very small tip to deliver plenty of heat. Steve Beeching explains what's involved and how to use the system.

Portable Appliance Testing

Here's a useful service you can offer local businesses that have to comply with the Electricity at Work Regulations, 1989 and receive periodic Health and Safety Executive visits. According to the regulations, all appliances that are connected to the mains supply via a flexible lead and plug have to be regularly tested by a competent person. Russ Phillips describes what's involved and how to go about it.

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 0AU (0171 261 7704). **Sole Agents** for Australia and New Zealand, Gordon and Gotch (Asia) Ltd.; South Africa, Central News Agency Ltd. ***Television*** is sold subject to the following conditions, namely that it shall not, without the written consent of the Publishers first having been given, be lent, resold, hired out or otherwise disposed by way of Trade at more than the recommended selling price shown on the cover, excluding Eire where the selling price is subject to currency exchange fluctuations and VAT, and that it shall not be lent, resold, hired or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever.

HST DISTRIBUTORS LTD LONDON

APPROVED TELEPRICE DISTRIBUTOR

Suppliers of High Quality

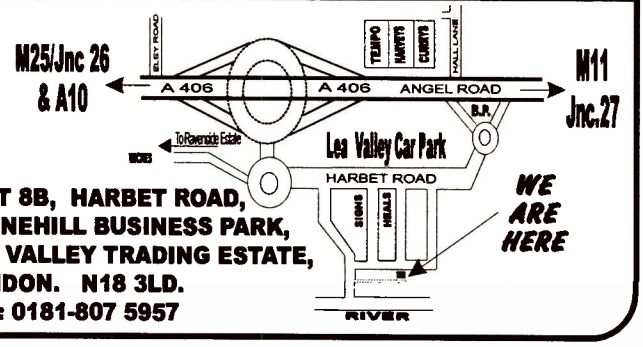
- **EX-RENTAL & GRADED TV 'S & VIDEO 'S**
- **FRIDGE FREEZERS**

DIRECT FROM SOURCE

***PHONE FOR DELIVERY DAYS ON* 0181-803 0505**

EXPORT ENQUIRIES WELCOME

DELIVERY SERVICE AVAILABLE



**UNIT 8B, HARBET ROAD,
STONEHILL BUSINESS PARK,
LEA VALLEY TRADING ESTATE,
LONDON. N18 3LD.
FAX: 0181-807 5957**

B GRADE

LARGE STOCKS AT COMPETITIVE PRICES

14in RC Text from	£50
20in RC Text from	£70
21in RC Text Nicam from	£85
28in RC Text Nicam from	£110
VCR LP/SP from	£55
VCR V/PLUS from	£65
AUDIO from	£15

Access

CONTACT SIMON OR DAVE
0161 439 5504

VISA

TSS ELECTRICAL

PO BOX 12 BRAMHALL STOCKPORT SK7 3HQ

CENTRAL TV

WHOLESALE DISTRIBUTION LTD

AIWA PRODUCTS

AUDIO

NSX-VHS ...PRO-LOGIC MINI HIFI REMOTE
NSXV70.MINI HIFI 3 CD SURROUND SOUND
Z2300 .....PRO-LOGIC MIDI HIFI REMOTE
L/CX100 .....CD MICRO SYSTEM
NSXV750 .....MINI HIFI CD PLAYER
NSX640..MINI HIFI 3CD SURROUND SOUND

WALKMANS

HSTA153	HSTA223	HSTA253
HSTA353	HSTA423	HSTX356
HSTX646	HSTX446	
HSGS242	HSGS252	HSGS352
HSPX257	HSPX347	HSPX357
HSPX447	HSPX547	HSPX747

PHONE FOR BEST PRICE ON THESE 'A' GRADED STOCK

PLUS MANY MORE MODELS AVAILABLE

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

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

WILTSGROVE LTD

28-29 RIVER STREET, DIGBETH, BIRMINGHAM B5 5SA

TEL: 0121-772-2733 FAX: 0121-766-6100

TOSHIBA SONY PANASONIC AMSTRAD FERGUSON AKAI PHILIPS GOODMANS TATUNG

REPLACEMENT REMOTE CONTROLS

SANYO PHILIPS SENTRA PERDIO MITSUBISHI THORN PROADSTAR NOKIA NIKKAI

AKAI	
CT2560	£5.35
CT2570	£5.35
CT2571	£5.35
CT2582	£5.95
CT2585	£5.95
CT2860	£5.35
CT2870/71/72	£5.35
CT2879	£5.35
CT2885	£5.95
CTF151/153	£5.25
CTF211/13	£5.25
CTF253	£5.25
CTF402/552	£5.25
ISR1000	£5.25
SX1000	£5.25
VSA77	£4.95
VSF10/11	£4.95
VSF15	£4.95
VSF30/33	£4.95
AKURA	
CX12	£5.75
CX23/33	£5.75
VX88/110	£5.35
ALBA	
CTV712	£5.85
CTV742	£5.85
CTV743	£5.75
CTV745	£5.85
CTV752	£5.85
G2	£5.35
H12V	£4.95
ISR7000	£5.25
REC600	£5.25
VCR180/185	£4.95
VCR6700	£4.95
VCR7800	£5.35
AMSTRAD	
240854	£5.95
241568	£5.95
CTV20N	£5.25
SR950+	£5.75
SRD510/520	£5.95
SRD540/545	£5.95
SRD550	£5.95
SRD700	£5.75
SRX160/320	£5.95
VCR400	£9.95
APOLLO	
SR1800	£4.95
SR1900	£4.95
120	£5.75
BAIRD	
5188/5988	£5.45
B6093	£4.95
RR5190	£5.75
RR5990	£5.75
RR6890	£5.75
TB6013	£4.50
TB6103	£4.95
VC142L	£4.95
VC143NX	£4.95
BT	
SVS200	£5.25
BUSH	
1480TS	£5.75
1500	£5.75
151IRD	£4.95
2009	£5.75
2020T	£5.85
2059	£5.75
2114T	£5.85
2321T	£5.85
2514T	£5.85
2515T	£5.85
2520T	£5.85
2521T	£5.85
2714	£5.25
2720	£5.25
2721	£5.25
2814T	£5.25
2820	£5.25
2820T	£5.25
2821T	£5.25
2914	£5.75
2914T	£5.25
CTV1400	£5.75
CTV745	£5.85
PREMIERE	£5.25
VCR186	£4.95
VCR3401	£5.35
VCR3402	£5.35
CAMBRIDGE	
ARD200	£5.25
IRC200	£5.25
DAEWOO	
DMQ14A1	£6.95
DTT21C1TU	£6.95
DTX14A1	£6.95
DTX14B1	£6.95
DTX20A1	£6.95
DTX21A1	£6.95
DTX21C1	£6.95
DVR4167D	£4.95
DVR4369D	£4.95
DVR4379D	£4.95
DVR4561D	£4.95
DVR5166D	£4.95
DVR5366D	£4.95
DVR5566D	£4.95
GB14A5T	£6.95
T140/142	£6.95
T200/202	£6.95
T204	£6.95
T512	£6.95
TFP14A1	£6.95
TI40	£6.95
DANSAI	
VCR801	£5.35

DECCA	
145SERIES	£5.75
150SERIES	£5.75
1901	£5.45
8673	£4.95
9711	£4.95
9873	£4.95
CD67434	£5.25
CN8422	£5.75
D21NAF6	£5.25
D21TDF6	£5.25
DBS9892C	£4.95
DN1471	£5.75
DN8951/54	£5.45
DN9422	£5.75
DT8751	£5.45
DT8466/68	£5.75
DT8496	£5.75
DT8956	£5.45
DT9496	£5.75
DT9752	£5.45
DT9757/59	£5.45
DT9772	£5.45
DU8957	£5.45
DUS9796C	£4.95
DUV9761	£5.45
DUV9786	£4.95
DUV9854	£4.95
DUV9A52	£5.25
DV8460	£5.75
DV8951	£5.45
DV9460/9468	£5.75
DV9499	£5.75
DV9786	£4.95
DVS9892	£4.95
DYS9468	£5.75
DYS9854	£5.45
DYS9893C	£5.45
DYV8873	£4.95
DYV9851	£5.25
DYV9851UP	4.95
DYV9873	£4.95
EOV8701	£5.45
ESV8712	£5.45
FX-D	£5.25
FX70	£5.45
RC300	£5.25
RC40	£5.75
RC41/42/43/45	£5.75
RC70	£5.45
RT9468	£5.75
TBS9822	£4.95
TN1901	£5.45
TN8422	£5.75
TN9424	£5.75
TO9701	£4.95
TP9424	£5.75
TU2C52G	£5.25
TUV9705	£5.45
TZ9515	£5.75
D20TDE5	£5.25
FERGUSON	
14C2	£4.95
14D2	£4.95
14J2	£4.95
14L2	£4.95
16A2	£4.95
16A3	£4.50
16C2	£4.95
2000	£4.95
20A2/3/4	£4.95
20C2/3/4	£4.95
20D3/G3	£4.50
20H3	£5.75
22B2/3/4/5	£4.95
22D3	£4.50
22D4	£4.95
22G2/G3	£4.50
22H3/5	£5.75
26D3/G3	£4.50
26H3	£5.75
36141	£4.95
36282	£4.50
36311	£4.95
36K3	£5.75
37003	£4.50
37023	£4.50
37041	£4.95
37063	£4.95
37081	£4.95
37093	£4.95
37101	£4.95
37103	£4.50
37123	£4.95
37141	£4.95
37195	£4.95
37311	£4.95
37341	£4.95
37351	£4.95
37353	£4.50
37361	£4.95
37363	£4.50
37371	£4.95
37373	£4.50
37463	£4.95
37493	£4.95
37801	£4.95
3781	£4.95
3789	£4.50
3793/95	£4.50
37953	£4.50
3796	£4.50
37963	£4.50
3V35/36	£5.65
3V38/9	£5.65
3V42/45	£5.65
3V48/9	£5.65
3V52	£5.65

3V55	£4.95
41H3	£5.75
51A0	£4.95
51A2/3/4	£4.95
51A5	£4.95
51B8	£4.50
51G2/G3	£5.75
51H3/4/5	£5.75
51J7	£5.75
51K3/4/5	£5.75
51K7	£5.75
51L3/5/7	£5.75
51P7	£5.35
5283	£4.95
52J7	£5.75
57971/81	£4.95
59B2/3/4/5	£4.95
59D2/D3	£4.95
59G2/G3	£5.75
59H3/4/5	£5.75
59J7	£5.75
59K4/5/7	£5.35
59L5BQ	£5.35
59L7	£5.75
59P7	£5.75
59SL2	£4.95
6245	£4.95
6603	£4.95
66B2/3/5	£4.95
66H3/4/5	£5.75
66K4	£5.35
66M3	£5.75
67971	£4.95
68K4	£5.35
68SL2	£4.95
7273	£4.50
A10R	£5.50
A14R	£5.50
A36R	£5.50
A51F	£5.75
B14C	£5.50
B14R	£5.50
B39F	£5.50
B49F	£5.50
B51F	£4.95
B51ND	£4.95
B51NX	£4.95
B59F	£4.95
B59N	£4.95
B68F	£4.95
B68N	£4.95
C39F	£5.50
C49F	£4.95
C51F	£4.95
C51N	£4.95
C59NX	£4.95
C68NX	£4.95
CT512T	£6.95
CT514	£6.95
D14R	£5.50
D51ND	£4.95
D59F	£4.95
D59N	£4.95
D68N	£4.95
E51N	£4.95
E59R8	£4.95
FV11R	£4.95
FV31R	£5.95
FV32L	£5.95
FV41R	£5.95
FV42L	£5.95
IRD2000	£4.95
S7971	£4.95
S7981	£4.95
SRD16	£4.95
SRD5	£4.95
T10R	£5.50
T14R	£5.50
T49F	£4.95
T49N	£4.95
T51F	£4.95
T51N	£4.95
T59F	£4.95
T59N	£4.95
T734	£4.95
T789DPL	£4.95
TX10TEXT	£4.50
FINLANDIA	
26625	£5.25
5120795	£5.95
C/D51LZBH	£5.95
C22CZ4	£5.25
C66JZ5E	£5.95
CD51JZ5	£5.95
CD59JZ5	£5.95
CD59JZ5E	£5.95
CD59KZ6F	£5.95
CD66JZ6	£5.95
D51JZ5E	£5.95
D51JZ6	£5.95
D59HZ5	£5.95
FINLUX from	£5.95
GOODMANS	
1401	£5.75
1410	£5.50
1428	£6.95
2045TS	£6.95
2050R	£5.25
2053T	£4.95
2580/2880	£4.95
C1401R	£5.75
CTV1401R	£5.75

CTV2T	£5.45
FST51T/T	£4.95
GD2880A	£4.95
GVR3400	£4.95
GVR3450	£4.95
GVR4500	£4.95
GVR6000	£4.95
SD1500/1600	£5.35
SD7700	£5.35
TV14RC	£5.75
TX1100/1101	£5.35
TX1200	£5.35
VCP600	£5.35
VCR7272	£9.95
GRANADA	
516K4	£4.95
51DRS	£4.95
51FK5	£4.95
C/D66KZ6	£5.95
C16WK3	£5.25
C20BY2/BY4	£5.25
C20BY5	£5.25
C20BZ5	£5.25
C20CD4	£5.75
C20WK1	£5.25
C20WY3	£5.25
C20WY5	£5.25
C20XA1	£5.25
C20XK1/K5	£5.25
C20XZ1	£5.25
C20YK5	£5.25
C20YY5	£5.25
C20YZ5	£5.25
C222WY5	£5.25
C22AZ4	£5.25
C22BY2	£5.25
C22BY4	£5.25
C22BY5	£5.25
C22BZ5	£5.25
C22BZ7	£5.25
C22CD4	£5.75
C22DZ4	£5.25
C22EZ5	£5.25
C22EZ7	£5.25
C22WY3	£5.25
C22WY5	£5.25
C22XA1	£5.25
C22XZ1	£5.25
C22XZ5	£5.25
C22YX5	£5.25
C22YX7	£5.25
C22YY5	£5.25
C26BY2	£5.25
C26BY4	£5.25
C26BY5	£5.25
C26BYS	£5.25
C26BZ5	£5.25
C26BZ7	£5.25
C26WY3	£5.25
C26WY5	£5.25
C26XZ1	£5.25
C26XZ5	£5.25
C26YB4	£5.25
C26YX5	£5.25
C26YY5	£5.25
C26YZ7	£5.25
C51C27	£5.25
C51CZ7	£5.25
C51EZ5	£5.25
C51GS2	£5.75
C51GZ5/Z7	£5.25
C51HS4	£5.75
C59EZ5/Z6/Z7	£5.25
C59FZ5/Z6	£5.25
HITACHI	
C1414R/1414T	£4.95
C1421T	£6.95
C14P216	£4.95
C14P218	£4.95
C1709T	£4.95
C1714T	£4.95
C1719T	£4.95
C1719TW	£4.95
C2114R	£4.95
C2114T	£4.95
C2118R/T	£4.95
C2119R/T	£4.95
C2121R/T	£6.95
C2146TN	£5.65
C2166TN	£5.65
C21P250	£4.95
C21P250TX	£4.95
C21S250	£4.95
C21S280	£4.95
C2509T	£4.95
C2514T	£4.95
C2524T	£4.95
C2546TN	£5.65
C2547TN	£5.65
C255250	£4.95
C2562TN	£5.95
C2564TN	£5.65
C2565TN	£5.65
C2566TN	£5.65
C2574TN	£5.65
C2574TNY	£5.65
C2575TN	£5.65
C25S250	£4.95
C2846TN	£5.65
C2862TN	£5.95
C2864TN	£5.65
C2865TN	£5.65

C2866TN	£5.65
C2874TN	£5.65
C2874TNY2	£5.65
CD2843TA	£5.95
CPT2196	£4.95
CPT2576/78	£4.95
CPT2598/A	£4.95
SR1050/D	£4.95
SR1051D	£5.75
SR2070D	£5.75
ITT	
VR3975UK	£5.65
JVC	
C2152T	£4.95
CT3S	£4.95
HR7700	£5.65
HRD110	£5.65
HRD120/121	£5.65
HRD140/150	£5.65
HRD225/455	£5.65
HRD565	£5.65
IRD2000	£5.25
TUAD1000	£5.25
TUC200	£5.25
LOGIK	
4094	£4.95
4098/4298	£4.50
MASPRO	
SRE250S/1	£4.95
SRE350S/1	£4.95
MATSUI	
1424	£5.45
1455/1460/1465	£5.75
1465RC	£5.75
14R1/T1	£5.35
14TI20	£5.35
1580	£5.85
20R1/T1	£5.35
21N1	£5.35
MITSUBISHI	
21M2TX	£5.25
CT1447	£5.85
CT14M1	£5.85
CT14MS1	£5.25
CT1525/35	£5.85
CT15M2	£5.85
CT15MS1	£5.85
CT2030/40	£5.85
CT2118	£5.85
CT2124TXV	£5.85
CT2125	£5.85
CT2131/32	£5.85
CT2142/44	£5.85
CT2145BMV	£5.85
CT2146TX	£5.85
CT2146TXV	£5.85
CT2153	£5.85
CT2154TX	£5.85
CT2155STX	£5.85
CT21A2STX	£5.85
CT21A3STX	£5.85
CT21A4STX	£5.85
CT21A5STX	£5.25
CT21AV1B	£5.25
CT21M1/TX	£5.85
CT21M2/M3	£5.25
CT21M4	£5.25
CT21M5BT	£5.25
CT2525/53	£5.85
CT2531/32/34	£5.85
CT2554TX	£5.85
CT2555/STX	£5.85
CT25A2STX	£5.85
CT25A3STX	£5.85
CT25A4STX	£5.85
CT25A5STX	£5.85
CT25B2/B3	£5.85
CT25M1	£5.85
CT25M2/M3	£5.25
CT25M5BT	£5.25
CT25MITX	£5.85
CT2963	£5.85
CT2964STX	£5.85
CT2965	£5.85
CT29A4	£5.85
CT29AS1	£5.85
CT29B2/B3/B4	£5.85
CT33B3	£5.85
CT3703	£5.85
NEI	
1451TX	£5.85
1481TX	£5.85
1551TX	£5.85
2005TX	£5.85
2031TX	£5.85
2041TX	£4.95
2131/51TX	£5.85
CTV787	£5.85
NIKKAI	
J1/J2	£5.35
NVR3	£4.95
TLG100T	£5.45
TLG2090	£5.75
NOKIA from	£5.35
OSAKI	
CT51T	£5.75
CTV21DT	£5.45
VCR34H	£5.35
PAGE	
MSS SERIES	£5.75
MSS100	£5.75
MSS100	

(6990000100)	£5.95
MSS100	
(6991000101)	£5.75
MSS100-1	£5.75
MSS1000	£5.75
MSS10000IP	£5.75
MSS1001	£5.75
MSS1008	£5.75
MSS1038	£5.75
MSS138/200	£5.75
MSS238/290	£5.75
MSS300/301	£5.75
MSS348/538	£5.75
MSS500/508	£5.75
PRD800/900	£4.95
PRIMA	£5.95
PSR800/900	£4.95
SS9090XT	£4.95
SS9200IRD	£4.95
PANASONIC	
TC1632	£4.95
TC1642	£4.95
TC2232	£4.95
TUSD200	£4.95
TX1	£4.95
TX1632/42	£4.95
TX2034/44	£4.95
TX2172/78	£4.95
TX21T1	£4.95
TX2200	£4.95
TX2234/44	£4.95
TX2300	£4.95
TX2470/72	£4.95
TX2482/92	£4.95
TX2636/46	£4.95
TX3	£4.95
TX3300/3370	£4.95
TXC71/78	£4.95
TXC81DRS	£4.95
TXC84DRS	£4.95
PERDIO	
2101	£5.85
CT1411	£5.75
CT2011	£5.75
PHILIPS	
from	£4.95
TOO MANY TO LIST!	
PROLINE	
5100TT	£5.45
9000/9100	£5.35
ROADSTAR	
VCR7200	£4.95
SAISHO	
CM159	£5.85
CM159TX	£5.85
SALORA	
15S20	£5.95
17S2	£5.95
17S4FST	£5.95
20S2	£5.95
21C40/C60	£5.35
21D61	£5.95
21D61VT	£5.35
21D70VT	£5.35
21D81VT	£5.35
21L5H	£5.25
21N6	£5.95
21S2VT	£5.95
21S5	£5.95
22J60	£5.25
25C40	£5.35
25C51VT	£5.35
25C60	£5.35
25D61	£5.95
25D61VT	£5.35
25D70	£5.35
25D81VT	£5.35
25N6	£5.95
25N7/8	£5.95
25S4/S5	£5.95
28C40	£5.35
28D70	£5.35
28D81VT	£5.35
28F8	£5.95
28N7/8/9	£5.95
28S4	£5.95
32F8/36F8	£5.95
7AZ4	£5.25
86091/2	£5.25
86173	£5.25
A24	£5.25
BZ4	£5.25
C22YZ7	£5.25
C26X5	£5.25
C2X25	£5.25
STUL24	£5.25
SAMSUNG	
C1346Z	£5.75
C1537ZG	£5.75
C1541ZG	£5.75
CB338RSF	£5.75
CB338ZSD	£5.75
CB346ZSD	£5.75
CB346ZSE	£5.75
CB517	£5.75
CB5312W	£5.45
CB538WT	£5.45
CEP1744T	£5.45
CEP2144T	£5.45
CI346Z	£5.75
CI348Z	£5.75
CI540ZG	£5.75

CI541ZG	£5.75
CS346ZSF	£5.75
CT348Z	£5.75
CX346ZSD	£5.75
CX346ZSE	£5.75
CX534	£5.75
TVC921	£5.45
SANYO	
CB1453	£5.75
CBP1744	£5.45
CBP2151	£5.75
CBP2152/62	£5.75
CBP2180	£5.75
CBP2551/52	£5.75
CBP3012	£5.75
CBP3024	£5.75
SENTRA	
VCR7620L	£5.35
SHARP	
8639A	£6.95
C1421F	£6.95
C142GS	£6.95
C1431H	£6.95
C2121	£6.95
C3390/96	£6.95
C3996	£6.95
C5486	£6.95
CV2021/31	£6.95
CV2121/31	£6.95
CV2133	£6.95
CV3704	£6.95
CV3707/09	£6.95
CV3710/20/30	£6.95
CV3745	£6.95
CV3790/96	£6.95
CV3996	£6.95
CV4207/5407	£6.95
CV6378/7078	£6.95
DV1406/1416	£6.95
DV1506/1706	£6.95
DV2010/16	£6.95
DV2106/2118	£6.95
DV3730	£6.95
DV3761H	£6.95
DV5101H	£6.95
DV5401	£6.95
HE2131	£6.95
SV2577/2877	£6.95
SV6387/7087	£6.95
XM2146	£6.95
SONY	
A1470634A	£5.65
AE1	£5.65
KV1412UB	£5.65
KV1420	£4.95
KV1612UB	£5.65
KV1614EC	£5.65
KV1882UB	£5.65
KV2052ETTX	£5.65
KV2062UB	£5.65
KV2064EC	£5.65
KV2066UB	£5.65
KV2215UB	£5.65
KV2217UB	£5.65
KV2220EC	£5.65
KV2222/24ES	£5.65
KV2240M	£5.65
KV2252/56UB	£5.65
KV2264EC	£5.65
KV24X4U	£5.35
KV25F1/F2	£5.35
KV25TA/TU	£5.65
KV25XSTA	£5.65
KV2706UB	£5.65
KV2720ET	£5.65
KV2752UB	£5.65
KV2756UB	£5.65
KV2762UB	£5.65
KV2766UB	£5.65
KV27EXD	£5.65
KV27XRTU	£5.65
KV27XS	£5.65
KV27XSTA	£5.65
KV2952U	£4.95
KV2962U	£5.35
KV29C1/X1	£5.35
KVA2111/12	£4.95
KVA2121/22	£4.95
KVA2511/12	£4.95
KVA2521/23	£4.95
KVA2542U	£5.35
KVA2911/21	£4.95
KVA2912U	£4.95
KVA2922U	£4.95
KVA2923	£4.95
KVA2942U	£5.35
KVA3411/13	£4.95
KVA3412U	£4.95
KVB2511	£5.35
KVB2512U	£5.35
KVB2911/21	£5.35
KVB2912U	£5.35
KVC2121/22	£4.95
KVC2161/63	£4.95
KVC2521/22	£4.95
KVC2561/63	£4.95
KVC2569	£4.95
KVC2571/73	£4.95
KVC25TA/TE	£5.65
KVC2971/73	£4.95
KVC2981/91	£5.35
KVD2911/21	£4.95
KVD3413	£4.95
KVD3421D	£4.95
KVD3431	£4.95
KVDX21TU	£5.65
KVDX271	£5.65
KVDX27TU	£5.65
KVE2521	£4.95

KVE2522U	£4.95
KVE2531/33	£5.35
KVE2532U	£5.35
KVE2542U	£5.35
KVE2911/21/22	£4.95
KVE2931/33	£5.35
KVE3431/33	£5.35
KVFX2913E	£4.95
KVFX2921	£4.95
KVFX29TA	£4.95
KVG2515U	£5.35
KVG2915	£5.35
KVH2511/12	£4.95
KVHD3215	£5.35
KVM1100	£4.95
KVM1400/01	£4.95
KVM1411U	£4.95
KVM1420/21	£4.95
KVM1430/31	£4.95
KVM1440/41	£5.35
KVM1621U	£4.95
KVM1920/D	£4.95
KVM1921/U	£4.95
KVM2100/01	£4.95
KVM2120/21	£5.65
KVM2130/31	£5.65
KVM2140/41	£4.95
KVM2151U	£5.35
KVM2171U	£5.35
KVM2181TU	£5.65
KVM2510U	£4.95
KVM2531U	£5.35
KVM2541U	£5.35
KVS2911/13	£5.35
KVS2951	£5.35
KVS3411	£5.35
KVTX25TU	£5.65
KVV1410/30	£5.35
KVV2110	£5.35
KVW2813	£5.35
KVX2102U	£5.35
KVX2120U	£5.35
KVX2121U	£5.65
KVX2161/62/63	£5.35
KVX2501	£5.35
KVX2532UB	£4.95
KVX2561/62/63	£5.35
KVX2571/81	£5.35
KVX2901/2902	£5.35
KVX2952U	£4.95
TOO MANY TO LIST!	
TASHIKO	
VVF933/34	£5.35
TATUNG	
140/150 SRS TXT	£5.75
170 SRS TXT	£5.45
180 SRS TXT	£5.45
190 SERIES	£5.45
8418/8446/48	£5.75
8725/8731	£4.95
8734/8821	£4.95
9725/9731	£4.95
9734/9772	£4.95
AX200	£5.25
CV8468	£5.75
D20TDE5	£5.25
D28N88E	£5.25
DN8954/56/58	£5.45
DT8466/68	£5.75
DU8760/9760	£5.45
DV8468/78/98	£5.75
DYN9B51P	£5.25
ESERIES	£5.25
T14RD50	£5.25
T25NB50	£5.25
T28NE51	£5.25
TN2C30	£5.25
TP9424	£5.75
TS8712	£5.45
TUV9711	£4.95
TV9410	£5.75
V21TD50	£5.25
TOO MANY TO LIST!	
THORN	
2083	£4.50
2251/56/61	£4.95
2283/93	£4.50
2323/33	£4.50
2353/63	£4.50
4013	£4.50
66M3	£5.75
8133	£4.50
8951	£5.65
CT5122T	£5.25
SAT99/120	£4.95
VC143N	£4.95
TOO MANY TO LIST!	
TOSHIBA	
150F6T	£5.75
1759BT	£5.75
175T9B	£5.75
210T6B	£5.75
210T6T	£5.75
212T7B	£5.75
215T8B	£5.75
23120895	£5.65
255T7B	£5.75
258T7T	£5.75
284R8T	£5.75
285D8T	£5.75
CT9178	£5.75
CT9194	£5.75
CT9268	£5.75
V57	£5.65
V66B	£5.65
TOO MANY TO LIST!	
PLEASE RING FOR MORE DETAILS ...	

TRADE ONLY

PLEASE NOTE: ALL STOCK IS SUBJECT TO AVAILABILITY, POSTAGE & V.A.T

FREEFAX ORDERLINE: 0500 55 05 05

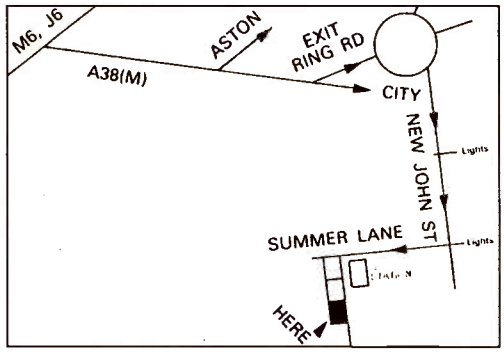
COLOUR TRADE SALE

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	£85	Music Centres from	£15
20" Text from	£95	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	Personal Stereo from	£4

All stock boxed and working



FERGUSON - SANYO - TATUNG - DECCA - AMSTRAD - BEKO - VARIOUS JAPANESE
FULL RANGE - CURRENT MODELS - CONTINUOUS SUPPLY - (Prices subject to VAT + Availability)

NATION-WIDE NEXT DAY DELIVERY SERVICE – VISITORS BY APPOINTMENT

Phone 0121-359 7020

FAX 0121-359 6344

PHOENIX HOUSE, 190 BRIDGE ST. WEST, BIRMINGHAM B19 2YT

AMERICAN EXPRESS VISA MasterCard DINERS CLUB INTERNATIONAL

BESCO LTD

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.

HI FI HI FI HI FI
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

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

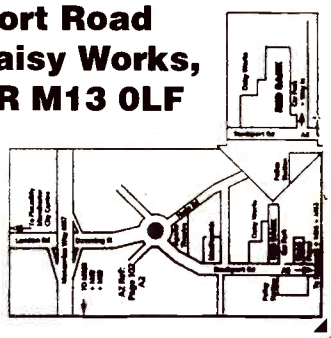
RED BANK

MANCHESTER'S NO 1 WHOLESALER

Ex rental TV's in stock
Working Teletext from £25
Video's - Portables - F.S.T
Nicams
Open: Mon-Fri 10am till 5pm

345 Stockport Road
South Area, Daisy Works,
MANCHESTER M13 0LF

Tel:
0161-273 8343



PRICES SUBJECT TO VAT

TUBE SALE

14" Narrow Neck Portable Tube ALL IN PRICE

£25

ie: Includes carriage & VAT

NEW TUBES AT REGUN PRICES

41 EAM	**£50**
51 JAR	**£54**
51 JXH	**£89**
51OUFB22	**£39**
59EAK71XII	**£99**
59ECF10X01	**£84**
66ECF10X01	**£89**
66ECF20X05	**£99**

Carriage & VAT extra

STILL BUYING EX-RENTAL? STILL LIVING IN THE PAST? SWITCH TO B-GRADE NOW!

Now in Stock Brand New 14" Twinspeed Televideos with 12 months in-home guarantee **£159**

B-GRADE PRICES AT ALL TIME LOW	1+ PRICE	10+ PRICE
14" REMOTE	£65	£60
14" TEXT	£75	£70
20" REMOTE	£80	£75
20" TEXT	£90	£85
21" REMOTE	£90	£85
21" TEXT	£100	£95
21" NICAM	£110	£105
25" NICAM	£160	£150
28" NICAM	£180	£170
33" NICAM	£390	£370
TWINSPEED VHS	£65	£60
CD MICRO, MIDIS + MINIS	£35	£30

All B-Grade Boxed & Working with Remote + Instructions

NOW IN STOCK SANYO B-GRADE AT PRICES SECOND TO NONE

Examples:

25" FASTEXT £179 – 25" NICAM £229
NICAM VIDEOS £119 – 28" PROLOGIC £300

GOGGLEBOX

175 Town Street, Armley, Leeds
5 mins from M1/M62

Tel: LEEDS
0113 2310359
ASK FOR ROBERT

ALL PRICES + VAT

EXPRESS TV

The Mill, Mill Lane,
RUGELEY, Staffs WS15 2JW

Tel: 01889-577600
Fax: 01889-575600

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

CHEAPEST HEADS IN THE UK

Make Id	Model No	Price	Hitachi	VT540	£17.99	Panasonic	NVG9	£7.99
			Hitachi	VT570	£24.99	Panasonic	NVH70	£23.99
Akai	VS422	£11.00	Hitachi	VTF70	£24.99	Panasonic	NVH77	£25.99
Akai	VS425	£11.00	Hitachi	VTM598	£17.99	Panasonic	NVHD100	£22.99
Akai	VSF30	£15.99	Hitachi	VTM622	£12.99	Panasonic	NVJ30	£9.99
Akai	VSF420	£15.99	Hitachi	VTM630	£13.99	Panasonic	NVJ35	£13.00
Akai	VSF430	£15.99	Hitachi	VTM640	£17.99	Panasonic	NVJ47	£11.99
Akai	VSF455	£15.99	Hitachi	VTM722	£12.99	Panasonic	NVL25	£11.00
Akai	VSG20	£12.00	Hitachi	VTM822	£12.99	Panasonic	NVSD40	£15.00
Akai	VSG204	£12.00	Hitachi	VTM930	£17.99	Sanyo	VHR150	£17.99
Akai	VSG205	£12.00	JVC	HR2200	£5.49	Sanyo	VHR2500	£14.99
Akai	VSG206	£12.00	JVC	HRD110	£5.49	Sanyo	VHR3100	£10.99
Akai	VSG20EK	£12.00	JVC	HRD140	£8.99	Sanyo	VHR4100	£13.00
Akai	VSG21	£12.00	JVC	HRD150	£8.99	Sanyo	VHR474	£17.99
Akai	VSG211	£12.00	JVC	HRD170E	£8.99	Sanyo	VHR7440	£17.99
Akai	VSG212	£12.00	JVC	HRD180	£15.99	Sanyo	VHR8100	£13.00
Akai	VSG215	£12.00	JVC	HRD230	£15.99	Sanyo	VHRD4400	£13.00
Akai	VSG217	£12.00	JVC	HRD330	£15.99	Sanyo	VHRD6550	£17.99
Akai	VSG225	£12.00	JVC	HRD370	£17.99	Sharp	VC381	£8.49
Akai	VSG24	£12.00	JVC	HRD401	£15.99	Sharp	VC477	£8.49
Akai	VSG25	£12.00	JVC	HRD440	£15.99	Sharp	VC581	£8.49
Akai	VSX400	£11.00	JVC	HRD530	£22.99	Sharp	VC699	£8.49
Ferguson	3V29	£5.49	JVC	HRD620	£14.99	Sharp	VCA101	£8.49
Ferguson	3V30	£5.49	JVC	HRD660	£15.99	Sharp	VCA501S	£17.99
Ferguson	3V32	£18.00	JVC	HRD750EK	£17.99	Sony	SLV125	£13.00
Ferguson	3V43	£17.99	JVC	HRJ200	£32.00	Sony	SLV225	£13.00
Ferguson	3V46	£8.99	JVC	HRJ205	£32.00	Sony	SLV282	£20.00
Ferguson	FV10B	£8.99	Mitsubishi	HS300	£9.99	Sony	SLV416	£19.99
Ferguson	FV12L	£15.99	Mitsubishi	HS347	£9.99	Sony	SLV801	£24.99
Ferguson	FV14T	£22.99	Mitsubishi	HSB20	£14.99	Sony	SLVX10	£13.00
Ferguson	FV31R	£11.49	Mitsubishi	HSB31	£16.49	Sony	SLVX30	£20.00
Ferguson	FV44L	£15.99	Mitsubishi	HSE20	£14.99	Sony	SLVX50	£19.99
Goldstar	GHV1221	£8.99	Mitsubishi	HSE31	£14.99	Toshiba	DV90	£10.00
Goldstar	GHV1244P	£8.99	Mitsubishi	HSM35	£16.49	Toshiba	V109B	£12.00
Goldstar	GHV1392P	£12.99	Panasonic	NV370	£6.74	Toshiba	V110B	£11.49
Goldstar	GHV1393P	£12.99	Panasonic	NV430	£7.99	Toshiba	V200G	£10.00
Goldstar	GSE1291PQ	£12.99	Panasonic	NV730	£11.49	Toshiba	V210	£11.49
Hitachi	VT100	£10.99	Panasonic	NV850	£19.99	Toshiba	V300	£20.00
Hitachi	VT11E	£8.49	Panasonic	NV870	£23.99	Toshiba	V31	£10.99
Hitachi	VT130	£13.99	Panasonic	NVF55	£27.99	Toshiba	V500	£20.00
Hitachi	VT17E	£15.99	Panasonic	NVFS90	£35.99	Toshiba	V55	£5.49
Hitachi	VT33	£8.49	Panasonic	NVG10	£10.99	Toshiba	V61	£11.00
Hitachi	VT330	£8.49	Panasonic	NVG17	£6.24	Toshiba	V71	£10.00
Hitachi	VT425	£13.99	Panasonic	NVG20	£11.99	Toshiba	V82	£10.00
Hitachi	VT522	£12.99	Panasonic	NVG21	£11.99	Toshiba	V93B	£10.00
Hitachi	VT535	£13.99	Panasonic	NVG33	£11.00			

TOO MANY TO LIST. PLEASE RING FOR A FREE CATALOGUE.
ALL HEADS ARE GUARANTEED FOR 12 MONTHS. ALL ORDERS RECEIVED BEFORE 5PM ARE DESPATCHED THE SAME DAY.

OPEN MON-FRI 9AM-6PM SAT 9AM-1PM

FREE P&P – PLEASE ADD VAT AT 17.5%. WE ACCEPT VISA, MASTERCARD, SWITCH AND CHEQUES. ACCOUNTS WELCOME.

Access VISA

N.A.V SPARES

Tel: 01274 772249 Fax: 01274 772247
WEST END BUSINESS CENTRE, 237 THORNTON ROAD, BRADFORD, BD1 2JS

CAMPION WHOLESALE LTD.

QUALITY USED TV & VIDEO

COMPLETE RANGE OF TVs VIDEOS AND SATELLITES

Most makes and models available
TVs from £3.00 • Satellites from £8.00
Videos from £15.00
Prices Ex-VAT

Free Delivery Service to most areas of the UK

U.K.s Largest Export Wholesaler

Specialists in conversions to most countries systems

**UNIT 75, BARRACKS ROAD,
SANDY LANE INDUSTRIAL ESTATE,
STOURPORT-ON-SEVERN,
WORCESTERSHIRE DY13 9QB**
Just 10 Mins from M5 Junct. 6 Worcs North

01299-879642 (3 lines)

FAX: 01299 827984

Sole UK Agents for SADELTA

TC-402D

Due to its weight and size, the TC-402D is the ideal instrument for the installation of FM and Terrestrial TV antenna, as well as CATV systems.

- Peak detection
- Built-in loudspeaker for AM and FM reception
- Frequency Indication with 4 digit LCD Display
- Multi-turn potentiometer to enable tuning
- Weight including batteries: 1.9 Kg

TC-90

Portable equipment, with many applications, designed to carry out any type of Terrestrial TV, FM Radio, CATV and Satellite TV. installations.

- Frequency Sweep on Satellite
- Peak Detection
- Measurement of terrestrial TV from 20u V to 3V without the need of external attenuators.
- Rechargeable 12V / 2.6 Ah Battery
- Weight including batteries: 3.5 Kg

TC-80

The TC-80 has been designed for the reception of TV Satellite systems, the installation and testing of domestic and SMATV systems.

- Full Band Frequency Sweep
- Switchable 14V or 18V LNC Power Supply
- Rechargeable 12V / 2.6 Ah Battery
- Weight including batteries: 3.3 Kg.

Available from most wholesale distributors across the UK or direct from

COASTAL AERIAL SUPPLIES

Unit X2, Rudford Industrial Estate, Ford, Arundel BN18 0BD
Telephone: 01903 723726 Fax: 01903 725322 Mobile: 0976 241505

No other consumer magazine in the country can reach so effectively those readers who are wholly engaged in the television and affiliated electronics industries. They have a need to know of your products and services.

CLASSIFIED

PHONE 0181-652 8339 **FAX 0181-652 8931**

The prepaid rate for semi display setting is £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 17½% VAT. All cheques, postal orders etc., to be made payable to Reed Business Information. Advertisements, together with remittance, should be sent to Television Classified, 11th Floor, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS

TRANSFORMERS

TV LINE OUTPUT TRANSFORMERS

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

ALBA · AMSTRAD · BUSH · DECCA · DORIC · BLAUPUNKT · FERGUSON · FIDELITY · GEC · GRUNDIG · GRANADA · HITACHI · HINARI · INDESIT · ITT · KÍMARA · NIKKAI · MATSUI · MURPHY · OSAKI · NORDMENDE · LOEWE-OPTA · PANASONIC · PYE · PHILIPS · SANYO · SAISHO · SHARP · SONY · SOLOVOX · SUSUMU · TANDBERG · TELEFUNKEN · THORN · TRIUMPH · THOMSON · GOLDSTAR · BINATONE ·

FULL RANGE OF KONIG: VIDEO HEADS, BELT KITS, IDLERS, PINCH ROLLERS, TENSION BANDS. LARGE RANGE OF REMOTE CONTROLS IN STOCK

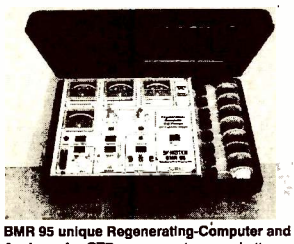
TIDMAN MAIL ORDER LTD · 236 SANDYCOMBE ROAD · RICHMOND · SURREY · TW9 2EQ

Approx. 1 mile from Kew Bridge.

Mon-Fri 9 am to 12.30 pm & 1.30-4.30 pm

TEST EQUIPMENT

MÜTER BMR 95



BMR 95 unique Regenerating-Computer and Analyser for CTRs, regenerates even better, also if all other machines do not succeed. With **CRPU®! BMR 95** removes shorts F-C, C-G1,G1-G2. FLASH-EX against remaining gas! 165 adapters available! Book with 12.500 CTR-types! Pays itself within 4 weeks! Please, ask for more information.

SEME Tel: 01664 565392 (UK)
Dönberg Tel: 075 48275 (IRL)
Müter Fax: 0049 2368 57017

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

FOR SALE

TELEVISIONS

150 FST black cabinet TVs all texted and makes include

Philips Hitachi Grundig Ferguson Solara etc

£3,000 the lot

Telephone 01274 308186
Fax 01274 722229

TV & VIDEO WAREHOUSE

All working stock

R/C TVs	£20.00
Teletext TVs	£25.00
Videos R/C	£35.00
Fastext R/C from	£40.00

Minimum quantity 10s

Delivery arranged

Manchester 0161-736 6333

Trade Only

Televisions	from £5.00
Teletext	from £20.00
Videos	from £20.00
Twin Speed Stereo	from £25.00

Minimum quantity – 10 units

BOURNEMOUTH WHOLESALERS
01202 470443

RETIREMENT SALE

Hameg HM604, 60 M s/c dual trace oscilloscope £350

100s circuit diagrams varied: 100s assorted comp including video idlers, belts, etc. Dozens of assorted remote controls, most copies of 'Television' from 1989 to date (minus adverts) in files including 1996 fault fix guide.

All for only £400

Tel: 01702 523858 (Southend) After 6.30 pm

To Advertise in Television Classified
Telephone Pat Bunce on 0181-652 8339
or Fax on 0181-652 8931

SERVICE DATA

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

LINEAGE

CAR RADIO DE-CODING: Are your decodes costing you £5.00 or £10.00 extra? Do you have to phone or fax every time you decode a set? Save time and money by converting index numbers yourself. Phone 01325 382325 for details.

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.

AVO 8 MK 5 with case excellent condition £35.00 + P/P Tel 01543 450347.

CLASSIFIED TEL:0181 652 8339

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 1 898394 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) £17.50

Low cost updates are available for all fault indexes.

Latest release - Equivalents guides - 2nd Edition.

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

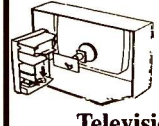
All programs require a PC or compatible & are supplied with a user manual.

E.C.S. *Technical Publishing* (Est 1985)

316, Upton Road, Noctorum, Wirral, Merseyside. L43 9RW.
Tel / Fax 0151 522 0053

Please add £1.75 P & P to total (Europe £2.75, r.o.w please enquire).

Service Manuals



Available for most equipment. From Valve Wireless to Video Recorders and everything else in between. Televisions, Computer Monitor, Test Equipment, Satellite, all Audio, Amateur Radio etc etc. If you need a Service Manual give us a call. Originals or Photostats as available. Our entire index of Manuals is now being put on our web site for instant access.

Alternatively complete the coupon below for our Floppy Disc catalogue of Manuals and Technical Books available.

MAURITRON TECHNICAL SERVICES
8 Cherry Tree Road, Chinnor, Oxon OX9 4QY
Tel: 01844-351694. Fax: 01844-352554.
Email:- enquiries@mauritron.co.uk
Web site at:- http://www.mauritron.co.uk/mauritron/

Please forward your Catalogue of Technical Books and Service Manuals Index on PC Disc for which I enclose 4 x 1st class stamps.

Name _____
Address _____
_____
_____
Postcode _____
Telephone _____

CLASSIFIED TEL:0181 652 8339

Fryerns

Service Information **FES** Circuit Diagrams

TVs, VCRs SATELLITE AUDIO & HI-FI

Most models/makes old & new covered

Also fault guidance service available
Prices are from £3.75 + £2.50 P/P
i.e. 1 item – total £6.25 inc
2 items – total £10.00 inc
3 items – total £13.75 inc
4 items – total £17.50 inc
Payment by credit card or postal order for next day delivery. Cheques to clear.
Tel/Fax 01206 211570
Answerphone outside office hours

P.O. Box 5830
Basildon, Essex
SS13 3RX

THE 'HOOKINGS' INDEX

More than 14,000 entries including remedies where appropriate, from 'TELEVISION' magazine

Bang up to date: Jan '87 to Oct '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
******

SERVICE INFORMATION

CIRCUITS and SERVICE MANUALS from 1930s – 1990s:
Radios, amps, radiograms, tuners, CDs, TVs, videos, cassette radios, ICE etc.
LARGE QUANTITY USED TV and VIDEO PANELS
BACK COPIES PW and TV MAG.

DAVE WILLIAMS
16 Church Street, Owston Ferry, Doncaster, S. Yorks DN9 1RG
Tel and Fax: 01427 728046

Mail order only. No callers

COURSES

New Dates **Digital Television**

2 day courses for service engineers

Call 0181 208 5171
for further details

College of North West London
Willesden Centre
Dudden Hill Lane
London NW10 2XD

WANTED

BILLINGTON EXPORT LIMITED
Billingshurst, West Sussex RH14 9EZ

VALVES WANTED FOR CASH

(KT88, PX4, PX25, DA100, EL34, EL37, CV4004, ECC83)

Valves must be Mullard/GEC/West European to achieve top prices

Ask for our free Wanted List.

WE SUPPLY VALVES, C.R.T., VIDICONS ETC

Visitors, please phone for an appointment, we're a very busy export warehouse.

Tel: (01403) 784 961
Fax: (01403) 783 519
Email: billingtonexportltd@btinternet.com

COMPONENTS

RCS VARIABLE VOLTAGE D.C. BENCH POWER SUPPLY

£45 INC VAT - POST & INS £4
Up to 20 volts DC at 1 amps continuous, 1.5 amps peak
Fully variable from 1 to 20 volts.
Twin voltage and current meters for easy read out.
240 Volt AC input. Fully smoothed.

RADIO COMPONENT SPECIALISTS
337 WHITEHORSE ROAD, CROYDON, SURREY, UK
Tel: 0181 684 1665
Lot of transformers, high volt caps, valves, speakers, In stock. Phone or send your wants list for quote.

MITSUBISHI ELECTRIC
INTERNET SERVICES

Helping your business get connected
0800 22 66 00

THE FACE OF BUSINESS INTERNET
http://www.menet.net

To Advertise in Television Classified
Telephone Pat Bunce
on 0181-652 8339
or Fax on 0181-652 8931

RECRUITMENT

COLOURVISION of Ilford

Colourvision is a nationally approved service company operating in the domestic market

We service hi-fi, camcorders, televisions, videos, microwaves

Due to recent expansion Colourvision now has a number of vacancies for experienced

BENCH and FIELD ENGINEERS

These positions are well paid and salary and benefits dependent on age and experience

The Customer Services Manager
COLOURVISION
123-125 Ley Street
Ilford, Essex IG1 4BH
Fax 0181 514 7318

Bedfordshire Area

BENCH ENGINEER required

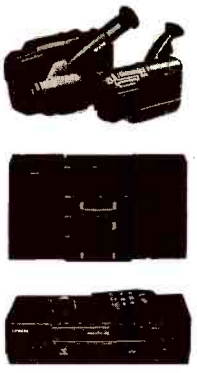
Able to repair electronic equipment to component level

Good salary and modern working conditions

Only experienced/adaptable engineers need apply in writing only to:

Mr M Powdrill
B.E.S.
6 Titan Court
Laporte Way
Luton, Beds LU4 8EF

BROWN GOODS ENGINEERS



Looking for Real Job Satisfaction, Reward and Security?

At Mastercare, part of the Dixons Stores Group, we are committed to ensuring that all our Engineers enjoy some of the most stimulating and rewarding roles offered anywhere in the UK. A promise that you can rely on from the day you join us.

FIELD ENGINEERS

Working a five day week, Monday through to Saturday, you will enjoy excellent technical back-up and considerable freedom. You will benefit from the support provided by your own CD Rom based lap top computer – a highly advanced personal management aid incorporating technical manuals and tips. Full driving licence is essential as vehicle is provided.

SUPERVISING ENGINEERS

An experienced engineer, you will supervise a number of in-store workshops which house the most up-to-date diagnostic equipment. In this wide ranging role, you will motivate, train and support your team as well as providing technical support when necessary.

INSTORE ENGINEERS

Based in a Currys Superstore, you will operate at the frontline of our engineering function, providing a high quality and technically superior after-sales service. This will include fault diagnosis, repairs and customer education. You will have your own fully equipped 'mini-workshop' and work on a 7 day rota basis.

TRAINING OPPORTUNITIES

For all positions you will ideally have previous brown goods experience. However, we offer retraining to people with experience of fault finding to component level and C&G 224 or equivalent. Our award-winning, full-time training programme is designed to build on your technical ability and customer-facing skills.

All positions promise on-going manufacturer/internal technical training and benefits include an immediate entry pension scheme, profit related pay and discounts on all Currys, Dixons, PC World and The Link products.

To apply, please write with full CV, stating which position and location you are interested in to Jill Wareham, Mastercare Service & Distribution Limited, Ground Floor West, Maylands Avenue, Hemel Hempstead, Herts HP2 7TG. Alternatively, telephone 01442 888666.

MASTERCARE *always there...*

M4 CORRIDOR • HERTS • BEDS • SOUTH WEST • LONDON & SOUTH EAST • HAMPSHIRE • KENT SUSSEX • SUFFOLK • NORFOLK • ESSEX • OXON • BUCKS • WEST MIDLANDS • AIRDRIE GLASGOW • TEESSIDE • ABERDEEN • NORTHERN IRELAND • LIVINGSTON

METRO

AUDIO VISUAL ENGINEER
COWFOLD

Metro South, based just outside Horsham, require someone to take on a responsible and challenging role as part of a small team, providing a varied range of Service and Engineering support.

This position involves maintenance visits on CCTV systems throughout the UK, as well as the service and repair of domestic and industrial equipment.

We are looking for someone with:

- Commercial or domestic equipment servicing experience
- Training to HNC level or equivalent in Electronics
- Confidence and a professional approach
- A flexibility with regard to working hours
- A full clean driving licence

Metro, part of WPP Group plc, is able to offer good career development opportunities to the right candidate, and the salary package will be appropriate to the level of experience. Please apply in writing, enclosing a copy of your CV and an indication of your salary expectations to:

Jane Callow – Corporate Services,
METRO, 53 Great Suffolk Street,
London, SE1 0DB.
(Fax No: 0171 261 0685)

DON'T SIGN ON THE DOTTED LINE UNTIL YOU TALK TO TEMPO

TEMPO

Bench Engineers Required

Opportunities are now available at our Tottenham Hale Service Division for a:

Brown Goods Bench Engineer & a PC Bench Engineer

Due to continued expansion we are looking for experienced engineers to service our wide range of leading brand products.

You must be organised and conscientious, with good communication skills. In return we offer a highly competitive package comprising of salary and performance related bonus.

Tempo is already one of the top 5 electrical retailers in the country with huge expansion plans. Secure your future with a company that's going places by sending your CV to:

Chris Cartey, Tempo Ltd, Unit 3, Lockwood Industrial Estate, Millmead Road, Tottenham, London N17 9QP or telephone either Chris or Mahendra Patel on 0181 365 1906 for further information.

DON'T SIGN ON THE DOTTED LINE UNTIL YOU TALK TO TEMPO

CLASSIFIED TEL:0181 652 8339

PROPERTY

FOR SALE

Appointments: £19.50 per single column centimetre (minimum 4cm = £78.00 + VAT)

Classified: £14.50 per single column centimetre (minimum 4cm = £58.00 + VAT)

Lineage: £2.00 per word (minimum 20 words)

Box Numbers: £22.00 extra

Spot Colour: 15% extra
Value Added Tax
All UK advertisement charges are liable to VAT at 17½%

Post
Television Classified Department
11th Floor, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

I enclose herewith cheque/PO for

£.....(inc VAT)

Cheques etc payable to Reed Business Information Ltd and crossed or use credit card facilities below.

Please debit my Access, Visa or Switch account as below:

Card Number

Access Visa

AmEx Switch

(Switch issue no:)

Expiry Date

Signature

TELEVISION

CLASSIFIED ADVERTISEMENT ORDER FORM

To appear under heading:

Please give details of your advertisement below

No. of insertions

Box number required YES/NO

Name

Address

Payment by Credit Card, please state cardholder's name and address card is registered to

(postcode)

Daytime tel. no:

1st FOR SPARES

NOMINATED FIRST CHOICE SUPPLIER
Source - Marvyn Hamlyn survey 'Independent Retail & Service Engineers' June 1997

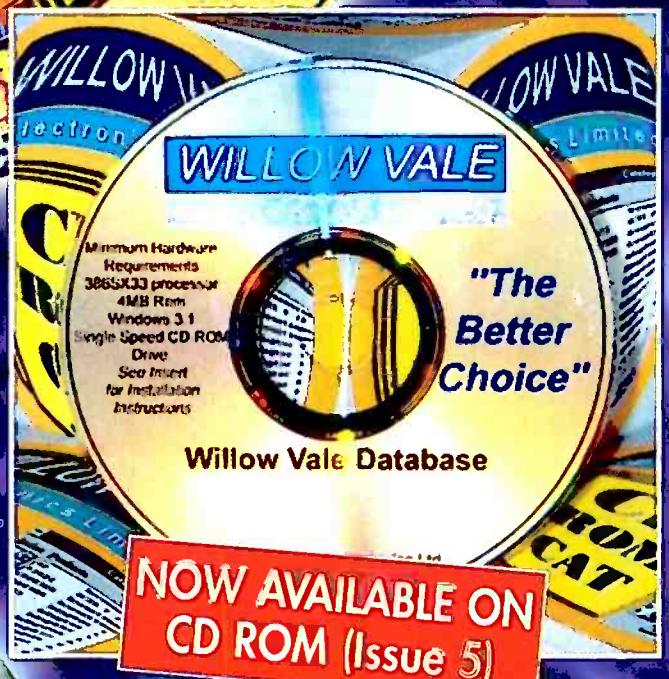
Willow Vale can now supply genuine spares and accessories for all these leading brands:

- 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.

QUALITY REPAIRS NEED GENUINE MANUFACTURERS SPARES!



NOW AVAILABLE ON CD ROM (Issue 5)

SERVICE PROFESSIONALS CHOOSE TO BUY FROM

WILLOW VALE
ELECTRONICS LIMITED

'The Better Choice'

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

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