<text>



New Serie CD Player Servicing Introduction to S-VHS • DX-TV Dish Alignment by BBC Computer VCR Clinic • TV Fault Finding The Saticon Camera Tube





TV SERVICE SPARES UNDER NEW MANAGEMENT BACKED BY TWENTY YEARS EXPERIENCE & STAFF OF TECHNICAL EXPERTS LOPTs, TRIPLERS, PANELS, TUNERS, SELECTORS ETC. PHILIPS SPARES G8 PANELS (Testec) Power \$12.50, Scan \$15.00, Signals \$15.00 p.p. \$2.50. KT3, K30 PANELS tested, exchange, sound, power, bridge rect, frame, RGB \$7.50 each. Decoder (Non-text) \$10.00 p.p. \$1.50. G11 PANELS (testel), frame, IF, decoder \$12.50 each. p.p. \$2.00. Scan \$15.00 p.p. \$2.80. Power tested exchange \$18.00 p.p. \$2.80. G11 PANELS EX-RENTAL (untested) Scan, Frame, Decoder \$2.50 p.p. \$2.00. G11 IF PANEL (new) less Tuner \$2.50 p.p. \$1.30. G11 6POS Touch Tune Channel Selector (replaces old type) incl. instructions \$20.00 p.p. \$1.80 G9 POWER SUPPLY UNIT \$5.00 p.p. \$2.30. G8 6 Position Channel Selector (sloping buttons) \$2.50 p.p. \$1.00. HANDSETS (new replacements) p.p. \$1.50. G11 ULTRASONIC non-text \$19.50, infra-red text \$19.50. Others available. KT3 non-text (RC4011), KT3, K30 Text \$19.50. HANDSETS EX-RENTAL, TEXT UNTESTED. KT, TEXT/VIDEO TYPE \$3.50 p.p. \$1.00. PHILIPS SPARES

MANUALS p.p. 80p. 611, K35, 2A £3.50, KT3 £4.50, CTX-E, CTX-S, CF1 £1.50 KT4/K40 SYSTEM 4 £3.50

THORN/FERGUSON SPARES 8000, 8500, 8800, 9800 PANELS tested, exchange. Power £8.80, Frame £10.00 p.p. £2.30.

1

2000 Series IF/Decocer tested £10.00 p.p. £2.30. TX9 Panels complete & tested £28.00 exchange (shop only) TX9 Panels ex-factory for small spares includes IC's & semiconductors, etc. £3.00 £2.00.

p.p. £2.00. TX9 panels salvaged ex-factory for spares incl. electronic & mains transformer. **£3.50** p.p. £3.00. TX9/TX10 Facia, cortrol panel incl. infra-red receiver **£8.50** p.p. £2.00 TX10 Focus control **£3.50** p.p. £1.00. TX9/TX10 Saw filter IF panel **£5.00** p.p. 80p. TX9/TX10 Remote & tuning control panel 1515 (incl. SAA5012) **£7.50** p.p. £1.80. TX Remote & tuning control panel 1509 (incl UAA1008A, battery) **£5.00** p.p. £1.80.

TX REMOTE PANEL 1564 (incl. SAA5012, M923) £5.00 p.p. £1.80. REMOTE CONTROL HANDSETS — TX9, TX10 inred-red text £19.50 p.p. £1.20.

REMOTE CONTROL HANDSETS — 139, 1310 inred-red text £19.50 p.p. £1.20. ITT SPARES: CVC30 series convergence & purity panels £2.50 p.p. £1.20. CVC30 series panels surplus (untested) £2.50 each, CMP31, CMF31, CMA30, CVC20/30 series chasis for small spares (shop only) £2.50. BUSH SPARES: T20/T22 panels, tested, exchange, power £18.00. Scan £25.00 p.p. £2.50. T20/T22 touch tune panels + controls £3.50 p.p. £1.50.

E25.00 p.p. £2.50, 12/12/ touch tune panels + controls **£5.50** p.p. £1.50, **GEC SPARES: 20AX MKII** line time base £18.00 p.p. £2.00. Power (PC778) tested exchange £18.00 p.p. £2.00. **SONY SPARES: ON/OFF SWITCH** 21mm or 26mm, spaced holes, universal Sony on/off £4.20 each p.p. 80p. **HANDSETS** (New Replacement) RM-604, 606, 613, 615, 630, 632, 635 £19.50 p.p. £1.00

£1.00. **TELETEXT DECOLER PANELS** (tested) — Mullard VM6101 Type £25.00, Philips KT3, K30 £20.00 p.p. £2.30. **MULLARD VM6230** teletext decoder (similar to VM6101) plus additional Prestel unit, VM6330 & Line Coupler £20.00 p.p.£3.00. **VARICAP TUNERS:** Grundig 8630 series £5.00 p.p. £1.00. U321, U322/ NSF204, ELC1043 (cquiv), SC4, VHF NSF203 £7.80 p.p. £1.80. UHF/VHF UV411 £10.80 p.p. £1.00. LOPTS New and gua². P/P £1.50, Bobbins 80p.

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1590, 1591, 1612, 1613, 1712 £4.80	R.B.M. T20, T22 Bobbin
FERGUSON 3787 (Normende) £9.80	DECCA Bradford (state Mod No) £8.80
THORN 1600, 1615, 1690, 1691, 1790 £9,00	DECCA 100 £8.80
THORN 3000/3500 SCAN, EHT £6.90	FIDELITY ZX2000, 3000 (Not 22") £15.50
THORN 8000	GEC 2110 series
THORN 9000 to 9600£9.80	ITT CVC 5 to 9, CVC20
THORN TX9 £12,50	ITT CVC25, CVC30 series
THORN TX10 £16.50	ITT CVC45
SPECIAL OFFER	PYE 725 (90°) 731 to 741 £9.20
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FTT VC300	PHILIPS G9
GEC 2114J/Junior Fineline£1.00	PHILIPS KT3£9.80
PHILIPS 320£2.80	PHILIPS K30, K35 £27.00
PHILIPS G11£5.00	PHILIPS CTX-E £22.50
GEC 2028, 2040, 2100£1.00	PHILIPS CTX-S £22.50
PYE 691-7 chassis type only	

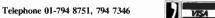
OTHERS AVAILABLE, PRICES ON REQUEST.

TRIPLERS: THORN 9000 £8.80.

UNIVERSAL (best quality) £7.80. CONTINENTAL TVK & BG RANGE (quote exact no.) replacements £13.80 DECCA/TATUNG £7.80 p.p. £1.50. THORN 1500 30R5 stick £1.50 p.p. 80p. Others available. 6-3V CRT Boost Transformers for Colour & Mono £5.90 p.p. £1.40. 455 CRYSTALS for Remote Control Handsets. 4 for £1.00 p.p. 50p. VHF to UHF Converters £26.50 p.p. £2.50.

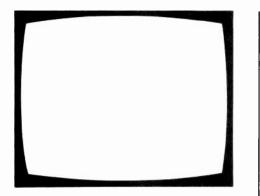
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TELEVISION

March 1989

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QUERIES

We regret that we cannot answer technical queries over the telephone nor supply service sheets. We will endeavour to assist readers who have queries relating to articles published in Television, but we cannot offer advice on modifications to our published designs nor comment on alternative ways of using them. Correspondents should enclose a stamped addressed envelope. Requests for advice on dealing with servicing problems should be directed to our Queries Service. For details see our regular feature "Service Bureau". Send to given address above (see the "correspondence").

this month

325 Leader

- 326 Teletopics
- News, comment and developments. 328 Failure and Success
- 28 Failure and Success Les Lawry-Johns One has to admit defeat with some sets though there are unexpected successes.
- 328 Book Reviews
- 331 Servicing Compact Disc Players, Part 1 Joe Cieszynski This initial instalment deals with disc parameters and the way in which digital audio data is stored on the disc and recovered by laser scanning, ending with a simple block diagram of the player.
 334 Introduction to S-VHS Nick Beer
 - 34 Introduction to S-VHS The way in which enhanced performance is obtained with the Super-VHS format and the techniques required in VCRs/camcorders.
- 335 Next Month in Television
- 336 Letters
- 338 A Simple Channel 1 Modulator
- Jeffrey Borin, B.Sc. (Eng.), A.C.G.I., M.I.Ě.E.
- A few simple modifications enable the h.f. modulator in the Rediffusion translator unit, which is readily available at very modest cost on the surplus market, to be used as a Channel 1 modulator to drive 405-line sets. The rest of the translator can be modified to provide a highclass tuner giving audio and video outputs. **TV Fault Finding**
- 340 TV Fault Finding Reports from Eugene Trundle, Mick Dutton, Ian Bowden, Philip Blundell, Eng. Tech., Alan Shaw, John Coombes, Roger Burchett and Hugh MacMullen.
- **342** Camcorder Servicing, Part 2 Steve Beeching, T.Eng. Operation of the Saticon camera tube and methods of checking for the no-signal condition.
- 345 The Pros and Cons of LocoScript 2 Vivian Capel As a follow-up to his original article on word processing with Amstrad machines using the LocoScript program Vivian Capel describes the changes introduced with the LocoScript 2 version and the effects of these in use.
- 349 Compact Disc System Developments Peter Marlow, B.Sc. (Hons.), C.Eng.
 Development of the system has produced the CD-Video and CD-Interactive discs.
 350 VCR Clinic Reports from Philip Blundell, Eng. Tech., Eugene Trundle, Ian Bowden, Alfred Damp and Nick Beer
 354 Dish Alignment by BBC Computer A user-friendly program to enable the BBC microcomputer to be used to obtain the correct dish
- microcomputer to be used to obtain the correct dish elevation and azimuth angles for various satellites, including Astra, at any location. 356 Long-distance Television F
- **356** Long-distance Television Roger Bunney Reports on DX conditions and reception and news from abroad. Latest Astra channel allocations.
- 359 Service Bureau
- 360 Test Case 315
 - OUR NEXT ISSUE DATED APRIL WILL BE PUBLISHED ON MARCH 15

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24hr. answ	. & B. Cuck vering servi	ice		0254 395361		£7 50 + VAT up to 25K (except tubes). We do not despatch on Saturdays.	supply an equivalent. We need expiry dates t	or credit card orders
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1 A211 3H22A		HR3320 3HSS HR3330 3HSS HR3350 3HSS HR3360 3HSS	/	D NV322 3HSSN D NV322 3HSSN D NV330 3HSSN D NV333 3HSSN D NV340 3HSSN D NV366 3HSS4NA D NV370 3HSSU1N	18.00 18.00 43.40 25.99	7550 Belt Kit 1950 Cass. Lamp VIDEO RECORDER VCR 9000		Sakura Remote Controlled Satellite Dish
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VK23 Sanyo 550 VK24 Nat. Pan. VK25 Toshiba V VK26 JVC/HR 7	NV300/NV333 7540 700/3V23		.55 Hitachi VT5000 .90 Sharp VC6300/6500 .96 Sony T C General		3.75 3.75 3.75 3.75 3.75	VIDEO LAMPS Nat. Pan. VHS 3ulb (also Sharp) General Purpose VHS Bulb 3V23 with Plug Amstrad 7000 Amstrad 4500/4600/5200/9000 Hitachi 9300/9500	1.59 1.59 0.45	£388.68 + VAT *Supplied by carrier only
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TELEVISION MARCH 1989

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	AERIAL EQUIPMENT	LABGEAR	INTEGRATED CIRCUITS
REMOTE HAND SETS	GENERAL LASHING KITS/ACCESSORIES	LABLELAK 2.39 CM7261 P.U 3.50 CM7055 U.HF.WB 16.18 CM7055 U.HF.WB 16.18 CM7055 U.HF.WD 14.74 CM7261 U.HF.WD 17.57 CM7253 Behind Set (Mains) 15.51 CM7263 Dist. Amp. 14.73 CM7053 Dist. Amp. 4.73 CM7033 Dist. Amp. 4.76 CM7030 Dist. Amp. 4.96 CM9704 Z/MH2 CB Suppressor 4.90 CM9003 207 Flush Sing. Outlet .94 9.96 CM900300 Flush Sing. Outlet .95 CM900300 Flush Sing. Outlet .35 CM9033 6 Way Pass Split. 11.72 Camboliner. .324 CM90030 Flush Tiff Fluters. A& C.D 8.89 CM90030 Flush Sing. 1.72 CM7042 TV Games Combiner. .324 CM9009 Flush TVFM Emulator .388 CM9005 Flush TVFM Emulator .89 CM7057 Televerta Down UHF/VHF .970 .70	COMPUTER IC'S/TRANS 40028 13.45
AMSTRAD TV/Video – TVR-1-MD1511910 15.00	GENERAL LASHING KITS/ACCESSORIES 0.86 6° Pressed Bracket 0.81 6° Pracket With Kit (lashing kit) 2.18 9° Welded Bracket Chinney 2.53 9° Bracket With Kit (lashing kit) 2.18 9° Welded Bracket Schinney 2.50 0ouble Brackets 2.77 Double Brackets 2.77 Ja, S' Cradle Bracket 2.25 13, S' Cradle Bracket A 2.25 Schard Repair Pack. 1.27 Double Repair Pack. 1.27 Double Repair Pack. 1.27 Double Repair Pack. 0.85 Lead Wall Nails (100). 6.17 Rawlbolts 0.60 Cable Clips (Pk. 100) 0.91 Coax Plugs Female 0.75 Line Connectors 0.18 Tetenuators 1.80 Tates m 0.32 Lg. 0.60	CM7065 UHF/VHF WB 16.18 CM7066 UHF/WD 14.74	HAL16L8CN 5.24 HN613128P POA LM1889 1.75
TVV/deo TVR-1-MD1511910 15.00 CTV 1409 MD1409221 15.00 VCR 5200 MD151175 17.00 VCR 7000 MD150878 10.00	9" Bracket with Kit	CN/7253 Behind Set (Mains)	Intol Stati I or LM1889
VCR 7000 - MD150583	Double Brackets with Kit 5.29 13. 5" Cradle Bracket 2.25	CM7093 Three Set Amp	MC1376 1.15 MC1388P 0.75
DECCA	13, 5" Cradle Bracket with Kit 4.25 Standard Repair Pack	CM97108/7298 8 + 1 Dist. Amp	MC1489AP 0.77 MC68008 17.97
80/100 Non-Txt US8511 19.50 101 Series Non-Txt US 8513 23.50 Tatung 145/150 17.50	Double Repair Pack (2) 2.56 Corner Plates 0.08	CM9003/00 Flush Sing_Outlet	ZX81 Rom
FIDELITY	Lashing Wire	CM9010 Flush Twin Outlet	ULA2C210E ZX81
CTV 20R/22R/140R 4 Button IR8876	Rawlbolts 0.60 Cable Clips (Pk. 100) 0.91	CM9033 6 Way Pass Split	QL Rom 256K 12.43 QL Rom 128K 7.20 SCH92880P1/F 1 Rom 3.00
IS 500 12 Button FD09820 13.81 F14R 12 Button FD09156 13.81	Coax Plugs	CM9009 FIUSD IV/FM Emulator	TC74HC04 0.86
CIV 200722101404 13.75 A Button IRB876 13.75 IS 50012 Button FD09820 13.81 F14R 12 Button FD09156 13.81 AVS 14 Button FD09156 13.75 Txt 32 Button IR8983 15.90	Line Connectors 0.16 Attenuators 1.80	CM7057 Televerta Down UHF/VHF 49.70	TMS1000 8.95 TMM23128P-1951 10.66 ULA6C001E (Spec) 6.50 ULA2G007 (M/D) 3.24
G.E.C.	Tape Sm 0.32 Lg 0.60 Wood Screws 0.08 WALL BRACKETS 0.08	CM7294 Dist Amp_UH//VHF	ULA2G007 (M/D) 3.24 ULA1H035E (Ram Pk)
U.E.U. 9.93 4001/Hitachi 9300 9.93 GC56520831/C1404H-C1658H-IR8314 31.80 GCA 512220/C1653 22.00 GCA 512230/C2086H-C2087H CGA 51420/C2086H-C2090H IR8823 CGA 51420/C2089H-C2090H IR8823 23.50 C2290H, C2889 C24 512210/C2090H IR8623	WALL BRACKETS	CM7282 UHF/VHF DISt. Amp	ULAZX8302 (QL)7.30 Z80A CPU
GCA 512220/C1033	12" T&K	C v15004 4 way Video Dist. Amp	ZX8401/PCF1304 .4.50 2N7400E .11.25 20RA043 .11.25
C2290H, C2889 C2290H, C2889 C2290H, C2889 C2290H, C2889 C2290H, C2889 C2290H, C2889 C2290H, C2889 C2290H, C2890 C2290H, C2890 C290H, C280 C290H, C290H, C280 C290H, C290H,	WALL BRACKETS 6"Weided 1.30 12"T&K 3.74 9"Weided 2.41 Gutter Brackets 1.00 18"T&K 4.65 24"T&K 5.35 5.35 5.35	ANTIFERENCE Universal No. 1 Clamp	SN7438N
GCA 510710/C2067H-IR8456	24"T&K	SB11 Splitter 2.50 CS200 Combiner/Splitter 3.94	74LS32 0.90 74LS157 0.78
GRUNDIG RTP05/VRCIR138-TP8-120-120E . 13.50	1" × 1"	Child Children 1.30 SB11 Splitter 2.50 CS200 Combiner/Splitter 3.94 CD811 Outlet 0.96 PU1240 Power Unit 11.65 PU1300 MHA 9.09 Eiglezers 0.68 Matched Transformer 2.83 YS2 Vraset 14.46	Sm (430) 2.00 74LS00 1.12 74LS32 0.90 74LS157 0.78 74LS152 0.63 74LS260 0.83 Ram 2114 2.31 251641.02 Photo
TTP06/IR107N - TP160-160E 13.50 RTP07/IR380N - TP200-300-390 13.50	1″U Bolts 0.20 J Bolts 0.20	Ciplexers 0.68 Matched Transformer 2.83	Ram 2114 2.31 251641-02 POA 2732 3.30
GROWING 13.50 RTP05/VRC [R138 – TP8-120-120E 13.50 TTP06/(R107N – TP160-160E 13.50 RTP07/IR380N – TP200-300-390 13.50 RTP20/VRC112 – TP162-121/VHR 13.50 RTP20/VRC112 – TP162-121/VHR 13.50 RTP20/VRC112 – TP162-121/VHR 13.50 RTP400/401 (R401 – TP400VT-500VT 13.50	24°T&K 5.35 CLAMPS 1"×1" 0.85 2"×2" 1.33 1"U Bolts 0.20 JBolts 0.20 2"U Bolts 0.20 2"U Bolts 0.20 2"U Bolts 0.28 UHF TV AFRIALS 0.28 114 124	XS2 Xtraset 14.46 XS04 4 Way DA 22.50	251641-02 POA 2732 3.30 2764 3.75 27128 4.95
VRC 204 U.S TP12	UHF TV AERIALS 10 Element State Group A. B. CD. WB	م ۲۵ م. ۲۰	27256 5.90 Ram 4118 2.92
GRANADA Universal IR8450	OHF TV ACHULS 10 Element State Group A, B, CD, WB 18 Element 19 Aerial Pack	Traveller Aerial 11.50 Silver Sensor Aerial 7.40	Ram 4116-4 1.10 Ram 4116-2 1.10 8240 3.00
	10 Ele, 3ft Mast, Coax Fittings	XG8 High Gam Aerial	8249 3.00 8247 3.50 8271 60.00
I.T.T. CVC 32 - RG15-US8573	VHF/FM AERIALS 3Element	Matched Transformer 2.83 XS2 Vtraset 14.46 XSQ 476 22.50 XS 4.6 43.13 Super Set Top Aerial 6.50 Caratenna Aerial 7.20 Travelier Aerial 11.50 Silver Sensor Aerial 7.40 VG8 High Gain Aerial 21.00 Power Sensor Aerial 2.30 Loop Aerials 2.30 Loop Aerials 1.00 Cax Cable S540 100m 33.70	8271 60.00 BBC UID ULA
CVC 45 - RG5-US8262			41256-15 8.95 6502 Commodore 3.50
J.V.C. TP 843/Txt IB170	MASTS 3 ft Crank L or S Shape 1.20	Toshiba Closed Length 206mm 1.55 Toshiba 330m 1.55	6522 4.00 6264 Commodore 7.50
	3.17 Crank Lor S Shape 1.20 6.11 " 1.79 10 ft 1 5" 7.00 12 ft 1.5" 8.50 16 ft 2" 14.41	NEC 252000 . 1.00	6510 Commodore 7.07 6526 Commodore 5.11
PHILIPS G11 Txi IR8435/IR170/843 13.50 G11 Txi IR8435/IR170/843 13.50 G11 Txi IR8435/IR170/843 29.42 G11 Nor Txi IUS 8263 21.50 G11 2 Function US 8518 18.75 KT3/K30 Non Txi IR8331 15.85 KT3/K30/K35/K40 Txt/Non Txt 17.90 KT3/K30/K35/K40 Txt/Non Txt 13.95 Chave Chave	12 ft 1.5"	1/45 195/mm 1.67 2 sanyo 150mm 1.74 Samyo 65mm 1.62 Sonyo 235mm 2.18 Sony 235mm 2.18 Sony 156 1.55	6561 Commodore 7.74 6569 Commodore 21.25 6581 Commodore 7.79
691-17181	BACK BOXES Plastic Single	Sony 235mm 2.18 Sony 160mm 1.55	6581 Commodore 7.79 8360 Commodore 19.61 8501 Commodore 4.18
G11 2 Function US 8518 18.75 KT3/K30 Non Txt IR8331 15.85	Deuts Bouts 0.68 Plastic Single 0.68 Plastic Double 1.09 Metal Single 0.45 Metal Double 0.88 Metal Double 0.88	Hitachi 300mm . 1.67	8701 Commodore 5.46 906114 Pla. Comm 4.51
KT3/K30 Txt Ir8420 17.90 KT3/K30/K35/K40 Txt/Non Txt	Metal Double 0.88 OUTLET BOXES	Aiwa 65mm 1.32 Aiwa 135mm 1.26 Sharp AANTR00017CEZZ 245mm 2.17	901225 Cha. Rom Comm. 3.37 901226 Bas. Rom. Comm. 8.71
(Replaces RC5 Series)	OUTLET BOXES 0.80 Surface Single 0.80 Surface Twin 1.10 Y Splitter 0.85 Flush Single 0.95 Flush Twin 1.20	Sharp AANTRO0030CEZ 245mm 1.62	901227 Ker. Rom Comm. 6.63 ZTX182/BC182 0.07 ZTX213 0.15
SUNT 29.04 SLC5-RM 75T 29.04 SLC6-RM 72 22.62 SLC7-RMT200 49.87 SLC9-RMT213 45.00	Y Splitter	F.M. RIBBON AERIALS 0.66 Ribbon with FM plug	ZTX2140.17
SLC7 - RMT 200	Flush Twin		ZTX510 . 0.39 ZTX551 0.39
THORN/FERGUSON TV REMOTES The following TV remotes are exact replacements for Thom sets	LEADS 2M Fly M/M 0.60 2M Fly M/F 0.60 4M Fly M/M 1.20 10M Fly 1.90 FlG 8 Mains Leads 0.62	Safe Block Mains 8.50	ZTX650/1 0.27 ZTX750 0.38 IS 2472 0.31
and cover a wide range of chassis inc. TX9/1090/100. Please state model number of set or onginal hand set number	2M Fly M/F	FC3W 3 Pin 10A Flex Connector 1.50 TS1 13A Single Trailing Socket 1.40 TS2 13A Twin Trailing Socket 2.65	
	FIG 8 Mains Leads 0.62 Computer to TV 1.10	TS2 13A Twin Trailing Socket 2.65 4 Way 13A Mains Connector	We have not listed our full range IC's. These are a few of our new
<i>Type Type</i> T651 M739 All One	5 Pin Din to 5 Pin Din	13Amp Plugs 0.48 Surge Protector Plug 12.50 320A Single Gang 13A Socket 1.95 320E Single Switched 13A Socket 1.95 320C Two Gang 13A Socket 2.53 320D Two Gang 13A Socket 3.92 International Travel Plug 3.50 320C Two Gang/Two Way Switches 0.80 320G Two Gang/Two Way Switches 1.78 320G Two Gang/Two Way Switches 1.78 320G Way Adaptor 3.80	types. Please ask for catalogue for full list of ICs and Semis.
T652 M738 Price SAME DAY DESPATCH T653 M737 FAST – FAIR – EFFICIENT T716 M737 13.00	TA51 Car Battery Thom 1615	320B Single Switched 13A Socket 1.95 320C Two Gang 13A Socket 2.53	AN5620
T716 M737 13.00 SERVICE T717 M737 T718 US8517 MCT ACKU	Scart Plugs 1.95 Scart Sockets 0.85	320D Two Gang Switched 13A Socket 3.92 International Travel Plug 3.50 320E One Gang/One Way Switches 0.80	LA7800
T718 D08517 JUST ASK!! T719 M737 T720 M739 We cannot advertise our	Scart to Scart Lead	320G Two Gang/Two Way Switches 1.78 3 Way Mains Adaptor 3.80	STK5481
T721 M737 complete range of products T723 M737 Please ask if you require	FIG 8 Mains Leads 0.62 Computer to TV 1.10 S Pin Din to 5 Pin Din 0.98 TA81 Car Battery Thom 1691 4.47 TA51 Car Battery Thom 1515 4.35 Car Battery Thom 1615 4.35 Scart Leads ZM (Open End) 2.50 Scart Plugs 1.95 Scart Leads ZM (Open End) 2.50 Scart Leads M (Start Eads) 4.47 Tot Scart Lead 4.95 Scart Leads Kit 6.44 Test Lead Kit 3.75 CABLES 33.70 Antiference Coax 100m S540 33.70 756 Coax Cable (100m) 3.50	3 Way Mains Adaptor 3.80 13 Amp Screwless Plug Tops	AN5620 4.87 AN5620N 2.84 LA7800 3.75 STK5326 6.33 STK5412 8.45 STR5412 8.45 STR5412 8.45 TAD100 2.66 TAD100 2.66 TBA73D 2.55 TBA73D 2.56 TDA1870 6.44 TDA2555 3.99 TDA3555 3.99 TDA36514Q 3.95 TDA36514Q 3.95 TDA36514Q 3.95 TDA36514Q 3.95 TDA36514Q 3.95 TDA36514Q 3.95 TDA3654 3.95
T724 M739 something which is not listed, T725 M750 ie Stationery, Styli, Axial/	Antiference Coax 100m S540	COMPUTER ACCESSORIES	TBA2800
T731 M738 Radial Electrolytics. Mixed T732 M739 Dialectric Caps., Polyester	75R Coax Cable (250m)	Goldstar 5.25" Floppy Disks 2DD DS/QD (Box 10)	TDA1870 6.44 TDA2005 2.94
T733 M738 Caps , Carbon Resistors, T734 M734 Wirewound Resistors,	b Core Security Cable (100m) 7.94 8 Core Security Cable (100m) 10.31 4 Core Jenhone Cable (100m)	Goldstar 3 ¹ / ₂ " Diskettes HF 2DD DS/DD (Box 10) 8.30 Unbranded 3 ¹ / ₂ " Diskettes	TDA3565 3.95 TDA35768 3.95
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T738 M738 Discs. Computer Cassettes, T739 M739 Thom New Life Tubes T740 M740 (collection only), New Mono	3162 3 Core Round 3amp (100m)	STORAGE BOXES	TDA3653AQ 3.99 TDA3654 3.99
T740 M740 (collection only), New Mono T742 M742 Tubes, Crystals, Cables (post T748 M748 charges extra), Aenal	4 Core Flat Cable (100m)	STORAGE BOXES 1.95 3½": Lobrary Case (10) 1.95 Lockable Box Holds (40 × 3½") (20 × 3") 8.50 5¼ Disk Box 9.37	UPU13/8 Z.34
T748 M748 charges extra}, Aenal T750 M750 Equipment, Electrical Plugs/ T769 M739 Sockets, Components for	6491X Earth Cable Green/Yellow 1sq mm (100m)	(40 × 3 ¹ /2") (20 × 3") . 8.50 5 ¹ /4 Disk Box 9.37	UPU5/43 . 3./:
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3V231.R. 8817 14.95 3V311.R. 8945 14.95 3V351.R. 8946 14.95 3V431.R. 8946 14.95 3V431.R. 8947 19.12	46199 Single Screened 7.00 Microphone (100m) 5.35 5641 2m Loudspeaker Cable (100m) 5.53 5CPU2 Twin Pick Up 100m. 9.95 SIL6 8 Core loway – All Cores 9.95 Colour Coded (100m) 4.00 SIB3Y 3 Core 15amp upt 3kw 4.07 Flexable 1.5 sg mm 49.70 SIB3Y 3 Core 10amp upto 2kw Flexable 1.0 sg mm 6491X Earth Green V/ellow 6mm 39.60 6181Y Lighting Red/Grey 1mm 14.50 6242Y Grey Lighting 14.50 Favor Carbin 1mm 21.00 Carbin 2 Min Main 2.5 Mil 38.20	AUDIO SPARES	D 14
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Includes Foil/Buttons/Inst	TV WALL BRACKETS	MDTORS	32611 answer
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164-150	3.50 TYP	E PRICE (£)	STK5730		A2532	2.10	FERGUSON 1615 FERGUSON 1690/1			.15 BU826A
1532/20NL3		03	STR4090		A2541		FERGUSON 1790/1			
510	.65 AN3	18 6.95	STR4009 STR4211) 7.95 TDA 3.95 TDA	42560 42576A		FERGUSON TX9 FERGUSON TX10			.12 BUT11AF
561	.95 AN7	620	STR441.	4.95 TDA	A2577		FERGUSCN TX90 (14'	') 19.75 BC327		12 BUX84
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LA6C0017	.95 HA1	366W 1.85					FERGUSON TX100 1 FIDELITY ZX2000 (In	BC360		
TX213 TX313	30 НА1 30 НА1	366WR	TA7193P		A2594		14"/20" FIDELITY ZX3000	L. WINLI DOCAD		10 T9053V
TX650 180A CPU1	-40 HA1	377	TA7205A TA7222P	P1.40 TDA 1.85 TDA	A2600 A2611A		FIDELITY ZX3000	44 ca 00.0TU		10 T9064V
		392	TA7227	2.95 TDA	A2653A		FIDELITY 22"/26"		•••••••	10 TIP29É 10 TIP31C
DIODES	HA1	3001	TA7609		A3190		GEC 1405 HINARI CT4/5	19.95 BC639		
YPE PR	ICE LAI	201 1.25		I.00 TDA I	43330 43540		HITACHI CTP1444/6. ITT CVC20	19.35 BD131		
Y133	.25 141	230	TBA530.	1.25 TDA	A3541	2.95	ITT CVC25'30/32			15/80H
Y164 V179	60 1 4 4	440		1.25 TDA	A3561A		ITT CVC40 PHILIPS G8	22.35 BD225		
1223		460 2.45		1.50 TDA 1.25 TDA	A3562A		PHILIPS GI11	14.95 PD239		
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1255/000		801 2.90					PHILIPS K35 PHILIPS CTX (14")			40 2SC3156
		13002	TDA440.		A3651AQ		PHILIPS CTX-E	17.95 00077		
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ed.	£44.00 £44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AU ALIGNMENT	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES NUALS, TENSIO IDIO/CONTROL H TOOLS AND TA	DEO SPARES S, MOTORS, N BANDS, IEADS, PES ETC.	VISA	ĀRD	Hitachi VT6 Sharp VC92 Amstrad/Sa Panasonic1 Sanyo VTC Panasonic1 Ferguson/J Sharp VC73 Sharp VC83	END SENSORS 4E REEL MOTORS 100, VC381 etc isho etc W333, NV366 5000, 5300, 5400 W7000, 7200 DRUM MOTORS	£1.20 each
ed.	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES NUALS, TENSIO IDIO/CONTROL H TOOLS AND TA L ORDER FACILI	DEO SPARES S, MOTORS, N BANDS, PES ETC. ITIES**	VISA	ĀRD	Hitachi VT6 Sharp VC90 Amstrad/Sa Panasonic1 Sanyo VTC Panasonic1 Ferguson/JI Sharp VC73 Sharp VC73 Sharp VC73 Sharp VC73	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC700 100, VC7700 100, VC7700 10	£1.20 each
ed.	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES NUALS, TENSIO IDIO/CONTROL H TOOLS AND TA	DEO SPARES S, MOTORS, N BANDS, PES ETC. ITIES**	VISA	ĀRD	Hitachi VT6 Sharp VC90 Amstrad/Sa Panasonic1 Sanyo VTC Panasonic1 Ferguson/JI Sharp VC73 Sharp VC73 Sharp VC73 Sharp VC73	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC700 100, VC7700 100, VC7700 10	£1.20 each
ed.	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I	RECEIVED E 4 PM. ARE DESPATCHES SAME DAY NDREDS OF VIC ERS, CLUTCHES NUALS, TENSIO JOIO CONTROL H TOOLS AND TA L ORDER FACILI ION-STOCK ITE	DEO SPARES S, MOTORS, N BANDS, PES ETC. ITIES**	VISA		Hitachi VT6 Sharp VC90 Amstrad/Sa Panasonic1 Sanyo VTC Panasonic1 Ferguson/J1 Sharp VC70 Sharp VC70 Sharp VC70 Sharp VC70 Sharp VC70 Sharp VC70 Sharp VC70 Sharp VC70	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC380, S400 DRUM MOTORS 100, VC7700 100,	£1.20 each
ed.	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I PINCH I	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES NUALS, TENSIO IDIO/CONTROL H TOOLS AND TA L ORDER FACILI	DEO SPARES S, MOTORS, N BANDS, PES ETC. ITIES**	LARGE RA		Hitachi VT6 Sharp VC90 Amstrad/Sa Panasonic1 Sanyo VTC Panasonic1 Ferguson/J1 Sharp VC70 Sharp VC70 Sharp VC70 Sharp VC70 Sharp VC70 Sharp VC70 Sharp VC70 Sharp VC70	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC380, S400 DRUM MOTORS 100, VC7700 100,	£1.20 each
I I	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT *FOR I PINCH I Onic	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES NUALS, TENSIO DIO CONTROL H TOOLS AND TA L ORDER FACILI ION-STOCK ITEI ROLLERS	DEO SPARES S, MOTORS, N BANDS, HEADS, PES ETC. ITIES** MS**	LARGE RA OF IC'		Hitachi VT6 Sharp VC90 Amstrad/Sa Panasonic1 Sanyo VTC Panasonic1 Ferguson/J1 Sharp VC70 Sharp VC80 Hitachi VT5 Cong VC80 Sharp VC80	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC380, S400 DRUM MOTORS 100, VC7700 100,	£1.20 each
I I	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I PINCH I ONICO	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VID ERS, CLUTCHES NUALS, TENSIO IDIO CONTROL H TOOLS AND TA L ORDER FACIL ION-STOCK ITEI ROLLERS 7000 NV7200	DEO SPARES S, MOTORS, N BANDS, IEADS, PES ETC. ITIES** MS**	LARGE RA OF IC' & SEM		Hitachi VT6 Amstrad/Sa Panasonic1 Sanyo VTC Panasonic1 Ferguson/J' Sharp VC73 Sharp VC73 Sharp VC73 Sharp VC73 Sharp VC73 Sharp VC73 Sharp VC73 Ferguson/J' Ferguson/J' Ferguson/J	END SENSORS 4E REEL MOTORS 100, VC381 etc. 1150 etc. 1140 333, NV366 5000, 5300, 5400 1140 400 1140 400 114	£1.20 each £18.20 £18.20 £18.20 £19.80 £29.90 £29.90 £26.40 £26.40 £22.80 5 5 5 5 5 5 5 5 5 5 5 5 5
I I	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I PINCH I ONICO	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VID ERS, CLUTCHES NUALS, TENSIO IDIO CONTROL H TOOLS AND TA L ORDER FACIL ION-STOCK ITEI ROLLERS 7000 NV7200	DEO SPARES S, MOTORS, N BANDS, IEADS, PES ETC. ITIES** MS**	LARGE RA OF IC & SEM CONDUCT	NGE s I- DRS	Hitachi VT6 Amstrad/Sa Panasonic1 Sanyo VTC Panasonic1 Ferguson/JI Sharp VC73 Sharp VC73 Sharp VC83 Sharp VC73 Ferguson/JI Ferguson/JI Ferguson/JI	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC7200. DRUM MOTORS VC 3V00, 3V22, etc. 100, VC7700 100, VC700 100, VC	£1.20 each £18.20 £18.20 £16.80 £9.90 £19.80 £29.90 £24.80 £24.80 £29.90 £24.80 £24.80 £29.90 £24.80 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £24.80 £29.90 £24.80 £29.90 £24.80 £24.80 £29.90 £24.80 £25.90 £24.80 £25.90 £24.80 £25.80 £25.80
sd.	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I PINCON I ON V2010, NV NV366, NV37	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES NUALS, TENSIO DIO CONTROL H TOOLS AND TA L ORDER FACILI ION-STOCK ITEI ROLLERS	DEO SPARES S, MOTORS, N BANDS, IEADS, PES ETC. ITIES** MS**	LARGE RA OF IC' & SEM CONDUCT AVAILAB	NGE s I- DRS	Hitachi VT6 Amstrad/Sa Panasonic1 Sanyo VTC Panasonic1 Ferguson/JI Sharp VC73 Sharp VC73 Sharp VC83 Sharp VC73 Ferguson/JI Ferguson/JI Ferguson/JI	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC7200. DRUM MOTORS VC 3V00, 3V22, etc. 100, VC7700 100, VC700 100, VC	£1.20 each £18.20 £18.20 £16.80 £9.90 £19.80 £29.90 £24.80 £24.80 £29.90 £24.80 £24.80 £29.90 £24.80 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £24.80 £29.90 £24.80 £29.90 £24.80 £24.80 £29.90 £24.80 £25.90 £24.80 £25.90 £24.80 £25.80 £25.80
sd.	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I PINCH I onic 0. NV2010. NV37 NV366, NV37 Son/JVC	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES NUALS, TENSIO IDIO CONTROL H IDIOLS AND TA L ORDER FACIL ION-STOCK ITEI ROLLERS /7000, NV7200 0, NV430	EV ED DEO SPARES S, MOTORS, N BANDS, IEADS, PES ETC. ITIES** MS** E4.95 E4.95 E4.95 E4.95 E7.95	LARGE RA OF IC' & SEM CONDUCT AVAILAB FOR TO	NGE s I- DRS	Hitachi VT6 Amstrad/Sa Panasonic1 Sanyo VTC Panasonic1 Ferguson/JI Sharp VC73 Sharp VC73 Sharp VC83 Sharp VC73 Ferguson/JI Ferguson/JI Ferguson/JI	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC7200. DRUM MOTORS VC 3V00, 3V22, etc. 100, VC7700 100, VC700 100, VC	£1.20 each £18.20 £18.20 £16.80 £9.90 £19.80 £29.90 £24.80 £24.80 £29.90 £24.80 £29.90 £24.80 £24.80 £29.90 £24.80 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £24.80 £29.90 £24.80 £29.90 £24.80 £24.80 £29.90 £24.80 £25.90 £24.80 £24.80 £25.90 £25.80
sd.	E44.00 E44.50 WE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I PINCH I onic 0, NV2010, NV NV366, NV37 Son/JVC W16, 3V22, 3V	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES, NUALS, TENSIO DID CONTROL H TOOLS AND TA L ORDER FACILI ION-STOCK ITEI FOLLERS /7000, NV7200 0, NV430	DEO SPARES S, MOTORS, N BANDS, HEADS, PES ETC. ITIES** MS** £4.95 £4.95 £7.95 £4.95 £4.95	LARGE RA OF IC' & SEM CONDUCT AVAILAB	NGE s I- DRS	Hitachi VT6 Sharp VC92 Amstrad/Sa Panasonic1 Sanyo VTC Pranasonic1 Pranasonic1 Pranasonic1 Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Ferguson/J Ferguson/J Ferguson/J Ferguson/J Hitachi VT53 Hitachi VT53 Hitachi VT53	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC7200 DRUM MOTORS VC3V00, 3V22, etc. 100, VC7700 100, V	£1.20 each £18.20 £18.20 £18.20 £19.90 £19.80 £29.90 £29.90 £24.80 5 £29.90 £24.80 5 £24.80 5 £25.80 £24.80 £24.80 5 £24.80
sd.	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I PINCH I ONIC 0, NV2010, NN NV366, NV37 SON/VC V16, 3/22, 3V 0, HP3360, PC	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES NUALS, TENSIO IDIO CONTROL H IDIO CONTROL H L ORDER FACIL ION-STOCK ITEI ROLLERS 7000, NV7200 0, NV430 23 3V24 33660, JU22200	EV ED DEO SPARES S, MOTORS, N BANDS, IEADS, PES ETC. ITTIES** MS** E4.95 E4.95 E7.95 E4.95 E4.95 E4.95 E4.95 E4.95	LARGE RA OF IC' & SEM CONDUCT AVAILAB FOR TV AUDIO	NGE s I- DRS	Hitachi VT6 Sharp VC92 Amstrad/Sa Panasonic1 Sanyo VTC Pranasonic1 Pranasonic1 Pranasonic1 Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Ferguson/J Ferguson/J Ferguson/J Ferguson/J Hitachi VT53 Hitachi VT53 Hitachi VT53	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC7200 DRUM MOTORS VC3V00, 3V22, etc. 100, VC7700 100, V	£1.20 each £18.20 £18.20 £18.20 £19.90 £19.80 £29.90 £29.90 £24.80 5 £29.90 £24.80 5 £24.80 5 £25.80 £24.80 £24.80 5 £24.80
	E44.00 E44.50 WE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I <i>PINCH I</i> <i>onic</i> 0, NV2010, NV NV366, NV37 Son/JVC V16, 3V22, 3V 0, HR3360, HF 7200, HR7200,	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES, NUALS, TENSIO DIO CONTROL H TOOLS AND TA L ORDER FACILI HON-STOCK ITEI ROLLERS 1/7000, NV7200 0, NV430 23 3V24 13660, HR2200 HR7300	EV ED DEO SPARES 5, MOTORS, N BANDS, HEADS, PES ETC. ITIES** MS** E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95	LARGE RA OF IC' & SEM CONDUCT AVAILAB FOR TV AUDIO	NGE s I- DRS	Hitachi VT6 Sharp VC92 Amstrad/Sa Panasonic I Sanyo VTC Pranasonic I Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Ferguson/J Ferguson/J Ferguson/J Ferguson/J Hitachi VT9 Hitachi VT9 Hitachi VT9 Hitachi VT9 Hitachi VT9	END SENSORS 4E REEL MOTORS 400, VC381 etc. 400, VC381 etc. 400, VC381 etc. 400, VC381 etc. 400, VC380 etc. 400, VC7700 400, VC	£1.20 each £18.20 £18.20 £18.20 £19.90 £19.80 £29.90 £29.90 £24.80 5 £29.90 £24.80 5 £24.80 5 £25.80 £24.80 £24.80 5 £24.80
2. 	E44.00 E44.50 WE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I <i>PINCH I</i> <i>onic</i> 0, NV2010, NV NV366, NV37 Son/JVC V16, 3V22, 3V 0, HR3360, HF 7200, HR7200,	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES NUALS, TENSIO IDIO CONTROL H IDIO CONTROL H L ORDER FACIL ION-STOCK ITEI ROLLERS 7000, NV7200 0, NV430 23 3V24 33660, JU22200	EV ED DEO SPARES 5, MOTORS, N BANDS, HEADS, PES ETC. ITIES** MS** E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95	LARGE RA OF IC' & SEM CONDUCT AVAILAB FOR TV AUDIO	NGE s I- DRS	Hitachi VT6 Sharp VC92 Amstrad/Sa Panasonic1 Sanyo VTC Panasonic1 Ferguson/J' Sharp VC72 Sharp VC72 Sharp VC83 Marp VC83 Sharp VC72 Ferguson/J' Ferguson/J' Hitachi VT84 Hitachi VT94 Hitachi VT91 Hitachi VT91 Sony C51-VI Avar, Margu	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC380, S400 DRUM MOTORS 100, VC7700 100,	£1.20 each £18.20 £18.20 £18.20 £19.90 £19.80 £29.90 £29.90 £24.80 5 £29.90 £24.80 5 £24.80 5 £25.80 £24.80 £24.80 5 £24.80
	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I PINCH I ONIC 0. NV2010. NN NV366, NV37 SON/JVC V16, 3/V2, 3V 0. HR7360, HF V30, HR7200, V36, 3/V38, 3V	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES, NUALS, TENSIO DIO CONTROL H TOOLS AND TA L ORDER FACILI HON-STOCK ITEI ROLLERS 1/7000, NV7200 0, NV430 23 3V24 13660, HR2200 HR7300	EV ED ED ED SPARES S, MOTORS, N BANDS, IEADS, PES ETC. ITIES** MS** E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95	LARGE RA OF IC' & SEM CONDUCT AVAILAB FOR TL AUDIO VIDEO	NGE s J- ORS LE Y,	Hitachi VT6 Sharp VC92 Amstrad/Sa Panasonic1 Sanyo VTC Panasonic1 Ferguson/J' Sharp VC72 Sharp VC72 Sharp VC83 Marp VC83 Sharp VC72 Ferguson/J' Ferguson/J' Hitachi VT84 Hitachi VT94 Hitachi VT91 Hitachi VT91 Sony C51-VI Avar, Margu	END SENSORS 4E REEL MOTORS 400, VC381 etc. 400, VC381 etc. 400, VC381 etc. 400, VC381 etc. 400, VC380 etc. 400, VC7700 400, VC	£1.20 each £18.20 £18.20 £18.20 £19.90 £19.80 £29.90 £29.90 £24.80 5 £29.90 £24.80 5 £24.80 5 £25.80 £24.80 £24.80 5 £24.80
	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I PINCH I ON V2010, NV NV366, NV37 Son/VC V16, 3V22, 3V 0, HR3360, HF V30, HR7200, V36, BH7200, V36, 3V38, 3V	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES, NUALS, TENSIO DID CONTROL H TOOLS AND TA L ORDER FACILI ION-STOCK ITEI FOLLERS 17000, NV7200 0, NV430	EV ED DEO SPARES 5, MOTORS, N BANDS, HEADS, PES ETC. ITIES** MS** E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95	LARGE RA OF IC' & SEM CONDUCT AVAILAB FOR TU AUDIO VIDEO	NGE s I- DORS ILE I, &	Hitachi VT6 Sharp VC92 Amstard/Sa Panasonic1 Sanyo VTC Perguson/J' Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Ferguson/J Ferguson/J Ferguson/J Ferguson/J Hitachi VT59 Hitachi	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC380, 5400 VV7000, 7200 DRUM MOTORS VC3V00, 3V22, etc. 100, VC7700 100,	£1.20 each £18.20 £18.20 £16.80 £9.90 £19.80 £29.90 £26.40 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £24.80 £29.90 £29.90 £29.90 £29.90 £29.90 £29.90 £29.90 £29.90 £29.90 £29.90 £29.90 £29.90 £24.80 £29.90
	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I PINCH I ONIC 0, NV2010, NV NV366, NV37 SON/JVC V16, 3V22, 3V 0, HR3360, HF V30, HR7200, 0, HR360, HR7200, 0, VTC5150, 0, VTC5150,	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES NUALS, TENSIO IDIO:CONTROL H CONTROL H TOOLS AND TA L ORDER FACILI KON-STOCK ITEI ROLLERS /7000, NV7200 0, NV7200 0, NV7200 10, NV7200 10	EV ED ED ED SPARES S, MOTORS, N BANDS, IEADS, PES ETC. ITIES** MS** E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95	LARGE RA OF IC' & SEM CONDUCT AVAILAR FOR T AUDIO VIDEO	NGE s I- DRS IE J, & S D nic J, NV20	Hitachi VT6 Sharp VC92 Amstrad/Sa Panasonic 1 Ferguson/J' Sharp VC72 Sharp VC72 Sharp VC83 Sharp VC83 C Sharp VC83 Sharp	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC7700 100, VC7700	£1.20 each £18.20 £18.20 £18.20 £19.80 £29.90 £29.90 £24.80 £29.30 £29.30 £29.30 £29.30 £29.30 £29.30 £29.30 £29.90 £34.50 £34.50 £34.50 £34.50 £24.80 £34.50 £24.80 £34.50 £24.80 £34.50 £35.50 £3
	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I PINCH I ONIC 0, NV2010, NV NV366, NV37 SON/JVC V16, 3V22, 3V 0, HR3360, HF V30, HR7200, 0, HR360, HR7200, 0, VTC5150, 0, VTC5150,	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES, NUALS, TENSIO DID CONTROL H TOOLS AND TA L ORDER FACILI ION-STOCK ITEI FOLLERS 17000, NV7200 0, NV430	EV ED ED ED SPARES S, MOTORS, N BANDS, IEADS, PES ETC. ITIES** MS** E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95	LARGE RA OF IC' & SEM CONDUCT AVAILAR FOR TV AUDIO VIDEO VIDEO NV2000 NV2000	NGE s I- ORS LE i, s b, NV200	Hitachi VT6 Sharp VC92 Amstrad/Sa Panasonic I Sanyo VTC Pranasonic I Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Ferguson/J Ferguson/J Ferguson/J Ferguson/J Hitachi VT9 Hitachi VT9 Hitachi VT9 Hitachi VT9 Hitachi VT9 Hitachi VT9 Many, many <i>IDLEF</i>	END SENSORS 4E REEL MOTORS 400, VC381 etc. 400, VC381 etc. 400, VC381 etc. 400, VC381 etc. 400, VC380 etc. 400, VC7700 400, VC	£1.20 each £18.20 £18.20 £16.80 £9.90 £29.90 £29.90 £24.80 £24.80 £29.90 £24.80 £29.90 £34.50 £34.50 £34.50 £34.50 £24.80 £34.50 £24.80 £34.50 £34.50 £24.90
	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I PINCH I onic 0, NV2010, NV NV366, NV37 son/JVC V16, 3V22, 3V 0, HR3360, HF V30, HR7200, 0, HR7200, 0, UTC5150, 00, VTC5150, 00, VTC5150, 00	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES NUALS, TENSIO DIDIO CONTROL H TOOLS AND TA L ORDER FACILI ON-STOCK ITEI ROLLERS /7000, NV7200 0, NV430. 23 3V24 13660, HR2200 HR7300 39 HRD120. VTC5300,	EV ED DEO SPARES 5, MOTORS, N BANDS, IEADS, N BANDS, IEADS, EA95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95	LARGE RA OF IC' & SEM CONDUCT AVAILAB FOR AUDIO VIDEO NV2000 NV2000	NGE s l- ORS LE t, t, t, t, t, t, t, t, t, t, t, t, t,	Hitachi VT6 Sharp VC92 Amstrad/Sa Panasonic 1 Ferguson/J' Sharp VC72 Sharp VC72 Sharp VC83 Sharp VC	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC7700 100, VC7700	£1.20 each £18.20 £18.20 £18.20 £19.80 £29.90 £29.90 £29.90 £29.30 £29.30 £29.30 £29.30 £29.30 £29.30 £29.30 £29.90 £34.50 £34.50 £34.50 £34.50 £34.50 £24.80 £34.50 £24.80 £34.50 £24.80 £34.50 £35.50 £3
	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I PINCH I ONIC 0. NV2010, NN NV366, NV37 Son/JVC	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES NUALS, TENSIO JDIO CONTROL H CONTROL H CONTR	EV ED ED ED SPARES S, MOTORS, N BANDS, IEADS, PES ETC. ITIES** MS** E4.95 E4.9	LARGE RA OF IC' & SEM CONDUCT AVAILAB FOR AUDIO VIDEO NV2000 NV2000	NGE s l- ORS LE t, t, t, t, t, t, t, t, t, t, t, t, t,	Hitachi VT6 Sharp VC92 Amstrad/Sa Panasonic 1 Ferguson/J' Sharp VC72 Sharp VC72 Sharp VC83 Sharp VC	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC7700 100, VC7700	£1.20 each £18.20 £18.20 £18.20 £19.80 £29.90 £29.90 £29.90 £29.30 £29.30 £29.30 £29.30 £29.30 £29.30 £29.30 £29.90 £34.50 £34.50 £34.50 £34.50 £34.50 £24.80 £34.50 £24.80 £34.50 £24.80 £34.50 £35.50 £3
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8 9 1 1 1 1 1 1 1 1	E44.00 E44.50 WE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA. **FOR I PINCH I ONIC NV366, NV37 SON/VC NV36, 3V23, 3V NV366, NV37 SON/VC N36, 3V23, 3V NV36, 3V23, 3V O, HR3360, HF V36, 3V23, 3V NO, HR360, HF V36, 3V23, 3V O, VTC9300 O, VTC9300 O, VTC5150, 0 O, SLC7	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES NUALS, TENSIO DIO CONTROL H TOOLS AND TA L ORDER FACILI HON-STOCK ITEI ROLLERS 17000, NV7200 0, NV430 23 3V24 13660, HR2200 HR7300 39 HRD120	EV ED ED SPARES S, MOTORS, N BANDS, HEADS, PES ETC. ITIES** MS** E4.95 E5.95 E	LARGE RA OF IC' & SEM CONDUCT AVAILAG FOR TV AVAILAG FOR TV AVAILAG NV2000 NV200	NGE s DRS LE LE VV360 NV2300, NV788	Hitachi VT6 Sharp VC92 Amstrad/Sa Panasonic1 Sanyo VTC Pranasonic1 Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Ferguson/J Ferguson/J Ferguson/J Ferguson/J Hitachi VT9 Hitachi VT9 Hitachi VT9 Hitachi VT9 Hitachi VT9 Many, man IDLEF	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC7700 100, VC7700	£1.20 each £18.20 £18.20 £18.20 £19.80 £29.90 £29.90 £29.90 £29.30 £29.30 £29.30 £29.30 £29.30 £29.30 £29.30 £29.90 £34.50 £34.50 £34.50 £34.50 £34.50 £24.80 £34.50 £24.80 £34.50 £24.80 £34.50 £35.50 £3
ad. V V I I I I I I I I	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGMMENT **SPECIA **FOR I PINCH I ONIC 0, NV2010, NV NV366, NV37 SON/VC V36, 3V32, 3V 0, VT25150, 0, VT25150,	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES NUALS, TENSIO DIDO CONTROL H TOOLS AND TA L ORDER FACILI (ON-STOCK ITEI ROLLERS 7/7000, NV7200 . 0, NV430. 23 3V24 13660, HR2200 HR7300 39 HR120. VTC5300, 7750.	EV ED DEO SPARES S, MOTORS, N BANDS, HEADS, PES ETC. ITTES** MS** E4.95	LARGE RA 0F IC' & SEM CONDUCT AVAILAB FOR TU AUDIO VIDEO Panas: NV2000 NV2000 NV2000 NV2000 NV2000 NV2000 NV2000 NV2000 NV2000 NV2000 NV2000 NV770 NV777, NV770 Forgus	NIGE s I- ORS LE I, NV200 NV788 NV788	Hitachi VT6 Sharp VC92 Amstrad/Sa Panasonic1 Ferguson/J' Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC73 Sharp VC73 Ferguson/J' Ferguson/J' Ferguson/J' Ferguson/J' Ferguson/J' Hitachi VT89 Hitachi VT89 Hitachi VT99 Hitachi VT99 Hitachi VT99 Hitachi VT99 Hitachi VT99 Hitachi VT99 Hitachi VT90 Hitachi VT90 Hi	END SENSORS 4E REEL MOTORS 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC381 etc. 100, VC700 100, VC700 100, VC7700 100, VC7700	£1.20 each £18.20 £18.20 £16.80 £9.90 £29.90 £29.90 £24.80 529.90 £24.80 529.90 £24.80 529.90 £24.80 £29.90 £24.80
as as as as as as as as as as	E44.00 E44.50 VE CARRY HU NC. PLAY IDL SERVICE MA BELTS AL ALIGNMENT **SPECIA **FOR I PINCH I ONIC 0, NV2010, NN NV366, NV37 SON/JVC	RECEIVED E 4 PM. ARE DESPATCHE SAME DAY NDREDS OF VIC ERS, CLUTCHES NUALS, TENSIO JIDIO CONTROL H CONTROL H CONT	EV ED ED ED SPARES S, MOTORS, N BANDS, IEADS, PES ETC. ITIES** MS** E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E4.95 E5.95 E5.95 E5.95 E5.95 E4.95	LARGE RA OF IC' & SEM CONDUCT AVAILAB FOR TV AUDIO VIDEO VIDEO NV2000 NV200 NV200 NV200 NV200 NV200 NV2000 NV20 NV2	NGE s DRS LF V, NV200 NV7366 NV2300 NV788 VV366 ON/1/16_3/2	Hitachi VT6 Sharp VC92 Amstrad/Sa Panasonic I Sanyo VTC Pranasonic I Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Sharp VC72 Ferguson/J Ferguson/J Ferguson/J Ferguson/J Ferguson/J Hitachi VT92 Hitachi VT92 Hitachi VT92 Hitachi VT92 Hitachi VT92 Hitachi VT92 Many, many IDLEFI 0	END SENSORS 4E REEL MOTORS 40 00, VC381 etc. 10, VC380 etc. 10, VC7700 10, VC770 10, VC77	£1.20 each £18.20 £18.20 £18.20 £19.90 £29.90 £29.90 £24.80 5 £29.90 £24.80 5 £29.90 £24.80 £4.50 £4.50
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REPLACEMENTS

VISA	REEL MOTORS	
	Sharp VC9300, VC381 etc.	£18.20
	Amstrad/Saisho etc. Panasonic NV333, NV366	£18.20
_	Sanyo VTC5000, 5300, 5400	10.00
S	Panasonic NV7000, 7200	. £9.90
.		19.00
,	DRUM MOTORS	
	Ferguson/JVC 3V00, 3V22, etc Sharp VC7300, VC7700	£29.90
	Sharp VC7300, VC7700	£26.40
	Sharp VC8300. Hitachi VT5000	£26.40 £24.80
		124.80
	CAPSTAN MOTORS	
	Sharp VC8300	£39.90
LARGE RANGE	Sharp VC7300, VC7700 Ferguson/JVC 3V00, 3V16, 3V22 Ferguson/JVC 3V29, 3V30 Ferguson/JVC 3V35, 3V36, etc.	£29.30
OF IC's	Ferguson/JVC 3V00, 3V16, 3V22	£29.90
& SEMI-	Ferguson/JVC 3V29, 3V30	£34.50
CONDUCTORS	Hitachi VTE000	£25.80
AVAILABLE	Hitachi VT5000	£24.80
FOR TV,	Hitachi VT8000, 8500, etc.	£34.50
AUDIO &	Hitachi VT9300, 9500, etc. Hitachi VT11, VT14, VT17	£34.50
VIDEO	Sony C5, C7	£26.80
	Akai VS1-VS5	£29.90 £29.90
	Many, many more!	2.29.90
	IDLER WHEELS	
Panasonic	IDEEN INIEEES	
NV2000, NV20	10 (Replacement)	£0.95
NV2000, NV20	(Genuine)	£2.90
NV7000, NV72		
NV333, NV366		
NV370, NV230	. NV430 (Genuine)	£4.50
NV777, NV788	(Genuine)	£4.50
NV730	(Genuine)	
Ferguson/JV	IC .	
3V00, 3V16, 3V;	22 (Large clutch)	£5.95
3V00.3V16.3V	22 (Small clutch)	C6 05
3V29, 3V30, HR	7200, HR7300	£3.90
3V35, 3V36, 3V	7200, HR7300 38, 3V39, HRD120.	£3.90
Sanyo	9300	
VTC9100, VTC9	3300	£1.90
VICMIUReeld	rive pulley.	£9.90
Sony	Rewind kit	
SLC5, SLC7	Rewind kit	£4.95
Sharp	THEWING KIL	£4.95
VC9100 VC930	0, VC9500 (Genuine)	£3.90
VC381_VC383	VC386 (Genuine) VC581 (also Saisho) (Genuine)	£3.90
VC482, VC483,	VC581 (also Saisho) (Genuine)	£3.90
VC482 etc. (Equ	ivalent)	£2.98
VC9300, 381 etc	ivalent) c. (Equivalent)	£2.98
Hitachi	,	
VT8000, VT830	0, VT8500	£4.72
VT9300, VT950	0, VT9700	£4.75
VT11E. VT14E.	VT17E_VT19	63.96
VT33, VT63, VT	64, VT65	£3.96
Akai		
VS2, VS3, VS4,	VS5	£4.50
Fisher		
FVHP615, FVH	P710, FVHP725, etc.	£6.90
we also carry a	all play idlers and clutches etc. for m	odels
listed plus man	y more.	

THIS MONTH'S **SPECIAL VIDEO SERVICE TOOL KIT** INCL. ALIGNMENT TAPE, TORQUE GAUGE, GREASE,

TAPE GUIDE ADJUSTING TOOL, CIRCLIP PLIERS, etc.



Sanyo VTC9100, VTC9300 VTC5000, VTC5150, VTC5300, VTC5400 Sony SLC5, SLC7 SLC6. SL8000, SL8080. Sharp VC7300, VC7700, VC7750 VC8300

VC8300, VC9500, VC9500, VC9500, VC9500, VC9500, VC9500, VC9500, VC561 etc. **Hitachi** VT5000, VT5500, VT5500, VT6500, VT6500, VT6300, VT6500, VT6500, VT6500, VT6500, VT6500, VT6500, VT9700, VT11E, VT14E, VT17E, VT19, VT13E, VT14E, VT17E, VT19, VT13E, VT14E, VT17E, VT19, VT13E, VT14E, VT1 Akai VS9700 VS2, VS3, VS4, VS5 VS9300, VS9500, VS9700 ... £6.95 £6.95 £4.95

Panasonic NV2000, NV2010, NV7000, NV7200 NV333, NV366, NV370, NV430 NV730

 Rerguson/JVC

 3V00, 3V16, 3V22, 3V23, 3V24

 HR3300, HR3360, HR360, HR2200

 3V29, 3V30, HR7200, HR7300

 3V35, 3V36, 3V38, 3V39, HRD120

Amstrad VCR4500, 4600 Pinch Roller mod kit £9.95

TELEVIDEO SERVICES UNIT 3, PLESSEY BUSINESS PARK, TECHNOLOGY DRIVE, BEESTON, NOTTINGHAM NG9 2ND TEL: 0602-226070 FAX LINE: 0602-431097 24HR ANSWERING SERVICE FOR ORDERS PLACED AFTER 5.30 p.m. Please add 70p post & packing and then add 15% VAT to total OFFICIAL ORDERS ACCEPTED FROM SCHOOLS, COLLEGES, ETC. EXPORT ENQUIRIES WELCOME. ALL ENQUIRIES SHOULD BE ACCOMPANIED BY STAMPED ADDRESSED ENVELOPE

ME	TEX	PRO	FESSIONAL EDUCATION AN PRICES ON RE	ID QUAN Quest	TITY	first 30	in tu AX;	be rebu 54	ILDING TECHNOLOGY
			3½ and 4½ 12mm L0 meters: 5 ranges A0 6 Resistance Range Diode Test: Continu and zero: Plus extra below. Size 176 x 90 mm (3800 172 x 88 x All with Test Leads: Fused: Hard carry of and instructions.	C and DC views to 20M o Transistor ity: Auto p features a (36): ase	olts: hm: AC7- test: olarity	FI AV	TAD AILABLI PRE CO	E ONLY F	VICING COST, REPLACEMENT ROM CHROMAVAC. AS ORIGINAL. UNIT NOT REQUIRED
MODEL	M4650 DIGITS	RANGES	3650 EXTRA FEATURES	BASIC	PRICE	M	TIA		SPECIAL
3800	31/2	32	Low AC/DC 0/20 micro amp ranges	0.5%	£31.50				CUFER'AL
3610	3½	30	LED continuity indicator	0.3%	£35.18				
3630	3½	30	5-Range Capacitance Test	0.3%	£40.65		ERC	IILDS	INLINE
3650	31/2	30	2-Range frequency counter 5-Capacitance	0.3%	£46.92				hat line to day
4630	41/2	30	Data Hold 5-Range Capacitance	0.05%	£54.75			et on tr	he hot-line today!
4650	41/2	30	Data Hold, 2-Range Freq. 5-Capacitance	0. 05 %	£62.57		SA	VE £££s	⁰⁶¹ 681 2959
S	REL	IABL	EX-RENTAL W E WHOLESA TIME!	LE T		Up to Up to Up to 110° 10° Low A47 17FH 4706 Delt	o 19" o 22" o 26" up to 26" focus 342 New HP New EHB New ta only. Le LINE TYP	£38 +£2 £28 £30 £30 255 5% 5+ 25 (NOT REBUIL	Up to 22" From £40 Up to 26" From £45 A56-540x
TO NA TV'S PHILIE DORIG FERG Plus P	STOC AME A F S G8 - C MK2 - USON T O'ye, Son Dishi, Tos	K THE EW G11 – K MK3 – M X9 – TX1 y, Finland	C3 VIDEOS fr LOT – 10p WIL T3 – KT30 – KT35 CTX MK4 – MK5 I0 – 9600 – 8800 ia, GEC, Hitachi, Nationa indig, ITT & MORE, MOR	L SAV	E ££s	370 AXT 420 420 420 420 420 470 510 510 510 560 560 560 560	HFB-A37-59 HUB '37-001 CSB EDB-A42-59 EZB ERB KUB UFB VSB 51-001 DYB-560 DT EGB CGB	0 £50 £50 £50 £50 £50 £50 £50 £50 £50 £67 £67 £67 £67 £67 £67 £67 £67 £67	AXT 56-001
			3V29/35/36/37/38/39/45 9700 + MORE, MORE,	MORE	Ĩ		rcharge /ithout	66 - 510	NE TUBES: ALSO A56/ 0/540 ETC. OLD GLASS
SHAR PANA	SONIC		6/370/2000/7200/3000				h. glass.		By return on all stock items.



POPULAR BAKERS DOZEN PACKS (Still available)

All packs are £1 each, if you order 12 then you are entitled to another free. Please state which one you want. Note the figure on the extrme left if the pack ref number and the next figures is the quantity of items in the pack, finally a short description.

- BD2 13A spurs provide a fused outlet to a ring main where device such as a clock must not be switched 5
- BD7 4
 - in flex switches with neon or/off lights, saves leaving things switched on 6v. 1A mains transformers upright mounting with 2
- BD9 fixed clamps BD11
- fixed clamps
 61/2" speaker cabinet ideal for extensions, takes your speaker. Ref BD137
 23 0 watt reed switches, it's surprising what you can make with these burglar alarms, secret switches, relay etc. etc.
 25 with load caesker bus unit cores avamt. **RD13**
- **BD29**
- **BD30** 2
- **BD32** 2
- BD34 BD42
- ches, relay etc. etc. 25 wat loud speaker two unit cross-overs B O.A.C. stereo unit is wonderfui value nicad constant current chargers adapt to charge almost any nicad battery humidity switches, as the air becomes damper the membrane stretches and oeprates a microswitch 2 meter length of connecting wire all colour coded 13A rocker switch three tag so on/off, or change over with centre off 24hr time switch, ex-Electricity Board, automati-cally adjust for lengthening and shortening day. BD45 1
- Original cost £40 each. with series resistors, these make RD49 10
- Original cost 240 each. neon valves, with series resistors, these make good night lights mini uniselector, one use is for an electric jigsaw puzzel, we give circuit diagram for this. One pulse into motor, moves switch through one pole flat solenoids you could make your multi-tester read AC amps with this suck or phus coverted pressure switch or it can BD56 1
- BD59 2 suck or blow operated pressure switch, or it can
- BD67 1 be operated by any low pressure variations such as water level in water tanks
- as water reven in water tails mains operated motors with gearbox. Final speed 16rpm. 2 wati rated 6 750MA power supply, nicely cased with input and output leads BD91 2
- BD103A 1
- stripper boards each contains a 400v 2A bridge rectifier and 14 other diodes and rectifiers as well BD120 2
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- 10 BD132 2
- BD134 10
- needs no switch microphone inserts - magnetic 490 ohm also act BD139 6
- as speakers reed relay kits you get 16 reed switches and 4 coil sets with notes on making c/o relays and other BD148 4
- sets with notes of making to reals and other gadgets safety cover for 13A msockets prevent those inquisitive little fingers getting nasty shocks neon indicators in panel mounting holders with BD149 6
- BD180 6 lens
- 6 5 amp 3 pin flush mounting sockets makes a low cost disco panel need cable clips 1 in flex simmerstat keeps your soldering iron etc BD193
- BD196
- always at the ready mains solenoid very powerful has 1" pull or could push if modified keyboard switches made for computers but have BD199 1
- BD201 8
- many other applications transistors type 2N3055 probably the most useful power transistor electric clock mains operated put this in a box and BD210 4
- BD211 1
- you need never be late 12v alarms make a noise about as loud as a car hom. Slightly solid but OK of \times 4" speakers 4 ohm made from Radiomobile BD221 5
- BD242 2
- BD252 1

BD259 50

- 6" × 4" speakers 4 ohm made from Hadiomobile so very good quality panostat, controls output of boiling ring from simmer to boil leads with push on ¼" tags a must for hook ups mains connections etc oblong push switches for bell or chimes, these can mains up to 5 amps so could be foot switch if fitted into natires BD263 2
- into pattress mini 1 watt amp for record player. Will also change speed of record player motor
 mild steel boxes approximately 3" × 3" × 1" deep BD268
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TELEVISION MARCH 1989

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Curr en pr133/100// U-200volts DC. Our rel 5P133/2007. THE AMSTRAD STEREO TUNER, A ready assembled unit is the ideal tune for a music contre or an amplifier Some of the features are: long wave band 115-170/Hz, modium wave band S25-1550/Hz, EM band 87-108/Hz, mono, steree & AFC swirtchable, fully asigned, Full wring up data showing you how to connect to amplifier or headphones and details to suitable FM aerial (note ferrite nord aerial is included for medium and long wave bands). All made up on very compact board. Offered at a fraction of its cost, only E5. Our rel 5%8.

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4473(20). 1/80th HORSEPOWER 12 VOLT MOTOR. Made by Smiths, the body length of this is approximately 3in, the diameter 3in and the spindle S16th of an inch diameter. It has a centre flange for fibring or can be fixed from the end by means of 2 nuts. A very powerful little motor which revs at 3,000 pr. We have a large quantity of them so if you have any projects in mind then you could rely on supplies for at least two years. Price 16, Our ref 6P1, discount for quantities of 10 or more.

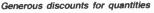
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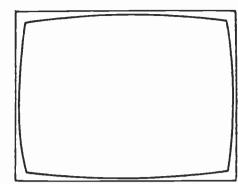


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John A. Reddihough

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CORRECTIONS

Last month's cover photograph showed the JVC GR-C11 camcorder not the GR-C7 as stated on page 253.

In the section on the Panasonic G deck on page 198, January (VCR Clinic) Model NV-G48 should have read NV-D48.

Some misprints occurred in the article on j notation last month. A note on these will appear next month.

COVER PHOTO

This month's cover photograph shows focus bias adjustment being carried out on a JVC compact disc player. See new series starting on page 253.

TELEVISION

The Satellite Shambles

Tragedy, farce or just plain bungling? The start of satellite TV broadcasting in the UK should have been a moment of triumph, the start of a new era in TV, leading to new prospects such as high-definition television. Instead, just look what's happened. A makeshift start with almost no receiving equipment in the shops and unedifying bickering between those who will be providing the services, Sky and BSB. One cannot help but admire the drive that has gone into getting Sky started in a matter of months. It has been almost like the pioneering initiatives that accompanied the start of the BBC's first service in 1936. There are other parallels. First almost no direct

One cannot help but admire the drive that has gone into getting Sky started in a matter of months. It has been almost like the pioneering initiatives that accompanied the start of the BBC's first service in 1936. There are other parallels. First almost no direct viewers — not all that many more than in 1936, though perhaps a few thousand rather than a few hundred. And secondly we have the perennial standards problems all over again.

It's a far cry from the careful planning that has gone into the extension of TV services over the last few years. Channel 4 for example came in beautifully on cue and after the novelty of the first night one might have been forgiven for thinking it has been there all the time. Teletext was introduced with no fuss and few problems, and soon those inclined to do so were busy with their remote control buttons. All different this time. There's confusion amongst viewers, in the press and in the trade, and just where are all those dishes we had been promised? Well, no one is going to go overboard producing new equipment for a new, untried market, but that apart there seems to have been a problem resulting from Sky's ad hoc approach to getting its services started. The channels were all to be unscrambled originally, financed by advertising. But then the owners of the film rights, the main attraction offered by the new services, cottoned on to the fact that much of Europe would also be able to see the movies, and Mr. Murdoch hadn't paid for that. To get over the problem, a hasty decision was taken to adopt scrambling. And that of course affected the design and production of the receivers, especially as it took a time to decide on the form of encryption to use. Presumably the delays are a temporary matter and we shall soon see the High Streets awash with dishes. Maybe.

This sad start reflects the brief history of attempts to get DBS started in the UK. There was one false start after another. Originally the BBC, in early 1982, was given the go-ahead to start a two-channel service, hopefully in 1986. In the following year, 1983, the IBA was authorised to supervise a commercial service. By mid-1984 the BBC, under the usual financial pressure, abandoned its attempt. A consortium that included the BBC, the fifteen ITV companies and others then had a go. By June 1985 the consortium had given up, reporting to the government that the project would not be commercially viable under the conditions laid down. There followed a year when little happened, and then in mid-1986 the IBA was asked to try to start a service. This time there was considerably more interest and several strong groups competed for the franchise. It was awarded to BSB in December 1986.

BSB's planning has been meticulous, as you might expect of an organisation operating under the guidance of the IBA. It has undertaken a lot — to commission and launch its own satellite system and to guarantee services to standards accepted as part of the franchise. The cost has been huge. Exact figures are not available, but informed guesses suggest that over £800 million is being invested in the project. What it didn't plan for was the appearance of Sky on the scene, via the medium-power Luxembourg Astra satellite. Despite having got there first. Sky has its problems — not only the shortage of dishes.

Despite having got there first. Sky has its problems — not only the shortage of dishes. The main problem will be to finance the service until the advertising revenue starts to come in. It's a classic chicken-and-egg situation. No viewers, no advertising revenue; no advertising revenue, no income to splash out on programmes to attract viewers. The schedules so far made available by Sky suggest that second-hand sit-comm, soaps etc. will comprise much of the fare. It's not inspiring to say the least, but what can you expect? Sky doesn't have the funds that say the ITV companies are used to.

The unfortunate aspect of the Sky intervention is that it could end up jeopardising the whole satellite scene in the UK and with it the prospects for further technical progress, programme options and business opportunities. It's questionable whether there is room for one DBS service in addition to the present terrestrial services, but we are to start off with two providing some eight channels between them. Dicey indeed. Especially when you consider what the viewer is being offered. BSB is to charge about £10 a month for its film channel while Sky will be asking £12 a month for its scrambled channels. About £120 and £144 a year respectively compared to the present colour licence fee of £62.50. Hardly a bargain, on these terms alone, regardless of the extra equipment required. And this brings us to the duplication required for both BSB and Sky. The TV systems aren't the same, the encryption systems are entirely different and whereas BSB has conditional access Sky is to rely on a smart card. How many little boxes does that add up to?

To have made the most of the opportunities presented by satellite broadcasting a collaborative effort by all concerned would have been best, to plan carefully, prepare viewers and then start up the new services with the smoothness we had come to expect. But that sort of thing hardly goes with the new era of deregulated broadcasting. Instead we have had to watch Sky and BSB engage in public dispute that's purely counterproductive. It does not augur well for the future of broadcasting in the UK.

Teletopics

MULTI-SATELLITE RECEIVING SYSTEM

Micro-X has become sole distributor in the UK of the Mapro STVS satellite TV receiving system. Since the system is upgradable to provide dish tracking and has infinitely variable polarity selection it can be used for reception of all the available and proposed satellites including Astra, the BSB craft and the Eutelsat and Intelsat series satellites. The basic price is £299 which with £60 for installation brings the total to £359: to add full tracking takes the total cost of an installation to £584. These figures do not include the cost of decoders to provide unscrambling of course. It's certainly a highquality system with its steel dish, ferrite polariser and HEM (high electron mobility) transistor LNB. The latter has a noise figure of 1.6dB. Mapro systems are being sold through Micro-X's network of dealers - Micro-X can be reached on 01-459 1200.

THINNER VHS TAPE

JVC has developed thinner video tape to extend the playing time with S-VHS-C and VHS-C equipment. These formats at present have a maximum record/playback time of thirty minutes in standard play and an hour in long play (for 625-line signals). Current VHS-C tape is 19 microns thick, consisting of a 5 micron magnetic layer, a 13 micron base film and a 1 micron backcoating. The new tape has a 4.5 micron magnetic layer and a 10 micron base made of a new material called Polystone. This increases the playing time to 45 minutes (SP) and 90 minutes (LP). According to JVC a new high-stiffness binder ensures high tape durability. No price or launch dates have been announced so far.

SATELLITE TV LATEST

Sky Television has reduced its estimate of the number of homes likely to be able to receive its transmissions after the first year of operation from 2.5 million to 1.15 million. A total of around 2.5m is considered to be still achievable, but the guarantee figure for advertisers is now 1.15m. On the advertising sales side Sky intends to undercut ITV rates by some 25 per cent. Free repeats will be offered if audiences fall below the guaranteed figure. Advertising agency Saatchi and Saatchi estimates that a total of around 420,000 receiving systems for Sky and BSB will have been installed by the end of the year. At present there appears to be a shortage of equipment, possibly because manufacturers are reluctant to increase production until the orders start to flow in.

The Thorn-EMI rental division (DER, Radio Rentals, MultiBroadcast and Focus) reports a high level of interest and has ordered over 40,000 receivers from Grundig. These will sell at around £349 with remote control. Granada is buying equipment from Salora and Tatung.

BSB has awarded a £50m contract to operate its customer management and advisory service to British Satellite Systems, a joint venture company formed by Next plc and CableData Inc of California. The Customer Service Centre will be at the Arlington Business Centre, Leeds and will initially create 400 new jobs in the city. It will handle the enablement of all BSB receivers, will answer viewer enquiries about equipment and programming and will handle the administration of subscriptions for the BSB Movie Channel and pay-per-view events. Information will be transferred from the Centre to Next's mainframe computer in Bradford then to BSB's computers at its Earth station at Chilworth near Southampton. Each BSB receiver will have a unique number, making it individually addressable over the air so that it can be turned on via the satellite.

Super Channel was saved from bankruptcy when creditors accepted a plan which will mean they are paid only a quarter of the £8m they are owed. New owners Beta Television hope that the channel will now break even with a new programming arrangement consisting mainly of music.

RTEEB 1988 VIDEO AWARD

Steven Gerald Thomas has received an award of £100 after achieving a 100 per cent pass mark in the Radio, Television and Electronics Examination Board's 1988 video recording and playback practical test. Steven is 31 and lives at Wirral. He's been in the trade for twelve years and is at present employed by Servicescope. This is the first time that anyone has obtained a 100 per cent pass mark. Course tutor was none other than Joe Cieszynski, who writes regularly in *Television*.

FAULT GUIDES

Both JVC and Sony have recently published fault guide handbooks, adopting a similar approach with a page to each fault.

The Sony Service Fault Finding Guide Edition 2 is intended as a supplement to Sony's first three guides which have now been reprinted. These are for audio (part no. S-795-100-01), TV (S-796-000-01) and video (S-796-202-01). A page is devoted to each fault symptom and the price is still £4.95 per volume. The new Guide covers more recent Sony models of all types, including CD players, 8mm equipment, TV sets etc. Its part no. is S-795-015-10 and the price is £7.95. These publications can be obtained from Regional Sony Service Centres, SES Ltd. or (account holders only) from the Sony Spare Parts Department at Thatcham.

The JVC Fault Diagnosis Guide Vol. 1, covering VCRs and camcorders, has a similar format but in addition includes check points for each fault, a useful addition. Some 200 faults from the obvious to the obscure are covered. The Guide is available from JVC (UK) Ltd. at £10.80. Write to JVC House, Eldonwall Trading Estate, Priestley Way, London NW2 7BA or 1 Olympia Industrial Estate, Gelderd Road, Leeds 12.

S-VHS-C CAMCORDER WITH HI-FI SOUND

JVC has released details of the first S-VHS-C camcorder to feature hi-fi sound recording. Model GR-S707U has a standard size (62mm) drum instead of the usual 41.3mm drum. This has been made possible by incorporating the direct-drive motor inside the drum itself. The GR-S707U weighs only 1.7kg: its body has been redesigned so that it rests on the shoulder for normal shooting.

Other features include a 360,000 pixel CCD image sensor with 8-lux sensitivity, two-speed ×8 power zoom, a multiple speed fast shutter, time-lapse recording, animation recording, VHS indexing, variable speed search, noiseless still and slow-motion playback, auto/manual iris and white balance, backlight compensator, a stereo microphone, HQ specification, insert editing, audio dub, S- video/AV sockets and optional remote control. It will be launched in NTSC countries later this year – there are no details yet of a European launch.

INTERACTIVE TV SYSTEM

A recent issue of the US magazine *Radio-Electronics* (December 1988) contained details of a proposed interactive TV system to enable viewers to participate in TV game shows. It's called IGN (interactive games network) and makes use of computer technology, an f.m. subcarrier and TV sets. Those participating would use an interactive games console which is linked to a control computer in the studio via a telephone modern and receives instructions on answering via a transmitted f.m. subcarrier. The system apparently meets FCC regulations.

VHS PENETRATION

JVC has released details of the growth and development of the VHS system. By the end of 1988 cumulative shipments of VHS equipment worldwide had reached some 210 million VCRs and 11·2 million camcorders. In the same year blank tape sales were estimated at one billion units with prerecorded software accounting for a further 190 billion units. JVC points out that 60 per cent of the VCR shipments have taken place during the past three years. The format was launched in Japan in the autumn of 1976. A million VCRs had been shipped by 1978, when VHS was launched in Europe. The ten million mark was reached in 1981 and the 100 million mark in 1986.

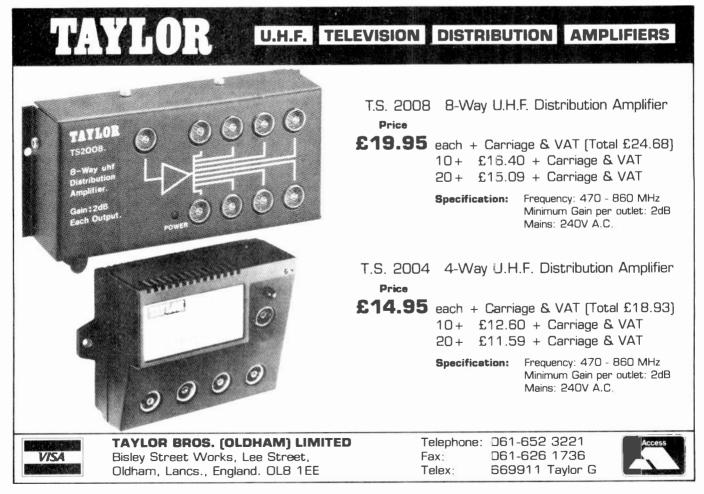
The regional breakdown is as follows: Europe 45 million VHS VCRs (21.4 per cent of the total); North America 96.6 million (46 per cent); Japan 37 million (17.6

per cent); other areas (including the Middle East, Australasia and South America) 31.6 million (15 per cent). VCR household penetration is estimated as UK 60 per cent, Japan 70 per cent, USA 60 per cent, West Germany 40 per cent and France 30 per cent. The camcorder figures are UK 1 per cent, Japan 8 per cent, USA 6 per cent, West Germany 3 per cent and France 1 per cent.

In NTSC areas S-VHS now accounts for some 20 per cent of total VHS sales. JVC expects European S-VHS sales to reach 15 per cent this year with an annual growth of 10 per cent thereafter.

IN BRIEF

The Cable Authority is to review all franchises that have been awarded for over a year and intends to cancel any that seem to be dormant. No work has been done yet on two of the original franchises awarded in November 1983 - in Belfast and Liverpool. Several other franchises appear to be stalled . . . Tatung is to install a new £4.6m production line in the UK with a capacity to produce 100,000 monitors a year. The existing colour TV receiver manufacturing facility is also being expanded . . . Sixteen US electronics companies have formed a partnership to develop an HDTV system and facilities to produce HDTV equipment. The American Electronics Association has been campaigning for such a move for some time and is hoping to obtain government funding for the research and development required . . . Frequency band allocations in the UK, from 1kHz to 60GHz, can be seen at a glance on a colour-coded bar chart that has been prepared by the Radiocommunications Division of the Department of Trade and Industry. The chart is published by HMSO at $\pounds 2.50$ – quote reference ISBN 0 11 514637 7.



Failure and Success

Les Lawry-Johns

I seem to be giving up more often when confronted with faults I could put right without thinking about it a couple of years ago. Take the Fidelity CTV14R that came in the other day. The rear-mounted 18k Ω wirewound resistor that feeds the 12V zener diode ZD5 was open-circuit so I replaced it. Switching on brought no response however. There was h.t. at the collector of the chopper transistor but it wasn't being switched on. I checked the driver transistor and all the components associated with the TDA2581 control chip, including ZD5. A couple of items didn't read right: I replaced these but the set still didn't work. So I gave up and admitted defeat.

Then look what happened just before Christmas. A woman brought in an ex-rental Multibroadcast set for repair. I told her I'd phone when I'd found out what was wrong. It turned out to be fitted with the Thorn 9000 chassis. The tripler and a couple of other things had gone, par for the course with these sets. I phoned her and gave her an estimate for thirty pounds. At this she said most emphatically that she didn't want the set done because she'd paid only seventy pounds for it about two years previously and had had to spend money on its since. She

Book Reviews

An Introduction to Satellite Television, new edition, by F.A. Wilson, published by Bernard Babini (publishing) Ltd., The Grampians, Shepherds Bush Road, London W6 7NF at £5.95.

Such is the interest in satellite TV that a new extended and updated edition of this book, which first became available early last year, has now been published. It's a useful handbook for any technician thrown in at the deep end by the coming of Astra and BSB, beginning with the basics and ending with the maths. Its prime virtue is that it deals with today's requirements in the UK – so many recent books have been written mostly with the C band used in the Americas in mind. **H.P.**

Getting the Most from your Multimeter by R.A. Penfold, published by Bernard Babani (publishing) Ltd., The Grampians, Shepherds Bush Road, London W6 7NF at $\pounds 2.95$.

Electronics changes so fast that the basics tend to be ignored – with test equipment meters are neglected in favour of more sophisticated gear. A good multimeter will however usually tell you just about all you need to know about a circuit, provided you use the right sort and apply it correctly. This book shows you how. **H.P.**

Newnes Guide to TV and Video Technology by Eugene Trundle, published by Heinemann Professional Publishing, Halley Court, Jordan Hill, Oxford OX2 8EJ. Paperback edition £8.95.

This book is a successor to two well-known Newnes Guides – to colour television and VCRs. The material from the earlier books has been revised, updated and added to for this single-volume presentation. Its well over told me not to do it and the set stayed in the shop into the new year.

Honey Bunch started to moan about the sets that had been left with us. Said they were cluttering up the shop. So when this chap came in and asked if we wanted anything dumped I pointed to the front row and he took them away. This included the Multibroadcast set. Several weeks later a chap came in and asked to collect it. I told him it had been dumped and told him he could take another working set in exchange for it. He took a nice 20in. Ferguson model and I didn't hear any more for a week or so. Then the woman phoned to say that she wanted her Multibroadcast set back. I told her it had been disposed of as she hadn't wanted it done and I couldn't keep sets that weren't collected. She said she'd sue me unless I could produce an identical set. I'm still waiting and the threat has been repeated. Oh dear!

I do have the occasional success however, sometimes after a struggle. Take the Philips G11 that came in recently. I repaired the line output panel and thought that was that. It wasn't. The picture was dark and the brightness control had no effect. Checks showed that there was a short from one end of R6065 to chassis until plug 6C was removed. This led me to the power supply panel where zener diode D4090 (BZX79-C4V7) in the beam limiter circuit had gone short-circuit. Fitting a replacement produced a good picture with full control. I'm still waiting for the set to be collected . . .

400 pages contain a great deal of basic information on television and video including such up-to-date subjects as MAC encoding, satellite TV reception and S-VHS. The book is not intended for those well versed in these matters, but can be recommended as an easy to follow introduction for those new to these subjects. A careful study will provide a good grounding in TV receiver and VCR operation in fair depth, and the book will afterwards serve as a handy reference. It can be obtained by post at an inclusive price (in the UK) of £9.95 from Paul Richards Books, 28 Boscobel Road North, St. Leonards on Sea, E. Sussex TN38 0NZ. J.A.R.

More Advanced Power Supply Projects by R.A. Penfold, published by Bernard Babani (publishing) Ltd., The Grampians, Shepherds Bush Road, London W6 7NF at $\pounds 2.95$.

This sequel to "Power Supply Projects" is really intended for the enthusiast. Because it features modern regulator chips however it's a handy book to have around. Particularly useful if you have a power supply problem with an older piece of equipment and decide to replace the whole thing with one of the current three-legged devices. **H.P.**

IBA Technical Review No. 24: The D-MAC/packet System for Satellite and Cable. Available to bona fide technical personnel, engineers and students by application to the IBA, Engineering Information, Crawley Court, Winchester SO21 2QA.

The IBA began publishing this series of Technical Reviews in 1962 – No. 2, the Technical Reference Book, has become almost the standard work defining the parameters of System I. This latest book looks like becoming the standard work of reference on D-MAC, and is a must for those who will have to deal with MAC equipment or explain its operation to others. The overview alone settles a lot of previously unanswered questions, especially as to how the system is intended to be progressively developed



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through wide-screen to high-definition compatible TV. Vision, packet multiplex, sound and conditional access all get a chapter to themselves, as does line 625 – on which everything happens. Even energy dispersal is explained in credible terms, surely a first in satellite literature. Did you know that the residual space in the sound/data multiplex

block has to be filled up, and that this is done with dummy packets which have the address 1023? Do you know the difference between scrambling and encryption, and how NICAM works? It's all here, but I wish we'd been told more about Viterbi decoding, which improves the noise performance. **H.P.**

Servicing Compact Disc Players Joe Cieszynski

One problem with a series such as this is that readers will have different levels of both knowledge and experience of the subject. Thus there's a danger of either boring those who have serviced compact-disc players and have attended manufacturers' servicing courses or on the other hand blowing the minds of those who have had little to do with them. From my experience however I find that most engineers who have attended short courses on CD players find it difficult to commit to memory the theoretical aspects of the CD system and concentrate more on taking down notes on stock faults with the player in question. This is not a bad thing of course, and does give the engineer struggling to keep abreast of the latest technology a degree of confidence and competence when he's faced with a player back at the workshop. As for the forgotten theory, you might question whether it's necessary. But if you don't consider it necessary to understand the theory of how the equipment you meet every day works you wouldn't buy and read a magazine such as this! It's possible to deal with a great many faults without fully understanding how the system works. What about the difficult faults? Does a knowledge of the theory then make a lot of difference? It's a difficult thing to prove, but I personally believe that it does. So we'll begin at the beginning, and I hope that even the more experienced amongst you will find that some of the points you missed during the courses start to make more sense the second time round. We'll be including plenty of practical hints and fault-finding procedures as we go along.

In starting at the beginning the first thing to make clear is just what it is that the player recovers from the shiny piece of plastic we call the disc. This knowledge is vital for an understanding of some of the track skipping and jumping faults that regularly occur with CD players.

Disc Basics

The disc contains up to sixty minutes of left and right audio information in the form of 14-bit words. In addition to the audio data over 200Mbits of data is added to enable the decoder to carry out error correction and the control microcomputer to operate the front display. In total a typical sixty-minute disc contains over 15,500Mbits of information, in other words fifteen and a half thousand million noughts and ones are mechanically stamped on to the disc. These noughts and ones take the form of pits and land, with a reflective aluminium covering. To play the disc the beam from a gallium arsenide laser is focused on the reflective layer, the reflected beam being picked up by photodiodes. A pit reduces the intensity of the light reaching the photodiodes whose output, after electronic processing, consists of the binary ones and noughts recorded on the disc.

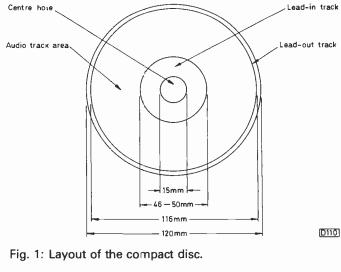
The data on the disc is laid down as a spiral track that

starts at the centre of the disc. During playback the laser scans the track at a constant velocity of 1.2m/sec, which means that the disc must rotate faster when the laser is near the centre than it does when the laser is at the outer edge. This method of scanning is known as constant linear velocity (CLV) scanning, which is the opposite of the constant angular velocity (CAV) technique used with traditional audio disc systems.

Fig. 1 shows the arrangement of the track on the disc. It consists of pits and land of varying length, the length depending on the data it represents. Fig. 2 illustrates this. Logic one is represented by an excursion from land to pit or pit to land, logic zero being represented by the absence of an excursion, i.e. for zero the disc acts as a plain mirror. It can be argued that zeros are not in fact stamped on the disc but are added by the player during the signal decoding process. We'll be going into this later on.

Disc Production

The important factors in disc production are that every pit is accurately stamped in and that the surrounding surface (the land) is flat and even. When you consider that the pits are 0.6μ wide, 0.11μ m deep and as little as 0.85μ m long you will appreciate the degree of accuracy required. Fig. 3 shows how a section of track would appear when seen through an electron microscope.



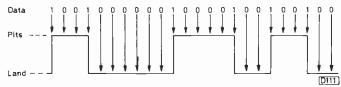


Fig. 2: How ones and zeros are represented in the disc.

When a recording is made the audio signal is first converted into a digital stream. The other data required is then added. This encoding process is highly complex and will be covered in detail later. The data is recorded on a master disc which is used to produce stampers which are in turn used to make the discs supplied to consumers. The complete process, illustrated in Fig. 4, is as follows. (1) A glass plate is smoothed and polished. (2) A photo-resist layer is applied. (3) The recording laser is focused on the photo-resist layer. Its beam is modulated by the digital stream. (4) After development, pits are present in the disc's surface. These pits are $0.11\mu m$ deep and, as we have already noted, the transitions from land to pit and pit to land represent the ones in the data stream. (5) The surface is coated with silver to protect the vital pit edges. (6) Nickel is applied to the glass master to produce a metal master. (7) The metal and glass masters are separated. (8) Mother plates are made from the metal master by stamping. (9) The mother plates are used to make stampers. These are a "negative" of the final disc. (10) The stampers are used to mass produce the final discs. (11) A layer of aluminium is vaporised on to the final disc to form the reflective surface on which the CD player's laser will be focused. (12) A thin, non-transparent protective film is added. This also acts as the contents label.

Note that the CD player's laser scans the disc from the transparent side. As a result, so far as the laser is concerned the pits are actually above the surface (see Fig. 2). In other words when the data is read the pits are higher than the surrounding land.

The precise minimum pit length is 0.833μ m and the maximum length is 3.05μ m. We'll consider the factors that determine this format, but first we must understand the way in which the laser scans the disc.

Scanning the Disc

water differen

When the laser's light is focused on the land part of the disc the reflected light focused on the photodiodes produces a positive output voltage. The pit height of $0.11 \mu m$ is about a quarter of the wavelength of the laser light. When the laser beam crosses a pit — see Fig. 5 — part of it strikes the pit while the rest strikes the surrounding land. The simplest explanation of the result of this is to say that the light reflected from the pit is 180° out of phase with that reflected from the land, so that cancellation occurs. In reality the way in which this cancellation takes place is far more complex, but as long as we appreciate that cancellation does occur this is of no consequence. The degree of cancellation depends on the land/pit reflection ratio. Calculation shows that with a pit width of $0.6\mu m$ and a focused laser beam (spot) diameter of $1.7\mu m$ more light will always be reflected from the land than from the pits - Fig. 5(a) shows this. If this was not the case and there was no output whatsoever from the laser pickup as the spot travelled over a pit there would be no signal, which would play havoc with the focus and tracking servos.

When the spot is focused on land area — Fig 5(b) — maximum reflection occurs and the pickup produces a high output voltage. As the spot begins to pass over a pit — Fig. 5(c) — there's a reduction in the reflected light and when the spot is over a pit — Fig. 5(d) — the reflected light falls to a minimum level. Fig. 5(e) shows the resultant pickup waveform. Notice that the rate of the slopes between the pits and land is constant. Thus the

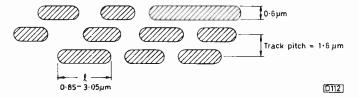


Fig. 3: Track parameters.

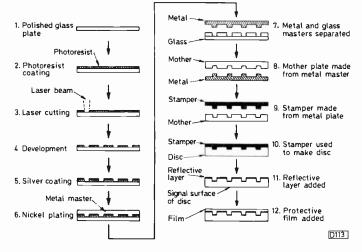


Fig. 4: Steps in the production of a disc.

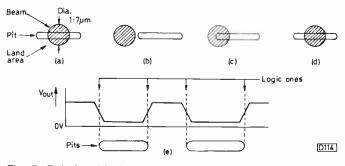


Fig. 5: Relationship between the laser beam and the track pits. (a) Beam passing over a pit. Note that the land area covered by the beam is greater than the pit area. (b) Maximum reflected light – beam entirely on land area. (c) Beam beginning to pass over a pit – the reflected light level is reduced. (d) Beam passing over a pit – the conditions for minimum reflected light. (e) Output waveform produced as the beam scans the pits.

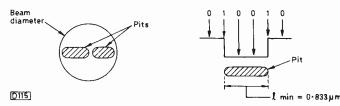


Fig. 6 (left): Adjacent ones would be missed if the beam diameter was such that it was able to cover more than one pit.

Fig. 7 (right): Minimum pit length – there must be at least two zeros between each one.

decoder is able to detect vertical pit edges (logic ones) by sensing the centre of these slopes.

Minimum Pit Length

The minimum pit length is determined by the laser's resolution. At the reflective surface the spot diameter is 1.7μ m. If the pits were shorter than the beam radius,

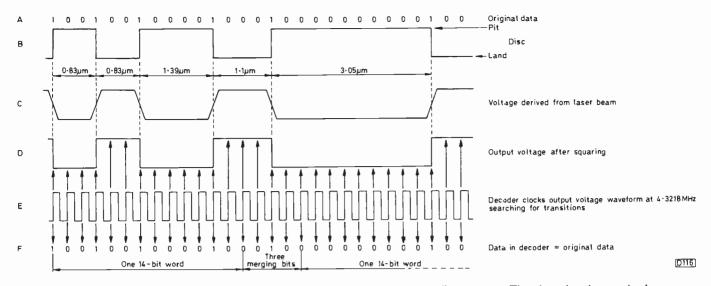


Fig. 8: How the disc is read. This diagram is the key to the whole compact disc system. The decoder detects logic one as coincidence between a clock pulse and an off-disc signal transition.

more than one pit could be covered by the spot and the transition between adjacent ones would be missed — see Fig. 6. As a general rule pit length should be equal to at least the radius of the laser spot. The length of 0.85μ m specified for a compact disc is just in excess of this.

A second factor that governs the pit arrangement on the disc is that two adjacent logic ones must not be permitted in the data stream. If this was allowed to occur the frequency of the light fluctations would be above the resolution of present-day domestic lasers. When we look at encoding later we'll see that there are other reasons why the data must not have adjacent ones, and that in practice there must be at least two zeros separating two ones.

Minimum pit length can be found from: length of one bit = disc rotation speed/data rate. For a compact disc this is $1 \cdot 2m$ /sec divided by $4 \cdot 3218MHz = 0 \cdot 27766\mu m$. With two zeros between ones the pit length must be at least three bits long (see Fig. 7). Thus one pit length = $3 \times 0.27766\mu m = 0.833\mu m$ minimum.

Maximum Pit Length

What about maximum pit (or land) length? We've just seen that there must be at least two zeros between ones. The question we now have is "what is the maximum

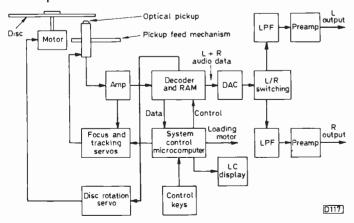


Fig. 9: Simple block diagram of a CD player, showing the signal path through the decoder, DA converter and filters; the four servo loops (the sled servo is included in the focus/tracking block); and the control data take-off for LC display drive.

TELEVISION MARCH 1989

number of zeros that can be present between any two ones?". The answer is ten. The pit rate generates a frequency component that's used as a reference by the tracking servo. We shall see later in this series that a stream of more than ten consecutive zeros would make the laser go off track. When we come to discuss the encoding process we'll see that there are other reasons for limiting the data to ten consecutive zeros. The maximum pit length is thus ten logic zeros plus a logic one multiplied by the length of one bit, i.e. $11 \times 0.277\mu m = 3.05\mu m$.

Binary Code

There are nine different pit lengths between $3 \times 0.277 \mu m$ and $11 \times 0.277 \mu m$. Each one indicates a different set of binary numbers, and we shall see later that these numbers form 14-bit binary words, each separated by three merging bits.

Reading the Disc

Fig. 8 provides an overall view of how the disc is read. A shows a stream of data representing a portion of audio signal. This is stamped on the disc as shown at B. When the disc is played, the voltage derived from the pickup diodes is as shown at C. This signal is passed through a squaring amplifier to give the signal shown at D. This is then fed to the decoder where it's checked against a 4.3218MHz clock signal (E) generated in the decoder. Signal transitions are thus detected. On detection of a transition the decoder provides a logic one output: when there is no coincidence between a clock and signal transition the decoder's output is logic zero. As mentioned earlier, the zeros are not actually put on to the disc but are added by the player. The original data is thus recovered (F) and is checked by the decoder to determine what is audio data, what is error correction data and what is LCD display data. Once it has been separated, the audio data is checked for errors, decoded and finally converted back to analogue form.

Player Block Diagram

To complete this introductory article, Fig. 9 shows a simplified block diagram of a CD player. Following instalments will examine each section in detail.

Introduction to S-VHS

Unless you've been on holiday in Outer Mongolia for the past eighteen months you can't have failed to have noticed the coming of S-VHS. It's now with us in practical form. We saw it first with the Pansonic NV-MS1 camcorder. More recently the NV-FS1 VCR, on which the practical aspects of this article are based, has come along. Steve Beeching wrote about the basic S-VHS specification in the July 1987 issue — we'll recap briefly on some of this. Let's first look at the improvements over the basic VHS system and the way in which they are achieved.

As we all know, the horizontal resolution of the basic VHS system is in the region of 240 lines. Thus the recorded picture is noticeably lacking in definition with respect to the original scene. To the average viewer this is no great hardship — they often tolerate poorly focused pictures with a poor grey scale. It can be most annoying to discerning viewers however, particularly those with cameras capable of a resolution performance of over 400 lines. S-VHS provides considerable improvement, with a specified horizontal resolution of some 400 plus lines. This is achieved by increasing the f.m. carrier frequency so that a greater luminance bandwidth is recorded on the tape. The f.m. carrier deviation is 5.4-7MHz compared to 3.8-4.8MHz with standard VHS. The wider deviation of 1.6MHz instead of 1MHz improves the signal-to-noise ratio. Increased resolution/bandwidth will increase the noise level: the wider frequency deviation counteracts this. Noise is further reduced by employing a non-linear sub-emphasis system which varies the emphasis applied in proportion to the amplitude of the signal being recorded.

Fig. 1 compares the VHS and S-VHS signal spectra. Notice that with the S-VHS system the chrominance and luminance signal bandwidths do not overlap. This an important feature of the new system since it means that cross-colour effects can be eliminated as far as recording and playback are concerned. To take full advantage of this the signals have to be kept separate, i.e. fed to the receiver/monitor as baseband signals instead of being PAL encoded, modulated on to a u.h.f. carrier and fed into a receiver via its aerial socket.

All in all the pictures are sharper and better contrasted, with minimal noise. Particular improvement can be seen on edges — such as door frames and the brick/stone detail of buildings.

S-VHS Tape and Heads

Because of the wider bandwidth, newly developed tape is required. Basic details of the tape construction are shown in Fig. 2. George Cole's article in the August 1988 issue described the tape in some detail. The magnetic layer consists of ultra-high density cobalt-coated ferricoxide particles applied with a binding agent that ensures uniform distribution. The surface is incredibly smooth.

The new tape provides increased output at the higher frequencies and reduced noise. The characteristics that make this possible are an 80 per cent increase in magnetic energy, higher coercivity (800-900 Oersteds) and higher remanence compared to standard VHS tape. The cassette has an identification hole at the bottom, in the rear lefthand corner when viewed from the bottom.

The S-VHS system also requires the use of a different

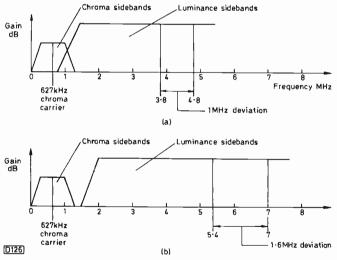
type of head. The amorphous type used has been employed in professional equipment and also in some newer machines. Its laminated structure reduces eddy currents, improving the reproduction efficiency especially at the higher frequencies. Noise is reduced by lowering the friction between the head and the tape.

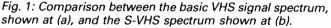
S-VHS Equipment

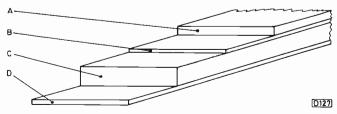
All the S-VHS machines released so far are "dualstandard", i.e. they will record/playback to the VHS or S-VHS standard. The identification hole in the cassette prevents VHS recording with S-VHS tape and vice versa. There is of course incompatibility between the VHS and S-VHS tapes and signals.

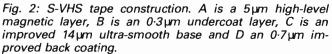
Keeping the chrominance and luminance signals separate is a feature of the S-VHS system. Use of a low-pass filter to separate the luminance from the chrominance signal to be recorded would have the disadvantage that luminance information above 4MHz is lost while chrominance information is still present in the luminance signal spectrum. Instead, a comb filter is used. It employs a 128 μ sec (two line period) delay line with addition and subtraction of the delayed and direct signals — the principle is similar to the use of a delay line in a PAL decoder. The chrominance signal is taken off via a bandpass filter.

The comb filter technique gives rise to a problem when there is no line correlation in the video signal — a form of dot interference can be introduced. The problem arises in









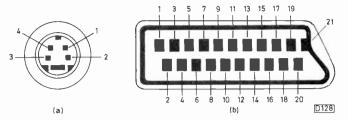


Fig. 3: Connectors for S-VHS, (a) 4-pin and (b) peritel. The 4pin socket connections are 1 luminance, 2 luminance earth, 3 chrominance earth and 4 chrominance. The peritel socket pinning is as follows: 1 audio out right; 2 audio in right; 3 audio out left; 4 audio earth; 6 audio in left; 8 function switching; 13 chrominance earth; 15 chrominance; 17 composite video or luminance earth; 19 composite video or luminance out; 20 composite video or luminance in; 21 casing/socket earth.

particular when switching from a monochrome to a colour signal and vice versa. To overcome this a non-correlation circuit which detects the presence of the 4.43MHz chrominance signal is used. It generates a non-correlation pulse when it detects this condition.

To ensure optimum conditions, separate luminance and chrominance signals can be fed into and out of S-VHS machines. Fig. 3 gives details of the four-pin S socket and the peritel socket connections for S-VHS use.

A 4-43MHz pilot burst signal is added to the line sync pulse whilst recording and is removed during playback signal processing. Its purpose is to indicate by its phase whether the signal being recorded consists of composite video or component video (luminance plus chrominance). For composite video the pilot burst phase is 90° with respect to the U signal phase axis while for component video its phase is 270°. With composite video a luminance component at about 1MHz is present in the chrominance signal and is not, of course, removed by the bandpass chroma filter. If not removed it gives rise to a dot pattern on the picture. A 1MHz trap is used to delete it, being switched in automatically when a 90° pilot burst is detected.

During playback the machine must establish whether the recorded signal is of the VHS or S-VHS type. This is done by checking whether the output from the playback preamplifier contains a 3.8MHz (VHS) carrier component. A peak detector amplifier is used for this purpose. Its output is integrated and smoothed and is then used to carry out the appropriate switching. With S-VHS the carrier deviation is 5.4-7MHz and the output from the peak detector will be low.

In conclusion, my thanks to Panasonic for providing information. My first impressions of S-VHS are of the undoubted improvement it provides. I think that the boom will come in the camera section of the market as the difference is more noticeable and the price differential is smaller. A camcorder costs around £1,600 compared to £1,300 for the equivalent VHS type. The Panasonic NV-FS1 VCR costs around £1,000 and includes hi-fi stereo sound and a NICAM decoder. At present there's a certain amount of confusion amongst customers as to whether a new TV set and VCR (for camcorders) will be required. This is not being helped by lack of sales staff training. An advantage of having an S-VHS camcorder is that an edited copy of an S-VHS recording can be made on to VHS of equal quality to an original VHS recording, i.e. there's no loss of quality as there would be when copying from a master VHS recording. This means that there is some compatibility between the two systems.

next month in

TELEVISION

EXTRA: SPARES GUIDE

Next month's issue contains the 1989 edition of our TV/VCR Spares Guide, a handy reference to scurces of spares for TV receivers and video equipment, listing brancs, manufacturers and spares stockists.

• THE B & O L/LX2500/2800

This Bang and Olu[±]sen series of colour receivers incorporates many state-of-the-art features including microcomputer control and stereo sound signal processing. It can be used as the central part of the B and O _ink system, giving control over any compatible hi-fi/Tw/video equipment. Nick Beer provides a guide to the chassis and some notes on faults encountered.

OPERATIONAL AMPLIFIERS

The audio and servo areas of VCRs and CD players lend themselves to the use of operational amplifiers, which are also found in various control systems. Keith Cumm ns describes the operation and use of these versatile units.

• THE PHILIPS VR6470/VR6670

- and clones such as the Pye DV468/562/761 and Tatung VRH8495. Notes on common faults, contributed by Barry Loughran.

• THE TRINITRON TUBE

An account of recent developments incorporated in Sony's CTV tube and details of alignment procedures.

TEST REPORT

Eugene Trundle has given the Crotech 3133 oscilloscope a thorough trial and finds it well suited to the TV/VCR workshop.

CD PLAYER SERVICING

Next month's instalment takes a detailed look at various types of laser assemblies.

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Letters

DEALING WITH SM DEVICES

I read with interest Ian Bowden's letter (January issue) on reworking surface-mounted components. The company I work for has recently invested in equipment for surfacemounted production and as a result I've had to find suitable rework methods and equipment.

I found that a large number of equipment manufacturers were willing to sell me infra-red or hot-air rework equipment, usually including precision X-Y-Z movements, microscopes, compressed-air solder cream dispensers and so on. While these items may be desirable for professional or military applications, they would involve a very large financial outlay (thousands of pounds) and anyway I've found that they are quite unnecessary.

I remove small chip components (resistors, capacitors) using a pair of electrically heated tweezers. These are available from some large electronic component distributors. They are rather like a soldering iron but have two spring-loaded elements and two tweezer-like bits whose temperature is adjustable over a wide range by means of a knob on the associated control box. Components can be removed and replaced in seconds using the tweezers.

Surface-mounted i.c.s most commonly have the gullwing dual-in-line package. I use a hot-air pencil to remove these. Again there are a number of these items on the market. Points to look for are a hot enough temperature and the ability to set the air flow to a very low value with absolute smoothness and regularity of flow. If this cannot be done the tool is useless for resoldering with solder cream – it gets blown all over the board. Don't assume that well-known manufacturers' items are suitable in this respect. I've not found it necessary to use an inert gas instead of air though some units have provision for this. It would probably give better joints.

Using a hot-air pencil I remove an i.c. as follows. Insert a pair of extractor tweezers (e.g. RS549-820) under the i.c. and heat one row of legs. When all the solder has melted, gently lever the row of legs clear of the board. This obviously stresses the opposite row of legs, so it must not be overdone or you will end up with lifted tracks. Now heat these other legs and lever them up – the i.c. should then lift clear of the board. Clean the PCB pads with desoldering braid and a conventional soldering iron.

I.C.s can be replaced using either solder cream and a hot-air pencil, soldering one row of legs at a time, or low melting-point solder and a conventional fine iron. Don't worry unduly if solder cream appears to bridge adjacent legs – it usually goes to all the right places when heated! Some care is required to apply just the right amount, and here a compressed-air dispenser is useful. Too much cream will certainly lead to bridging and if it gets under the i.c. it will remain there as the heat cannot reach it.

I've not had to remove and replace the square flat-pack i.c.s with legs on all four sides (thank goodness!) but I can see that with these it would be necessary to desolder the individual legs.

To summarise, I would suggest that anyone who repairs equipment using surface-mounted components should consider purchasing the following: electrically heated tweezers, a hot-air pencil and an ultra-miniature soldering iron. Smaller items should include: low melting-point solder (contains silver, which prevents leaching with some components), tweezers and large needles (very useful!). I've found one particular range of surface-mount tools useful and of excellent quality. They are made by a German company, Daturr, and are distributed by STC Components, Verospeed, OKI Industries and perhaps others. The hot-air station costs approximately £500 and the heated tweezers approximately £200.

Finally, try to order components that are marked – it makes life a lot easier. Surface mounting is nothing to fear, though it may be an incentive to get some new glasses!

Paul Barton,

Harrogate, North Yorkshire.

FERGUSON TX10 CHASSIS

Every picture tells a story: how many readers spotted something wrong with the TX10 chassis picture shown on the front cover of the January issue? K. Rutherford's excellent article on servicing the Ferguson TX10 chassis mentioned insulation breakdown with earlier focus controls. This is something of which most of us are by now well aware, and we fit the modified type that includes two plastic pillars to stand the control off the metal chassis. Obviously the repair technician who dealt with the set shown in the picture didn't see the need to fit these! *Alan Shaw*,

Bolton, Lancs.

EHT ARCING

I was interested to read the article on dealing with e.h.t. arcing (January issue) and found much of what it said both valid and good sense. I feel I must take the author to task on a couple of points however.

First, it's not true that manufacturers don't see fit to smear silicone grease under the cavity connector's cover. My company handles a lot of repairs to ultra high resolution video monitors, and with these it's by no means uncommon to see large quantities of white silicone grease in this position. Notably one very large Japanese manufacturer who also makes TV sets does this.

Secondly, the use of silicone rubber compound around areas that are likely to discharge is also widespread. While I agree that this compound should not be used to "seal in" faults, I see no valid reason why it shouldn't be used to prevent the ingression of moisture into likely trouble spots. Indeed I have modification instructions, from the same Japanese manufacturer, advocating its use.

Finally I don't believe that just because the manufacturer didn't do it in the first place this is a reason for not subsequently doing it. I could cite many cases where sets are installed in houses belonging to old people who smoke forty cigarettes a day and run a Calor gas heater throwing out about a gallon of water an hour, the result being that they go through an e.h.t. connector about once every three months. The only permanent cure for sets operating under these conditions is to seal the cap so that the moisture canot get under it in the first place.

G.H. Darby, Proprietor Monitech,

Earls Barton, Northampton.

PROBLEMS WITH RANK SETS

May I say thanks to Colin Doman (Letters, January) for his suggested modification to get rid of the accursed teletext lines with sets that use the Rank A823 series chassis? I'd been struggling for some time with one of

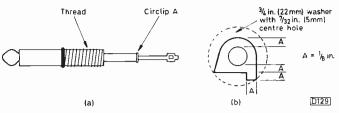


Fig. 1: Making a nylon bush for Rank tuning mechanisms. Cut out the nylon washer as shown in (b).

these sets. I'd tried Mr. Catchpole's suggestion of extra windings on the line output transformer but the lines were still visible. The net result was to increase the field scan by ten per cent, out of the range of the height control. It's a useful idea however if the 40V line is still low after adjusting the h.t. to its correct level of 200V - cheaper and quicker than replacing the LOPT. John de Rivaz's pulse generator circuit didn't help but Colin's modification hit the nail, or perhaps I should say the teletext lines, squarely on the head. Well done Colin Doman. Ten minutes after reading his letter I was out of my misery.

Much has been written about the shortcomings of the Rank-Bush-Murphy channel selector pushbuttons. Here's a way of making those dreaded nylon bushes so beloved by Rank. First obtain a number (as required) of 22mm diameter by 4mm thick nylon washers. Remove the tuner from the set, unplugging all the leads. Dismantle the button unit on a table or bench, noting the positions of all the buttons, washers, springs and screws. Place them out of harm's way before beginning the next phase of the operation, which is to remove the broken bush from the sprindle and also circlip A - see Fig. 1(a). Since the circlip is made of mild steel, with a little care it's unlikely to break.

Place the nylon washer in a vice and drill a 7/32in. diameter hole in the centre. The point to note here is that you will be using the threaded part of the spindle to make a thread in the nylon washer, so gently does it when drilling - if too much material is removed it won't be possible to thread the washer. While the washer is still in the vice, push the spindle into the hole from the cross end and carefully twist it, using pliers if necessary (a small drop of thin oil on the spindle will help), until a thread has been cut.

Remove the washer from the vice and mark it out as shown in Fig. 1(b). Remove the excess material, using a small hacksaw and a file to complete the bush. Fit the new bush on the spindle, taking care over two points. First that the bush is fitted the correct way round, and secondly that it runs smoothly along the thread of the spindle. Remember that you will have to carry out the tuning procedure with the tuner installed in the set, using those horrid buttons. Finally, as all the best manuals say, reassemble in the reverse order.

Incidentally, a friend has for sale a 45ft Versa tower complete with rotator. If anyone is interested let me know and I'll pass the offer on. Buyer collects.

D.R. Isham, Windy Ridge, Mount Pleasant Close, Buckingham, Bucks MK18 1DN. Telephone 0280 813 770.

FOR DISPOSAL

Due to shortage of space I have for disposal several TV sets - two Thorn 1500s (24in. models), an early Thorn 1500 with 19in. tube, a huge Ekco T420 and a KB Warden - the latter two are dual-standard sets. All are basically sound but require some attention. A line or telephone call before visiting would be appreciated.

W.J. Knight, 532 Rochester Way, Eltham, London SE9 1SQ Telephone 01-850 4147.

WANTED

As a collector of vintage TV sets I'd like to buy a v.h.f. pattern generator, preferably transistorised, to set them up. I'd also like to buy a pre-war set to add to my collection. If anyone has such items for sale, please let me know.

R. Howells, 6 Dunlin Drive, Spennells, Kidderminster, Worcs DY10 4TA.

Could anyone supply an operating manual and/or service manual for a Sony "S.E.G. 370P" PAL special effects generator? The instrument was made for Sony in 1979 by Shintron in the USA. Photocopies would be acceptable and all costs would be met.

A. Kitching, 67 High Street, Great Broughton, Middlesborough, Cleveland TS9 7EF. Telephone 0642 710 955.

Can anyone supply a service manual for the Hitachi VT5500E VCR? This is no longer available from the makers. I'd be willing to pay the going price of £22 for a copy.

Steve Field, 82b Cliff Road, Hornsea, E. Yorkshire HU18 1HX.

Can anyone supply a tuning panel for the Ferguson 3V31 VCR - it's the one with the two microcomputer chips on it - and a good A51-570X tube? Second-hand items will do so long as they work.

J. Olijnyk, 9 Woodview Terrace, Weston-super-Mare, Avon BS23 3PF. Telephone 0934 417 441.

SERVICING PRECAUTIONS

As expected, my article and subsequent letter on the Amstrad CTV2200/2210 produced some comments. My thanks to J.E. Jones (January) for his interest and the tip about C845.

Another point - which could apply to many another TV set or VCR - is that the fuses (F501/2) are often loose in their clips. I always remove both and retension all the clips by bending, at the same time checking the fuse types and ratings. They can easily be overlooked as a result of their inaccessibility. Similarly we always check the plugtops of all items that enter the workshop. Most require refitting. The fuse ratings, clips and cord grip can be inspected at the same time.

If a set has lost its feet we always replace these to ensure adequate ventilation - even if the set lives on a stand (someone may remove it one day!).

In reply to S.J. Cain's interesting letter, anyone who regularly services a large cross-section of CTVs will know that it's often impractical and sometimes impossible to replace semiconductor devices with the original types. This is, after all, why we have equivalents books! Use of these, coupled with experience, will enable a good, sound, safe alternative type to be fitted. A device that is "better' than the original can usually be selected. I keep a very large stock of semiconductor devices, but it's impossible to keep every type and customers are not prepared to wait weeks while the exact part is obtained. It would have been almost a year in the case of the 2SC3156 transistor!

When the first Amstrad CTV2210 came into my workshop I borrowed a service manual and a 2SC3156. A few days later it failed again. At the time spares could be obtained direct from Amstrad, but neither the manual nor the 2SC3156 was available. The latter item was on order from Japan. Maybe Mr. Cain had bought the lot? When I opened an account with CPC it was the same story. I wrote to Amstrad's technical department for advice about a suitable alternative, but didn't receive a reply. As no data on the 2SC3156 was available, the circuit was studied and several alternatives were tried - successfully. The idea of using a D type with a parallel diode and base-emitter parallel resistor was to provide the device with greater protection against mains spikes, which could have contributed to its failure. We can't always assume that electrical installations/adaptors are perfect.

Incidentally the Amstrad spares agent doesn't seem to be able to obtain R814, a special 20W, 27Ω resistor that fixes to the chassis via a steel bracket. Under the part number a standard 17W, 27Ω wire-ended resistor is supplied. I don't consider that this is a valid replacement: not only is it lower rated, but the bracket doesn't fit.

To put the matter of safety into perspective, if a fire did occur negligence would have to be proved. Provided that repairs are carried out in a careful, neat, sound and workmanlike manner (unlike some I've seen perpetrated by so-called trade engineers), that any equivalents fitted are carefully selected, that safety components are replaced with the same types, that fuse ratings and types as well as h.t. rail voltages are checked as a matter of course, then no problems should arise.

Dave Mackrill,

St. Leonards on Sea, East Sussex.

A Simple Channel 1 Modulator

In the November and December issues last year I wrote in detail about 405-line TV and mentioned a Rediffusion modulator conversion. A letter in the January issue promised further details of this. The unit concerned is called a translator and is available at very modest cost. It contains a u.h.f. tuner with i.f. strip that provides video and audio (to drive a loudspeaker) outputs, an h.f. converter, an h.f. modulator and a power supply.

Until now most people who wanted a Band I modulator built David Looser's excellent design (*Television*, October 1984). Making use of the Rediffusion units provides a simpler approach with equally high-quality results. You have to buy two of the Rediffusion units to obtain two modulators. This will leave you with two perfectly good off-air tuners – see later.

Modulator Conversion

The first step is to extract the h.f. modulator can - it's the tuner-like can on the right-hand PCB, near the mains transformer. The circuit of this module is shown in Fig. 1. Conversion details are as follows.

Replace R2 (vision modulator only) with a $3.9k\Omega$ resistor.

Replace R8 with a 560 Ω resistor.

Replace C7 with a 220Ω resistor.

Replace R13 with a 10pF capacitor.

Replace C8 with a 68pF capacitor.

Replace C9 with a 47pF capacitor.

Delete R22, C16 and C12.

In the sound modulator, remove Tr2 and connect a $47k\Omega$ resistor between the base and emitter connections.

Replace X1 with a 41.5MHz crystal in the sound modulator and a 45MHz crystal in the vision modulator. Add a $2.2k\Omega$ resistor across the crystal on the back of the PCB to provide damping.

Add a 100pF capacitor from the carrier test point to chassis.

In the vision modulator, add a 1N4148 diode in series with R1 (cathode to R1).

These points are all shown in Fig. 1.

Connect the r.f. 0V pin to the modulator's case.

The r.f. output obtained from the circuit shown in Fig.

Jeffrey Borin, B.Sc. (Eng.), A.C.G.I., M.I.E.E.

1 is about 30mV r.m.s. The arrangement shown in Fig. 2 provides two r.f. outputs, with the vision at 22mV peak-to-peak and the sound at 10mV peak-to-peak.

Each modulator is best aligned with the other one turned off. It's easy with a wide bandwidth scope looking directly at the output. Otherwise look at the demodulated video using a receiver or diode probe. Set L1 for maximum output. It tunes very broadly and the tuning is not critical. With the vision modulator feed in a standard video signal (625 will be perfectly o.k.) and set RV1 for positive modulation with zero carrier at the sync tips. If monitoring demodulated video, set RV1 so that sync crushing is just avoided. Without a scope, adjust RV1 until sync fails, then back off a bit. With the sound modulator, use RV1 to set the unmodulated carrier to 10mV peak-to-peak. Alternatively feed in about 100mV of audio tone, with the gain control at maximum, and adjust RV1 until distortion is just heard on the demodulated sound.

If you don't want to order crystals specially you could try using a series LC circuit, adjusting on test with a counter. Omit the $2.2k\Omega$ damping resistor.

I have not had a chance to look at the modulator's output on a spectrum analyser – if some lucky person has one, could they please tell me just how revolting the output looks!

These modifications have been thoroughly proved on Channel 1 but not on the higher channels. With appropriate crystals they should work throughout Band I, but the MC1496 modulator chip is not really suited to Band III use.

Sources of Parts

When ordering crystals, specify 41.5MHz and 45MHz, third overtone, series resonant in HC18/U style. There are no tight tolerances involved. Quartslab Marketing Ltd. (PO Box 19, Erith, Kent DA8 1LH – 0322 330 830) can provide 45MHz crystals ex-stock at £2.50 inclusive; 41.5MHz crystals cost £5.25 with a delivery of two-three weeks. McKnight Crystals Ltd. (Hardley Industrial Estate, Hythe, Southampton SO4 6ZY – 0703 848 961) have a same-day service at £11.50 per crystal inclusive.

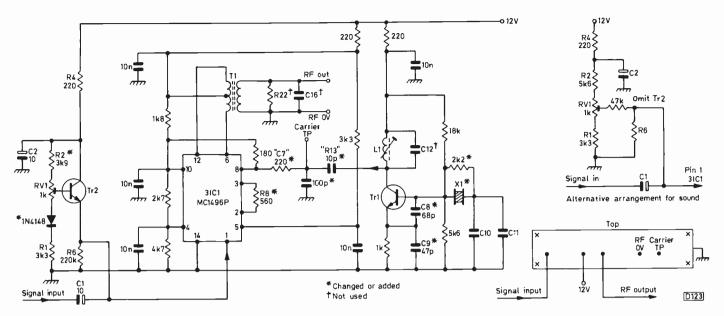


Fig. 1: Circuit diagram of the Rediffusion h.f. modulator, showing the modifications required.

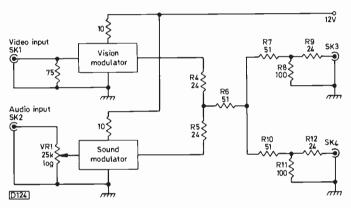


Fig. 2: Suggested input/output arrangements.

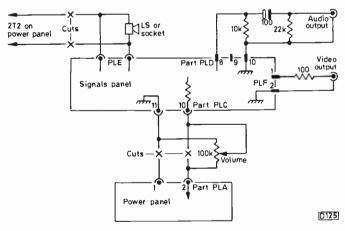


Fig. 3: Making use of the tuner section of the unit.

The translators are available from Stan Willetts, 37 High Street, West Bromwich, West Midlands B70 6PB – 021 553 0186.

Using the Tuner

You now have a working Channel 1 modulator. What about the tuners? Here's how to get the best from them. Fig. 3 illustrates most of the following points.

First ensure that only the mains input flex goes to one side of the mains switch. The other side of the mains switch should go to only the L and N tags on the power supply panel. Mains earth must be connected to the earth tag at the front right of the power supply panel.

Remove all wiring to the "octal" output plug and "octal" socket on flylead. Remove the lead to PLB on the power panel but retain for reuse. If the h.f. modulator is to be converted to a Band I modulator remove it from the power panel.

Install sockets on the back panel for video (suggest BNC), audio (suggest phono or XLR) and loudspeaker outputs. Alternatively a small speaker could be squeezed into the case. I've not tried this, but if you want a line level balanced output T2 on the power panel might be used to match the speaker level output. Volume would then have to be preset.

Clip the wires from SKE on the power panel. This pair originates at PLE on the signals panel. Connect the free end to the loudspeaker or socket.

Use the lead and connector removed from PLB to connect the video output from SKF (virtually at the front, under the tuning button assembly) to the video output socket. Include a 100Ω resistor in the inner to get the level about right. It would be possible to design a T-section network to give an accurate output match.

Take the audio output from PLD - refer to Fig. 3.

Fit a 100k Ω potentiometer on the front panel to act as the volume control. Connect to PLA and PLC as shown in Fig. 3. The preset control previously used as the volume control, on the power panel, can be used to set the maximum volume.

If all eight tuner buttons are stuck in they can be released by pushing the latch bar with a small screwdriver. This is not obviously visible. Looking at the back of the tuning assembly, reach into the left side beyond button seven. The latch bar is level with the buttons, virtually at the front of the assembly.

Under the mechanism, behind each tuning button, there's a fine leaf spring. This is actually the bandswitch used to select between u.h.f. and Rediffusion h.f. Buttons 1-7 are normally set to u.h.f. and button C to h.f. It's simple if rather fiddly to change the C switch to u.h.f. by setting the spring to the same position as on buttons 1-7.

If the door over the tuning presets is missing or the little orange trimming tool is absent, the a.f.c. will not work. A variety of possibilities can be adopted, from matchsticks and sticky tape to a separate proper a.f.c. switch.

TV Fault Finding

Rank T24 Chassis/Toshiba C1695B1 etc

This fault fooled one of our engineers since it produced symptoms similar to those with a duff line output transformer – at switch-on the set gave one squawk then shut down in the standby mode. The effect was of heavy loading in the line output stage and was due to zener diode D472 in the overvoltage protection circuit being leaky. It's a 6.2V device, type BZX79B6V2. E.T.

Philips 2B Chassis

We have a large number of the version two of this chassis out and are beginning to get a steady stream of them back in the workshop with the BUT12 chopper transistor shortcircuit. In all the cases I've seen there have been dry-joints on the chopper transformer. I haven't had a set fail after resoldering these joints. Philips recommend however that if you experience further BUT12 failures for no apparent reason the device should be replaced with a 2SC3973B and the value of R3671 should be changed to 22Ω , 5W.

When the BUT12 fails it sometimes goes short-circuit collector-to-base, which rather upsets the rest of the power supply. Usually it damages T7686, T7685, D6686, D6672, D6671, D6670, D6690, R3687, R3670 and C2690. P.B.

Grundig Cinema 9050

The problem with this projection set was intermittent no sound or vision. When the fault occurred the mains voltage didn't reach the TV power supply. Relay 601 wasn't pulling in because T6021 on the "omniplatte" wasn't being turned on.

At the top left-hand side of the set (viewed from the front) there's a microswitch that should operate when the screen is up. It was faulty. **P.B.**

Philips NC3 Chassis

This set came in with a shorted BUT11 chopper transistor. After a fruitless check on the components that could possibly have led to its demise we fitted a replacement which immediately failed. The cause of the trouble was that R418 was open-circuit. This resistor is connected between pin 9 of the chopper transformer and the junction of L403/R409, not in parallel with R425 as in all the circuit diagrams we've seen. **P.B.**

Sony KV2052

One of these sets came in recently with a blown up power supply. A major rebuild cured the problem for two days after which it again blew up. The cause of the trouble turned out to be a pinhole in the chopper transistor's mica insulating washer. M.D.

Grundig CUC41 Chassis

There was no output from the power supply, with a ticking noise coming from within the set. The +A rail was pulsing very slightly. H.T. was present at the collector of the chopper transistor and there were no shorts on the

Reports from Eugene Trundle, Mick Dutton, Philip Blundell, Eng. Tech., Ian Bowden, Alan Shaw, Roger Burchett, John Coombes and Hugh MacMullen

output lines. As we couldn't find any obvious fault we resorted to checking components individually. We eventually found that R651, which is in series with the set-H.T. control, had gone open-circuit. M.D.

NordMende FIV Chassis

This elderly 26in. colour receiver suffered from reduced height. We spent a considerable time checking around the field output stage only to find that when the field oscillator transistors were given a squirt of freezer the height returned to normal. As there was no tendency to field roll we had initially ruled out the oscillator stage. **M.D.**

Sharp C2092

The customer's complaint was that the picture would go off intermittently. On soak test we found that when the fault appeared the screen went blank white, with some deterioration of the sound. The cause of the problem turned out to be IC401 (IX0118CE) which contains a clamping circuit. M.D.

Salora J20 Series

The symptom was no line lock. A scope check at pin 11 of the TDA2594 sync/line oscillator chip ICB501 showed that a suitable video waveform was present – and also cleared the fault! The scope had been set to d.c. input: when switched to a.c. the fault was still present. A look at the circuit suggested that RB514 ($2.7M\Omega$) could be responsible for the trouble and when checked it turned out to be open-circuit. I.B.

B and O 33XX Series with Text

There were three problems with this set. First when text was selected the required page number couldn't be obtained – you simply got 100. Secondly the on-screen channel number couldn't be brought up with the remote control unit's TV button. And finally when trying to select a channel above nine the on-screen display would just flash on then off instead of staying there for three seconds so that you can select the second digit of the channel number. All three problems were caused by a faulty 4015 shift register chip (8IC1) on the remote control decoder panel. I.B.

Salora 16J20

This set had an odd cyclic fault. Every ten-fifteen seconds the picture would gradually darken then, with a ping from the degaussing circuit, it would jump back to the correct contrast level, usually with a bad purity error. The noise and purity problems would go if the degaussing coils were disconnected, but the picture contrast would continue to vary as before. A check on the beam current limiter voltage (across CB503) showed that this dropped as the picture darkened. This is the opposite of how it should work, i.e. when the beam current rises (high contrast/ brightness) the voltage should fall in order to limit the drive from the TDA3562A colour decoder chip, using transistor TB200 to hold down the d.c. brightness and contrast control inputs. The cause of the fault turned out to be a dry-joint on the upper connection of the screening "wall" between the colour decoder and the RGB output stages. This wall is used to link a chassis return from the c.r.t. base to the main panel. Loss of this connection meant that the grid supply potential divider had no link to chassis. **I.B.**

Philips K40 Chassis

We've had a couple of faults on these sets recently. The first one incorporated teletext. It had a dark picture and the contrast control was inoperative. Tr7116 (BC558B) on the teletext interface panel was short-circuit base-to-emitter.

Predominant blue with faint flyback lines visible was the fault on the second set. The blue output transistor's collector voltage was low at 100V instead of 160V because the h.f. compensation capacitor C2216 in its emitter circuit was leaky.

Quick Checks

Loewe MS56: For no sound and vision check whether the line driver transistor's supply resistor R534 ($3 \cdot 3\Omega$) is opencircuit. If the h.t. is high at around 230V (should be 142V) check C638 (1 μ F).

Toshiba 221E: For field foldover at the top of the screen check C313 for loss of capacitance.

Toshiba 2226: No line sync – check whether R402 ($15k\Omega$) is open-circuit.

Philips CTX chassis: Tripping has been traced to the BYV95A 26V rectifier D6590 being short-circuit.

Sharp C1871: For intermittent partial field collapse check R525.

Ferguson TX90 chassis (20in. version): For lack of height check whether D106 is leaky.

Amstrad TVR2: This 14in. CTV plus VCR combination came in with the complaint that it was dead. There was a measurable short across the collector and emitter of the line output transistor. D1606, type FR304, was short-circuit.

Hinari VTV100: This combination 20in. CTV plus VCR came in with a high raster brightness fault. We found that the 2SA1015 luminance amplifier transistor Q301 was short-circuit emitter-to-collector. A BC307 proved to be a suitable replacement.

Rediffusion Mk 3 Chassis

For tuning drift don't strip the selector unit or suspect the tuner. Resolder pin 8 of socket 0PLA (at the top of the signals panel). This fault is becoming very common. It will save you time and trouble if you do this with every Mark 3 that comes into the workshop. **R.B.**

Rank T20 Chassis

Intermittent failure to start up from cold was the problem with this set. It would continue to work after bridging the start-up capacitor 4C19 (10μ F). 4R16 (910Ω) and 4C19 were original components and were replaced. Numerous dry-joints were resoldered. But after leaving the set for half an hour it refused to start. I noticed a certain reluctance to start up even with the bridge in place. Turning the overvoltage trip control down improved the starting. I then tried to set the overvoltage trip but found this very difficult. It transpired that 5D5 (1N4148) on the trip subpanel was dead short. I've had this before, after a tripler failure, but the set then refused to start at all. Put it down to experience. At least this particular T20 has had all the stock faults attended to.

Similar symptoms to the above – intermittent failure to start, eventually leading to a "dead" set (h.t. present but no line timebase action) – usually means that the collector of the 12V regulator transistor 4VT7 (2N5296) is going open-circuit.

Decca 70 Series Chassis

Very intermittent failure to start, which could not be traced to a bad joint and did not appear to be affected by tapping or flexing the board, was eventually traced to R625 ($180k\Omega$, 1W) in the start-up circuit. It had a crack almost completely around the body. **R.B.**

Sanyo CTP3105 (79P Series)

For no sync check first whether R403 (1k Ω) is opencircuit, then check the sync/line generator chip IC401 (LA1460) by replacement. J.C.

Hitachi CPT1444/CPT1446

If the screen flashes red, green or blue when the channel is changed replace IC501 (TDA3562A), reduce the value of R726 (680 Ω) to 560 Ω and change R610 from 12k Ω to 8.2k Ω .

If there's no sound and no raster and the mains fuse FS901 is open-circuit this item can be uprated from 1.25AT to 1.6AT. J.C.

Toshiba C1410

For no signals on all channels, first ensure that 15V is present at the emitter of the 2SC1166 series regulator transistor QE01 on the selector board. Next check the 33V line at the junction of RE06 and DE03 (ZTK33B). If this line is low or absent, replace DE03. Then if necessary check ICA01 (TA7177P) and/or ICA02 (TA7178P) by replacement. J.C.

Hitachi CPT2236/CPT2238

If the receiver is permanently in the standby mode check whether R1437 (820Ω , 0.25W) is open-circuit. If so fit a 1W replacement. J.C.

Rank Z718 Chassis

There was no line drive. After quite a bit of searching on the scan drive panel we found that the printed link from the anode of the 8.2V zener diode 4D12 to chassis had blown off. There was thus full h.t. on 4D11 and at pin 4 of the TBA950 sync/line generator chip 4SIC1. We made good the chassis connection and changed the chip only to find that in addition 4D12 was open-circuit. **H.MacM.**

Philips G8 Chassis

The h.t. was 250V and couldn't be adjusted. The set employed the very early power supply panel with the zener diode in the BC147 control transistor's base circuit. R1365 had increased in value from $47k\Omega$ to $60k\Omega$. H.MacM.

Camcorder Servicing

Part 2

There are two basic sections of the JVC Videomovie camcorder, the camera section and the VCR section. As the two are contained within the same housing some simplification is possible, with shared facilities. The result is a reduced component count and less power consumption compared with the use of separate pieces of equipment. The power supplies are shared, with use made of d.c.-d.c. converters to develop the various voltages and supply lines required. This makes for easy switching between the record and playback circuits. It also enables the camera section to be controlled via the microcomputer syscon (system control) circuitry associated with the main deck. Fig. 1 shows an overall block diagram of the camera and recorder sections.

Camcorder Block Diagram

For recording purposes the video signals are obtained from a half-inch, high-band Saticon pickup tube or a CCD (charge-coupled device) image sensor. The signals have to be decoded, then processed to be PAL compatible in a form suitable for recording. We will be describing the individual processes involved later. The luminance and chrominance components of the signal are fed to separate recording circuits and are then added for application to the heads via the switching system described last month.

The sync signal generator (SSG) produces all the timing signals. It provides outputs to drive the deflection circuits, which also produce the high voltages needed for correct Saticon tube operation. Sync, clamping and 4.43MHz carrier signals are supplied to the video processing circuitry by the SSG.

Before application to the frequency modulator the luminance signal is passed through a low-pass filter and then a dynamic aperture corrector (DAC). The chrominance signal is passed through a bandpass filter (BPF) not so much to provide filtering – the signal is already at 4.43MHz – but to provide correct timing. A small delay is required to match the timing of the luminance signal during record. Down-conversion and colour level control follow standard practice.

Part of the luminance and chrominance signal is tapped off prior to the recording circuits to provide a composite colour signal which is used for E-E monitoring. The electronic viewfinder is also linked to this line, via a lowpass filter to prevent colour dot patterning.

Playback follows standard VHS practice. The signals from the video heads are switched, as we saw last month. The luminance signal is limited and demodulated while the chroma signal is up-converted and phase corrected. The two signals are then added to provide a composite output signal.

Record only camcorders are somewhat different. The SSG provides timing signals to encode the R - Y and B - Y colour-difference signals at the down-converted frequency of 625kHz. There's no 4.43MHz colour signal available within these machines for setting up, so an up-converting jig is required to connect to the camera head to power it and provide a composite, baseband output.

Audio recording and playback are fairly standard. Recording is possible only via the inbuilt microphone and can be monitored from the main output socket or via earphones. Naturally there are variations on this arrangement. Some machines allow an external microphone to be used and in rare cases there's provision for external AV inputs.

The Saticon Tube

This instalment will deal mainly with the Saticon tube used in models that employ a thermionic pickup device.

Fig. 2 shows the basic items associated with the tube. The incoming light passes through the camera's zoom lens, a colour-temperature filter, iris, master lens and crystal filter, being focused on to the tube's faceplate and photosensitive target area. Within the tube an electron beam scans the opposite side of the target area. It's deflected electromagnetically, conforming with a standard scanning system, i.e. in Europe 625 lines, 50Hz - the principle is the same as with TV tube scanning. As the electron beam scans the target, variations in the light intensity at various points of the target cause variations in the beam current. Some beam current flows even without any light. This is very small, in the range of picoamperes, and is called the dark current. Signal current from the tube is taken from the target. It's a very small current from a high-impedance source and is highly susceptible to external interference. For this reason the preamplifier is mounted on the tube, within a screened container that includes the very short target connection. The target itself

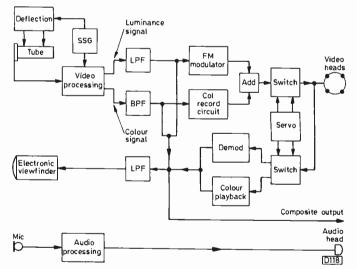


Fig. 1: Overall block diagram of a camcorder using a pickup tube.

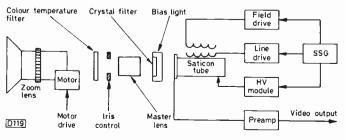


Fig. 2: Basic items associated with the tube.

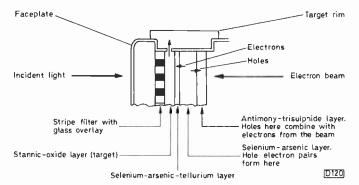


Fig. 3: The target part of a Saticon tube.

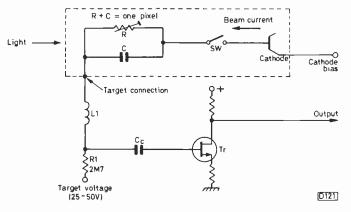


Fig. 4: Operation of the target.

consists of a complex sandwich layer of selenium-arsenictellurium (hence SATicon) film bonded to other semiconductor layers – see Fig. 3.

The first item after the glass faceplate is a stripe filter. This consists of diagonal cyan and yellow stripes which are deposited on the inside of the faceplate and overlayed with glass – we'll have more to say about the action of this filter later on. Next comes a transparent layer of stannic oxide which is the target output electrode. This forms a hetero-junction (cross-coupled) with the selenium-arsenictellurium layer and the chalcognide glass material. Between the selenium-arsenic-tellurium layer and a layer of antimony trisulphide on the beam side there's a thick layer of a selenium-arsenic mixture.

Light passes through the faceplate, the stannic-oxide and SAT layers to the selenium-arsenic layer where holes and free electrons are produced. The electrons flow back towards the faceplate, into the stannic-oxide layer via the SAT layer. Holes cannot penetrate the stannic-oxide layer due to the selenium film deposited on it by the SAT layer. The holes can travel in the opposite direction however. In doing so they combine with the scanning electron beam via the antimony-trisulphide layer. The electrons in the scanning beam cannot pass through the antimonytrisulphide layer due to a film of selenium on the opposite side. Beam current is thus dependent on the number of holes created by the light and available for combining. In effect the holes form a capacitive "charge" representing pixel elements. For each hole that combines with a beam electron an electron is released via the stannic oxide layer and the target output connection.

To recap briefly, light produces equal numbers of holes and free electrons in the selenium-arsenic layer. For each hole that combines with an electron from the scanning beam an equivalent electron is released via the target connection. Hence the current output from the target depends on both the amount of incident light and the beam current.

So much for the theory. Fig. 4 provides an equivalent circuit that illustrates in a more practical manner what goes on. It represents a single pixel element of the photosensitive target layer. The Saticon's target layer in effect forms a parallel RC circuit. The value of R varies with the intensity of the light falling on it. With no light, R has a finite value which is designed to be as high as possible to minimise the standing dark current. As the target is scanned by the electron beam, each pixel is linked to the beam once per frame. Contact between the beam and a pixel is represented by switch SW. When the electron beam arrives at the pixel the switch is in effect closed. The capacitive element is then charged via the target and the tube's cathode - the beam effectively connects one side of C to the cathode. When the beam has passed, C begins to discharge via R whose value, as we've seen, is light-dependent. With no light R has a high resistance and C can discharge only a little. If the light level is high the value of R is small and C's discharge can be high. The next time the electron beam passes the pixel, the amount of beam current that flows through the target load resistor RI is the current required to recharge C. Thus with a high light level the current flowing via Rl is high and the signal voltage developed across Rl is relatively high.

The target output signal is therefore dependent on the recharging current at each pixel capacitor and the light-dependent value of the associated resistance. As the Saticon's electron beam scans a TV line, many hundreds of small capacitive elements charge. The varying charge current that flows via the load resistor develops a signal voltage which is connected to the camera's preamplifier transistor Tr via the coupling capacitor Cc.

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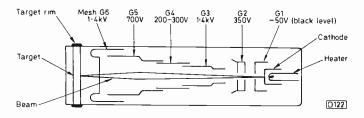


Fig. 5: The Saticon tube's gun structure, showing the electrode operating conditions. The target is connected to the front rim and the mesh (G6) is internally connected to G3. Blanking is carried out at the cathode. A scope connected to G1 will show the blanking pulses at about -70V.

While the signal voltage developed across RI is very small, it has a very good signal-to-noise ratio, i.e. an extremely low noise content. To maintain this low-noise condition, the first stage of the preamplifier uses a lownoise junction field-effect transistor selected for its lownoise characteristic. LI is called a Percival coil. It resonates with the target's capacitive output, lifting the output at the higher frequencies. With a colour camera the resonant frequency is 4·3MHz, which is the R/B colour carrier frequency obtained from the tube (more on this next month).

Saticon Operation

The internal arrangement of the Saticon tube is shown in Fig. 5. At the faceplate end there's an external target connection, the target flange or rim. A small leaf spring contacts the rim and is soldered to the Percival coil at the other end.

One danger when servicing cameras fitted with a Saticon tube is the presence of high voltages on the innocent looking PCBs. While a shock is not lethal, it can result in demise of the camera if the camera is dropped as a result of receiving a shock. This is especially the case when there's a capacitor that doesn't discharge at switch-off connected to grid G6.

The highest voltage is the mesh voltage. This is usually in the range 1·4-1·6kV and is internally connected to grid G3. Grid G5 is a collimator lens to narrow the beam as it approaches the target, and is at 700V. It operates in conjunction with the voltage, which is variable between 200-300V to provide electrostatic focusing, at grid G4. If the beam is not focused the tube's resolution drops and the R/B colour carrier falls to zero, leaving a green picture. Adjusting the focus control will rotate or twist the picture about the centre. It can be used in conjunction with external beam shift magnets to centralise the beam landing. A spot in the centre of the picture must stay put when the focus is adjusted and not shift off the centre axis. This sort of adjustment will however create purity and shading problems that will take hours to sort out!

Grid G2 is the first high-voltage electrode, its purpose being to accelerate the electrons that leave the cathode. G1 is a reverse biased grid: the bias voltage is variable to set the beam current to a value which is sufficient to charge the target capacitance at full white, without being excessive so that the target is saturated. The visual effect of reducing the beam current below the nominal value is to clip the peak whites. The correct setting is for just above maximum peak white voltage at the signal output. Too much beam current will adversely affect the focusing and twist the picture.

The cathode sits at about 6V above chassis potential.

Field and line blanking are carried out at the cathode – the blanking pulses have an amplitude of about 64V peak-to-peak. If the cathode blanking drive chip fails it will shut off the tube.

An oscilloscope connected to the beam current grid G1 will display negative-going blanking pulses down to about -70V, with a black level of about -50V upon which the video signal can be seen. This check will indicate whether the tube is operational even when there's no output due say to failure of the preamplifier.

Beam Deflection

While the focusing is electrostatic the deflection is electromagnetic, achieved by means of a deflection yoke around the tube. Shorted turns in the yoke can stop deflection, resulting in no output from the target and no signal at G1. Loss of field drive will produce the same effects. Line deflection is linked to the high-voltage circuits, as with a TV set, and failure of the line scan usually results in no high voltages.

No Camera Picture

What do you do if there's no picture from the camera? First check that the high voltages are about right, next check that the scan outputs to the deflection yoke are present, then check that the cathode drive pulses are present and correct. If these things are all right, turn attention to the tube's preamplifier. This can be checked only by access to the target connection, involving partial removal of the tube. If the preamplifier is o.k. there will be massive amounts of noise when you go near it, due to the very high impedance and sensitivity.

Bias Light

The bias light – see Fig. 2 – is present to reduce lag or after-image effects as a result of the dark current being too small. It illuminates the target. The theory here is as follows. When there's a rapid change from bright light to dark, it's possible for the target's capacitive elements to be left with residual charges that cannot be discharged via the associated resistance between beam scans because the resistance value is too high. These charges show up as an after image. The effect can be reduced by using a small light to bias the target, thus maintaining a lower resistance level and hence increased discharge of the capacitive elements. The bias lights can be LEDs, mounted around either the tube face or the tube base to backlight the target.

Crystal Filter

The crystal filter is used to reduce cross-colour effects or moiré patterning in scenes that incorporate small chequered patterns or fine stripes. If fine patterns at around 4·43MHz in the luminance channel of a TV set are allowed into the colour circuits random blue/purple moiré herringbone patterns will be seen. Similar problems arise with a camera. Scenes that create luminance signal components at around the R/B carrier frequency of 4·3MHz will produce similar effects. The crystal filter is included to prevent this. It consists of an optical spatial filter with gratings effective at 4·3MHz, thus effectively blocking fine patterns before they reach the target.

Next month we will take a look at colour signal processing.

The Pros and Cons of LocoScript 2

When the Amstrad PCW8256 was launched it was hailed as the poor man's word processor. And so it was, for at £399 plus VAT few who regularly used words and put them down on paper couldn't afford one. This was particularly the case since most word processors were priced in thousands rather than hundreds of pounds. Understandably those who had laid out thousands went loco over it, and so did the competition. The program, LocoScript 1, was described by some as non-professional and amateur, and its limitations were fully aired. It did have limitations, but it also had many features not found with the more expensive outfits - the critics had little to say about these. In an article in the December 1986 issue of Television I endeavoured to give a balanced view, mentioning its pros and cons as well as those of word processing in general.

Since then Amstrad has brought out other models. There was first the upgraded PCW8512 with its second disc drive and double RAM M-drive capacity, increased from 256K to 512K (incidentally these numbers explain the model numbers adopted, the 8 referring to the Z80 8-bit microprocessor which is the heart of these machines). The 8512 was also supplied with LocoScript word processing. Subsequently Amstrad turned to IBM compatible arrangements. Being thus succeeded the PCW8256 came on offer at prices down to £299, representing an excellent opportunity for anyone wanting to start with word processing.

Development of LocoScript

Unlike many firms that lose interest in their older models, Amstrad continued to refine the LocoScript program. LocoScript 1 was taken through several suffix numbers, then in July 1987 the completely revamped LocoScript 2 was released. Some of the initial reviews in the computer magazines were clearly done in a hurry and inevitably some of the trivial points were emphasised while important ones were missed. In view of LocoScript 2's complexity and the large number of facilities available, it seemed prudent to get well acquainted with it before doing a follow-up to my original article.

My copy of LocoScript 2 has been in daily use now for a good few months – often for up to ten hours a day. The following comments are primarily intended for LocoScript 1 users who may be wondering whether or not to make the change to LocoScript 2. They should also be helpful to anyone contemplating a first plunge into word processing. One can start word processing with LocoScript 2 at a very elementary level – you don't have to learn a host of commands as you do with some other word processing systems. As you become familiar with the operation of LocoScript 2 you can start to use and master other features.

The Manual

The instruction manual was a problem with LocoScript 1. It was difficult for the beginner to follow. As a result many books and courses came on offer to help those who were as baffled by it as I was. Strangely the manual now

Vivian Capel

doesn't seem so bad and I can follow most of it – but then I'm no longer a newcomer.

The LocoScript 2 manual is a big improvement. After the preliminary setting up and connection instructions it outlines the main differences between LocoScript 1 and 2, referring to the appropriate sections of the manual to consult for detailed information on the changes. Thus it first gives LocoScript 1 users an overall picture of the differences, after which they can go into the detail.

The main part of the manual is a step-by-step tutorial for newcomers. It strikes about the right tone, being neither patronising nor too formal. Anyone starting from scratch should have few problems.

There's a postscript with tips on using LocoScript 2 for particular applications – business letters, memoranda, magazine articles, technical reports, invoices, circulars, newsletters and so on. Appendices include a glossary of all the technical and operating terms used, a list of all the characters available and how to obtain them, a quickreference guide with basic instructions for each function, and a trouble-shooting section. All in all it's a comprehensive, well thought out and easily understood manual.

Disappointments

One disappointment for me with LocoScript 2 is the lack of a word count, something that's very useful for authors, journalists, reporters, etc. I find this surprising as a number of features of limited use are included - the complete Russian alphabet, playing card symbols, male/ female symbols and even black and white smiling faces! A word count is included with the spelling-checker dictionary LocoSpell however. This is available as a separate program that works within the LocoScript format with direct access when working on a document, unlike other spelling checkers that have to be loaded separately after the document is complete. It's twice the price of some others however, and the main dictionary takes up so much space that it cannot be loaded into the 256K memory of the PCW8256 - it requires either an upgraded 8256 or an 8512. Otherwise the smaller dictionary included on the disc is loaded and used. This combination of a word count and spelling checker is not such a good idea - professional users who would get most benefit from a word count are least likely to require a spelling checker.

Another disappointment is the fact that you can't change existing text from lower case to capitals and vice versa. You can do this with some word processors and I'd hoped the facility would be included with LocoScript 2. It's easy when typing adjacent letters to touch the shift lock accidentally and thus type a line or so of capitals before you notice them. Instead of being able to change them you have to erase and retype the lot.

Menus

There are three ways in which you can operate and choose the various LocoScript facilities: by menus, by keystrokes, and by using an intermediate method which we'll ignore here. The menus consist of a group of related options that appear on the screen when the appropriate f key is pressed. There are four such keys which with the shift key give numbers f1-8. Having called up the right menu you move the cursor down it, with the cursor moving key, to the option required. You then press the plus and the enter keys. To cancel the option you do the same again, this time pressing the minus key. With the alternative keystroke method you simply press the plus key followed by a one- or two-letter code: to cancel you press minus followed by the same code. One wonders why the longer and more laborious menu method was the one taught throughout the whole LocoScript 1 manual, the simpler keystroke method being mentioned almost as an afterthought in half a page towards the end. With the LocoScript 2 manual keystroking appears throughout, but is still presented as an alternative to using menus.

The reason given for this is that the beginner uses the menus until he can learn the codes for keystroking. Nearly all the codes however are the initial letters of the options required – I for italic, B for bold, CE for centring, RA for right align, LS for line space, U for underline, etc. One hardly needs a photographic memory for these! This is unlike some word-processing systems with which the letter codes bear little resemblance to the functions.

My grumble about all this is that there are actually more menus with LocoScript 2 than with LocoScript 1. You can avoid many of them by keystroking of course, but many of them pop up without being asked. For example to print a document you first press the letter P. Then a menu asks whether you want high quality or draft, more than one copy and whether all or part of the document is to be printed. These are all useful options, especially the last one which was not available with early versions of LocoScript 1. Having chosen from these another menu appears to ask whether you want to use the current paper (the one to which the printer is set) or the one for which the document was set up. As the current paper option heads the menu you have to move the cursor and enter that option if you want to use the document designed paper, as in most cases you would. The menu thus seems to be superfluous, but should at any rate have had the designed paper at the menu head. After this yet another menu appears asking if you want to proceed with the printing (as if you didn't) and you have to affirm.

Other functions which now have to be done via a menu are copying, moving and erasing a file. With LocoScript 1 these were done by a single keystroke. When setting up the document the different tabs could be set by individual keystrokes with LocoScript 1. This too now has to be done via a menu, and the menu comes right over the top ruler, obscuring the tab position. The cursor must therefore be set to the required position before calling up the menu. This also applies to setting the left-hand margin, which is similarly obscured.

Another extra menu that requires an acknowledgement and can thus be irritating to the careful user, though no doubt a life saver for others, is the one which warns that a finished document on the M drive will be lost if you switch off without copying it on to a disc. In view of what is at stake however this is perhaps justified.

More irritating are the messages that appear in windows when certain functions are selected. For example, when inserting text from another source the message "insert document: select document using cursor keys then press enter or cancel to abandon" is displayed. As precisely the same wording appears at the same time in the header at the top of the page this message is superfluous. The annoying bit is that, as with some of the menus, the window obscures the very part of the screen you want to use. The message clears after a while, but introduces an unnecessary delay. The same thing happens when copying or moving a document – it didn't with LocoScript 1.

Too Amateurish?

The overall impression given by these extra menus and messages is that LocoScript 2 is less professional than LocoScript 1, which is rather a pity since in many other respects it improves on LocoScript 1's amateur image and includes facilities that rival and excel most professional word processing programs. The makers clearly felt it important to appeal to the beginner and the experienced user, but in so doing have tended to fall between two stools. One solution would be to issue the disc with the full existing program on one side and a streamlined version on the other. There would be room for this along with the tutorial examples that occupy part of this side.

Function Keys

The function keys and their options have been changed. This has been done mainly because of a rationalisation in the way in which the functions are classified, but one or two seem to have been altered for no apparent reason. Disc change for example is now f7 instead of f1. Tables 1 and 2 show the differences. The keystroke codes have changed little except for a few additional letters.

Setting up Documents

Setting up document templates and establishing the layouts is quite different with LocoScript 2. One effect is that the layouts become part of the text rather than being stored in the document header. So when the text is transferred or copied on to another document, or a different position in the same document, the layout goes with it. Layouts can also be given names as well as numbers. The advantages of the new system seem to be minimal, and to make it easier for users I think this should have been left as it was.

Improvements

My comments so far seem to have been mainly criticisms. I wanted to get these out of the way before mentioning the numerous improvements that more than balance them out.

Pagination

I always felt that too much attention was paid to pagination – the messages you might want to put at the top and bottom of each page – in LocoScript 1. Apart from page numbers this is not an oft-used facility. Yet when setting up every document or template you had to go through a pagination routine whether you wanted it or not. With LocoScript 2 the facility is there but can be sidestepped apart from a display of the pagination boundary lines.

With LocoScript 1 the header and footer zones included the top and bottom gaps, the top inch and bottom half inch on which you cannot print. These had to be allowed for when calculating the space to be allocated to headers, footers and main text. They are now treated separately, so that the usable zones can be assigned as required without

Table 1: Comparison of f-key functions when disc manager is displayed

Кеү	LocoScript 1
f1	Disc change
f2	Inspect
f3	Сору
f4	Move
f5	Rename – document; group; disc; recover from limbo.
f6	Erase
f7	Modes – edit; print; create; direct; ASCII file.
f8	Options – show limbo; show hidden files.

LocoScript 2

Actions – make ASCII file; show/load/save phrases; show blocks. Disc – copy; verify; format; rename. File – move; erase; rename; recover from limbo. Group – rename. Document – inspect; set first pages; set total pages. Settings – paper type; character styles. Disc change

Options - show limbo; show hidden files.

Table 2: Comparison of f-key functions during edit

кеу	LocoScript	LocoScript 2
f1	Show – codes; rulers; blanks; spaces; effectors.	Actions – document set-up; edit identity text; insert text; disc manager; show phrases; show blocks.
f2	Layout – new layout; layout no.; base layout; edit current/layout no.	Layout – centre; right align; justification; new layout; change layout; layout exchange; layout replacement.
f3	Emphasis – underline; bold; double; reverse video.	Style – underline; word underline; bold; double; italic; superscript; subscript; reverse video.
f4	Style – half height; italic; character pitch; normal/double width.	Size – character pitch; normal/double width; line space; CR extra spacing; line pitch.
f5	Lines – centre; right justify; soft/hard space; soft/hard hyphen; line spacing; line pitch.	Page – find; end; last line; current line with no. of lines above/below.
f6	Pages – last line; end page; lines together; page no.	
f7	Modes – edit header; identity text; insert text; disc manager.	Spell (for use with LocoSpell program).
f8	Blocks – blocks; save block no.; phrase; save phrases.	Options show codes/rulers/blanks/spaces/ symbols.

These comparative tables illustrate the major differences in operations between LocoScript 1 and 2. Many options call up submenus which are also different. There are other modes of operation such as printing and document set-up which have their own different key functions. While the functions are displayed across the top of the page for reference with both LocoScript 1 and 2, a LocoScript 1 user will take a while to get used to the changes.

the need for mental arithmetic. As with LocoScript 1 the screen indicates the number of lines available for the main text after the headers and footers have been determined.

Printers

While LocoScript 1 can be used with only the dotmatrix printer supplied, LocoScript 2 can be used with a wide variety of printers, of the matrix or daisy-wheel type. In fact you can connect a matrix and daisy-wheel printer at the same time and select from the keyboard which is to be used for a particular print-out. The supplied matrix printer gives perfectly satisfactory results however – in the high-quality mode the results are not far short of those obtained with a daisy wheel. The big advantage with the matrix printer is that an enormous range of characters and signs, letter styles and sizes is available. With the exception of one or two letters the styling of LocoScript 1 was good. The styling of all letters has been revised with LocoScript 2, the visual effect being even better than before.

With LocoScript 1 the printer had to be set for the type of paper to be used, so this had to be done when creating and when printing a document. LocoScript 2 has a built-in memory of various named paper sizes which can be inspected, altered or added to. When a document is to be printed the printer recognises its paper size from the memory. If it has just been printing another size a menu

TELEVISION MARCH 1989

tells you that it's not set to the document paper. A single keystroke plus enter sets the printer to the required size. If the document is created for a paper not present in the memory the printer will find the nearest listed size and offer it on the menu.

As A4 is the most commonly used size this is the one to which the printer is set at switch on. If you more frequently use another size you can change the memory to select this instead. This gives you automatic selection of the preferred size without a succession of printing menus – after three quick taps on the enter key the printer will start without further ado.

Page Numbering

When the page number code is inserted in the document set up, page numbering is carried out automatically as before. Now though with a long document such as a book, in which the chapters are more conveniently prepared as separate files, the page numbering can be made consecutive instead of each file starting at page 1.

Phrases and Blocks

As with LocoScript 1, blocks of text or individual phrases can be copied out, given code numbers and inserted elsewhere as many times as required by typing the code. Previously phrases could be inserted into other documents but blocks couldn't be unless they were specially saved. Now blocks are automatically saved and can be used in different documents. If required in the future they must still be saved on disc – the internal memory is lost when the PCW is switched off.

When it was asked to show what phrases and blocks were stored LocoScript 1 listed just the code numbers or letters. The first few words now appear along with the letters. This is very useful as unwanted or obsolete items can be identified and removed to make room for new ones.

Find and Exchange

A snag with the find and exchange feature with LocoScript 1 was that the word typed in had to match the one sought exactly. Thus if it sometimes appeared in the text with a capital initial but you typed it into find in lower case it would be ignored. If the word also occurred as part of a longer word the cursor would stop at all these too. With LocoScript 2 the find facility has been made more flexible. If told to do so it will find words irrespective of case. It will also find only complete words if so set. This makes the feature much more useful.

Cursor Movement

One of the criticisms of LocoScript has been the rather limited scope for moving the cursor around the screen. It can be moved to the next character, word, line, paragraph, unit, page or to the end of the document. These movements can also be reversed to go back through the document. This may seem to be a comprehensive list but two very useful moves are omitted, from one phrase to another (stopping at commas or semicolons) and from one sentence to another (stopping at full stops). When corrections are made the portions to be erased are usually phrases or sentences, so such moves would be very helpful. It's possible to use the find facility to locate the next and subsequent full stops or commas, but if you change from one to the other you have to reinstruct find accordingly.

Speeding things up

Other word processors permit erasure of a line to the right of the cursor, to the left of the cursor, or the whole line under the cursor. With LocoScript you have to define the portion to be erased by placing the cursor first at the start and then at the end of the section, operating the cut key in each position. This is not too onerous if the line and end-of-line keys are operated to produce quick cursor movement. Some users may get confused about these keys and not use them to the full. The line key takes the cursor to the end of the line while the end-of-line key (line plus shift) takes it to the start of the next line. If pressed with the alt key the cursor moves to the start of the same line. It's a pity that these keys were not given less confusing designations.

Another tip worth remembering is that a single dab on either of the horizontal cursor movement keys with the shift key will move the cursor by forty characters, i.e. about half a line to left or right. The vertical keys with shift give movement of forty lines up or down for a single press. This is the case with both LocoScript 1 and 2. If you practice these manoeuvres a few times you soon get the hang of it, greatly speeding your movement around the text. This makes LocoScript as fast as any other word-processing system.

An aid to speedy movement with LocoScript 2 is the facility enabling you to select a required page from the start of a file. The chosen page appears on the screen in just under half the time it takes to scroll through to the page with the cursor movement key.

Characters

With LocoScript 2 there are special registers known as super-shifts to make a greatly enlarged range of characters available. These are entered by pressing the alt key with one of the f numbers 1, 3, 5 or 7. Amongst the characters obtainable in this way are the complete Greek alphabet in lower and upper case, which is very useful for technical writers – LocoScript 1 had just a few. There is also the complete Cyrillic (Russian) alphabet in both cases with several Ukrainian alternative characters: other special language characters available include examples from Turkey and Greenland. A wide range of accent marks can be amalgamated with any letter simply by typing one after the other.

A considerable number of textual symbols, including special continental ones, and the symbols for the world's leading currencies are included. Over seventy mathematical symbols can be obtained, including the one that was conspicuously missing from LocoScript 1 – the radical or square root sign. There are even sixteen varieties of arrows and, yes, those card symbols and smiling faces!

With such a vast array of characters provided it seems ungrateful to grumble, but it's now harder to get eighth fractions. Thirds fractions are now included however.

Discs

A much vaunted facility with LocoScript 2 is the ability to format or copy discs with the LocoScript system, though I feel that it's a marginal advantage. It's performed by key f2 which produces a menu of options – copy disc, verify disc, format disc and rename disc. The verify option is the only omission as far as I can see from the otherwise excellent manual. There's no information as to what it does – it seems to check whether a disc is properly formatted.

Editing

What I consider to be a major improvement seems to have gone largely unheralded. When an existing file is edited you need at least the same amount of space to be available as that taken up by the file. This is because the edited version is recorded on a disc before the old one is scrapped. Thus for a few seconds both versions are present. If the file is a long one you need plenty of spare room. It's all too easy to overlook this and with LocoScript 1 the first intimation you have of insufficient space is when you try to exit and store the result whereupon the "disc full" notice appears. There's no information or advice in the old manual about what to do next. After two experiences of losing a morning's work I discovered how to suspend recording while moving or erasing files from the disc to make room.

When you start an edit with LocoScript 2 the disc is scanned to see if there's enough space. If there isn't, the notice "warning, document may not fit" appears and the options to cancel or continue are given. This is one menu I heartily welcome! In this situation the easiest course is to copy the document to drive M, work on it there, then move it back to drive A while erasing the original.

Another very useful new feature relates to the use of the same file name. You cannot have two files with the same name in the same group as the addressing and indexing facilities would be unable to distinguish between them. With LocoScript 1 if you want to replace an obsolete file with an updated one having the same name you have to give it a temporary, different name, move it into the required group, erase the old file then change the name of the new one to that of the old one. Now when a new file is moved into the same group as an old one with the same name a menu appears pointing out that the name is already in use and offering the options of replacement with the new file, choosing another name or cancelling the operation. Choosing to replace erases the original file and instals the new one at the same time. This facility can be used when moving an edited document in drive M back to replace the original version in drive A. I've found it to be a very convenient feature and a considerable time saver.

Documents made in LocoScript 1 cannot be printed or

edited with LocoScript 2. If an edit is attempted, the file will be converted automatically to LocoScript 2. Only the paper size may need to be reset. Conversion is necessary only the first time, after which the file becomes a permanent LocoScript 2 document. This means that it cannot afterwards be worked on in LocoScript 1. If you want to preserve that option it's best to copy the document, then convert the copy to LocoScript 2, retaining the original LocoScript 1. All templates should be converted otherwise every document made from them will be in LocoScript 1 format and will need converting. Not all the details come out right however: I've found it better to remake all templates in LocoScript 2.

Conclusion

So much then for the main differences between LocoScript 1 and 2. I feel less than enthusiastic about some of the changes and am disappointed over the omissions, but the fact remains that it's an excellent word-processing system. The many advantages over LocoScript 1 clearly outweight the drawbacks.

Compact Disc System Developments

Some interesting technical details of the Philips CD-Video system were presented at a recent talk at the Institution of Electrical Engineers. The lecturer was Simon Turner, head of the Home Interactive System Division of the Philips Research Laboratory, Redhill. His talk, entitled "Voice, Data and the Compact Disc", started with a general view of the evolution of CD technology from its beginnings at Eindhoven in 1969. Since the launch of CD digital audio in 1982 thirty million players and 450 million discs have been sold worldwide (eight per cent of UK households own a player). CD audio has been called the fastest-growing consumer electronics product: its success has been helped by the common standard, which ensures that all discs can be played on all players.

CD-Video

CD-Video is now in the shops. It combines digital audio with analogue video on the same disc. The standard 5in. CD-Video disc (gold coloured to differentiate it from its audio counterpart) contains five minutes of video with digital sound on the outside of the disc and twenty minutes of digital audio on the inside. A single laser head reads the sound and vision signals simultaneously. The video signal is handled in the same way as with LaserVision: the PAL signal is modulated on to a 7MHz carrier with the baseband digital audio underneath — it takes up about 2MHz. The digital audio portion of the 5in. disc can be played on an ordinary CD player.

CD-Video players can take any size of disc up to 12in. (a 3in. disc is planned). LaserVision discs are compatible — most players can handle an analogue sound track. Setting up of the required tracks is done on the TV screen with the remote control unit.

CD-Interactive

There's no transatlantic compatibility with the analogue video signal, which is a drawback. It will limit the choice

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of CD-Video discs, or software as we have to call them. This however is not the case with Philips' next development, CD-Interactive. CD-I is being planned with the domestic market firmly in mind. Audio, graphics, data and video are stored on the same disc, with the difference that this time the video is digital. This makes for true compatibility between TV standards. The pixel standards are 384 \times 280 for normal pictures, 768 \times 280 for double size and 768×568 for "extended" studio-quality pictures. For most applications the video consists of stills, but moving effects such as a talking head within a stationary frame can be generated. The recording techniques are very much related to computer images rather than TV. However the picture display will always be via a TV set rather than a computer monitor as CD-I is seen as a primarily domestic product.

The first CD-I players are now being demonstrated. At present they consist of two boxes, the CD player and the MMC (Multi-Media Control) module. The latter links the player to the TV set and hi-fi system and is operated by remote control. The remote control unit incorporates a pointer control for on-screen selection. The hardware is based on a 68000 microprocessor which runs the OS-9 operating system. A dedicated piece of hardware is used for file handling, though the data transfer rate is fairly slow at about 150kbytes/second. It shouldn't be too long before the two boxes become one!

The CD-I players will not sell unless there's good software for them, i.e. plenty of discs to go with them. To this end Philips has set up a company called AIM (American Interactive Media) which is linked with Polygram. Two other similar companies are being set up in Europe and Japan. The main applications envisaged are interactive talking books, educational aids and superior adventure games. Replication cost is small, but the data gathering and setting up is an expensive and time-consuming business. No doubt Philips will be supplying development tools to make it as easy as possible to exploit this interesting new technology.

VCR Clinic

Philips VR6462

This machine had two faults as follows: first at power up with no cassette the tray moved in and out more times than usually, secondly the machine remained in the rewind mode and refused to do anything else. The cause of the first fault was that the threading motor counter signal was missing due to a faulty Hall-effect sensor on board P671. The second symptom was present because the head drum didn't rotate – IC7001 (L272) was open-circuit. P.B.

Grundig VS440

The problem with one of these machines was intermittent no erase or sound bias. It would clear if the PCB on the back of the audio/control/erase head was pressed. When the PCB was removed we found that there was a solder bridge from one of the pins to the screening can. **P.B.**

Sanyo VHR1100

If you encounter one of these machines that won't lace up and/or produces a nasty smell or puff of smoke when asked to record or play, check R3110 which is associated with IC3005 on the SY-1 board. If it's overheating, the loading motor is drawing excessive current. Depending on how many goes the user has attempted, the motor drive chip IC3005 (BA6238A) may or may not have survived. **E.T.**

Panasonic NV-M1

We've encountered the following situation on more than one occasion: the capstan motor starts running at switch on then after a few seconds the syscon switches the camcorder off again. The cause is that the 9V supply to the main PCB is missing — check at TP1002. You'll find that the circuit protector fuse PR1002 is open-circuit. This seems to happen for its own internal reasons, since we've never found that excessive current has been flowing and have never had a replacement fuse fail. E.T.

Sony CCD-V100

Since the same accessories are used, the design and pinning of the recessed multi-output plug on this model is the same as for the CCDV7/8/AF range. Even though the readily-conductive metal caps are omitted from the locating pins with the later production r.f. unit, clumsy insertion of the modulator can bend and short-circuit the delicate connection pins. Thus whenever the main 3.15A fuse inside the camcorder has blown, carefully examine pin 3 of the multi-connector for signs of arcing or burning. Unless the pin is broken or badly bent, the fuse (in this model F381 on board SC-6) is the only casualty. E.T.

Grundig VS180

Grundig VCRs are rare visitors to our workshop. This one was said to be stuck in pause. What happened was that the machine would have a brief go at any function selected and would then shut down with the pause LED alight. This is an "emergency" indication, drawing attention to lack of reel sensor pulses, and in this case came on Reports from Philip Blundell, Eng. Tech., Eugene Trundle, Ian Bowden, Alfred Damp and Nick Beer

because the reel brake solenoid didn't operate. A pull-in current is routed via a switch (behind the solenoid) which opens when the armature has moved over. Its contacts were dirty, leaving only the hold-in current in the solenoid. Giving the switch contacts a good clean restored normal operation. E.T.

Hitachi VT410

Many customer descriptions are merely the first clue in the guessing game that occupies an engineer during the first part of his diagnostic session. "Sound slurs" is one of the better ones, usually indicating problems in the capstan department. On this machine the capstan ran slowly and erratically. A meter connected to the speed control line to the motor showed that the servo was working flat out to speed up the motor. The motor itself was faulty, though it ran very freely when turned by hand. E.T.

Fisher FVH-P710

If you find that fuse F902 (500mAT) on the mains transformer PCB has blown for no apparent reason, check for dry-joints at the PCB connections of pins 10 and 12 of connector PV903 on the regulator panel. Considerable current passes through these pins, and some of it will be diverted through F902 and C928 in the event of a momentary open-circuit. The other joints on the plug/ socket connections to this board are also worth checking.

Ferguson FV20

The fault with this machine was no colour. Use of another machine proved that it was recording the chroma signal, so the fault was only on playback. From the head amplifier circuit the chroma passes to the playback processing circuitry via a couple of filters. There was an input to the first filter LPF201 but no output. As a check, the filter was removed and an 0.1μ F capacitor was used to couple its input and output connection points. This restored colour, so a new filter was ordered. **I.B.**

Ferguson FV20

There were two fault symptoms with this machine, no playback picture (blank screen, sound o.k.) and what looked like a low luminance level in the E-E mode. Both problems were caused by the same faulty component, low-pass filter LPF102 which is connected between pins 10 and 21 of IC101 and is used for both E-E and playback.

I.B.

Ferguson FV11

Sound but no playback picture was the reported fault with this machine. From this description I suspected clogged video heads, so before trying a tape I took a look at them. There was some oxide present, but it wasn't too bad. The drum was next warmed to remove any moisture and a tape was played back. The picture was fine! It was only when I moved the luminance/chroma board – I had to fold it up to the vertical position to remove the video head screening can – that the fault occurred. The effect was similar to an off-tune monitor TV set – just off the higher end of the r.f. output. The fault could be made to come and go by slightly twisting the panel. Close examination revealed a dry-joint on a small luminance coupling capacitor (C134) which is next to the right-hand subpanel. **I.B.**

Philips VR6362

This machine came in with a broken cassette lift and the complaint of no rewind or reverse picture search. In fact what happened was that when the VCR entered the rewind mode the tape tightened and was then unloaded. The drive coupling, item 214, was at fault. A.D.

Akai VS112

This machine would play back prerecorded tapes but there were no E-E signals and the channel indicator LEDs didn't light. The LEDs and the tuning potentiometers had 33V on all sides, including the chassis connection. When we traced the earth return back to the main board, via connector P601, we found that an earth tag on the tuner unit was dry-jointed – the tuner's case is used as a link to the earthy side of the tuning presets. We decided to resolder all four mounting lugs on the tuner as well. A.D.

Sharp VCA100

The capstan motor in this VCR refused to work. We found that the 15V and 5V supplies were present and correct and that the 2.5V reference voltage was correct, but the capstan drive voltage was low at 1.5V instead of 2.4V. The capstan stop signal at pin 57 of the system control chip IC827 was then found to be permanently low. When this monster chip was replaced the capstan motor worked correctly. **A.D.**

Hitachi VT33

This VCR generated a noise in most modes. The symptom was similar to that produced by a dry capstan flywheel bearing in the later VT64 series. As suspected, the flywheel bracket was fitted with the nylon bearing. Further pushing, prodding and listening revealed that the noise was coming from a pulley on the clutch assembly, item 301. A.D.

Ferguson 3V30

The rather unusual complaint with this machine was no sound in the E-E, record or playback modes. We soon found that the 10.5V supply to the audio section was way down at only 0.344V. There was no excessive loading and it turned out that the regulator transistor Q17 was opencircuit. It's a 2SD636 but we fitted a 2SD637 (60V version) as this is a much used device we stock for Panasonic VCRs. N.B.

Panasonic NV-100/NV-10B

The problem with this portable VCR and tuner/timer combination was failure to record. On test we found that there was no sound or vision in the E-E mode – only the test signal could be produced. Playback direct from the VCR was fine. A look at the V10 unit was thus required. As the test signal was present that path from P7002-3 was o.k., including the thick interconnecting lead. There was no video output from pin 2 of IC701 (BN5115). It was

present at the base of Q733 but not at its emitter. When it was tested we found that Q733 (2SC945/BC547) was short-circuit collector-to-emitter. The sound was muted because of the no video signal problem. The NV100 was then cleaned, and after replacing the noisy transmission pulley and belt it too performed perfectly. N.B.

Panasonic NV-G25

After a recent repair the customer complained that the clock/counter display faded out. Our field engineer (we call him Enid Blyton because of the fairy tales he tells us about the faults he sees) said he'd seen the fault. After many hours on soak test the display went dim, the final digit of the counter being even dimmer than the rest. The heater voltage was correct but the grid drive was incorrect. The drive comes from the MN15283VJU timer chip IC7501. Replacing this restored correct operation.

N.B.

Ferguson FV11

A couple of faults are becoming very common with these machines. First is intermittent failure to eject, or other intermittent mechanical faults, caused by a loose earthing screw on the mecha connection PCB. The other is intermittent going into rewind from play during a tape. This is caused by dry-joints on the supply photosensor. Both faults can be exceptionally intermittent. N.B.

Panasonic NV366

A fault you may be faced with in these machines is the channel one LED flashing and inability to change channels. This can very often arise after replacing the three gold memory back-up capacitors. If you remove these by twisting them off the board (as you should if they are leaking) you can break R7693 ($22k\Omega$) in half, producing the new fault. **N.B.**

Panasonic NV2000

This one came in with no comments under "fault" on the job card — always a bad sign! After switching it on the first fault noted was that the machine didn't switch from E-E to V-V. This was because the EXCEPT REC 9V supply was missing, soon traced to Q6043 (2SA719) which had a $4.7k\Omega$ collector-emitter leak. Next the drum speed took about forty seconds to settle down. Adjustment of the drum free-run control took care of this.

I then decided to refix the two main panels to the metal frame, which was hanging around them loosely as someone had removed all the screws. I'd previously noticed that three out of seven chassis fixing screws were missing and bolts were fitted where there should have been screws and vice versa. Next I found that there was no colour in the playback mode — the chroma reference set trimmer had been "graunched". A replacement was fitted and set up within minutes, but the a.f.c. also had to be realigned — a twiddler had been at large . . .

We're not through yet: there was no sound in E-E or playback because the REC 9V supply was permanently present, due to Q6041 in the syscon being short-circuit. When all this had been put right and the whole thing had been reassembled correctly the machine worked well. The correct screws were fitted! I hope the idiot responsible for putting the deck in this state is reading this and is thoroughly ashamed of himself. **N.B.**

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17089 17127 17376 1N4001	3.45 2.50 1.58 0.04	2SC1923 0 2SC1929 2 2SC1942 1	0.30 2.25 1.98	AN236 3 AN240P 4 AN241 1	5.09 3.33 0.99 1.71	BC237 BC238 BC238B BC239B	0.10 0.16 0.08 0.25	BF115 BF117 BF118 BF121 BF122	0.29 0.66 0.67 0.25	BU208A BU208D BU209 BU226	1.12 1.43 1.93 2.45	HA13365 HA1366WR HA1367 HA1368R	4.02 1.38 2.75 2.45	MC14073 MC14493P MC14494P MC14497 MC14510BAL	4.20 2.15 3.46 3.75	SAS6700 SAS6700 SAS670 SAS6710 SBA750	1.33 1.33 1.33 2.21 1.61	T6035V T6036 T6037 T6044V	7.96 0.73 0.67 2.11 0.97	TCA270S TCA270S TCA270SQ TCA290A TCA420A	1.71 2.15 1.05 2.39 2.16	TDA4610 TDA4620 TDA5500 TDA5700 TDA7270S	6.73 7.45 2.75 2.25
1N4002 1N4003 1N4004 1N4005	0.06 0.06 0.05 0.05	2SC1957 0 2SC1953 1 2SC1962 1	0.95 1.93 1.93	AN253 1 AN260 3 AN272 2	4.90 1.80 3.85 7.92	BC251A BC294 BC300 BC301	0 31 0.50 0.35 0.23	BF123 BF127 BF137 BF153 BF154	0.13 0.29 0.58	BU326 BU326A BU406 BU406D BU405D	2.00 0.99 1.49 1.53	HA1368 HA1370 HA1374 AA117	2.07 3.71 1.80 9	MC14510BAC MC14511BCP MC14528BCP MC1712 MC5192	1.10 2.15 3.88 19.50	SC84203 SC8504P SDA2006 SDA2112/2	19.35 1.95 17.95 10.28	T6045 T6049 T6052V T6058	1.20 1.45 0.87 3.08	TCA420A TCA530 TCA640 TCA650	2.25 2.24 2.25 3.05	TDA8190 1DA9403 TDA9503 TDA9513	3.96 1.50 2.92 3.15
1N4007 1N4148	0.08 0.07 0.03 0.05	2SC1983 3 2SC1985 1 2SC2009 0	1.28 1.55 1.34	AN301 2 AN302 2 AN305 1	5.52 2.45 3.09 8.88 2.46	BC302 BC303 BC307A BC308A BC309	0.53 0.30 0.06 0.11 0.17	BF159 BF158 BF159 BF160	0.26 0.33 0.18 0.18 0.31	8U407 BU412 BU426A BU500 BU508A	0.82 5.29 1.67 1.45 1.89	HA1377 HA1389R HA1389 HA1392 HA1394	1.75 2.05 2.39 1.38 2.37	MC7724CP MC7818C MCR106 5/6 MCR220/7	3.49 2.18 1.23 2.28	SG264A SG613 SG629 SG6533	5.26 8.75 8.27 10.31	T6059 T9083V T9005V T9011V	2.77 1.25 2.30 1.40	TCA660B TCA730 TCA750 TCA8000	2.60 3.81 2.25 5.95	TDB1033 TDE1081 TEA1002 TEA1009	2.68 7.05 2.30 0.80
1N5404	011 013 018 015	2SC2028 2 2SC2063 0 2SC2078 3	111 0.99 1.39	AN316 AN318 AN320 AN320	5.53 9.35 5.47 2.25	BC317A BC327 BC328 BC337	0.13 0.33 0.11 0.09	BF167 BF173 BF177 BF178	0.38 0.34 0.55 0.40	BU536 BU608 BU705 BU806	1.65 1.65 2.50 0.85	HA1397 HA1398 HA1406 HA1452	2.95 2.95 2.07 0.85	ME0411 ME6002 ME6102 ME8001	0.75 0.26 0.28 0.34	SI1125H SI1225HD SI1630HD SKE2F1/04	7.50 19.27 20.50 1.39	T9013V T9014V T9016 T9019W	4.95 2.42 1.02 1.98	TCA830S TCA890 TCA900 TCA910	2.38 5.44 2.04 1.65	TEA1014 TEA1020SP TIC106C TIC106M	1.50 4.93 0.61 0.77
1N5408 1N914 1S1555 1S44	0.14 0.04 0.31 0.10	2SC2085-0 1 2SC2091 1 2SC2141 2	1.65 1.30 2.44	AN322 6 AN337 5 AN340P 1	6.78 5.37 1.53 5.98	BC338 BC368 BC440 BC441	0.12 0.18 0.69 0.46	BF179 BF180 BF181 BF182	0.36 0.36 0.32 0.34	BU807 BU826A BUW84 BUX84	1.40 1.95 1.39 0.50	HD14538 HD38702-A2 HD38750A53 HD38750A-7	2.07 7.95 5.77 7.25	ME0411 MJ2501 MJ3001 MJ481	0.75 3.30 1.43 1.53	SKE2G3/04 SKE4F1/06 SKE4F2/08 SKE4F2/06	0.85 0.35 1.07 0.80	T9034V T9035V T9051 T9054V	1.45 1.40 7.14 3.46	TCA940 TCA940E TD3F800R TD3F900H	0.82 2.93 3.67 5.36	TIC44 TIC45 TIC47 TIP120	0.72 0.56 0.77 1.55
1S921 2N2219A 2N3053 2N3054 2N3055	0.10 0.37 0.35 0.99 0.79	2SC2216 0 2SC2233 1 2SC2236 1	20	AN362 1 AN370 2 AN5111 3	1.50 3.95 3.43 4.50	BC454 BC460 BC461 BC462	0.36 0.42 0.47 0.51	BF183 BF184 BF185 BF194	0.39 0.43 0.39 0.14	BUX85 BY126 BY127 BY133	0.69 0.13 0.13 0.06	HD38800A50 HD44801A05 HISH1010 HISH1004	14.09 12.50 8.59 6.00	MJ802 MJE2955 MJE3055 MJE340	3.93 1.89 1.25 0.49	SKE4F2/10 SKE4G2/02 SKE5F3/10 SKS1/10	1.33 0.96 1.60 2.15	T9057V T9062V T9064 TA7027	2.77 0.49 3.90 4.80	TD62706P TDA10018 TDA1003A TDA1005A	4.50 2.31 1.79 2.22	T(P110 TIP112 T)P117 TIP121	0.53 0.34 0.95 0.40
2N3442 2N3702 2N3703 2N3705	1.16 0.14 0.18 0.16	2SC2335+Krt 7 2SC2551 1 2SC2565 3	.00 .26 .94	AN5250 AN5610 AN5612 2	4.42 4.40 7.43 2.07	BC463 BC478 BC479 BC532	0.30 0.32 0.41 0.28	BF195 BF196 BF197 BF198	0.14 0.17 0.16 0.17	BY164 BY176 BY179 BY182	0.44 0.52 1.42 1.05	HISH1002 HM6231 HM6232 HM6251	9.50 9.81 10.95 5.25	MJE520 ML231 ML232B ML2376	0.49 0.99 3.01 2.51	SL1310 SL1430T SL414 SL432A	3.14 2.31 3.69 3.44	TA7050 TA7051 TA7054 TA7060AP	1.74 5.74 2.55 0.71	TDA1006A TDA1010AF TDA1011 TDA1010	7.00 4.25 2.40 1.02	TIP126 TIP132 TIP137 TIP29 TIP2955	0.38 0.99 0.96 0.84
2N3706 2N3707 2N3711 2N3771	0.14 0.16 0.11 2.04	2SC2577 1 2SC2578 6 2SC2671 0	.60 5.75 5.91	AN5630 3 AN5701N 1 AN6250 3	4.20 3.95 1.66 2.95	BC546 BC547 BC548 BC549 BC550	0.17 0.10 0.10 0.10	BF199 BF200 BF218 BF224 BF227	0.17 0.37 0.36 0.17 0.65	BY187 BY189 BY198 BY207 BY207	0.77 1.76 1.62 0.22 1.11	HM7103 HM9032 HM9012 HM9015	4.85 4.00 3.22 3.24	ML238 ML923 ML926 MM5314N MM5316N	5.77 3.10 3.50 8.99 9.16	SL439 SL471 SL480 SL490 SL901B	2.48 2.88 3.14 2.37 8.32	TA7061AP TA7069 TA7070P TA7072P TA7074P	1.27 3.13 1.83 2.57 1.98	TDA1011A TDA1028 TDA1034B TDA1035S TDA10351	1.51 2.45 2.42 2.95 2.55	TIP298 TIP298 TIP298 TIP290 TIP290	0.86 0.46 0.63 0.40 0.75
2N3772 2N3773 2N3819 2N3823	1.55 2.20 0.40 1.17	2SC3153 6 2SC372 1 2SC373 1	5.50 1.40 1.16	AN6310 4 AN6340 6 AN6341 1	4.40 4.54 6.46 1.42 6.00	8C556 8C556 8C558 8C558 8C559	0 10 0 16 0 10 0 10 0 10	BF240 BF241 BF245 BF245B	0.65 0.19 0.17 0.50 0.49	BY208 BY210-400 BY210-600 BY210-800 BY223	0.18 0.27 0.19 1.43	HT4207 HT4208 KA2101 KC581C KC582C	13.25 20.65 1.00 7.68	MM5318N MM5369N MM5387AA/N MM5841N	3.11 2.01 6.20 6.64	SL918A SN15861AN0 SN15862AN SN15966N	9.07 0.82 2.98 10.25	TA7076P TA7089P TA7092P TA7093P	7.50 3.10 9.94 3.99	TDA1037 TDA1037 TDA1037D TDA1044 TDA1047	1.95 2.05 1.95 3.25	TIP3055 TIP30A TIP30C TIP31A	0.66
2N3904 2N3908 2N4101 2N4240 2N4444	0.15 0.62 1.33 2.00 0.90	2SC388 1 2SC394V 0 2SC403C 0	1.27 0.81 0.60	AN6531 1 AN6551 0 AN6552 0	1.95 0.50 0.68 1.65	8C560C 8C635 8C636 8C636 8C637	0.14 0.34 0.20 0.24	BF246A BF255 BF256 BF257	2.52 0.20 0.28 0.34	BY224-600 BY226 BY227 BY228	1.88 0.25 0.20 0.60	L200CV LA1201 LA1210 LA1230	4.85 1.69 0.75 1.56 1.44	MN1400VL MN1405 MN1435VX MP1192	13.65 7.92 9.50 5.07	SN29717N SN29716N SN29715N SN29715N SN29722	7.19 3.66 6.04 11.95	TA7102P TA7108P TA7109 TA7122B/P	5.88 1.61 3.71 0.87	TDA1059B TDA1054M TDA1060 TDA1062	0.80 1.21 2.60 3.25	TIP31B TIP31C TIP32A TIP32B	0.38 0.30 0.35 0.46
2N5293 2N5294 2N5296 2N5297	0.90 0.50 0.50 0.48 0.50	2SC495 0 2SC515A 1 2SC535 0	1.92 1.85 1.79	AN7111 AN7115 AN7115 AN7145	1.25 2.52 2.80 9.90	BC639 BC640 BCX34 BD115	0.36 0.24 0.40 0.36	BF258 BF259 BF262 BF263	0.33 0.34 0.57 0.57	BY229-1000 BY229-600 BY255 BY295-600	1.12 0.92 0.13 1.03	LA1320 LA1357N LA1363 LA1364	2.87 9.00 1.05 3.02	MP2794 MP2812 MP8512 MPC596	4.00 5.07 1.57 2.13	SN29723AN SN29764AN SN29767 SN29767 SN29770BN	8.77 2.38 3.90 3.69	TA7124P TA7129P TA7130P TA7136AP	2.34 1.50 1.27 1.89	TDA1151 TDA1190 TDA11902 1DA1200	1.22 2.11 2.48 1.51	TIP32C TIP33 TIP33A TIP33C	0.28 0.85 1.02 0.80
2N5298 2N6109 2N6130 2N6133	0.61 1.58 0.85 1.25	2SC537 0 2SC605L 1 2SC620 1	0.54 1.16	AN7151 2 AN7156 2 AN7158 2	2.37 2.85 2.34 0.80	BD116 BD124 BD131 BD132	0 70 1.31 0.42 0.42	BF271 BF273 BF274 BF324	0.34 0.20 0.20 0.23	BY298 BY299 BY407 BY409	0.20 0.60 0.90 1.49	LA1365J LA1385 LA1387 LA3350	1.15 1.53 5.95 1.43	MPF256C MPS6570 MPSA42 MPSA56	0.60 0.48 0.35 0.08	SN29772BN SN29771BN SN29791 SN29798N	5.60 4.15 1.67 5.56	TA7137P TA7141AP TA7146 TA7146P	0.98 3.87 2.50 4.23	TDA1235 TDA1236 TDA1270 TDA1327A	3.88 3.30 3.74 1.50	TIP34 TIP41A TIP41B TIP41C	0.75 0.49 0.31 0.68
2N6180 2N6292 2SA1006 2SA1011	0.73 1.65 1.50 1.65	2SC681 4 2SC682 1 2SC684 1	.40 .88 .65	AU107 AU110 AU113	4.55 5.87 5.69 6.95	BD133 BD135 BD136 BD137	0.53 0.36 0.36 0.26	BF336 BF337 BF338 BF355	0.33 0.45 0.40 0.49	BY448 BY713 BYW56 BYX55-600	1.35 0.65 0.14 0.23	LA3361 LA3390 LA4032P LA4100	1.60 5.52 2.35 1.25	MPSA92 MPSU05 MPSU10 MPSU56	0.45 0.86 1.56 0.60	SN2709 SN7400N SN7401N SN7402N	0.44 0.61 0.36 0.65	TA7148P TA7149P TA7152P TA7161P	1.67 3.26 2.72 4.50	TDA1412 TDA1420 TDA1440 TDA1470	1.08 1.52 3.45 2.90	TIP42A TIP42B TIP42C TIP47	0.60 0.79 0.82 0.65
2SA1015 2SA1012 2SA1020Y 2SA1027R	0.49 1.25 0.80 0.45	2SC710 1 2SC711A 0 2SC717 1	.15).50 1.28	AY106 1 BA524 6 BA310 0	2.08 1.09 8.94 0.14	BD138 BU139 BD140 BD144	0.28 0.34 0.32 1.43	BF362 BF363 BF371 BF391	0.60 0.50 0.50 0.25	BYX71-600 BYX71-350 BYY56 BZY93C30	0.85 0.62 1.20 1.86	1A4101 LA4102 LA4112 LA4125	1.30 0.75 0.56 2.25	MPSU60 MR818 MR854 MR914	1.33 0.33 0.50 1.20	SN7404N SN7408N SN7410N SN74121	0.52 0.27 0.27 1.60	TA7162P TA7172P TA7176P TA7153P	3.51 1.41 1.75 4.80	TDA1470P TDA1506 TDA1510 TDA1512	4.25 6.58 4.60 2.89	TIS43 TIS90 TL011CP TL494CN TL072CP	1.43 0.21 1.56 8.95 1.45
2SA473 2SA766S 2SC1173Y 2SC1474	0.75 4.95 1.25 1.25	2SC783 3 2SC790Y 1 2SC828 0	3.98 1.85 1.28	BA1320 1 BA1322 2 BA1330 2	1.98 1.38 3.95 2.75	B0150 B0157 B0160 B0163 B0166	0.75 0.67 1.60 0.71	BF417 BF418 BF422 BF423 BF450	0.84 1.87 0.30 0.33 0.35	8ZY88 RANGE BZX61 RANGE BZX79 RANGE C106D C106M	0.10 0.18 0.10 0.37 0.76	LA4138 LA4140 LA4192 LA4220 LA420	4.58 0.70 1.50 1.25		17.35 13.95 0.34 2.65 0.19	SN7413N SN74141N SN74151AN SN74154N SN74190	0.37 2.65 1.51 1.27 1.35	TA7204P TA7206P TA7207P TA7208P TA7208P	2.16 12.19 1.48 2.15 1.45	TDA1515 TDA1559 TDA1670 TDA1770 TDA1905	2,89 3,15 4,48 2,75 1,27	TMP4320 TMS1024NLL TMS1025N TMS3720ANS	15.00 10.50 6.25
2SC1509 2SA1095 2SA1103 2SA329 2SA329 2SA489	1.35 3.00 6.00 0.40 1.17	2SC876 0 2SC930 0 2SC935 4	1,96 0.54 1,13	BA148 BA154 BA155	0.19 0.25 0.40 0.12 0.05	BD175 BD179 BD181 BD182	0.42 0.28 0.30 0.99 0.99	BF450 BF451 BF457 BF458 BF459	0.35 0.29 0.41 0.49 0.52	CA3046 CA3089 CA3090A0 CA3094	1.55 0.83 3.25 2.20	LA4420 LA4422 LA4430 LA4440 LA4445	1.72 1.00 1.29 1.95 1.80	NE556 NP1106 0A202 0A47	0.65 11.51 0.11 0.16	SN7420N SN7430 SN7440N SN7442	0.34 0.49 0.27 1.54	TA7214P TA7215P TA7217AP TA7222	3.63 2.58 1.45 1.95	TDA1908 TDA1940 TDA1950 TDA1950 TDA2005	2.90 1.95 2.50 1.45	TMS3748NS TMS3755 TMS3894NL TMS5102NLL	14.95 13.65 19.25 6.25
2SA490 2SA493 2SA562 2SA564	1.32 2.25 0.57 0.62	2SD1128 2 2SO1138 0 2SD1273 1	2.90 0.94 1.30	BA159 BA182 BA222	0.09 0.19 1.66 1.24	BD183 BD184 BD187 BD189	0.99 1.21 0.53 0.69	BF460 BF469 BI470 BF471	0.99 0.28 0.26 0.33	CA3131EM CD4001 CD4002 CD4008	2.95 0.34 0.27 1.35	LA4460 LA4461 LA5112N LA7020	1.75 1.70 1.18 13.86	DA91 DA95 DC28 DC29	0.14 0.09 2.52 2.15	SN7474N SN7490AN SN74LS26N SN76001N	0.44 0.93 1.45 1.65	TA7226 TA7229P TA7230P TA7233P	3.57 4.22 1.35 3.46	TDA2006 TDA2004 TDA2002 TDA2003	1.55 1.48 0.90 1.00	TUA2000 TY6010B ULN2204 UPA53C	8.98 2.97 8.50 4.94
2SA614 2SA628 2SA639S 2SA659	4.88 0.37 1.75 0.49	2SD152K 2 2SD198 3 2SD234 0	2.64 3.87 0.47 0.60	BA311 BA312 BA313 BA317	0.65 1.45 0.76 0.04	BD190 BD201 BD202 BD203	0.69 0.49 0.60 0.46	BF472 BF479 BF480 BF491	0.33 0.61 1.79 0.50	CD4011 CD4012 CD4013 CD4015	0.29 0.24 0.33 0.36	LA7025 LA7027 LA7040 LA7042	11.97 10.92 9.20 3.90	0C36 0C44 0C45 0C72	7.53 0.35 0.18 0.44	\$N76013ND SN76023N \$N76023ND SN76033N	3.50 2.97 3.91 5.54	TA7240AP TA7245P TA7310P TA7313AP	2.55 5.52 2.15 0.65	TDA2030 TDA2140 TDA2150 TDA2151	1.35 2.14 6.20 1.30	UPC1003 UPC1009C UPC1025H UPC1028H	5.95 6.32 2.90 2.00
2SA673 2SA684 2SA697 2SA699 2SA715	1.50 1.20 0.80 1.25 0.95	2SD257 1 2SD292 4 2SD313 2	1.98 4.09 2.65	BA328 BA333 BA335	0,09 1.65 1.37 6.27	BD204 BD207 BD208 BD222	0.41 1.79 1.23 0.50	BF506 BF532 BF596 BF597	0.43 0.24 0.18 0.27	CD4017 CD4020 CD4021 CD4023	0.40 1.23 0.39 0.28	LA7800 LA7801 LB1274 LC7800	1.03 0.90 3.61 9.20	0C75 DN236 DN782 DT121	0.44 1.05 1.98 1.45	SN76110N SN76115AN SN76131 SN76227N	0.90 1.61 0.82 0.85	TA7314 TA7323P TA7325P TA7339P	5.94 3.15 1.15 1.85	TDA2160 TDA2161 TDA2170 TDA2270 TDA2270 TDA2520	4.01 2.40 4.50 3.96 2.25	UPC1032H UPC1042C UPC1156H UPC1161C UPC1182H	0.82 8.95 1.45 4.98 1.50
2SA748 2SA817 2SA835 2SA836 2SA844	1.95 0.18 2.50 0.89 0.65	2SD350 3 2SD353 7 2SD389 2	3.05 7.50 2.41	BA511 BA514	2.50 1.95 1.00 1.20	BD225 BD228 BD229 BD232 BD234	0.46 0.63 1.05 0.49 0.42	BF694 BF757 BF759 BF761 BF762	0.22 0.59 0.47 1.05 0.34	CD4025 CD4028 CD4040B CD4047 CD4047	0.64 0.84 0.60 1.06	LD3120 LD3150 LM1017N LM1877	1.13 2.75 1.81 3.50	PT6042 PT8504 R1038 R1039 R2008B	2.45 4.98 2.19 2.19 1.33	SN76226DN SN76228N SN76242 SN76243 SN76396	2.00 3.27 5.23 5.23 2.90	TA7340P TA7607AP TA7609 TA7611AP TA7616P	5.95 2.10 2.65 2.32 5.25	TDA2522 TDA2524 TDA2521 TDA2525 TDA2525 TDA2532	2.50 4.50 3.71 3.90 2.50	UPC1186H UPC1181H UPC1185H UPC1188 UPC1212C	1.05 1.35 2.10 8.77 0.80
2SA872 2SA884 2SA937R 2SA940	0.59 2.15 0.97 2.23	2SD414 1 2SD471 2 2SD560 2	1 40 1 98 2 13 2 95 2 98	BA526 BA527 BA532 BA536	1.20 8.94 7.98 2.98 1.50 1.70	BD237 BD238 BD239 BD240	0.47 0.28 0.45 0.57	BF869 BF870 BF959 BF960	0.49 0.30 0.42 0.49	CD4049 CD4052 CD4066 CD4069 CD4070	0.24 0.54 0.21 0.29 0.25	LM2808 LM2877 LM317CKC LM324N LM339N	5.94 7.45 1.08 0.98 0.41	R2009 R2010B R2029 R2030	1.98 2.98 1.33 1.33	SN76533N SN76532N SN76545 SN76546N	2.47 0.91 4.87 3.47	TA7622AP TA7628P TA7629P TA7630P	8.94 2.50 7.50 0.95	TDA2530 TDA2541 TDA2540 TDA25450	2.20 1.88 2.15 5.94	UPC1225H UPC1230 UPC1238 UPC1278H	4.83 1.48 2.10 5.95 1.81
2SA940 2 2SA950 2SA951 2SA966 Y 2SA999	2.14 0.72 1.75 0.85 0.75	2SD601R 2SD613 2SD636	0.65	BA656 BA7100 1 BA841A 2 BA843	3.10 1.00 1.35 8.98 3.96	8D241 BD242 BD243A BD243C BD244	0.39 0.50 0.37 0.50 0.31	BF970 BFR39 BFR61 BFR62 BFR79	0.50 0.44 0.92 0.50 0.29	CD4081 CD4093 CD4511 CD4528	0.14 0.40 1.10 2.04	LM340K LM348N LM380N LM384N01	11.85 2.15 2.80 1.55	R2267 R2265 R2305 R2322 R2323	2.35 1.49 1.18 0.67 0.76	SN76549 SN76570 SN76611 SN76620 SN76660N	2.45 3.08 2.59 2.59 2.48	TA7640AP TA7672P TA7676P TA7726P TA7726P TAA320A	2.40 2.55 2.81 10.25 1.27	TDA2560 TDA2575A TDA2578A TDA2576A + TDA2581	2.17 0.50 2.73 Kit 12.35 1.60	UPC1351C UPC1350C UPC1353 UPC1355C UPC1355C UPC1363	1.40 1.58 2.13 4.20 4.10
2SB774 2SB185 2SB375 2SB400 2SB405	0.65 1.13 3.87 0.40 1.03	2SD657 2SD661A 2SD731	0.96 2.80 0.80 2.11 0.60	BA854 BAV18 BAV19 BAV20	5.76 0.06 0.11 0.35 0.12	BD244C BD245C BD246C BD253 BD278A	0.72 0.70 0.80 1.05 0.70	BFR81 BFR86 BFR89 BFR90A BFX29	0.29 1.08 1.63 0.85 0.34	CD4556 CR02AM-8 CV12E CX095D CX104	1.47 1.70 4.09 3.14 8.77	LM567CN LM6402/011 LM6402A093 LM748	1.71 10.23 10.15 0.69	R2354A R2354B R2443 R2461 R2540	0.64 2.01 1.36 1.50 1.91	SN76666N SN76708 SN76709N SN76707N SN76705N	1.41 4.86 5.94 1.23 6.60	TAA350A TAA570 TAA621AX1 TAA621A12 TAA6618	0.80 1.85 4.85 2.14 1.00	TDA2582 TDA2591 TDA2594 TDA2593 TDA2593 TDA2595	1.80 2.70 3.40 3.40 5.52	UPC1362 UPC1365C UPC1366 UPC1360C UPC1378H UPC1378H UPC141C	4.10 2.50 1.65 4.51 2.44
2SB511 2SB54 2SB546 2SB56 2SB618A	0.40 1.03 2.65 1.39 0.56 2.90 2.22	2SD811 2 2SD823 2SD823 1	7.63	BAW62 BAX12 BAX13 BAX16	0.11 0.11 0.11 0.08	BD317 BD318 BD375 BD380	1.20 2.72 0.42 0.76	BFX84 BFX85 BFX86 BFX87	0.37 0.41 0.36 0.55 0.34	CX108 CX109 CX130 CX134	12.48 7.86 8.76 11.10	LM8360 LM8361 LR3419 LR3471	3.87 3.57 9.37 9.37	R2540X R2615 RCA2060 RGP01-15 RGP10	3.30 0.67 2.00 0.70	SN76730 SN76810N SN76832N SN94041 SN94042	6.60 5.54 0.60 1.35 5.54 4.35	TAA691 TAA700 TAA930 TAA970 TAG626-600	8.58 2.37 4.87 2.83	T0A2600 T0A2611A0 T0A26120 T0A2611A	7.60 1.25 4.68 1.25 2.79	UPC141C UPC1458 UPC151C UPC2002 UPC2002 UPC30C	2,50 1,65 4,51 2,44 4,95 2,00 2,95 1,48 2,51 4,70 4,95 4,35 4,10
2SB631 2SB643 2SB669 2SB681	2.00	2SD894	2.00 1.00 1.84 1.15 1.75 0.82 2.15	BC108B BC1098 BC113	0 11 0 15 0 14 0 14 0 36 0 20	BD410 BD433 BD434 BD435 BD435 BD436	0.49 0.44 0.45 0.49 0.60	BFX88 BFX89 BFY50 BFY51 BFY52	0.44 0.30 0.33 0.27	CX136 CX139 CX157 CX158 CX177	11.49 11.83 5.52 5.50 8.75	LU1141 LU52012 LU52011 LU03112 M193	7.27 5.95 14.95 12.37 6.83	RGP30M RT402 RT905A \$1299	0.30 0.28 1.58 2.38 5.34 1.84	SP8385 SP35384 ST1702L STA401	4.35 0.55 1.98 0.99 2.50 3.10	TBA120AS TBA120SB TBA120T TBA120U	1.20 0.70 1.05 0.9? 2.50	TDA2610 TDA2620 TDA2630 TDA2631 TDA2640	1.96	UPC324C UPC32C UPC339C UPC41C	4.70 4.95 4.35 4.10
258695 258774 258819 25C1096 25C1104	3.96 1.99 0.65 1.13 1.16 3.90	7805-T022 1 7806 1	0.63	BC132 BC135 BC137	0.20 0.14 0.14 0.18 0.34	BD437 BD438 BD441 BD442 BD509	0.41 0.52 0.59 0.66 1.42	BFY79 BFY90 BLY49 BR100 BR101	0.49 0.42 2.20 0.22 0.70	CX187 CX755 CX885A E1222 E5024	5.26 12.95 6.85 0.40 0.28	M21C M23C M293 M51102L M5115P	1 30 1.98 6.71 1.69 5.24	\$28000 \$2802 \$2818 \$3702\$ \$40W	1.84 2.90 4.05 5.21 13.10	STA441C STA471C STK0029 STK0050 STK016	3.10 7.95 5.54 7.72 6.91	TBA120A TBA1440 TBA1441 TBA240A TBA295	1.05 1.94 1.95 3.99 1.10	TDA2652 TDA2653 TDA2654 TDA2670 TDA2680	2.50 2.73 3.61 8.25 6.18 4.73 2.48 3.20	UPC4558C UPC474 UPC554C UPC575C2 UPC580C	2.15 5.11 1.85 2.40 6.60 1.34 2.15
2SC1106 2SC1114 2SC1116 2SC1124	3.90 4.54 3.25 4.95 1.65 0.64	7905 0 AC133 0 AC127 0 AC128 0 AC138 0	0.35 0.64 0.80 8.12 0.27 0.09 0.24 0.29 0.35 0.30	BC139 BC140 BC141 BC142	0.33 0.45 0.34 0.23	80510 80519 80529 80530	0.75 0.98 0.60 0.80	BR103 BR303 BRC84 BRX44 BRX49	0.56 1.15 2.08 0.60 0.34	E5386 GD243 GF758 HA11215 HA11211	0.25 4.34 0.04 1.75 2.53 4.29 3.46 1.75	M51203L M51231P M5134-9341 M51353P	3.15 3.07 4.13 5.25 5.96	S6080B SA8063 SAA1006 SAA1020 SAA1025	9.98 5.17 1.85 4.76 4.40	STK022 STK031 STK040 STK054 STK058	5.25 12.95 13.34 3.95 27.50	TBA3950 TBA396 TBA400 TBA440C TBA4800	0.60 1.20 2.39 2.34 1.30	TDA2740 TDA2780AQ TDA2795 TDA2791 TDA2910	5,00 8,84 2,78 1,81 13,25	UPC587C2 UPC592H UPC595 UPC595 UPC595 UPC595 UPD1514C	1.34 2.15 2.95 1.98 4.76
2SC1129 2SC1131 2SC1158 2SC1162 2SC1162 2SC1172 2SC1195	0.64 3.33 0.55 2.72 6.09	AC138 AC141 AC142K AC176 AC179	0.29 0.35 0.30 0.28	BC147 BC148B BC148C BC149B	0.34 0.11 0.13 0.11 0.13	BD533 BD534 BD535 BD536 BD536 BD537	0.67 0.52 0.45 0.50 0.50	BRY39 BSS38 BSTBD140G BSTC0246	0.69 0.67 4.93 8.64	HA11225 HA11229 HA11235 HA11124	4.29 3.46 1.75 5.25	M51381P M51393AP M51394P M5142P M5144P	9.48 12.50 6.85 3.77	SAA1024 SAA1075 SAA1121 SAA1124	2.81 4.25 7.44 2.45	STK077 STK1039 STK2110 STK2145	7.67 5.75 7.33 16.95	TBA510 TBA520 TBA5200 1BA530	1.37 1.84 1.68 1.30	TDA33008 TDA3330 TDA3506 TDA3501	6.98 2.88 4.40 12.09	UPD2819C UPD4013B UPD4066B UPD553-164	4.98 4.00 4.95 19.52
2SC1213 2SC1226 2SC1293 2SC1306	0.89 1.46 0.90 1.98 0.50	AC188K AD140	0.28 0.72 0.39 0.37 0.57 1.06	BC154 BC159 BC160	0.14 0.14 0.16 0.40 0.28	BD538 BD544B BD677 BD679 BD680	0.67 0.83 0.40 0.57 0.52 1.48	BSTC0233 BSTCC0143 BSTD1043 BSV57B BSW68	6.12 3.07 2.85 3.91 0.60	HA1125 HA1137W HA1138 HA11414 HA1156	5.25 4.29 1.38 5.03 5.65 1.16	M51513L M51515BL M51517L M5192 M5194AP	2.55 2.75 2.90 2.20 5.74	SAA1130 SAA1174 SAA1250 SAA1251 SAA1351	4.99 7.77 3.95 3.20 8.11	STK2240 STK2250 STK3042 STK3044 STK4019	16.65 18.95 4.95 5.75 4.50	TBA530 TBA540 TBA5400 TBA560C TBA560C0	1.30 1.15 1.15 1.40 1.60	TDA3500 TDA3510 TDA3520 TDA3540 TDA3541	4.25 5.95 9.71 6.99 2.22	UPD8049C-1 X0022CE X0029CE X0031CE X0035TA	11.50 5.75 7.09 6.32 6.18
2SC1317 2SC1364 2SC1383 2SC1391 2SC1398	0.49 1.20 2.45 0.75	AD143 AD145 AD161 AD162	1 93 1 60 0.30	BC169C BC170 BC171	0.28 0.36 0.16 0.16 0.11 0.27	BD681 BD696 BD699 BD700 BD707	1.48 2.47 1.85 3.70 0.60	BSX19 BSX20 BSY52 BSY79 BT108	0.34 0.19 0.50 0.51 1.45	HA1160 HA1166X HA1167 HA11706 HA11705	4,79 6,60 6,45 3,61 8,00	M5231L M53274P M54532P M54544L M58478P	4,80 1.33 1.50 1.22 6.75	SAA3027P SAA5000 SAA5010 SAA5012 SAA5020	2.55 3.25 4.40 5.50 5.78	STK433 STK4332 STK435 STK4352 STK436	4.78 6.25 4.95 1.95	TBA5700 TBA570A TBA651 TBA673 TBA700	1.60 1.71 0.87 2.45 1.85	TDA3560 TDA35710 TDA3576 TDA3590 TDA3591	2.22 4.25 2.83 7.48 6.79 6.45	X0040TA X0042CE X0043CE X0056CE X0057GE	6.32 6.18 4.50 4.35 6.25 6.00 8.35 5.77 10.00
2SC1413A 2SC1446 2SC1447 2SC1447 2SC1475 2SC1505	5.00 1.25 2.07 0.60 1.00	AF118 AF127 AF139	2.47 1.24 1.20 0.65 0.40	BC173 BC174B BC177 BC178	0.17 0.27 0.35 0.26	BD709 BD710 BD809 BD810	0.60 0.80 0.80 0.69	8T119 8T120 8T121 8T123	1.45 1.76 2.17 2.48 1.98 1.03	HA11703 HA11701 HA11710 HA11713	4.22 4.56 3.45 2.90 2.00	M58485P MA06 MA8001	12,75 1.07 0,82 1.16	SAA5030 SAA5050 SAB1009B SAB3011	6.33 7.74	STK437 STK4372 STK460 STK466 STK466 STK4833	7.21 7.50 13.13 7.02 11.77	TBA720 TBA730 TBA7500 TBA760 TBA800	2.30 3.55 2.90 1.71 1.09	TDA3650 TDA3650 TDA3651AQ TDA3651AQ TDA3651A TDA3651A TDA3651A	6.45 5.90 2.60 3.95 1.95	X0062CE X0065CE X0074GE X0077GE X0079CE	8.35 5.77 10.00 15.96 4.95
2SC1514 2SC15730 2SC1583 2SC1617	1.37	AF180 AF181 AF185	1.45 0.55 0.55 0.53 0.53	BC182 BC182LB BC183LB BC183LB BC184	0.26 0.09 0.14 0.26 0.13	BD879 BD895 BD901 BD902 BDW83C	0.74 2.18 0.99 0.65 0.99	BT151-800R BTT6018 BU106 BU108 BU109	2.42 2.48 1.50 2.25	HA11711 HA11715 HA11714 HA11716 HA11725	9.90 7.76 13.10 18.26	MB3712 MB3713 MB3730 MC13002	1 98 1 85 1 69 2 09 3 90	SAB3013 SAB3021 SAB3024 SAB3209 SAB3210	5.90 7.34 2.47 7.90 6.36 5.82 3.10	STIC501 STIC502 STIC5314 STIC5730	9.52 6.32 7.25 12.40 3.20	TBA810S TBA810T TBA810AS TBA820	1.61 1.75 1.00 0.66	TDA3950 TDA4050B TDA4280 TDA4290	2.60 3.95 1.95 2.50 4.50 3.40 7.20 1.95	X0092CE X0096CE X0109CE X0113CE	4.95 5.95 11.25 2.07 7.50
2SC1678 2SC1741 2SC1810 2SC1815	0.34 3.89 1.90 1.25 1.70 0.20	AF239 AF279	0.53 0.88 3.98 1.89	BC184LB BC186 BC187 BC204	0.26 0.25 0.28 0.16	BDW84C BDX32 BDX53A BDX53B	0.99 1.88 4.93 3.35	BU110 BU125 BU126 BU137	5.69 2.48 1.10 6.53	HA11725MP HA117555P HA11781 HA1180	16.00 6.23 21.15 5.15	MC1310P MC1327P MC1330P MC1350P	2.25 1.33 1.98 0.90	SAF1032P SAF1039 SAS5010 SAS560S	3.58 1.95 8.39 1.86	STIC7216 STIC772 STR1096 STR4090	13 10 3.71 4.50 9.52	TBA820M TBA890 TBA920 TBA920Q	0.82 3.30 1.65 2.52	TDA4400 TDA4420 TDA4422 TDA4427S	4.90 2.30 8.32 9.00	X0195CE X0204CE X0261CE ZPY120	7.50 8.74 8.90 3.25

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VID37	SHARP 9300	Etc. lamp plus plastic shroud.			2.53		vailable with please 9" $ imes$		Stock	EX 33849 ueries by post o s of 100+ per line for special quote.	nly
VIDEO L VID34 VID35 VID36	AMPS/BULBS LA9295 LA9210S NAT/PAN.	Universal lamp without socket Universal lamp with socket 31 P.C. MTG. leadless lamp			0.45 0.50 0.50	VTC 6500 VTC 9300 VTC 9350 VTC M10/11/20 VTC M21/30/31 VTC M50	VID7533 DBK134 DBK145 VID7809 VID7809 VID7809	£0.78 £2.66 £2.66 £0.61 £0.61 £0.61	V 8600 V 9600 V 5250 V 5280 V 5280 V 5475	DBK124 VID7810 DBK148 DBK148 DBK148 DBK122	61.1 63.9 62.0 61.1
SHARP /ID29 /ID30 /ID31 /ID32 /ID33	RMOTP1029 RMOTV1008 NIDL0006 NIDL0005 NIDL0004	Capston motor 73/9300 Reel motor VC9700 Idler VC387H etc Reel idler VC9300 etc Idler wheel VC2300			33.55 18.85 1.75 1.85 2.15	VT 9500 VTC 5000.5150 VTC 6000 VTC 5300 VTC 5400 VTC 5500	DBK129 SANYO VID7807 VID7807 DBK111 DBK1110 DBK1110 DBK1110 DBK1110	£0.50 £1.19 £1.19 £0.70 £0.70 £1.76	SLT 7 ME SLT 7 MER V 55/57 V 66/67 V 7540	DBK100 DBK100 TOSHIBA VID7543 VID7540 DBK123	ដាំនេ ជាន ជាន លាន ជាន ជាន
SANYO/I /ID24 /ID25 /ID26 /ID27 /ID28	FISHER 4529V10800 1430662T01201 PR2758 1430490400900 1430420400300	Reel motor VTC5000/5150 Reel drive pulley Pinch roller VTC5000/5150 Gear idler Fisher FVH-P615 Heart idler Fisher FVH-P615			9.50 6.50 3.85 6.50 2.95	VT 11-VT 88 VT 3000 VT 5000 VT 6500 VT 7000 VT 8000 VT 8500 VT 9300	HITACHI DBK128 DBK125 DBK142 DBK142 DBK142 DBK143 DBK144 DBK129 DBK144 DBK129	£1.24 £1.65 £1.46 £0.68 £0.68 £0.68 £0.68 £0.68	SL 8000 SL 8080 SL 8500 SL 8600 SLC 5 SLC 6 SLC 7 SLC 9 SLJ 7	SONY DBK115 DBK115 DBK115 DBK115 DBK115 DBK100 VID7519 DBK100 DBK130 DBK130	
4018 4019 4020 4021 4022 4023	VXP0344 VX20078 VXP0521 VXP0463 VXP0432 VXP0401	Ider NV7000/7200 Tension Band NV7000 Idler NV770 Reel Idler NV777 Rinch Roller NV333 Idler wheel NV333	ALL	LEASE NOTE Video Spares Handling 1.25 + Vat	0.85 3.50 2.65 3.40 3.30 1.25	VBS 7000 VBS 7000 VBS 7000 VBS 9000 FVHP 420 V 4000 H V 4001 H V 4002 H V 4100 H	0BK146 DBK105 DBK105 VID75:12 GEC DBK129 DBK129 DBK129 DBK129 DBK129	£2.66 £2.34 £1.76 £1.62 £0.68 £0.68 £0.68 £0.68 £1.24	VC 381/383 VC 385/386 VC 2300 VC 6000/6300 VC 6500/7300 VC 7700/7750 VC 8300 VC 9300/9500 VC 9700	DBK116 DBK116 VID7545 DBK117 DBK117 DBK117 DBK118 DBK119 DBK120 DBK121	ជាតិ តាត់ តាត់ តាត់ តាត់ តាត់ តាត់ តាត់ ត
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	ON/JVC 01X0-003-381 01X0-018-024 01X0-018-025 01X0-018-729 01X0-040-006 01X0-033-454 01X0-040-007 01X0-040-017 01X0-065-009 01X0-065-016	Tension band T3292/PU5450 Take up idler T3292/PU47752 Rewind idler assembly T3V16 Take up idler T3V00/PU49280 Loading belt T3V29/30/PU489 Roller Assy. (cass. Housing) T Take up idler 3V29/30/PU489 Reel motor assembly 3V29/30 Capston motor 3V35/36/36/39 Cass. housing Assy. 3V35/36/	(PU49282 41-2 (3V23/PU4 578 (PU51381) (PU55371)	<i>l</i>	2.55 5.00 6.20 6.95 0.26 4.50 2.90 27.95 27.00 27.00	VP 77 VP 68 VS 1 VS 2 EG VS 3 EG VS 5 EG VS 100 VS 9300 VS 9500 VS 9700 VS 9800	DRIN AKAU DBK1325 DBK1335 DBK1031 DBK101 DBK101 DBK101 DBK101 DBK101 DBK101 DBK101 DBK101 BK1015	20.86 20.86 21.65 21.76 21.76 21.76 21.65 21.65 21.65 21.65 21.65 21.65 21.65	ВЕL ня 3300 ня 3330 ня 3360 ня 3660 ня 3660 ня 4100 ня 7600 ня 7650 ня 7700	TS JVC DBK137 DBK107 DBK103 DBK103 DBK103 DBK127 DBK138 DBK138 DBK132 DBK132 DBK132	ព ជ ជ ព ព ព ព ព
achine No.: 1 57008			VHS A VH700	Head Part Nos.: A6762 072. Machine No.: SLC20, C30, SLF1, F30, HF72, HF100, T2	C33, C40,	36A, 139A, 213A C44		BETA W	691 201 66 691 201 78 691 202 87		£61.9 £49.9 £55.3
achine Nos.: R3360 HR36 R7610 HRD1 RD220 HRD2	HP4000 HR2200 HR330 60 HR3750 HR3860 10 HRD111 HRD120 25	0 HR3320 HR3330 HR3350 HR4100 HR7200 HR7600 HRD121 HRD140 HRD150	VHS A	SONY Head Part Nos.: A6762 044. Machine No.: SL3000, 8000 Head Part Nos.: A6762 012. Machine No.: SL5W, 5000 9), 8030, SL A, 038A, 0 5100 SLC5	T 6Me, 7, 7E, 7N 55A, 129A C6, C7		BETA A Beta B	PHILIPS 310 274 44 691 200 54 691 200 98 691 201 12		ΡΟ £49.6 £62.0 £61.6
R3943 VR396	vR3605 vR3033 vR390 3 vR3993 vR3975 vR39 Iso Ferguson)	05 VR3913 VR3914 VR3935 985 VR3986 VR3833	VHS A	Machine No.: VTC5350 VTC Head Part Nos.: 1430762 TC Machine No.: VTC9300 VTC Head Part Nos.: 143072 TC Machine No.: VTC9300PS V	02000 9455 VTC9 2100	500		BETA D BETA X BETA X	01X0 033 8 01X0 040 0 01X0 056 0 01X0 057 0 01X0 082 0 01X0 083 0	02 13 02 01	£47.0 £48.3 £61.3 £31.3 £46.0 £66.0
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530 P615 P62 EC	20 P622 P710 P720 P72	620 D720 P420 P510 P520 11 P722	VHSU	SHARP Head Part Nos.: DDRMU 00 Machine No.: VC581/2/3 65 Head Part Nos.: DDRMU 00 Machine No.: 2C9 VC110	1 681/2/3/5 01 HE00 0	659 699 002 HE02 04 05 (06 81 VC384	VHS S	VHS D VHS E VHS F VHS H VHS I VHS K		£81. £74. £81. £21. £21. £21.
/29 3V30 3V3		3V06 3V16 3V22 3V23 3V24 19 3V49	VHS A	Head Part Nos.: VEH0286 Machine No.: NV430 Head Part Nos.: VEH0174 Machine No.: NV366				VHS W VHS X	BETA X VHS VIDE(VHS A VHS B VHS C)	231.5 214.5 214.5 219.5
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	VS9500 VS9700 VS-P1	/P7200 VS1 VS2 VS3 VS5 VS-P5	VHS P	Head Part Nos.: VEH0099 0 Machine Nos.: NV300 NV32 NV3000 NV7000 NV7200	2 NV332 NV NV7500	/333 NV340 NV39 NV7800 NV7850	0 NV2000 NV8170		Head Part No. BETA A BETA B		Prie 1 + £16.9 £16.9

Dish Alignment by BBC Computer

The following program for use with the BBC microcomputer has been written to help satellite TV aerial fitters to determine the azimuth and elevation angles for dish alignment at a particular site. Many articles on the subject have appeared over the last three years, but the data given usually applies for only major cities. This program should provide the required data for any satellite visible from the UK, at any location, provided the longitude and latitude are known - this information can be obtained from an Ordnance Survey map.

When the program is run a menu listing a number of satellites appears on the screen - see Fig. 2. If required this list can be changed between program lines 1,390 and 1,640. When the satellite is not listed option number seven enables its longitude to be entered.

Use

The program is "user friendly". An example of a typical calculation, in this case for the Astra satellite, is as follows:

(1) Select Astra from the menu by entering number six (without pressing the return key). The screen will clear and the satellite's position, "19-2 degrees East", will appear at the top of the screen.

(2) A prompt at program line 520 requests that the longitude of the receiving site is entered. In this example the site is Land's End, which is longitude 5.75°W. Enter the number 5.75 then press the return key. Prompt line 560 will then request that E for east or W for west of Greenwich is entered. Type W but don't press the return key.

(3) The final prompt at line 630 requests the site latitude to be entered. Type 50 and press the return key.

The elevation – the angle at which the front plane of the dish has to be tilted back with respect to the vertical - is then displayed on the screen. In this example it's 27.972°.

The azimuth angle is calculated and displayed in degrees of rotation from true north and also as an angle east or west of true south. As can be seen (Fig.3) the azimuth bearing is 148.728° from true north, which is 31.272° east of true south.

It's important to know the geographical location in degrees and decimals, not degrees and minutes. To convert minutes to decimal, divide by 60. For example, thirty minutes is equal to $30/60 = 0.5^\circ$. Note that longitude as drawn on Ordnance Survey maps is with respect to "grid north". This must be converted to true north: the conversion constant is shown in the map's legend.

Before the dish can be pointed east or west of true south it's necessary to find true south. A compass needle will point to magnetic north and the correction angle can be

J.T. Beaumont

found from the latest edition of an Ordnance Survey map. For Land's End the magnetic variation is currently 8°W. Once the magnetic variation has been found azimuth correction can be applied. Subtract the variation from azimuths east of south, add it to azimuths west of south. A rough indication of true south in the UK can be found by mounting a vertical stick on a flat surface and noting the shadow produced by the sun at 1200 hours GMT (noon).

If you wish to change the satellites listed in the menu (options 1-6), the latitude in degrees is held in variable theta and E or W of true south (Greenwich meridian) in variable A\$ (lines 1,570-1,620).

Program

- * * * * * * * * * * * * * * * * * * * 10 REM ‡ 20 REM * 30 REM 4 SATELLITE DISH REM 1 40 AZIMUTH/ELEVATION 50 REM J. T. Beaumont 1988 60 REM 70 REM 80 MODE1 *KEY 10 OLD:MRUN:M 90 100 VDU23,225,28,34,34,28,0,0,0,0 **REM Define Degree symbol** 110 120 VDU19,0,4,0,0,0 130 VDU23;8202;0;0;0; 140 **REM Remove flashing cursor** PROC_Geost 150
- PRINT TAB(13,18);"SATELLITE DISH" 160
- PRINT TAB(10,20);"AZIMUTH/ELEVATION" 170
- PRINT TAB(14,22);"CALCULATIONS" 180
- PRINT TAB(10,26);"John Beaumont (1988)" 190
- PROC_Border 200
- COLOUR 1 210
- PRINT TAB(2,30);"Press any key to start the 220 program"
- 230 COLOUR 3
- 240 *FX15,0
- 250 S\$=GET\$
- 260 CLS
- 270 PROC_Geost
- PROC_Menu 280
- 290 CLS
- 300 COLOUR 2
- PRINT TAB(3,1);"Satellite Dish AZ/EL calculations" PRINT TAB(3);"------310
- 320 "
- 330 COLOUR 3
- 340 **REM Earth Radius**
- 350 LET Rad=6376.77
- 360 LET Altitude = 35786

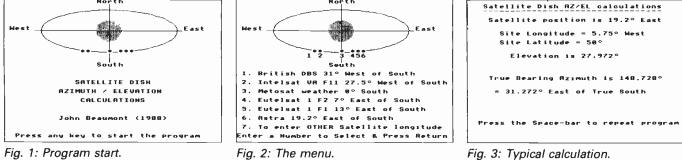


Fig. 1: Program start.

Fig. 2: The menu.

- 370 REM Altitude of Satellite in GEO-STATIONARY ORBIT
- 380 IF Q=1 THEN GOTO 450
- 390 PRINT TAB(2,5); "Enter Satellite position in Degrees"
- 400 PRINT TAB(2,6);"and press the RETURN key";
- 410 INPUT Theta
- 420 PRINT TAB(0.5):SPC(40):TAB(0.6):SPC(40)
- 430 PRINT TAB(2,5);"Is the Satellite E or W of South ?" 440 A\$=GET\$
- 450 IF A\$="E" OR A\$="W" GOTO 460 ELSE PROC_ Error:GOTO 440
- 460 IF A\$="E" THEN B\$="East"
- 470 IF A\$="W" THEN B\$="West"
- PRINT TAB(0,5); SPC(40); TAB(0,6); SPC(40) 480
- 490 COLOUR 1
- PRINT TAB(4,4);"Satellite positions is";Theta; 500 CHR\$(225);" ";B\$
- 510 COLOUR 3
- 520 PRINT TAB(2,7);"Enter the site Longitude in Degrees"
- 530 PRINT TAB(2,8);"and press the RETURN key ";
- 540 INPUT Long
- 550 PRINT TAB(0,7); SPC(40): PRINT TAB(0,8); SPC(40)
- 560 PRINT TAB(1,7);"Is site Longitude E or W of Greenwich?"
- 570 C\$=GET\$
- 580 IF C\$="E" OR C\$="W" GOTO 590 ELSE PROC_ Error:GOTO 570
- 590 PRINT TAB(0,7); SPC(40): PRINT TAB(0,8); SPC(40)
- 600 IF C\$="E" THEN D\$="East"
- 610 IF C\$="W" THEN D\$="West"
- 620 PRINT TAB(6,7);"Site Longitude = ";Long; CHR\$(225);" ";D\$
- PRINT TAB(3,9);"Enter the site Latitude in Degrees" 630
- PRINT TAB(3,10);"and press the RETURN key "; 640
- 650 **INPUT** Lat
- PRINT TAB(0,9);SPC(40):PRINT TAB(0,8); 660 SPC(40):PRINT TAB(0,10);SPC(40)
- PRINT TAB(6,9);"Site Latitude = ";Lat;CHR\$(225) 670
- IF A\$="E" AND C\$="W" THEN Orbit = Theta+Long 680
- IF A\$="E" AND C\$="E" THEN Orbit = Theta-Long 690
- IF A\$="W" AND C\$="W" 700 THEN Orbit = Theta-Long
- IF A\$="W" AND C\$="E" THEN Orbit = Theta+Long 710 LET Constant = Rad/(Rad+Altitude) 720
- LET A = COS(RAD(Lat))*COS(RAD(Orbit)) 730
- 740 LET B = A - Constant
- LET C = SQR $(1-(A^2))$ 750
- LET Elev = DEG(ATN(B/C))760
- LET Elev=INT(Elev*1000+0.5)/1000 770
- 780 IF Elev<0 THEN PRINT TAB(2,12);"The Satellite is over the horizon":GOTO 940
- 790 COLOUR 2
- IF Lat<=0 THEN PROC_Zero 800
- PRINT TAB(8,12);"Elevation is ";Elev;CHR\$(225) 810
- 820 COLOUR 3
- 830 LET Angle = TAN(RAD(Orbit))/SIN(RAD(Lat))
- 840 LET Azimuth = ABS(DEG(ATN(Angle))) 850
- PROC_Azi 860
- LET Bearing=INT(Bearing*1000+0.5)/1000 TAB(4,17);"True Bearing Azimuth 870 PRINT is ;Bearing;CHR\$(225)
- 880 COLOUR 2
- IF Bearing>180 THEN Bg=INT((Bearing-180)* 890 1000+0.5)/1000
- Bearing>180 THEN PRINT TAB(5,20);"= 900 IE ";Bg;CHR\$(225); " West of True South"
- 910 IF Bearing=180 THEN PRINT TAB(7,20);"which is 0"; CHR\$(225);" TRUE SOUTH"
- 920 IF Bearing<180 THEN Bg=INT((180-Bearing)* 1000+0.5)/1000
- Bearing<180 THEN PRINT TAB(5,20);"= 930 1E -";Bg;CHR\$(225); " East of True South"
- 940 PROC_Border

- 950 COLOUR 1
- 960 PRINT TAB(2,27);"Press the Space-bar to repeat program"
- 970 COLOUR 3
- 980 *FX15,0
- 990 Z\$=GET\$
- IF Z\$=" " CLS:GOTO 260 1000
- 1010 **GOTO 990**
- 1020 END
- DEFPROC_Azi 1030
- IF A\$="E" AND C\$="W" LET Bearing 1040 180-Azimuth:ENDPROC
- IF A\$="W" AND C\$="E" THEN LET Bearing = 1050 180+Azimuth:ENDPROC
- IF A\$="E" AND C\$="E" AND Theta<=Long THEN 1060 LET Bearing=180+Azimuth:ENDPROC
- IF A\$="E" AND C\$="E" AND Theta>Long THEN 1070 LET Bearing=180-Azimuth:ENDPROC
- IF A\$="W" AND C\$="W" AND Theta<=Long THEN 1080 LET Bearing=180-Azimuth:ENDPROC
- 1090 IF A\$="W" AND C\$="W" AND Theta>Long THEN LET Bearing=180+Azimuth:ENDPROC
- 1100 DEF PROC_Geost
- 1110 radius=75:angle=0
- 1120 S=620:T=800
- 1130 MOVE radius+S,T
- 1140 GCOL1,1
- 1150 REPEAT
- 1160 MOVE S,T
- PLOT85, radius*COS(angle)+S, radius*SIN(angle)+T 1170
- 1180 angle=angle+0.1
- 1190 UNTIL angle>2*PI+0.1
- 1200 PLOT69,1020,800
- 1210 GCOL1.3
- FOR I=0 TO 2*PI+0.1 STEP 0.1 1220
- 1230 DRAW 400*COS(I)+620,150*SIN(I)+800
- 1240 NEXTI
- 1250 MOVE 620,550
- 1260 DRAW 620,1000
- MOVE 1050,800 1270
- 1280 **DRAW 180,800**
- PRINT TAB(1,6);"West" 1290
- PRINT TAB(33,6);"East" 1300
- PRINT TAB(17,0);"North" 1310
- 1320 PRINT TAB(17,14);"South"
- COLOUR 2 1330
- 1340 PRINT TAB(21,11);"***"
- PRINT TAB(14,11);"**" 1350
- PRINT TAB(19,11);"*" 1360

DEF PROC_Menu

West of South"

South"

South"

South"

COLOUR 2

COLOUR 1

PROC_Border

COLOUR 3

P\$=GET\$

LET Q=0

*FX15,0

PRINT TAB(21,12);"456"

PRINT TAB(13,12);"1 2 3"

PRINT TAB(1,16);" 1. British DBS 31";CHR\$(225);"

PRINT'" 2. Intelsat VA F11 27.5";CHR\$(225);" West of

PRINT'" 3. Meteosat weather 0";CHR\$(225);" South"

PRINT'" 4. Eutelsat 1 F2 7";CHR\$(225);" East of

PRINT'" 5. Eutelsat 1 F1 13";CHR\$(225);" East of

PRINT'" 6. Astra 19.2";CHR\$(225);" East of South"

PRINT'"Enter a Number to Select & Press Return"

355

PRINT'" 7. To enter OTHER Satellite longitude"

1570 IF P\$="1" THEN Theta=31:A\$="W":Q=1

1370 COLOUR 3 1380 ENDPROC

1390

1400

1410

1420

1430

1440

1450

1460

1470

1480

1490

1500

1510

1520 1530

1540

1550

1560

| 1580 | IF P\$="2" THEN Theta=27.5:A\$="W":Q=1 |
|------|---|
| 1590 | IF P\$="'3" THEN Theta=0:A\$="W":Q=1 |
| 1600 | IF P\$="4" THEN Theta=7:A\$="E":Q=1 |
| 1610 | IF P\$="5" THEN Theta=13:A\$="E":Q=1 |
| 1620 | IF P\$="'6" THEN Theta=19.2:A\$="E":Q=1 |
| 1630 | IF P\$="7" LET Q=2 |
| 1640 | IF Q=0 GOTO 1550 |
| 1650 | ENDPROC |
| 1660 | DEF PROC_Border |
| 1670 | COLOUR 3 |
| 1680 | MOVE0,0: DRAW1279,0: DRAW1279,1023: |
| | DRAW0,1023: DRAW0,0 |
| 1690 | ENDPROC |
| 1700 | DEF PROC_Error |
| 1710 | COLOUR 2 |
| 1720 | PRINT TAB(2,18);"Make sure the CAPS LOCK key is |
| | ON !" |
| | |

Long-distance Television

Roger Bunney

December provided a relatively quiet close to the year, reflecting the conditions during much of 1988. Sporadic E reception wasn't wonderful except for early June when over a three-day period ch. A2/3/4/5 signals from North America were seen in the UK and identified as coming from various locations along the eastern Canadian/USA seaboard. There was also a remarkable lunchtime period when North African Band III signals were seen in the UK - in the lower half of the band. Conditions in late October/early November were lively, with increasing sunspot activity and ch. E2/R1 reception from deep into Russia and the Middle-Far East. Since then F2/TE reception has occurred from time to time when the m.u.f. has risen into the lower end of Band I.

December's log has a little of everything. SpE had its moments as follows:

| 4/12/88 | ORF (Austria) | ch. E2a; | RAI | (Italy) | ch. IA. |
|---------|---------------|----------|-----|---------|---------|
|---------|---------------|----------|-----|---------|---------|

- 5/12/88 NRK (Norway) E2.
- 6/12/88 TVE (Spain) E3; RAI IB.
- 7/12/88 TVE E2; 3.
- 9/12/88 SVT (Sweden) E2; NRK E2.
- TVE E2, 3, 4. 10/12/88
- 11/12/88 TVE E2.
- TVE E2, 3. 13/12/88
- 14/12/88 TVE E2, 3; RAI IA; ORF E2a; CST (Czechoslovakia) R1; TVP (Poland) R1; SVT E2.
- 15/12/88 TVE E2
- NRK E2, 3. 16/12/88
- 17/12/88 ARD (West Germany) E2; JRT (Yugoslavia) E3; ORF E2a; RAI IA; TVE E2, 3.
- TVE E2; CST R2; TSS (USSR) R2. CST R1; TVP R1; TSS R1; SVT E2. 19/12/88
- 20/12/88
- 21/12/88 CST R1.
- 22/12/88 TVE E2, 3, 4; TVE-2 E2; unidentified programmes on chs. R1, 2, 3.
- 24/12/88 TVE E2; NRK E2, 3.
- 30/12/88 SVT E2.
- 31/12/88 SVT E2.

On the 16th an aurora was observed, with disturbance in Band I. There was improved tropospheric propagation

- 1730 PRINT TAB(5,20);"and press the keys requested"
- 1740 FOR W=1 TO 3000:NEXT W
- 1750 PRINT TAB(1,18);SPC39;TAB(1,20);SPC39
- 1760 COLOUR 3
- 1770 **ENDPROC**
- 1780 DEF PROC_Zero
- 1790 COLOUR 2
- 1800 PRINT TAB(1,18);"You cannot divide by zero on a computer
- 1810 PRINT TAB(8,20);"don't enter silly data"
- 1820 FOR W=1 TO 3000:NEXT W
- 1830 COLOUR 3
- 1840 PRINT"TAB(5)"PRESS ANY KEY TO START AGAIN"
- 1850 *FX15,0
- 1860 A\$=GET\$
- 1870 RUN
- 1880 **ENDPROC**

on the 11th, with mainly West German Band III/u.h.f. and Danish Band III signals received in central/eastern UK. The 22nd produced several Swiss Band III and many West German Band III signals. January 2nd/3rd gave W. German/Benelux reception and ducting on the 2nd produced Danish Band III signals in the midlands.

There was lively meteor activity during the month with the Geminids shower. Tim Anderson logged SWF (W. Germany) ch. E7 on the 12th during this event, though there was naturally much activity in Band I - sufficient to prove the efficiency of the Les Wallen 49MHz helical aerial!

F2 activity has unfortunately been at a low level. Tim Anderson received what he believes to have been Malaysia ch. E2 between 0825-0923 on the 23rd, at levels to P4. The programme content was western with subtitles of Indo-Chinese origin. During this time Finnish radio amateurs were in contact with their Australian counterparts in the 50MHz band. The next morning (24th) produced weak, scanner-level sync information on chs. R1, E2 and E3. With the m.u.f. rising to 50MHz, American amateurs are commonly reporting reception of ch. R1/E2 video information. On the 20th for example very high level ch. E2 signals were received for some four hours in Canada, though there was only weak backscatter here in the UK. Hugh Cocks in Portugal reports that Brazil ch. A2 and African ch. E2/3/4 signals are received almost daily signal propagation is mainly by late afternoon/evening TE. One pointer for transatlantic reception is a broadcast link now operating in Columbia at 45.7MHz. The RSGB VHF/UHF Newsletter reports that transatlantic openings at 50MHz were frequent during November/December. Unfortunately the TV bands start at a lower point in the spectrum in Europe than in America, where the lowest channel is A2 (55.25MHz), so the m.u.f. really has to rise for transatlantic TV reception in Europe.

Anthony Mann (Perth, Western Australia) reports F2/ TE reception from China/Malaysia, with some SpE enhancement over the final path. What is of importance for the record books is the news that Brian Clark, a TV/ FM DXer in Auckland, New Zealand, received the following transmissions on October 4/5th: Cairns 4ABC-FM at 105.9MHz, 80kW, a distance of 2,260 ABMQ-4 TV, miles;Mackay 100kW, at 1,900 miles;Rockhampton 4ABC-FM at 93-7MHz, 50kW, 1,700 miles; and Brisbane f.m. and ch. A10 TV at 1,400 miles!

During the tropospheric opening on the 22nd a scrambled System B ch. E8 TV signal was noted, possibly from RTB-F (Belgium) or ARD. Can anyone comment on this?

The RSGB VHF/UHF Newsletter suggests that the present sunspot cycle, no. 22, will peak late this year with a smoothed count of around 180. This would represent the second best since records began. The last peak of around 165 in 1978/9 produced signals reaching to about 60MHz over long F2 paths. In the late fifties cycle no. 19 produced a smoothed count of around 200, so things look good for us later this year!

My thanks to the following for their comments and reception reports: Hugh Cocks (Portugal), Bill Cotterill (Tipton), Mark Baldwin (Rushden), Iain Menzies (Aberdeen), Tim Anderson (St. Leonards), Simon Hamer (Powys) and Roger Fussell (Torpoint).

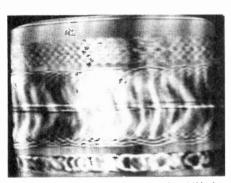
Andrew Emmerson (BATC) hopes to start a "405-line" circle. If any readers are interested, please write in so that letters can be forwarded. One reader at Lea on Solent (Hants) tells us that he now has two working 405-line cameras with correctly timed pulse/blanking and can record System A slides on to VHS tape. If anyone has 8/ 16mm films/telerecordings for transfer, please write in.

Astra Channel Allocations

We have received, via Kesh Electronics, the latest Astra channel allocation list. Details are as follows. Note that this list supersedes previously published information.

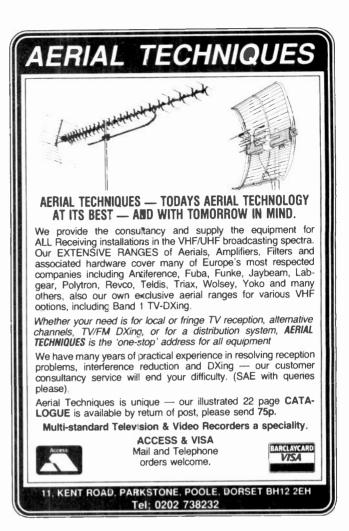
| Channel | Frequency
(GHz) | Transponder | Polarity/
mode |
|--------------|--------------------|-------------|-------------------|
| Sky | 11.318 | 8 | V1 |
| Sky News | 11.376 | 12 | V1 |
| Sky Movies | 11.435 | 16 | V1 |
| Disney | 11.258 | 4 | V1 |
| Eurosport | 11.332 | 9 | H1 |
| Sky Arts | 11.391 | 13 | H1 |
| UK TBA | 11.421 | 15 | H2 |
| Screen Sport | 11.214 | 1 | H1 |
| Lifestyle | 11.273 | 5 | H1 |
| Filmnet | 11.362 | 11 | H2 |
| Scansat | 11.303 | 7 | H2 |
| Scansat-TV3 | 11.244 | 3 | H2 |
| German | 11.229 | 2 | V2 |
| German | 11.288 | 6 | V2 |
| German | 11.347 | 10 | V2 |
| German | 11.406 | 14 | V2 |

Screen Sport and Lifestyle will be clear initially, then in MAC. UK TBA (to be advised) could be Premiere or the BBC. Scansat should be the same as now on Intelsat. No information at present on the German channels.



Typical F2/TE reception in the UK, by Andrew Tett in June 1980. Note the multiple images. The signal was received from the south, on ch. E3 – perhaps from Sokoto, Nigeria.

TELEVISION MARCH 1989



News Items

East Germany: The BDXC reports that the main DFF-1 ch. E4 Cottbus transmitter (100kW e.r.p.) has closed down. A low-power relay provides a local service on the same channel. This transmitter, a favourite for MS reception, will be missed.

France: A Belgian contact reports that all new French TV networks have their transmitter channel information carried by the Minitel videotex service. Transmitters are grouped in two-digit department codes, e.g. 75 = Paris region, 59 = Nord/Pas de Calais etc. We've received a print-out on a modified Prestel terminal from a BBC computer.

In brief: Philips is to supply 15,000 decoders to the medical profession for reception of the daily hour-long

IRISH T.V. DEALERS

VIDEOS UHF-VHF Ferguson, Sharp, ITT, Panasonic, Nord, etc fully serviced. Top Loaders, from £150 each. Front Loaders from £175 each.

TV's UHF-VHF Most makes in stock 8,16, and multi Channel remotes. Fully serviced from £75 each, untested off the pile £30 each.

EXPORT SPECIALISTS "Sets modified for African transmission"

T.V. TRADE SALES E.D.I. HOUSE, KYLEMORE PARK WEST, DUBLIN 10. TEL. 0001 264139 or 263517 news and information service run during "dead" BBC-2 time. There's a £50 annual subscription for the service . . . TRN reports that a ch. E2a (49.75MHz vision) 0.2kW e.r.p. transmitter is now in operation in the Lebanon . . . The first Belgian commercial TV station, Vlaamse Televisie Maatschappii, was due to come on air on February 1st.

New EBU Listings

W. Germany: Rosengarten ch. E52, 501kW e.r.p. horizontal. This is a private station.

France: Le Mans-Mayet ch. E32 150kW La 5; Metz-Luttange ch. E39 200kW La 5; Troyes ch. E50 250kW M6; Auxerre ch. E55 100kW La 5; Amiens ch. E52 100kW M6. Powers e.r.p. and polarisation horizontal in all cases.

Publications

HS Publications, 7 Epping Close, Mackworh Estate, Derby DE3 4HR has published a second edition of the "Teleradio News – Data File Bands 1 and 2". This is an extremely useful guide for SpE and general DXing. It includes transmission standards, a channel allocation/frequency section, main Band I/II transmitter locations/ technical data with a map, seven pages of test patterns and captions and general notes on the Band I/II transmissions in various countries. Very good value at £5.99 postage paid in the UK.

Bernard Babani (publishing) Ltd. has published a second, updated and expanded edition of "An Introduction to Satellite Television" by F.A. Wilson. It provides a great deal of information on the subject for just £5.95. Available from the publishers at The Grampians, Shepherds Bush Road, London W6 7NF, from booksellers or from Aerial Techniques.

Meteor Shower/Scatter Propagation

From time to time in this column we describe for newcomers the basic signal propagation modes that make long-distance reception possible. This month we'll consider meteor shower/scatter propagation.

When the E layer of the ionosphere, about seventy miles above the world's surface, is sufficiently ionised v.h.f. TV signals can be reflected back to Earth, giving long-distance reception at up to say 1,200 miles from the transmitting site. Sporadic E propagation occurs when patches of the ionosphere become intensely ionised. This happens mainly during the summer months, when SpE openings can produce high-level, long-duration signals in Bands I-III. A similar phenomenon is caused by meteorites that enter the ionosphere. When they reach the E layer they burn up and vaporise, producing ionisation sufficient to support signal reflection. Such ionised areas lie in trails along the paths of the decaying meteorites. The ionised trail is relatively small, and as a result the distant reception site will have an area of only about six miles by twenty five miles. Thus a signal received by one DXer via this mode may well not be present at another DXer's location perhaps twenty miles away. This second DXer may receive a signal of minimal strength or perhaps a signal from a different transmitter.

Meteor scatter propagation works best with Band I signals. Higher frequency signals can be reflected by very high density trails – Band III TV signals are reflected at times, particularly during the regular meteor showers, but in Band III the signals are of short duration and infrequent.

It's interesting to note that military communications systems exploit the random MS trail phenomenon for regular data communications, using digital techniques. In modern duplex systems a continuous probe signal is radiated. When the intended receiving site detects the probe signal an acknowledgement is sent back to the transmitter which then sends out a digital burst signal along the MS reflection path. The ionisation density lasts long enough to support reflection for between half a second to a minute. According to military information a data rate of a hundred words a minute can be averaged over a 24-hour period. In the USA information on snow levels and other weather data is transmitted via the MS SNOTEL system, and in Alaska military information from remote radar sites is transmitted via MS propagation. There is particular military interest in MS propagation since a nuclear strike could cause disruption of h.f. communications through E/F layer destruction.

MS propagation makes DX-TV reception possible throughtout the year, though the duration of the signals received will be short, ranging from "pings" of a second or so to "super pings" that give reception for approaching a minute. One problem with Band III MS reception is that DX aerials tend to be of the multi-element type, with reduced vertical capture.

Apart from daily random MS activity there are periods of intense MS when the regular meteor showers occur – the main meteor shower dates for 1989 were listed in the January issue (see page 208).

For MS DX-TV reception the receiver must have very fast sync action since the signals may last for only seconds. Many of the signals are weak, so aerial gain and a low-noise amplifier are necessary. Accurate tuner calibration is essential. The early morning hours tend to be best for MS, though results depend on the transmitters that happen to be on air at the appropriate time – with increasing "breakfast TV" in Europe, Band I MS reception is these days a lot more common than it used to be.

Radio Amateur Operation at 50MHz

The RSGB reports that Dutch radio amateurs have been given permission to use SSB transmission at 50MHz - formerly only c.w. had been permitted. Some 420 applications for permission to operate at 50MHz have been received by the French authorities. Strict operating limits are in force to prevent interference to ch. L2 TV transmissions. Over 100 permits have been issued to date. 50MHz operation was considered in Luxembourg but apparently there have been interference problems with cable systems. The Danish authorities have not yet reached a decision on 50MHz operation. Twenty five experimental permits have been issued in Sweden, allowing operators to use 50W e.r.p. for stations 250km from a ch. E2 transmitter and lower powers at closer distances. Cyprus has extended 50MHz operation. Farther afield, at least one UK amateur is operating at 50MHz in Nigeria and a further amateur is operating in the Falklands.

The 50MHz amateur band has caused TV-DXers few problems to date – unless you happen to live within a few miles of an operator, when ch. E2/R1 reception can become difficult. The problem is not as bad as a nearby 49MHz baby alarm however. We understand that Dave Lauder is working on a new notch filter design with a very sharp response to help with rejection of adjacent sources of interference and hope to be able to pass on more details shortly.

Service Bureau

Requests for advice in dealing with servicing problems must be accompanied by a £2 cheque or postal order (made out to IPC Magazines Ltd.), the query coupon and a stamped addressed envelope. We can deal with only one query at a time. We regret that we cannot supply service sheets nor answer queries over the telephone.

TANDBERG CTV3 CHASSIS

This set trips continuously and although the feeds from the power supply and the line output stage have been disconnected I cannot isolate the cause. The power supply panel has been checked for dry-joints and various smaller semiconductor devices have been replaced. With the 160V line isolated from the main panel the h.t. pulses up to about 80-90V. The 12V supply to the TBA920 chip is also low and pulsing. Obviously the overvoltage trip is not operating or the fuse would blow.

It sounds as if the excess current trip is operating. First check that R754 (0.47 Ω) hasn't increased in value, then check Q736 (BC548). To prove that the line output stage etc. isn't loading the power supply excessively, wire a 60W, 240V bulb across the main output from the power supply.

SONY SLF30

This machine plays prerecorded tapes all right but its own recordings produce a picture that is grainy for a second or two then a good picture with wow on the sound, as though the speed is varying. The fault is the same when the tape is played back on another machine.

The cause of the trouble could well be poor transfer of the control track pulses - clean the control track head. If this doesn't cure the problem, try setting up the capstan servo. If difficulty is experienced in doing this check the capstan shaft bearings for free running.

BUSH BC6004

There's no vision or sound - even the tube's heaters are out. The supply into the set is all right but it seems to use some rather unusual circuitry.

This set was produced by Saba and uses a combined line output/power supply regulation arrangement called a Wessel circuit. Check with an ohmmeter whether T686 (BU208) or D687 (SKE4F/10) is short-circuit. If they are o.k., check for 300V at the mains rectifier's reservoir capacitor C858. If this voltage is missing the surge limiter resistor R854 (6.8Ω , 11W) is probably open-circuit. If it's present the protection circuit associated with thyristor Thy697 could well have come into operation. Investigation of this calls for the use of a variac and oscilloscope.

GRUNDIG 2 \times 4 SUPER

When picture search is selected, in either direction, the picture rolls continuously. Occasionally the picture locks for a split second. When this happens the picture is good.

This affect is usually due to need for tape servo adjustment. This should follow a check on video head height offset - a dual-beam oscilloscope is required for this. Servo adjustment also requires an oscilloscope and a

method different from that described in the manual refer to page 76 of the Grundig Technical Bulletin issue no. 5, 1983 (part no. 00002-360.05).

FERGUSON TX90 CHASSIS

This is one of the 14in. models. The fault is a thin white line rising from the bottom of the picture. Sometimes there are two such lines.

We suggest that you check the 95V supply decoupler C191 (22μ F), then D107, R203 (33Ω) and TR105 (TIP112H) in the field output stage before suspecting the expensive TDA4500 chip. Use of gentle heat from a hairdryer and a freezer aerosol may help to pinpoint the faulty component

PANASONIC NV788

The heads were replaced using genuine Panasonic parts. The result: excellent standard play operation, along with slow-motion effects etc., but on long play the picture is very noisy, as though one head isn't functioning. Inspection of the f.m. envelope waveform showed that the output from one head is about half that from the other one. A second set of heads has made no difference.

The heads have separate preamplifiers — IC3502 caters for LP operation. Suspect it once you've proved that the tracking is perfect in the SP mode and that the drives to the bases of Q3501 and Q3502 are correct.

GRUNDIG CUC720 CHASSIS

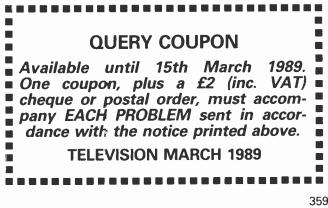
After fitting a new tube the picture was found to be offcentre vertically, by about 5/sin. (too high). The problem is that there's no field shift control. All the controls available work normally.

The tube tolerances are such that with correct setting up the picture should be within a few mm of the correct centring. The purity adjustment has the biggest influence on centring. The other c.r.t. neck rings also affect it. These items should be adjusted.

FERGUSON 3V48

We have the same trouble with two of these machines. The fault is with hi-fi audio and occurs with both own recordings and prerecorded tapes. Intermittently a slight buzz/ crackle is heard on both channels, for approximately a half to a second. This can happen every ten seconds or not be heard for about five minutes. All the relevant adjustments have been carried out. If a scope is connected anywhere in the playback circuit a ripple can be seen when the noise is present. Slight pressure on the deck produces a similar fault but slight adjustment of the entry/exit guides only makes matters worse.

IC204 could well be the culprit. Apart from this a good deal of information on the problem was published in issue no. 29 (February 1987) of Ferguson Feedback.



HITACHI CRP143 (NP6C CHASSIS)

Sound and picture are periodically lost. After switching off, sometimes for an appreciable period of time, everything is o.k. when the set is switched on again. Any suggestions?

First check the soldered joints around the chopper transformer T902 and the line output transformer T703, preferably by disconnecting them then resoldering. If necessary replace the voltage divider/reference source unit CP901 (HM9102) and the error amplifier transistor TR907 and check all associated joints. Occasionally rectifier diode CR705 (V09C) or R733 fails, killing the 12V line.



315

Each month we provide an interesting case of TV/video servicing to exercise your ingenuity. These are not trick questions but are based on actual practical faults.

David the Downtrodden was about to leave the yard on this bitterly cold morning. Out of his warm den the Service Manager trotted with a further job in his hand. One more in Crowfield – a rental Toshiba VCR with a "poor picture". What does a "poor picture" mean? Anything! Why can't the hens in the office get more specific details?

David arrived to find a Toshiba Model V66 (similar to the JVC HRD140, Ferguson 3V44 etc.). He was told that the playback picture was "wobbly". His own test tape, with a recording of the IBA test pattern, was inserted and the playback picture on the TV screen was then examined. The picture showed a lateral twitch effect, with watery verticals, especially in the lower part of the screen. This can arise from incompatibility with the TV set, but the one installed was correctly set up for VCR use – indeed the off-tape picture was considerably worse when tuned in on one of the off-air channels. Just to make sure, another TV set from the van was brought in and hooked up. The results were exactly the same. Anyway, TV compatibility problems usually cause a twitch at the top of the screen rather than the bottom.

David cleaned the lower drum, the capstan, the pinch roller, the guides and the head drum cylinder. This did not improve the playback pictures, and a recording made on the machine showed that the jitter effect was even worse! On to the van with the machine then.

With the VCR in the workshop the symptom was carefully studied and analysed. It was plainly due to timing jitter in the playback signal – the effect of minute changes in the speed at which the recorded tracks were being scanned. This can arise from irregularities in the tape's progress or in the head drum's peripheral speed.

The second possibility was investigated first. The drum was carefully rotated by hand, while "feeling" and listen-

ing for any roughness or rumble in the bearings. None was apparent. A scope was next hooked to the drum motor's error control line. The ripple level here was found to be no higher than in a similar model whose playback picture. *was* o.k. Could it be that the head motor, a direct-drive type, was faulty? Perhaps the only real test for this is by substitution, so at this stage we decided to investigate the alternative possibility, tape judder.

The entire tape path was again cleaned and polished, and the 1kHz tone from a test tape was listened to carefully for signs of flutter. No clues emerged from these steps, or from a check of head eccentricity with an improvised mounting for the gauge. The running of the impedance roller (beside the full-erase head) was next checked. When spun fast it rattled and roared somewhat. Could this be the cause of the trouble? A single drop of light lubricant was run down its shaft, after which it ran as sweet as a nut. The playback picture was no better however!

Workshop Sage was consulted on the matter. The fact that the jitter was worse in the lower part of the picture seemed to him to be an important clue. With no tape in the machine he prodded, poked, felt and listened. He then loaded a test tape into the machine and, while watching the TV screen, applied a miniscrewdriver tip to a certain part of the deck. This had some effect on the jittery picture. Sage suggested a possible culprit, a small but high-precision component, which did indeed turn out to be the cause of the trouble. What was it? See next month's issue for the answer.

ANSWER TO TEST CASE 314 – Page 284 last month –

An incredible set of symptoms was present in the Panasonic NV7200 VCR described last month. In playback the machine behaved exactly as if a blank tape was loaded, except that there was sometimes a snatch of sound and vision at the beginning of the playback and that there were good pictures in the review mode provided the tape being reviewed hadn't previously seen an attempt at playback in the machine!

The machne was of course "reading" blank tape in the playback mode. As the tape approached the video head drum it was being erased by the full-erase head, which was operating even during playback. Thank goodness the alignment tape hadn't been fed into the machine at any stage!

Normally the full-erase head comes into action only when the machine is in the record mode. The erase oscillator is switched on by a voltage at pin 3 of P4001. This voltage turns on switching transistor Q4019 on the Y/ C/audio panel. When tested this "relay" transistor was found to have developed a virtual short-circuit, with the result that the erase oscillator was powered at all times.

During the testing and head-scratching in the workshop the rogue machine had wiped clean sizeable portions of some of our favourite tapes, and had done the same to some of those belonging to the owner. The worst news however was for the proprietor of the video rental shop . . .

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FPRICE IMITED SIMPLY THE WHOLESALE SUPPLIER **EX-RENTAL** • OF THE r.v.'s & video recorders IN THE UNITED KINGDOM RING OUR LOCAL MANAGER FOR DETAILS AVONMOUTH FARNBOROUGH WAREHOUSE WAREHOUSE MAJOR **KARLA HEATH** CLIFF PARSONS REGIONA B T 0272 235093 0252 540814 7/8 KINGSGROVE INDUSTRIAL EST. 1018 **5 PORTVIEW ROAD** INVINCIBLE ROAD **AVONMOUTH** FARNBOROUGH **70UR SERVI BRISTOL BS11 7LQ** HANTS. GU14 7QS SUNDERLAND LINWOOD AINTREE WAREHOUSE WAREHOUSE WAREHOUSE **BRIAN CADE** IAN DORAN IAN McCLELLAND 雷 B B 091 523 5554 0505 29284 051 530 1285 1a LYON ROAD **9A/B** UNIT 2. RACECOURSE IND. EST. **94 CARRMERE ROAD** LINWOOD INDUSTRIAL ESTATE ORMSKIRK ROAD LEECHMERE INDUSTRIAL EST. LINWOOD AINTREE SUNDERLAND SR2 9TE

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| LINEAR IC'S | 2SC-1213 50p | 2SC-3422 110p | 4075 13 p
4076 42 p | 74HC32 20p
74HC42 32p | 74LS11 14p
74LS12 14p | 6820 140 p 745287 190 p
6821 140 p 745288 160 p | IDLERS & PULLEYS | ELECTROLYTIC |
|---|--|---|--|--|---|---|---|--|
| Cont.
ZN-428425
ZN-429215 | 2SC-1214 40p
2SC-1226 75p
2SC-1279 30p | 2SC-3467 70p
2SC-3468 70p
2SC-3503 90p | 4077 13p
4078 13p | 74HC51 20p
74HC73 26p | 74LS13 22p
74LS15 15p
74LS20 15p | 6840 310p 745289 180p
6845 620p 745387 200p | REPLACEMENTS
Servo | CAPACITORS |
| ZN-435340
ZN-448510 | 2SC-1279 30p
2SC-1306 90p
2SC-1308K 350p | 2SC-3568 200p
2SC-3675 160p
2SC-3685 400p | 4081 13p
4082 13p
4085 36p | 74HC74 26p
74HC75 30p
74HC76 30p | 74LS21 15p
74LS22 15p | 8080A 400p 75108 80p
110p 75109 110p | Reel, Pulley 143-0-662T-01201 520p | AXIAL LEAD
16 VOLTS 40 VOLTS |
| ZN-459190
ZN-1034170
ZN-1040640 | 2SC-1317 25p
2SC-1318 25p | 2SC-3789 75p
2SD-024 60p | 4086 30p
4089 75p | 74HC77 40p
74HC85 33p | 74LS24 38p
74LS26 15p
74LS27 15p | 8085A 300p 75110 80p
8155 360p 75112 140p
8156 360p 75113 105p | Gear Idler 143-04904-00900 450p
Take Up Idler 143-0-4204-00100 650p
Idler 143-256T-03200 450p | 47 MF 25p 10 MF 25p |
| ZNA-134H2150
ZNA-234E920 | 2SC-1327 20p
2SC-1342 120p
2SC-1383 50p | 2SD-313 70p
2SD-325 60p
2SD-348 460p | 4093 18p
4094 44p
4095 58p | 74HC86 29p
74HC93 50p
74HC107 31p | 74LS28 15p | 81LS95 120p 75114 130p
81LS96 130p 75115 130p | Sony | 220 MF 35p 47 MF 35p |
| 2SJ-48480
2SJ-49425
2SJ-50425 | 2SC-1384 50p
2SC-1398 80p | 2SD-371 240p
2SD-401 130p | 4098 50p
4099 42p | 74HC109 31p
74HC112 31p | 74LS32 17p
74LS33 17p | 81LS98 130p 75121 125p
8224 270p 75122 125p
8226 270p 75150 110p | Rew Pulley A-6706-348-B 400p Rew Pulley A-6706-391-A/B 300p | 1000 MF 60p 220 MF 50p |
| 2SJ-77350
2SJ-122580 | 2SC-1413 265p
2SC-1419 150p
2SC-1444 360p | 2SD-438 100p
2SD-600 120p
2SD-613 70p | 4501 27p
4502 36p
4503 30p | 74HC113 31p
74HC123 43p
74HC125 35p | 74LS31 16p
74LS38 17p
74LS40 16p | 8228 270p 75154 110p
8243 250p 75158 140p | Sharp
Idler Assembley NIDL0005 Gezz 325p | 4700 MF 160p 1000 MF 100p |
| 2SK-15350
2SK-1945
2SK-4950 | 2SC-1454 320p
2SC-1472 40p
2SC-1505 80p | 2SD-718 100p
2SD-1277 190p | 4504 55p
4505 180p
4506 58p | 74HC126 36p
74HC131 38p
74HC132 37p | 74LS42 28p
74LS47 56p
74LS48 52p | 8250 850p 75159 200p
8087 11000p 75160 400p
8251 320p 75161 400p | Idler Assemialey NIDL0006 Gezz 325p
Idler Sharp NIDL0005 Gezz 225p | 470 MF 40p 63 VOLTS |
| 2SK-55100
2SK-68100
2SK-133480 | 2SC-1507 140p
2SC-1509 80p | 2SD 1398 250p
2SD 1453 180p
2SD 1609 110p | 4507 30p
4508 67p | 74HC133 35p
74HC137 55p | 74LS51 15p
74LS54 15p | 8253 320p 75162 700p
8255 310p 75172 720p
8256 1200p 75182 100p | Hitachi
Idler Assembley 6886971 300p | 2200 MF 70p 1.0 MF 25p |
| 2SK-134415
2SK-135415 | 2SC-1514 65p
2SC-1515 60p
2SC-1520 120p | BRIDGE
RECTIFIERS | 4510 32p
4511 30p
4512 38p | 74HC138 36p
74HC139 24p
74HC147 45p | 74LS73 26p
74LS74 20p | 8257 350p 75183 100p
8259 360p 75188 60p | Idler Assembley V-68661482 385p
JVC | 2.2 MF 25p 25 VOLTS 4.7 MF 25p 22 MF 25p 10 MF 30p |
| 2SK-147160
2SK-176800
2SK-191160 | 2SC-1573 95p
2SC-1586 540p
2SC-1624 140p | 1A/50V 16p
1A/100V 18p
1A/200V 19p | 4513 80p
4514 65p | 74HC148 40p
74HC151 36p
74HC153 35p | 74LS75 26p
74LS76 26p
74LS78 26p | 8271 3400p 75189 60p
8272 1200p 75195 185p
8279 450p 75322 130p | Idler Assembley PU-47752 480p
Take Up Idler PU-51402A 145p | 47 MF 35p 22 MF 35p
100 MF 35p 47 MF 40p |
| 2SK-19245
2SK-195150
2SK-197140 | 2SC-1675 100p
2SC-1678 120p | 1A/400V 21p
1A/600V 23p | 4515 65p
4516 36p
4517 100p | 74HC154 110p
74HC155 50p | 74LS83 40p
74LS85 40p | 8282 300p 75324 340p
8283 400p 75325 155p | Take Clutch PU-55373 225p Idler Arm FU-55374-3-8 285p | 220 MF 40p 100 MF 50p
470 MF 45p 220 MF 60p |
| 2SK-210130
2SK-211130 | 2SC-1729 900p
2SC-1730 540p
2SC-1740 40p | 1A/800V 28p
2A/100V 33p
2A/200V 33p | 4518 36p
4519 28p
4520 36p | 74HC157 36p
74HC158 36p
74HC160 44p | 74LS86 28p
74LS90 29p
74LS91 60p | 8287 360p 75450 45p
8288 650p 75451 42p | Fast Forward Idl PU-45896C 210p
National | 1000 MF 70p 470 MF 100p
2200 MF 125p 1000 MF 160p |
| 2SK-217130
2SK-291300
2SK-294400 | 2SC-1741 45p
2SC-1755 90p
2SC-1756 40p | 2A/400V 37p
2A/600V 43p
2A/800V 43p | 4521 86p
4522 43p | 74HC161 44p
74HC162 44p
74HC163 44p | 74LS92 35p
74LS93 28p
74LS95 45p | 8748 1100p 75452 42p
8755 1400p 75453 65p
AY3-1015 290p 75454 65p | ldler 300p | 35 VOLTS
10 MF 25p 100 VOLTS |
| 2SK-312750
2SK-322300
2SK-323130 | 2SC-1758 30p
2SC-1775 20p | 3A/200V 43p
3A/400V 43p | 4526 38p
4527 41p
4528 38p | 74HC164 44p
74HC165 58p | 74LS96 56p
74LS107 30p | AY5-3600 570p 75480 135p
SP0256AL2 500p 75491 60p | SERVICE AIDS | 22 MF 25p 1.0 MF 25p
47 MF 30p 2.2 MF 25p |
| 25K-555480
25K-557650 | 2SC-1809 40p
2SC-1815 30p
2SC-1826 60p | 3A/600V 44p
6A/200V 80p
6A/400V 72p | 4529 65p
4532 48p
4551 75p | 74HC166 70p
74HC173 55p
74HC174 38p | 74LS109 30p
74LS112 30p
74LS113 30p | Z80BCPU 500p 8T26 95p
Z80ADMA 650p 8T28 110p | SERVISOL PRODUCTS | 100 MF 35p 4.7 MF 30p
220 MF 40p 10 MF 35p |
| 35K-8870
JAPANESE
TRANSISTORS | 2SC 1845 20p
2SC 1847 120p | 25A/100V 150p
25A/200V 165p
25A/400V 185p | 4553 140p
4555 29p | 74HC175 38p
74HC181 130p | 74LS114 30p
74LS122 38p
74LS123 38p | Z80AP10 230p 8T31 330p Z80BP10 480p 8T95 90p Z80ACTC 250p 8T96 110p | V. Head Cleaner 85p
Switch Cleaner 100p | 470 MF 90p 22 MF 35p
1000 MF 110p 47 MF 40p |
| 2SA-473 35p
2SA-483 400p | 2SC-1875 260p
2SC-1881 210p | 25A/600V 200p
25A/800V 240p | 4556 36p
4557 140p
4583 60p | 74HC182 60p
74HC190 46p
74HC191 60p | 74LS124 85p
74LS125 32p | Z80AS10 660p 8T97 90p
Z80AS10-1 700p 8T98 110p | Silicone Grease 115p
Freeze It 105p | 2200 MF 160p |
| 2SA-490 60p
2SA-562 57p
2SA-563 45p | 2SC-1906 75p
2SC-1907 75p
2SC-1909 250p | 35A/100V 185p
35A/200V 200p
35A/400V 220p | 4584 30p
4585 40p | 74HC192 60p
74HC193 43p
74HC194 47p | 74LS126 32p
74LS132 32p
74LS133 32p | Z80BP10-2 700p
Z80ADRT 680p UHF TUNERS
74S188 17/5p U322LO 600p | Foam Cleaner 105p
Anti-Statis 105p | SOLDERING IRON |
| 2SA-571 500p
2SA-634 50p
2SA-636 50p | 2SC-1921 60p
2SC-1923 25p | 35A/600V 230p
35A/800V 260p | 40101 78p
40102 150p | 74HC195 47p
74HC221 100p | 74LS136 32p
74LS138 31p | 74\$189 210p U341 500p
74\$201 240p U342 500p | Aerokleane 90p
Aero Duster 115p
Plastic Seal 105p | ANTEX XS25W 240V Soldering Iron
240Vac 540p |
| 2SA-673 20p
2SA-684 60p | 2SC-1941 40p
2SC-1942 260p
2SC-1944 350p | 1.5A/100V 40p
1.5A/800V 40p
PLASTIC | 40103 120p
40104 90p
40105 140p | 74HC237 50p
74HC238 65p
74HC240 48p | 74LS139 31p
74LS145 70p
74LS147 100p | VIDEO RUBBER BELTS | 105p | Spare Element for XS25W 240V 260p
ANTEX C15W 240V Soldering Iron |
| 2SA-699 100p
2SA-715 90p
2SA-720 20p | 2SC-1945 350p
2SC-1946 1500p
2SC-1947 450p | CASED | 40106 35p
40107 50p | 74HC241 47p
74HC242 55p
74HC243 60p | 74LS148 80p
74LS151 30p
74LS153 36p | VS-2EG/5EG 5 belts/kit 180p
VS-9300 7 belts/kit 220p
VS-9700EG 6 belts/kit 200p | * * * * * * * * * * * * * * * * * * * | 240Vcm 540p
Spare Element for C15W 240V 260p |
| 2SA-733 30p
2SA-798 55p
2SA-844 30p | 2SC-1957 70p
2SC-1969 160p | 4A/400V 60p
6A/400V 69p
8A/400V 68p | 40108 260p
40109 74p
40110 170p | 74HC244 44p
74HC245 49p | 74LS154 85p
74LS155 36p | VS-9500/9800 7 belts/kit 220p | * * * * * * * * * * * * * * * * * | |
| 2SA-872 40p
2SA-872A 50p | 2SC-1971 400p
2SC-1972 600p
2SC-1983 130p | 12A/400V 85p
16A/400V 105p
20A/400V 190p | 40114 180p
40117 180p
40147 240p | 74HC251 25p
74HC253 37p
74HC257 41p | 74LS156 41p
74LS157 28p
74LS158 31p | HR-3300/3600 9 belts/kit 220p
HR-3330 7 belts/kit 200p
HR-3360/3660 7 belts/kit 190p | | DESOLDERING PUMP |
| 2SA-886 90p
2SA-899 60p
2SA-907 650p | 2SC-2001 60p
2SC-2002 40p
2SC-2003 25p | 25A/400V 205p
8A/400V 52p | 40160 55p
40161 55p | 74HC258 50p
74HC259 55p
74HC273 42p | 74LS160 44p
74LS161 44p
74LS162 44p | HR-4130 7 beits/kit 195p
HR-7200 3 beits/kit 75p | SONY on/off SWTTCHES 250p | Desolder Pump 290p
Spare Nozzle 60p |
| 2SA-909 700p
2SA-933 40p | 2SC-2023 180p
2SC-2026 60p | THYRISTORS
0.8A/60V 20p
0.8A/100V 28p | 40162 55p
40163 55p
40174 48p | 74HC279 37p
74HC280 65p | 74LS163 40p
74LS164 40p | HR-7600 3 belts/kit 145p
HR-7730 3 belts/kit 77p | ****** | Spare Nozzle 60p |
| 2SA 935 40p
2SA-937 40p | 2SC-2028 75p
2SC-2029 120p
2SC-2053 120p | 0.8A/200V 29p
4A/400V 28p | 40175 60p
40181 170p
40182 70p | 74HC283 65p
74HC297 950p
74HC298 52p | 74LS165 56p
74LS166 60p
74LS168 68p | NATIONAL NV-300 5 belts/kit 160p NV-333 5 belts/kit 135p | | SOLDER MOP 65p |
| 2SA-940 70p
2SA-950 30p
2SA-952 50p | 2SC-2060 60p
2SC-2068 90p | 8A/300V 59p
8A/400V 70p
8A/600V 79p | 40192 48p
40193 48p | 74HC299 105p
74HC354 38p | 74LS169 60p
74LS170 75p
74LS174 36p | NV-777 4 belts/kit 130p
NV-2000 5 belts/kit 155p | VIDEO LAMPS | |
| 2SA-953 60p
2SA-965 60p | 2SC-2073 70p
2SC-2075 80p
2SC-2078 95p | 12A/400V 75p
12A/600V 90p
2N4444 76p | 40194 58p
40208 240p
40257 120p | 74HC356 45p
74HC365 34p
74HC366 36p | 74LS175 38p
74LS190 51p | NV-3000 6 belts/kit 180p NV-7000 5 belts/kit 100p NV-7200 5 belts/kit 90p | UNIVERSAL VIDEO LAMP 30p
12V 60mA (300mm Wires)
RED OR BLUE | SOLDER |
| 2SA-966 70p
2SA-970 50p
2SA-979 85p | 2SC-2086 60p
2SC-2098 600p
2SC-2166 90p | 8R103 37p
BR303 85p | 74 SERIES
7400 20p | 74HC367 36p
74HC368 36p
74HC373 47p | 74LS191 48p
74LS192 46p
74LS193 47p | NV-8600 7 belts/kit 200p
SONY | VIDEO LAMP FOR PANASONIC 60p | 18 SWG 500g 580p
20 SWG 500g 650p |
| 2SA-984 50p
2SA-992 30p
2SA-1012 130p | 2SC-2228A 60p
2SC-2229 25p | BT106 120p
BT116 80p
BT119 100p | 7401 16p
7402 18p | 74HC374 50p
74HC375 60p | 74LS194 47p
74LS195 50p
74LS196 55p | SL-C72SL-J7 6 belts/kit 140p
SL-T7ME/T7I/IER 6 belts/kit 170p
SL-T9/P7/J9 7 belts/kit 210p | | 20 SWG 500g 650p |
| 2SA-1015 30p
2SA-1102 190p | 2SC-2233 125p
2SC-2235 60p
2SC-2236 60p | BT120 100p
OT121 120p
TIC44 22p | 7404 35p
7405 10p | 74HC377 55p
74HC386 20p
74HC390 55p | 74LS197 48p
74LS221 50p | SL-8000-8080 6 belts/kit 240p | FLOPPY DISCS
5 ¹ /4 indh DSDD (10 in box) Branded | SOLDERING IRON |
| 2SA-1104 200p
2SA-1105 250p | 2SC-2238 70p
2SC-2240 45p
2SC-2259 80p | TIC45 27p
TIC47 32p | 7406 40p
7407 40p
7408 25p | 74HC393 50p
74HC423 70p
74HC533 68p | 74LS240 50p
74LS241 46p
74LS242 50p | VTC-5300 5 belts/kit 190p
VTC-5500 3 belts/kit 95p | Name £12.50
5 ¹ /4 inch DSDD (bulk pack) 25 £10.00 | STAND |
| 2SA-1106 250p
2SB-022 80p
2SB-324 55p | 2SC-2271 60p
2SC-2275 50p
2SC-2290 1800p | 17088 200p
17089 200p
17127 200p | 7409 20p
7413 35p
7414 45p | 74HC534 65p
74HC540 73p | 74LS243 55p
74LS244 45p
74LS245 46p | VTC-9300 4 belts/kit 240p
HITACHI | 31/2 inch DSDD (10 in box) Branded
Name £21.00 | Soldering Stand 200p
Spare Sponge 40p |
| 2SB-370 45p
2SB-546 70p
2SB 557 225p | 2SC-2314 70p
2SC-2324 120p | 15/80H 230p
15/85R 230p
SG613 850p | 7416 40p
7417 32p | 74HC563 73p
74HC564 73p | 74LS247 46p
74LS248 48p | VT-5000 7 belts/kit 155p
VT-8000 3 belts/kit 110p
VT-11 5 belts/kit 190p | 3 inch CF2 Branded Name £2.40
3 inch CF2D Branded Name £3.00 | |
| 2SB-561 50p
2SB-566 130p | 2SC-2329 480p
2SC-2334 240p
2SC-2335 120p | SG264A 300p
4000B SERIES | 7420 22p
7421 25p
7425 15p | 74HC573 73p
74HC574 70p
74HC583 90p | 74LS251 28p
74LS253 40p | FISHER
VBS-7000 6 belts/kit 245p | ELECTROLYTIC | VIDEO HEADS |
| 2SB-595 80p
2SB-598 60p
2SB-600 500p | 2SC-2335 120p
2SC-2369 100p
2SC-2371 45p | CMOS IC's
4000 13p
4001 13p | 7430 25p
7437 28p
7438 35p | 74HC595 85p
74HC597 85p
74HC620 110p | 74LS256 58p
74LS257 38p
74LS258 40p | VBS-9000 3 belts/kit 120p
TOSHIBA | CAPACITORS | REDUCED TO |
| 2SB-600 500p
2SB-616 190p
2SB-621 85p | 2SC-2373 210p
2SC-2407 110p | 4002 13p
4006 34p
4007 13p | 7442 45p
7447 60p | 74HC623 110p
74HC640 90p | 74LS259 55p
74LS260 38p | V-5250/5280 5 belts/kit 230p
V-5480 7 belts/kit 210p
V-5475 6 belts/kit 190p | RADIAL LEAD
10 Volts 40 Volts | UNBEATABLE
PRICES |
| 25B-646A 90p
25B-647 30p | 2SC 2408 120p
2SC-2470 65p
2SC-2482 40p | 4008 38p
4009 20p | 7450 22p
7451 10p
7454 25p | 74HC643 90p
74HC646 15Cp
74HC648 15Cp | 74LS273 50p
74LS279 37p | V-7540 5 belts/kit 190p
V-8600 6 belts/kit 150p | 22 MF 15p 10 MF 15p
47 MF 15p 15 MF 15p | JVC/AKAI/FERGUSON 3HSS £15.50 |
| 2SB-649 40p
2SB-688 120p
2SB-703 125p | 2SC-2484 240p
2SC-2509 580p
2SC-2545 55p | 4010 21p
4011 13p
4012 13p | 7470 30p
7473 30p
7474 40p | 74HC651 110p
74HC652 110p
74HC670 90p | 74LS280 100p
74LS283 55p
74LS290 30p | SHARP
VC-6300 5 belts/kit 195p | 100 WF 18p 22 MF 15p
220 WF 18p 47 MF 20p | NATIONAL PANASONIC 4HSS £15.50
SONY DSR-35R
C20/C30/C40 £20.00 |
| 2SB-705 200p
2SB-707 200p
2SB-716 30p | 2SC-2547 65p
2SC-2550 70p | 4013 19p
4014 32p
4015 32p | 7475 25p
7481 90p | 74HC688 150p
74HC690 120p | 74LS293 30p
74LS365 30p | VC-7300 5 belts/kit 160p VC-8300 5 belts/kit 175p VC-9300 5 belts/kit 155p | 470 WF 25p 100 MF 25p 1000 WF 35p 220 MF 30p 16 Vielts 470 MF 35p | C20/C30/C40 £20.00
SONY DSR-43R £20.00
HITACHI VT11/33 £20.50 |
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2SB-754 80p | 2SC-2551 70p
2SC-2562 90p
2SC-2564 245p | 4016 18p
4017 29p | 7482 70p
7485 30p
7486 28p | 74HC691 120p
74HC4002 25p
74HC4015 85p | 74LS367 33p
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6V 290 p | 10 MF 15p 1000 MF 50p
22 MF 15p 2200 MF 190p | SHARP VC387/9700
VC581/681 £21.00 |
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2SB 764 60p | 2SC-2565 280p
2SC-2570 60p
2SC-2577 125p | 4018 30p
4019 28p
4020 33p | 7489 80p
7490 35p
7492 45p | 74HC4016 75p
74HC4017 43p
74HC4020 59p | 74LS373 50p
74LS374 50p
74LS375 52p | 9VCW 290p
12VCCW 290p
12VCW 290p | 47 MF 15p 50 Volts
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| 2SB-772 45p
2SB-775 160p
2SB-791 280p | 2SC-2578 220p
2SC-2579 200p
2SC-2580 240p | 4021 36p
4022 36p
4023 13p | 7493 35p
7495 48p
7497 80p | 74HC4022 40p
74HC4024 34p
74HC4028 40p | 74LS390 46p
74LS393 41p
74LS399 75p | 13.2VCW 290p
13.2VCCW 290p | 220 MF 18p 2.2 MF 15p
470 MF 25p 4.7 MF 15p | VCR 7000 £20.50
NATIONAL NV370 £21.00 |
| 2SB-792 70p
2SB-795 60p
2SB-825 135p | 2SC-2581 290p
2SC-2608 620p | 4024 25p
4025 13p | 74107 30p
74111 52p | 74HC4040 34p
74HC4049 50p | 74LS629 105p
74LS641 100p | CASSETTE TAPE HEADS
Mono Head 90p
Stereo Head 150p | 1000 MF 50p 10 MF 20p
2200 MF 60p 22 MF 25p | NATIONAL NV430 £21.00 |
| 2SB-861 160p
2SB-882 180p | 2SC-2611 40p
2SC-2611 65p
2SC-2625 380p | 4026 60p
4027 18p
4028 29p | 74116 85p
74119 85p
74122 40p | 74HC4050 50p
74HC4051 95p
74HC4052 95p | 74LS642 140p
74LS644 140p
74LS645 140p | Mono Mini Head 230p
Auto Reverse Head 250p | 4700 MF 110p 63 Volts
25 Volts 0.47 MF 15p | |
| 2SB-884 120p
2SB-886 225p
2SB-895 120p | 2SC-2681 270p
2SC-2688 70p
2SC-2695 2100p | 4029 34p
4030 17p
4031 90p | 74123 20p
74125 40p
74126 45p | 74HC4053 55p
74HC4059 85p
74HC4050 33p | 74LS670 68p
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Sanyo
Reel Motor (RM11) P/N 4-529V- | 10 MF 15p 1.0 MF 15p
22 MF 15p 2.2 MF 15p
47 ME 15p 2.2 MF 15p | * * * * * * * * * * * * * * * * * * * |
| 2SB-950 180p
2SB-951 190p
2SB-1009 110p | 2SC-2719 80p
2SC-2749 350p | 4032 52p
4033 60p
4034 76p | 74132 42p
74141 55p | 74HC4066 33p
74HC4072 33p | COMPUTER
IC'S | 10800 790p
Capstan Wotor 4-527V-51000 2400p | 100 MF 18p 4.7 MF 15p
100 MF 18p 10 MF 15p | * SMALL ZIPPED * |
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2SB-1077 180p | 2SC-2785 60p
2SC-2810 360p
2SC-2837 360p | 4035 42p
4036 180p | 74145 70p
74153 45p
74155 45p | 74HC4075 26p
74HC4078 32p
74HC4094 50p | 2114 200p
2532 330p
2716 200p | Sony
Capstan Motor BHF-1100D 2500p
Sharp | 470 MF 25p 47 MF 20p
100 th MF 50p 100 MF 20p | * £28.99 + VAT * |
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2SC-97A 380p
2SC-454 45p | 2SC-2922 610p
2SC-2979 320p
2SC-2988 280p | 4037 75p
4038 46p
4039 180p | 74157 45p
74160 50p
74164 50p | 74HC4316 100p
74HC4351 110p
74HC4352 180p | 2732 280p
2732A 300p | Reel Motor RMOTB 1007 Gezz 1750p
Reel Motor RMOTM 1008 Gezz 1750p
Loading Motor RMOTM 1017 1000p | 220+ MF 70p 220 MF 30p
35 Volts 470 MF 50p | * CONTAINING: *
* PLIAR, CUTTER, * |
| 2SC 458 15p
2SC 461 30p
2SC 495 60p | 2SC-3025 500p
2SC-3039 140p | 4040 30p
4041 36p
4042 30p | 74167 35p
74173 50p | 74HC4310 120p
74HC4511 35p | 2764 240p
27C64 550p
27128 350p | JVC
Capstan Motor PU-55371V
Capstan Motor PU-45979 2250p
2250p | 10 MF 15p 1000 MF 100p
22 MF 15p 100 Volta | TOP CUTTER |
| 2SC-536 30p
2SC-681 340p | 2SC-3040 260p
2SC-3042 300p
2SC-3060 900p | 4043 36p
4044 36p | 74175 65p
74176 45p | 74HC4514 140p
74HC4515 130p
74HC4516 130p | 26256-25 400p
41256-15 450p
256DRAM 450p | VIDEO PINCH ROLLERS | 100 MF 20p 0.47 MF 15p | * MULTI TESTER, *
* TWEEZER * |
| 2SC-710 50p
2SC-733 30p
2SC-790 125p | 2SC-3148 410p
2SC-3150 200p | 4045 72p
4046 42p
4047 45p | 74180 50p
74182 45p
74192 40p | 74HC4518 70p
74HC4520 80p
74HC4533 90p | 4116 75p
4164 150p
6116 200p | National
NV-300 475p | 220 MF 25p 1.0 MF 15p
470 MF 30p 2.2 MF 15p
1000 MF 60p 4.7 MF 15p | * FIVE DIFFERENT TYPES *
* OF TINE TOOLS * |
| 2SC-792 380p
2SC-828 25p
2SC-930 50p | 2SC-3152 250p
2SC-3153 350p | 4048 27p
4049 18p
4050 20p | 74196 40p
74197 45p
74393 70p | 74HC4543 120p
74HC7266 75p | 6264-15 300p
6502 300p | Sanyo
VTC-9300 475p | 2200 MF 100p 10 MF 15p | ****** |
| 2SC-943 160p
2SC-945 40p | 2SC 3158 260p
2SC 3173 180p | 4051 38p
4052 35p | 74393 70p
74HC SERIES
HIGH SPEED | 74HC22106 580p
74HC40104 190p
74HC40105 250p | 6502A 400p
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Sony
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2SC-1060 99p | 2SC-3178 340p
2SC-3181 240p
2SC-3210 400p | 4053 35p
4054 53p
4055 52p | CMOS
74HC00 14p | 74LS SERIES
LOW POWER | 6520 170p
6522 330p
6530 1050p | SL-C7 475p
JVC HR-3300 500p | Duotations given for large quantities Pleat
Components All valves are new and bo
availability and may be changed without | se allow 7 days for delivery. All brand-new
ixed. Prices quoted are subject to stock |
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2SC-1070 65p
2SC-1096 60p | 2SC-3212 510p
2SC-3264 510p
2SC-3264 510p
2SC-3277 280p | 4056 52p
4060 40p
4063 52p | 74HC02 14p
74HC03 14p
74HC04 15p | SCHOTTKY
T.T.L.
74LS00 14p | 6532 460p
6545 880p | HR-3330 500p
HR-3360/3660 500p | GRAND | |
| 2SC-1106 180p
2SC-1114 415p
2SC-1115 400p | 2SC-3293 85p
2SC-3299 120p | 4066 20p
4067 120p
4068 13p | 74HC08 18p
74HC10 20p
74HC11 14p | 74LS01 14p
74LS02 14p
74LS03 14p | 6551 530p
6800 210p
6802 220p | HR-7200 500p
HR-3300 500p
Akai | K.P. HOUSE, UNIT 15, POP | IN COMMERCIAL CENTRE, |
| 2SC-1116 290p
2SC-1161 110p | 2SC-3318 500p
2SC-3355 90p
2SC-3358 80p | 4069 13p
4070 13p | 74HC14 28p
74HC20 20p | 74LS04 14p
74LS05 14p
74LS08 14p | 6803 800p
6808 500p
6809 600p | VS-9703EG 360p
Hitachi
VT-5000 475p | SOUTHWAY, WEMBLEY,
Telephone: 01-900 2329 | Telex No: 932 885 (Sunmit) |
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2SC-1164 600p | 2SC-3402 50p
2SC-3416 80p | 4071 13p
4072 13p
4073 13p | 74HC21 20p
74HC27 20p
74HC30 20p | 74LS08 14p
74LS09 15p
74LS10 14p | 6810 150p
6818 380p | V1-5000 47.5p
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Pinch Roller | 3V29
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Reel Idler
Take Up (
Belt Kit
Pinch Roll | SON 3V35 dler 1.85 3.75 3.75 Clutch 2.80 1.75 | HITACHI
F/F Rewind
Belt Kit
Pinch Roller | VT11
2.75
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VXP0433 Idler
VXP0401 Idler
Belt Kit
Pinch Roller | NV333
4.95
0.95
2.95
4.95
Total 19.80 |
| KIT 1 | £11.50 | KIT 2 | £11.85 | KIT 3 | £8.50 | KIT 4 | £11.50 |
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VXP0329 IDLER
VXP0331 IDLER
Belt Kit
Pinch Roller | NV2000
0.95
0.95
2.25
<u>4.95</u>
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VXP0344
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| HITACHI
8000/9700 22.4
VT11/33 22.4
VT17/1936.75 | 50 SHARP | | FERGUSON
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9300/9700 | 581/2/3/4 | Ferguson 3V00-29 | SENSORS | | 10-90-100 Cl | |
| PANASONIC NV333/2000 7000/8200 14. NV270/370 21. | | 19.50 | (includes socket)
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TODD TRADING

NEW WAREHOUSE OPEN! HIGH QUALITY TELEVISIONS & VCR's

Specialists in 'ready to retail' televisions and VCRs (packed with handbook and patch lead). Mostly Ferguson but all models stocked.

NEW 'B' GRADED EQUIPMENT AVAILABLE.

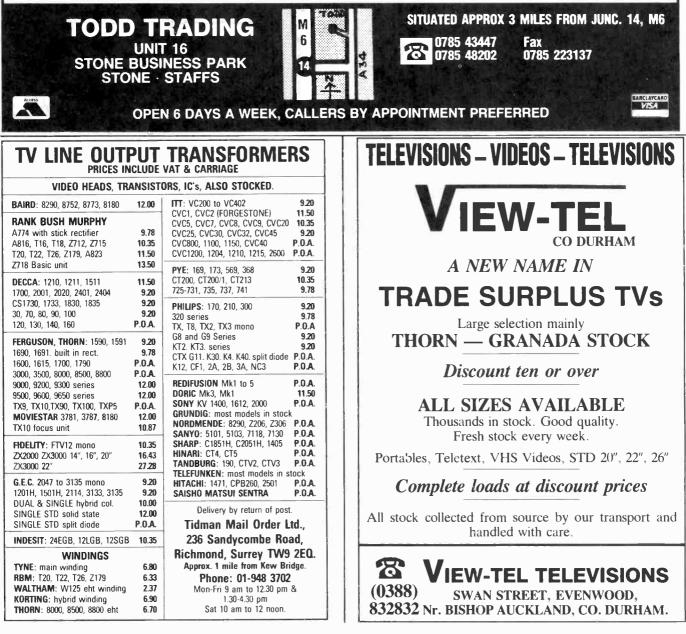
ITEMS USUALLY IN STOCK

Ferguson Non Text, Text and Stereo, Text & New F.S.T. B Grade. Ferguson, JVC, Sharp, Hitachi, Sony, etc., etc. V.C.R.s working: Ferguson 3V29/30 V.C.R.s ready for retail in fives £75 + VAT. Ferguson Compact Disc Units, A Grade and B Grade, from £40 + VAT. Sony C9 Beta in top condition, back to spec, plenty in stock. Ferguson V.C.R.s for spares: 3V16/3V22/3V23/3V24/3V29/3V31/3V35/3V43/3V45/3V55.

NATIONWIDE DELIVERY

EVEN ON SMALL ITEMS -- MIN OF 5 UNITS

PHONE FOR DETAILS





Do you use cathode ray tubes?
 Can't find a replacement or shocked by the cost?
 It may well be that a rebuilt tube

that a rebuilt tube will solve your problem.

Come to one of the most experienced firms in the business. We have been rebuilding cathode ray tubes for industry, broadcasting authorities, major airlines, M.O.D. universities, and, of course, the TV trade in general since the '60's.

WHY NOT TELEPHONE UXBRIDGE (0895) 55800 TO DISCUSS YOUR REQUIREMENTS. DAVE DYSON WILL HELP YOU WITH DOMESTIC TV TUBES. TERRY SMITH DEALS WITH COMMERCIAL/ PROFESSIONAL TYPES.

We are currently redeveloping our factory and have temporarily transferred production facilities to a factory unit in nearby lver (Bucks). We have made arrangements for the Uxbridge 55800 telephone to be rerouted to the lver factory at the exchange, but if you should wish to dial directly, the lver number is (0753) 630137. During the temporary period of relocation we shall maintain goods handling facilities at Uxbridge. It would be appreciated if intending visitors telephone us first to be sure that technical staff are available at Uxbridge if required. We greatly appreciate the confidence placed in us by our customers which has enabled our business to grow and look forward to being of continued service in the future.

DISPLAY ELECTRONICS LTD. SWAN WHARF, WATERLOO ROAD, UXBRIDGE, MIDDLESEX.

VHS VIDEOS FERGUSON

3V00, 3V22, 3V23, 3V16, 3V29, 3V30, 3V31, 3V32, 3V35

> HITACHI 5000, 8000

NATIONAL PANASONIC

NV8600, 8610, 2000, 7000, 370, 333, 2010

<u>SHARP</u> 620, 630, 640, 2300 H T/P Untested from £70

BETAMAX VIDEOS

SANYO VTC 9300, 5300

SONY C5, C6, C7 Untested from £25 HITACHI VHS TUNER/TIMER £10, HITACHI VHS BATTERY CHARGER £10, ROBERTS VHF RADIOS £5 VHS/Beta tapes used – from 40p each

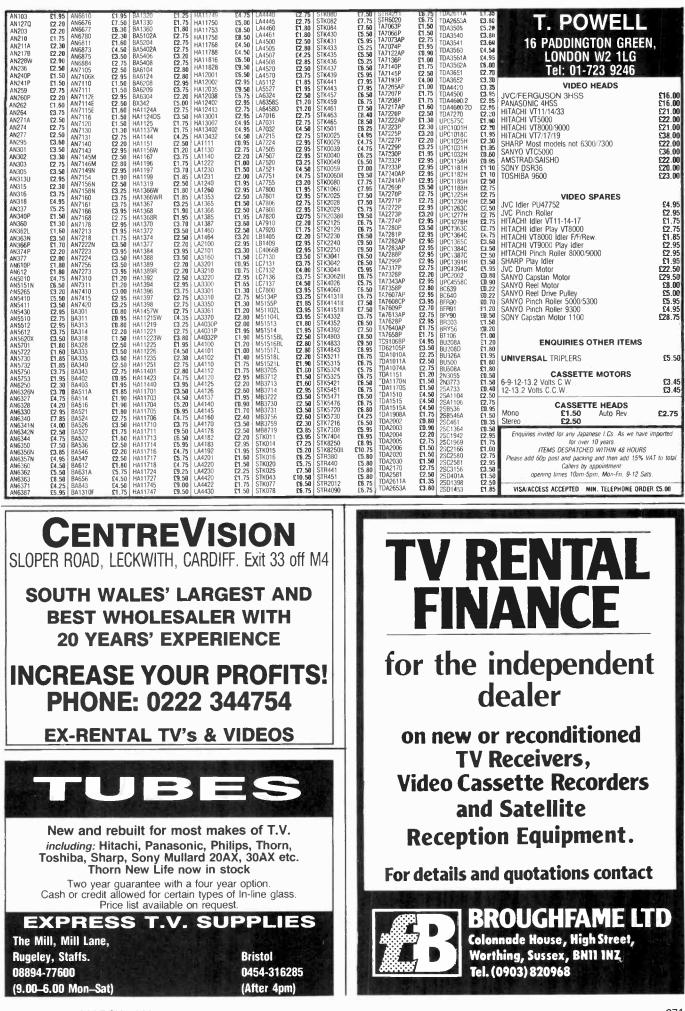
Sorry must collect as we do not send through the post.

<u>PLUS</u>

17" 18" 20" 22" 26" Hybrid/ Solid State from £8. Also available CTVs Remote Control & Teletext All prices subject to 15% VAT

Discount for Quantities Complete loads delivered from pick up point

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W. TREE TRADE TVs Spring-time specials

| | Off the pile | Working |
|-------------|--------------|---------|
| G11 C.T.V. | £10.00 | £18.00 |
| G11 TEXT | £20.00 | £50.00 |
| KT3 C.T.V. | £15.00 | £30.00 |
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| TX10 C.T.V. | £20.00 | £40.00 |
| TX TEXT | £35.00 | £65.00 |

ALSO IN STOCK AT 'OFF THE PILE – PRICES' GRUNDIG – BUSH – DECCA TATUNG – TOSHIBA – ITT PANASONIC – GEC – FERGUSON FIDELITY – PYE – ETC.

QUANTITY DISCOUNTS



W. TREE TRADE TVS UNIT 1, SUNSHINE MILLS WORTLEY ROAD, LEEDS 12. TEL: 0532 – 638804 ALL PRICES PLUS VAT



BOLTON COMMUNICATIONS PROJECT SATELLITE TELEVISION RECEPTION TRAINING COURSES

ONE DAY COURSE on SATELLITE T.V. RECEPTION

To be held at Smithills Coaching House, Bolton on Thursday, 23rd February, 1989 £45.00 (including Lunch).

FOUR DAY PRACTICAL COURSE on SATELLITE T.V. INSTALLATION

To be held at the Last Drop Hotel, Bolton on the 20th, 21st, 22nd and 23rd March, 1989 £300.00 (including lunches and course material).

STARTING SEPTEMBER

FULL-TIME TWO YEAR B.T.E.C. NATIONAL DIPLOMA IN ELECTRONICS AND COMMUNICATIONS (including Satellite Television)

PART-TIME CITY & GUILDS 224 PART III – Satellite Television CITY & GUILDS 279 – Television and Video Production

For further information please contact:

Terry Tudor (Project Manager), Bolton Metropolitan College, Manchester Road, Bolton BL2 1ER. Telephone: (0204) 31411 Ext. 3371/3395



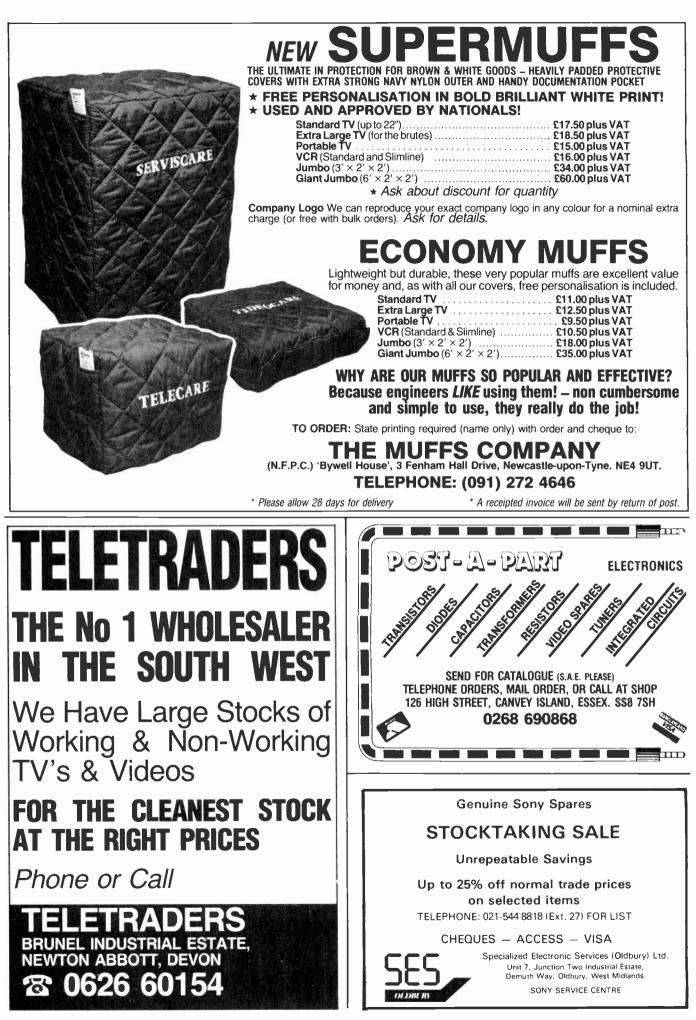
GARY WINTERTON HAS FINALLY TAKEN THE PLUNGE AND GONE IT

ALONE. OFFERING A FULL RANGE OF EX-RENTAL TV & VIDEO. NO WILD PROMISES – JUST GOOD STOCK AT FAIR PRICES

YOU COLLECT OR DELIVERED TO YOUR DOOR!

NO ORDER TOO LARGE OR TOO SMALL

FOR MORE DETAILS RING 0203 368437 OR 0836 590696 (MOBILE) TRADE ONLY SUPPLIED





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| LRC (SPARES) | | ORDERS | UNDER £50 ADD | £1.00 P&P |
| VIDEO SPARES FAST ex- | -stoc | | 8817 | |
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PANASONIC |
| UVCFRCUSOWETC 3HSS-V 12.50
TOSHEA 964 (4 HEAD) 25.10
PANASONIC NV-362 (4 HEAD) 24.55
PANASONIC NV-330/777 38.45
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VIDEO SPARES
NV333/366 IDLER VXP0401 | | RUM MOTOR HR3660/3V22
/UP IDLER (LARGE) HR3660
/UP IDLER (SMALL) HR3660 | 24.75 NV333/370
24.75 NV366
5.50 NV730
5.50 NV730 | BLACK OR SILVER 10.39 VS00257 11.21 VS00357 30.58 NV-A17E 30.59 |
| PANASONIC NV.333.2000/7000 ETC. 18.10 NV.333.068 (DER PANADUL SMARP UNVERSAL 25.60 NV.333.068 (DER VERDADI SONY SLC56/78000 19.10 NV370430 (DER VERDS21 SONY SLC56/78000 39.42 VM370430 (DER VERDS21 | 1.24 T
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| SHARP UNIVERSAL 25.60 NV333366 (PLAYTAKE UP) VXP0433 SONY SLCS:r78000 18.10 NV3704300 (PLAYTAKE UP) VXP0433 SONY SLCS:r78000 18.10 NV370430 (PLAYTAKE UP) VXP0431 SONY SLC2:r030406F1 36.00 NV3102450/70 (PLAYTAKE UP) VXP0571 FISHER / NV1-615 FTC 34.10 NV500480 (PLAYTAKE UP) VXP0451 SANYO VTC5000 5150/5300 31.60 NV77777 RIDLER VXP0453 SANYO VTC50300 31.60 NV2000 SRIES IDLER VXP0453 | 3.18
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ASSETTE CARRIAGE 3V45 ETC
INCH ROLLER (ALL MODELS) | 2.20
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MAX ALIGNMENT TAPE 88.10 |
| Many More Replacement Heads In Stock W72000 (PLAYTAKE UP) V7003 (PLAYTAKE UP) V7033 V9033 (PLAYTAKE UP) V7033 (PLAYTAKE UP) V7 | 3.18
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YANASONIC NV370830/850
YANASONIC NV588
YANASONIC NV-2000 SERIES
YANASONIC NV-7000 SERIES | | IÀRD - LEADS — XV1442 60,64
ZAM ADAPTOR 53,20
RUBBER PAD-RIM632:6 6.40
AERIAL XV1400:1612 7.85
AERIAL XV1412:1430 9.34
NG KIT (UNIV.) 4.25
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| VT65 5459282 60.84 P PULLER WV000 VXL0/r VT120 5457471 48.15 TENS BAND WX33056777 VX20129 VT130 5457472 48.16 TENS BAND WX33056777 VX20129 VT120 5457472 48.16 TENS BAND WX30730 VX20129 VT150 5457472 48.16 TENS BAND W202020 VX20075 | 2.08 | VIDEO BELT KITS (REPL | ACEMENT) | NG KIT (UNIV.) 4.25
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NV100/200 VEH0171 41.40 ORIGINAL SONY VIDEO S | DADEC I S | ANYO VTC-5000
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& JVC MANUALS P.O.A. |
| NV180 VEH0252 62:10 F.F. & REW ASSY SLC20040-01100 NV230 VEH0295 41:40 GUIDE THVIT SLF1.59(2:03040) NV333 VEH0103 41:40 GUIDE THVIT SLF1.59(2:03040) NV356 VEH0103 41:40 CORDC CONVERTOR SLC5 IV056 VEH0174 82:10 CARRIAGE MOD KIT SLC5 | 5.40 J
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VC HR-7650
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IITACHI VT5000
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OREMOTE (QUOTE MODEL) 4.10 |
| NV356 VFH0174 62.10 C_ARRIAGE MOD KIT SLOS NV370 5688 VEH0170 62.10 CARRIAGE COMPLETE SLOS NV777 VEH0177 62.10 CARRIAGE MOTO KIT SLOS NV330 VEH0268 41.40 CAPRIAGE MOTOR SLOSOLE1 NV730 VEH0266 41.40 CAPRIAGE MOTOR SLOSOLE1 NV738 VEH0267 62.10 IDLER KIT SLOS NV788 VEH02107 70.38 IDLER KIT SLOS | 22.75 S
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| NV810 VEH0294 69.11 FWD LIMITER ASSY, SLC5.7 NV830 VEH0266 70.38 FWD LIMITER ASSY, SLC5 NV850 VEH0265 70.38 FWD LIMITER ASSY, SLC5 NV870 VEH0268 93.84 PINCH ROLLER SLC56/7 | 2.72 1 1
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| NV2000/2000/0200/8610 VEH0103 41.40 TENSION BAND ASSY. SLC56/7 NV3000/7000/7200/8610 VEH0115 41.40 LOADING PULLEY SLC56 NV6600 VEH0115 41.40 LOADING PULLEY SLC6 NV67 VEH0295 41.40 PLEASE ASK FOR ANY PARTS NOT LIST | 3.48
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IM615P KV2056/2212/16/2705 ETC | 28.59 2SC1114 = 2
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IM641A KV2092/2096
IM651 KV1442
IM661A KV21XRU | 28.59 25C1413A
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| V0181/07530/5030 ETC RV5 89.46 SAMVO REL MOTOR VTC5000 EVA300/EVS700 (RED 0R BLUE) DVR-04R (0) 88.82 SAMVO REL DRIVE VTC5000 EVA300/EVS700 (GREEN 0R BLACK) DVR-04R (0) 88.82 SAMVO REL DRIVE VTC5000 SL-HF950 DSR-78R 132.25 HITACHI FREW, ARM VT1/33 SL-HF90 DSR-78R 132.25 HITACHI MREST FRAME OP MOD | 5.97 F
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1MT213 SLC9
1MT216 SLC20:30/40/HF100 GREY
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| TELEQUIPMENT D283 Dual Trace 50MHz Delay Sweep Large Tube. With Manual £350 DUAL TRACE. Delay Sweep. 50 MHz SSMHZ. Delay Sweep. 50 KIS State. Portable 8 × 10Cm DUAL TRACE. Delay Sweep. 50 MHz DUAL TRACE. Delay Sweep. 50 MHz SSMHZ. Delay Sweep. 50 KIS State. Portable 8 × 10Cm TRIO RF SIGNAL GENERATOR Type SG402 I ON Optional Front Protection Cover containing 2 Probes & Veiwing Hood. C10 Dates Size. Rechargeable batteries SCOPEX 4010 Dual Trace 18MHz Sind State 1500 Plate with Battery Charger/Mains Adptor. Splate with Marual No Portable AC on External DC operation 8 × 10cm CUOUR BAR GENERATOR Type PAL MC C00 Gasplay with Marual Trace 15MHz. With Stide Of Yame Path Charger/Mains Adptor. Yearbible AC on External DC operation 8 × 10cm C10UR BAR GENERATOR Type PAL MC C10UR BAR GENERATOR Type PAL MC Gasplay with Marual E150 patterns Video/Sound Output. (PAP S1) TELEQUIPMENT D43. Dual Trace 15MHz. With C10UR BAR GENERATOR Type DAL MC (PAP S2) | of D75)
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windings are new
and guaranteed NATIONWIDE MAIL ORD LOCAL DELIVERY - 2 YR A47 342/343X - 470 BCB22/CFB22/A5 A51-30X/1527/051/68 S10-VL322/JEB22/JDB2 | UDE CARRIAGE. VAT
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G8 & G9 series colour
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REDIFFUSION Doric MK.3
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CTV 2-4-126
CTV 2-4-126
CTV 3-1-156 3-3-164
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Gosberton, Risega
Nr. Spalding,
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RANK BUSH MURPHY
T20a T22, T26 Pri & Sec 6.00
Z718 primary state 18" or 22" 6.00
8.50
SOVEREIGN FARA £15.00
14" colour overwind
15.00
14" colour overwind
15.00
1615 EHT with Rectifier 9.00
1630–1691 EHT overwind 7.00
1630–1691 EHT overwind 7.00
ISOULD SZ0.00 old unit
Required.
20
Belivery by return of post.
CASCHIREE
PHONE FOR QUOTE
SONY TYPES £69
4700LB22/FWB/KHB/KTB
KLB-520SB22/NB/RB/XB |
| TELEQUIPMENT DB3 Dual Trace SOMItz Delay Sweep Large Tube. With Manual E350 SMHz Dual Source Dual Trace SMHz Dual Source Dual Trace SMHz Delay Sweep. Sould's State Portable & x 10cm Optional Front Protection Cover containing 2 Probes THIO RF SIGNAL GENERATOR Type SG402 1 SCOPEX 4010 Dual Trace 10MHz with Manual 150 Source Stermal Cover containing 2 Probes Source Stermal Cover Containing 2 Probes SE LABS SM111 Dual Trace 10MHz C150 Daterms Video/Sound Output C160 Orbitratile AC or Stermal DC operation 8 × 10cm C150 December 2000000000000000000000000000000000000 | of D75)
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RANK BUSH MURPHY
T20a T22, T26 Pri & Sec 6.00
Z718 primary state 18" or 22" 6.00
Z718 primary state 18" or 22" 6.00
T18 primary state 18" or 22" 6.00
T14" colour overwind 15.00 SOVEREIGN FARA £15.00
14" colour overwind 15.00 SOVEREIGN FARA £15.00
14" colour overwind 15.00 I615 EHT with Rectifier 9.00
1690-1691 EHT overwind 7.00 TH
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or the 1.8.M.LCE FB1 and the
Digital V1100 £20.00 old unit
Required. VISUAL DISPLAY UNITS
We can Rewind the L.O.P.T.S
for the 1.8.M.LCE FB1 and the
Digital V1100 £20.00 old unit
Required. VB Delivery by return of post. CASSHIREE PHONE FOR QUOTE
SONY TYPES £69
4700LB22/FWB/KHB/KTB
KLB-520SB22/NB/RB/XB
A43JHT00X-5700B22/EB/HB
GB/JB-A53JBW01X/JCG00X
JB00X-(680CB22/DB/EB £79) 14" PORTABLES £59
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Z718 primary state 18" or 22" 6.00
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T14" colour overwind 15.00 SOVEREIGN FARA £15.00
14" colour overwind 15.00 SOVEREIGN FARA £15.00
14" colour overwind 15.00 I615 EHT with Rectifier 9.00
1690-1691 EHT overwind 7.00 TH
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We can Rewind the L.O.P.T.S
for the 1.8.M.LCE FB1 and the
Digital V1100 £20.00 old unit
Required. VB Delivery by return of post. CASSHIREE PHONE FOR QUOTE
SONY TYPES £69
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KLB-520SB22/NB/RB/XB
A43JHT00X-5700B22/EB/HB
GB/JB-A53JBW01X/JCG00X
JB00X-(680CB22/DB/EB £79) 14" PORTABLES £59
3708UB-AXT3001- |
| TELEQUIPMENT DB3 Dual Trace SOMItz Delay Sweep Large Tube, With Manual C3050 SMHz, Delay Sweep, Solid State, Portable & x 10cm Display With Manual NOW ONLY C180 each Optional Front Protection Cover containing 2 Probes THIO RF SIGNAL GENERATOR Type SG402 1 SOPEX 4010 Dual Trace 10MHz with Manual C150 Sol State Portal Solid State With Manual SE L ABS SM111 Dual Trace 10MHz C100 Ortable AC or Steternal DC operation 8 × 10cm C100 Gold LD/ADVANCE OS255 Dual Trace 15MHz. With Manual Solid State With Manual C100 SCOPEX 456. Single Trace 10MHz. With Manual SCOPEX 456. Single Trace 10MHz. With Manual SCOPEX 456. Single Trace 6MHz. With Manual C150 DeCCA Colour Bar Generator type 82514. Optional Front Power Meter TR898.0 kall Stote From E50 AV0 REATOR Type C1000 RBAR GENERATOR Type 5006 AV0 8 Complete with Batteries & Leads F100 SCOPEX 456. Single Trace. F100 Stote From E50 AV0 8 Complete with Batteries & Leads F100 Complete with Batteries & Leads F100 Compl | of D75)
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CS1730 1733 colour 10.00
CS1830 1835 colour 10.00
30' series Bradford colour 10.00
80 series colour 8.50
100 series colour 8.50
KB – ITT
CVC5 CVC7 CVC3 CVC9 col. 10.00
CVC30 series colour 9.00
CVC30 cVC32 series colour 8.50
CVC45 8.50
CVC45 8.50
FT100 FT110 state p/no. 10.00
All lopts and
windings are new
and guaranteed
NATIONWIDE MAIL ORD
LOCAL DELIVERY - 2 YR
A7 342/343X - 470 80C322/CTB22
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A51-360/LS22/CFB22/CFB22/CFB22
A51-360/LS22/CFB22/CFB22/CFB22/AG522
S10-VLS22/CFB22/CFB22/CFB22/CFB22/CFB22/CFB22/CFB22/CFB22/CFB22/CFB22/CFB22/ON
A51-570X/580/001/210/241
A56-6120X/132/140/410
S60-DEB22/DFB22/CFB22/CFB22/CFB22/CFB22/CFB22/CFB22/CFB22/OFB22/ON
A56-6120X/132/140/410
A56-6120X/135/140/410
A56-510X/135/1-A66-500
30AX - A56-540X - A66-540X | UDE CARRIAGE. VAT PHILIPS G8 & G9 series colour PYE 725-741 CT 200 KT2 REDIFFUSION Doric MK.3 TANDBERG CTV 2-4-126 CTV 2-4-126 CTV 3-1-156 3-3-164 E. PAPWORT 120 Risegate Roc Gosberton, Risega Nr. Spalding, Lincs PE11 4EY 0775 84077 OCLANCE CBBB22/ CS3 YALB22/GLB22 CS3 CYALB22/GLB22 CS3 CYALB22 CS3 CYALB22 CS3 CYALB24 CS3 CYALB25 CS4 <th>NOT APPLICABLE. WINDINGS
RANK BUSH MURPHY
T20a T22, T26 Pri & Sec 6.00 7.18 primary state 18" or 22" 6.00 7.18 primary state 18" or 22" 6.00 9.00 SOVEREIGN FARA £15.00 15.00 SOVEREIGN FARA £15.00 15.00 14" colour overwind 9.00 15.00 1615 EHT with Rectifier 9.00 1615 EHT with Rectifier 9.00 9.00 1615 EHT with Rectifier 9.00 1610 1615 EHT with Rectifier 9.00 1610 1815 EHT with Rectifier 9.00 1610 1815 EHT with Rectifier 9.00 1610 1816 EHT overwind 7.00 1610 1817 EHT overwind 7.00 100 1818 EHT overwind 100 100 1810 EHT with Rectifier 9.00 100 1817 EHT overwind 7.00 100 1818 EHT overwind 100 220.00 old unit Required. Delivery by return of post. 100 20.00 old unit</th> | NOT APPLICABLE. WINDINGS
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| TELEQUIPMENT DB3 Dual Trace SOMItz Delay Sweep Large Tube. With Manual E350 SMHz Dual Source Dual Trace SMHz Dual Source Dual Trace SMHz Delay Sweep, Sould State Portable & x 10cm Optional Front Protection Cover containing 2 Probes ThiO RF SIGNAL GENERATOR Type SG402 1 SCOPEX 4010 Dual Trace 10MHz with Manual 150 Source Sternal DC operation 8 × 10cm ScopeX 4010 Dual Trace 10MHz C150 Sold State With Manual C150 Optional From Protection Cover containing 2 Probes Colour Bar GENERATOR Type PAL MC Gappare/Mains Adaptor. ScopeX 4010 Dual Trace 10MHz C150 Sold State With Manual C150 Sold State With Manual C150 GUUL0/ADVANCE 0S255 Dual Trace 10MHz. C90 ScoPEX 458. Single Trace. 6MHz. With Manual 525 Clour Bar Generator KG1 8 Test Prom 100 Manual C150 Colour Bar Generator KG1 8 Test Prom 100 ScoPEX 458. Single Trace. 6MHz. With Manual 525 Colour Bar Generator KG1 8 Test Prom 100 ScoPEX 458. Single Trace. 6MHz. With Manual 525 Complete with Batteries & Leads P00 ScoPEX 458. Single Trace. 6MHz. With Manual 525 Compotent theattreis 8 Leads | of D75)
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CS1830 1835 colour 10.00
80 series colour 8.50
100 series colour 8.50
KB – ITT
CVC5 CVC7 CVC8 CVC9 col. 10.00
CVC30 series colour 9.00
CVC30 cVC32 series colour 8.50
CVC45 8.50
FT100 FT110 state p/no. 10.00
All lopts and
windings are new
and guaranteed
ALL DELIVERY - 2 YR
AA7 342/343X - 470 BC822/CT822
A51-370X/580/001/210/241
A55-120X/132/168/168
510-VK822/JE822/CT822
A51-370X/580/001/210/241
A55-120X/132/140/150/200
20AX - A56-540X - A66-540X
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RANK BUSH MURPHY
T20a T22, T26 Pri & Sec 6.00
Z718 pnmary state 18" or 22" 6.00
3.00 S.50 T20a T22, T26 Pri & Sec 6.00
Z718 pnmary state 18" or 22" 6.00
3.00 S.50 SOVEREIGN FARA £15.00 SOVEREIGN FARA £15.00 SOVEREIGN FARA £15.00 SOVEREIGN FARA £15.00 SOVEREIGN FARA £15.00 Id" colour overwind 9.00 SOVEREIGN FARA £15.00 SOVEREIGN FARA £15.00 Idits EHT with Rectifier 9.00 9.00 Idits EHT overwind 7.00 9.00 Idits EHT with Rectifier 9.00 9.00 Idits EHT with Rectifier 9.00 9.00 Idits USAL DISPLAY UNITS We can Rewind the L.O.P.T.s
for the 1.8.M.LCE FB1 and the
Digital V1100 £20.00 old unit
Required. VB Delivery by return of post. CASSHIREE PHONE FOR QUOTE
SONY TYPES £69 470DLB22/FWB/KHB/KTB
KLB-520SB22/NB/RB/XB
A43JHT00X-570DB22/EB/HB
GB/JB-A53JBW01X/JCG00X
JB00X-(680CB22/DB/EB £79) 14" PORTABLES £59
3708UB-AXT3001-
37-550/2/3/4-A37-570
580/590 CALLING
NGTON, LANCS. |



| Stock items despatched by return A.Z. ELECTRICS Access & Visa Accepted | | | | | |
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| , , , | REMOTE CONTROLS | BELT KITS | IDLER ASSEMBLIES | | |
| VIDEO HEADS
Ferguson | Ferguson, Grundig, ITT, Phillips, Pve, Sony and | | Sham | | |
| 3HSSV – JVC/Ferguson most models. £18.00 | Hitachi various models TV & Video | Sanyo VTC5000 £0.55 | VC9300/9500 etc £1.75 | | |
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VC9300/9500/481/581 etc. (NDL005GE7Z or | | |
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BC214B £0.07 BU208 £6.70 | · · · · · · · · · · · · · · · · · · · | | |
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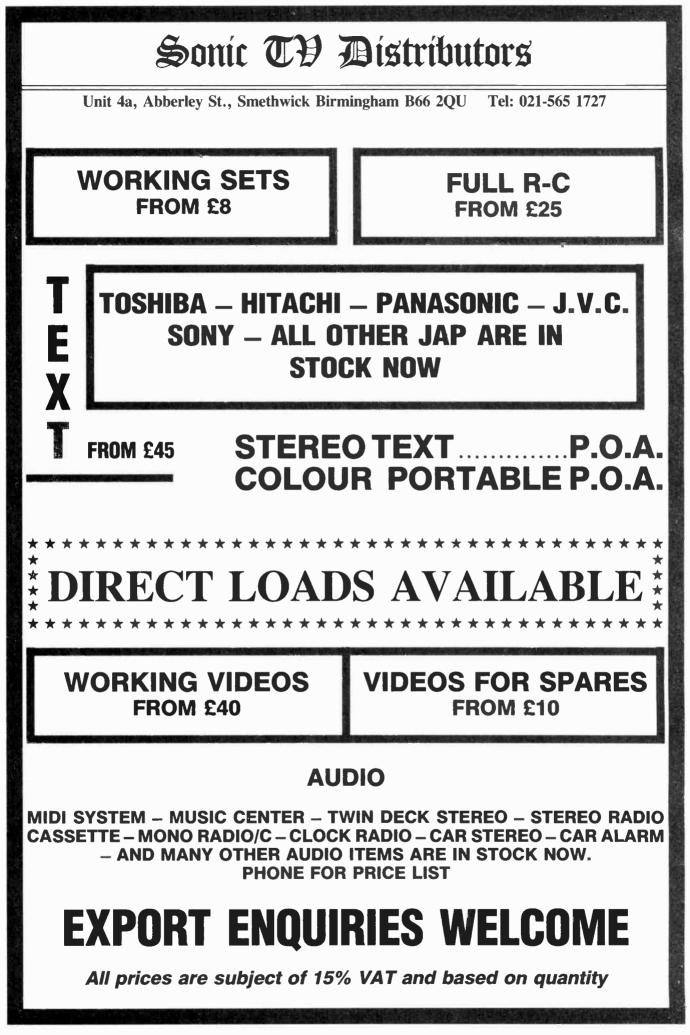


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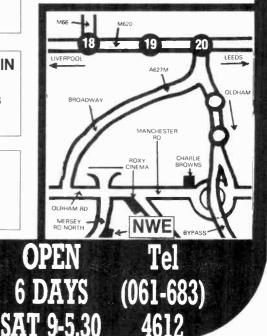
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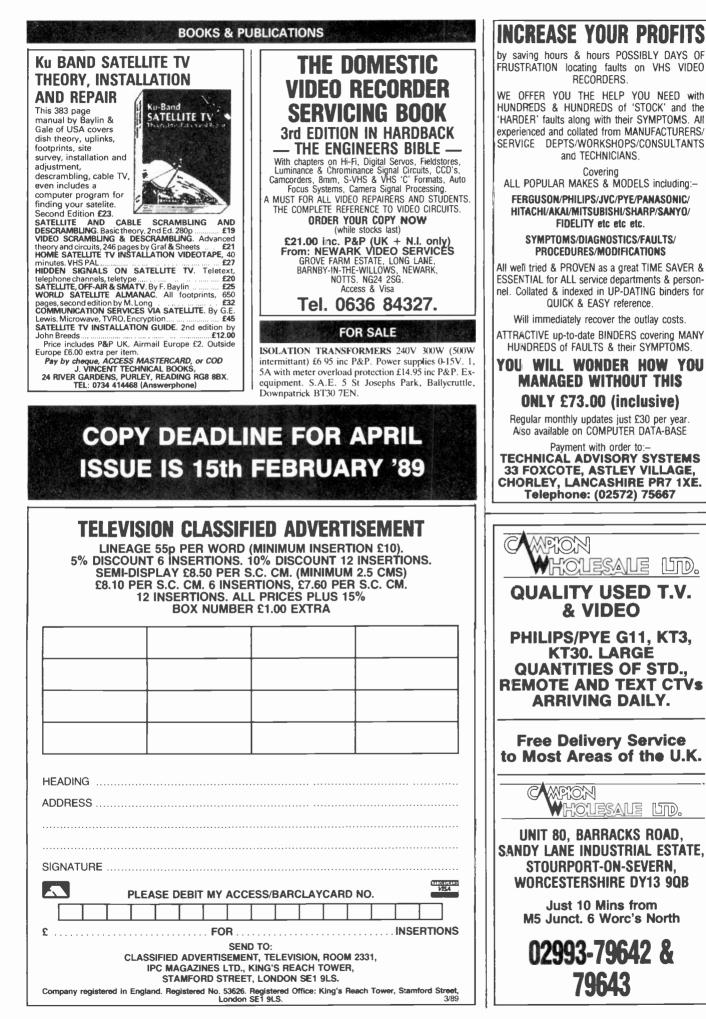




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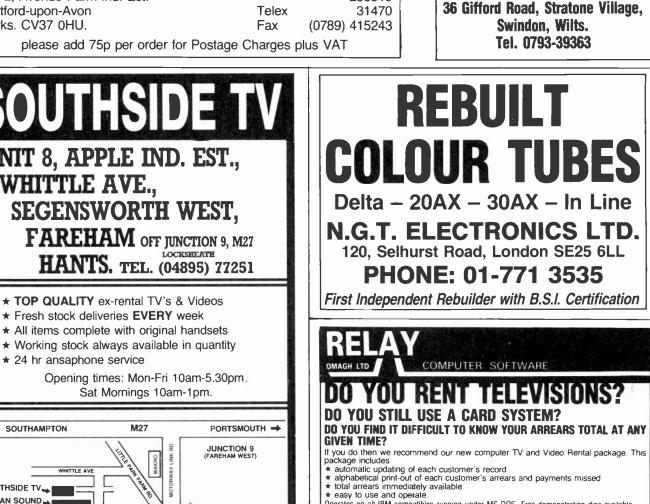
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329 |
|--|------------|--|-----------------|---|---------------------|
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Audio Visual Services
Avon Meters
A-Z Electrics | 322
387 | G.G.L. Components
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Griftronic Emission Ltd | 362, 363
390 | Sendz Components 330, 392, Cov
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Southside TV | 382 |
| Bi-Pak
Bi-Tech
Bi-Tel | 329 | Halton TV Trade Disposals
Hussain Central TV Ltd
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Stewart of Reading
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| | Componenta | G8 LOPT Panel
Rank T20 Z136 Panel | £12.00
£6.00 | 220 MFD Sprague 385V 50p
350V 300M + 300M £1.00 |
| | COMPONENTS
E BACK PAGE | NEW GEC 20AX Power Supply Switch M
Field + Jungle panel for GEC 3133/3135
GEC 2110 line panel with transformer | £7.00 | 400V 400M 60p |
| Matsushita PY34220 Tuner £7 | K35 Decoder £8.00 | GEC 2110 line panel with transformer
GEC 2110 tuner unit + IF Panel
Pye/Chelsea Line op panel | £12.00
£12.00 | 175/100/100/350v £1.00
KT3/200/25/25/385v £1.00 |
| C. Cam Decoder with TDA3591 £5
Toshiba VHF/UHF EG522F £6 | Thick Film Daughter K13 3122-127-43891 | Pye 205 T/unit
Pye 713 IF panel and tuner | £3.90
£7.00
Στο/. £19.00 | KT3-K30 220+40+40 75p 200+200+75+25M 325V £1.00 300+300+150+100+50MFD 2000 |
| Mitsumi MEC1-F51 £5 | 12 C H. K30 Tex Rec Front Panel with
LC. £5 | Pye 713 Chroma
Pye/Chelsea Timebase panel with LOPTI
Pye 731 Frame Panel | £J 70 £19.00 | G11 CAP 470/250 62 50 |
| Thorn Spares
New 9000 Decoder £8.50 | K35 IF £5.00 | Pye 731 Convergence Panel
Pye 731 Chroma
Pye 731 Chroma
Pye 731 IF panel + tuner | UFF £5.00
£19.00 | 2500/2500/63v 50p |
| 9000 Frame panel£89000 Cyclops panel£1.50 | Plug In
K4 Focus Pot £1.00 | GEC portable chassis + LOPTI 2114 New | ALL £10.00
£4.00
£6.00 | 3/0/100/10/16/275v £1.50
100/200/325v 40p |
| 8800 convergence panel £6 | Fidelity Tube Base with transitor & focus | G9 Power Panel
Mono RANK Chassis 127A NEW
NEW G9 Frame Panel | | 200/200/75/25M 375V £1.00
Thorn TX9 Caps 500+500M 175V £1.00 |
| 4000 Power supply £3
1600 Mains lead, switch
T605 1vNPN T066 80v/6A 10p | pol £1.50 | NEW G11 IF Panel | £10.00
420M 400V £1.00 | |
| 9000 Sound output panel £1
3500 Focus unit £1.50 | Bush Tube Base on panel £1.00 | G8 Tuner Unit + Panel £4.00 G8 IF & Chroma £6.00 G8 Chroma £3.00 | 420M 400V ±1.00
470M 380V ±1.00
220/400V ±1.00 | 100/350 + 300/200/100/16/275v £2.00 |
| 3500 Mains Trans £4
3500 cut outs 10 for £4 | TX10 Tube Base on Panel £3.00 | G11 IF Detector £3.00 | 1200PF 15KV 10p | 500/500/25v 50p
150/150/100/300v 75p |
| 3500 IF panel £2 3500 Frame panel £3 3500 Line panel £3 | Line Transformers
Line O.P. Trans. Mono T.X. 12"-14" | G11 Selector gain module £3
Complete CVC 825 Chassis £15 | .01 2KV 10p
1+1 MFD Mains Filter ITT 3 Pin 15p | ITT 8 and 6 Push Button £1.00 |
| 3500 A1 Diode 20p
Export 3500 1F panel £2 | Philips
27482 £10 | AEC V/Cap Resistor Unit UHF with IC
SAS660 SAS670 £3.00
Z714 RANK IF Panels 6MHz 1 I.C. | 1/100 × 10 30p | Pye 731 LOPTs £6.00
Thom 8500-8800 LOPTs £5.00 |
| IC board with set of SN74LS £1 4000 Tube base £4 3500 A1 pots 50p | 4822 £10
10273 £10 | SL437F £3.00 Z909B RANK IF Panels \$1000000000000000000000000000000000000 | 22/100 10g
4 7M/100 5g
470/100 20g | CMC 302 front panel 55.00 |
| Beam limiter panel £1.50
3500 Power panel with Y969 £1 | Thorn 1690 LOPT £7.50 2 J/Pots 3,500 1 off each type £3.00 G8 Trans. Philips £7.00 | Export 5.5MHz 2 LC.'s
TBA1205B TCA2705Q £2.50 | 4700/100 75p
47/160 10r | CMC 302 Panel with TC mains switch
etc |
| 3 Way regulated adaptor 240V 6V/
7,5/9V/300mA £3.50 | G11 Split Diode £12.00 CVC820 Split Diode ITT £10.00 Thorn B/W AD5308F + Stik + | K35 IF £6.00
Z743 RANK IF Panel | 300 300/300\/ 80p
 800/160 50p | CMD 800 Decoder 68.00 |
| Rank/Toshiba preh unit 0354 £9.50
4 Push button unit preh £1.00
6 Push button VHF/UHF for | Lead £1.50 | Export 5.5MHz 3 I.C.'s
TBA750+SC9504P+
SC9503P £1.50 | 2,2 250v 10p
7N5 1500V 15r | 3 i C. Power Supply G11 Full Remote |
| v/cap. GEC-Decca type £7.00
7 Push button for CVC5 ITT £8.00 | GEC 2040 £3.00 GEC 2110 £7.00 Mullard AT 2036 £1.50 | Pye G11 Front panel with transducer,
pots, tuner pots, 6 pb switch+lead £5.00 | 3n3/250 A.C. 10p
33/250∨ 20p | Receiver Panel £3.00 PHILIPS SBC 469 Stereo Microphone |
| KT3 12 Push button unit £2.00
KT3 (Export) 12 P.B.u £2 | Pye 169 Line Trans £3.00 Pye mono £3.00 Rank mono T704A £3.50 | Pye 6 button switch portable £1.00 GEC V/cap VHF/UHF tuner and IF+ | .39/250V 15p
4n7/250 tested 5KV 25p | £23.00
Meters Hills 520
Meters Hills 420
£10.00 |
| 6 Push button Unit Thorn £1.00
6 Push button GRC £6.00
6 Push button PYE 731 £6.00 | Split Diode Trans £7.00
GEC 20 AX Rank Z522 £3.00 | GEC Line O/P PC 659B3 £6.00 | 47/250 10p | 750AC 10 Amo 20 MPG Pangers 528 |
| Hearing aid unit £3
Rank Z718 4 P/B/Unit MECH £4 | Rank L.O.P.T. Z970 £3.00 CVC32 £6.00 CVC30 ITT £7.00 | 2110 GEC Power Panel £8.00
CVC 20 Front panel with sliders +
mains input panel £4 | G11 470/250V £1.75
GEC600/250 60p | HT 500 Multimeter £7.75 |
| 7 Button Unit GEC with Lamps £7
697 Push Button Unit £6.00 | CVC32 Line Tran £7.00
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CVC 40 PUSH BUTTON ASSY with
sliders: complete with lamp assy + pots | 700/250 £1
300 + 300 MFD 350v £1.00
800/250 £0 | HT700 £15.00
HD1000 Digital £20.00
HD3000 Digital £25.00 |
| Z916B panel £5.00
T513AP panel £5.00 | CVC825 Split Diode £10.00 CVC 45 £5.00 GEC Portable G10T2041 £3.00 | 8 button units £9.00
CVC9 slider pots panel 50p | 32/300 20
4/350 5r | HD5000 Digital £25.00
HD5500 £29.00 |
| Mains Droppers | GEC Portable G1OT2046 £3.00
EHT Split Diode Leads ITT £1.00 | Universal Focus. Fits Pye, Thorn and Decca Units. | 8/350 8p
4.7M/350v 10c | HD8000 Digital £37.00 |
| Pye 731 3+56+27R 50p
Thom 50/17/1K5 £1.00
120/20/20/48/117 £1.00 | 3500 L.O.P.T. & HT Trans each £2.00 LOPT Rank Z763 £5.00 K35 Split Diode 3122/13835930 £10.00 | T147 Rank tube base on panel£1.00Z718 Focus Unit£1.50T20 Focus Unit£1.00 | 33/350 20
220/350 30
300/350 40
400/350 50 | Trans Volts Ohms and Amps ranges £60
Infra Red |
| 270/10/6 for Thorn 4000 50p
18/320/70/39 £1.10 | | T20 Focus Unit£1.00Large Type75pDecca Small75p | 1 22/3/5 | Works off 9 volt battery £8.00 |
| Thorn 50-40R-1K5 50p
Ae Socket & Lead | Universal Tripler
with small focus pot. Green type £7.00 | KT3 Focus Unit 75p
K30 Focus Pot 75p | 220/385 (ITT) 75p | Fits in top pocket. |
| GEC, ITT, Philips, Pyc 25p
7×3 ³ /4 Thorn £1
Thorn 1600-1700 £1.50 | Black Triplers
KT3 Triplers £6.00 | K30 Tube base on panel £1.00
TX10 Focus Units £8.50 | 0.1/400 15
KT3 E/W .39/400 15
.56K/400v 20 | |
| Rank Toshiba Tube Bases 30p | S T.C. Universal Tripler £6.00
11 TJT £2.50 | CVC 32 Focus Unit 75p
Fedility Focus Unit 14R–14S 30p
3500 Thorn Focus Unit £1.00 | 4/00/pt/400 10p
.22/400 10p | RC4001 Full Remote KT3 K30 Teletext |
| 20,000 Per Volt
HT420 Hills Meter | 11 TGA £2.00 1TT CVC 5-8-9 £3.50 Rank T25LE Tripler £2.00 | ITT Small for use with Split
Z718 Bush Focus £2.00 | 8/400 15p
33/400 20p | Handsets exchanged £15.00 |
| 10 Amp AC/DC
1,000 and ohmes range £10 | Rank 11TCP A823 £3.50
FU 25 30K Rank £3.00 | Diode 50p
Remo TV12SP 50p | 394K/400V 20c | GEC Full Remote Infra-red, 1983 models
£15.00 |
| 4 ohmes ranges 0-1000 volt AC/DC
AEG KT2000/641-005 | 11 TEZ Rank £3.00 G9 Philips £4.00 GEC 2110 £4.00 | 1600 Thorn EHT Rec and Lead 50p TV14 50p TV20 £1.00 | .47/500 25p
1 0.1/600 15p | Timers. 60 mins. small £1.00
TOSHIBA |
| | 3500 Thorn £3.00
8500 Thorn £4.00 | TV45 50p
Thorn 14/1500 rec stick 5p | 0.1/1200V wire end 20p
0.1/450 A/C wire end 20p
.22/1000 20p | HAND SETS
24 Button CT938 Fuliremote £5.00
32 Button CT983 Videotext £6.00 |
| Hand Sets
Fidelity All Types
£15 to £35 | 9000 Thorn £7.00 9500 Thorn £4.50 9600 Thorn £4.00 | TX10 8 Button Unit £10.00 | 1.047/600 15
0.047/1000 10 | THORN
VCR Front Display Panel £7.00 |
| | 2040 GEC £3.50
GEC TVM25 Tripler £2.00 | TX10/TX100 16 Button £10.00 | 0.01/1000 10
0.1/1000 10 | Handset £15.00 |
| KT3-K30
OF-425
OF-550 E.W. 10p | Universal Tripler £5.00 G8 Tripler £5.00 CVC20-32 £5.00 | G11 drawer ASS 3 pots Mains switch
and lead £2.00 | .47/1000v 65
.47/250V A.C. 10
.001K/1250 10 | G11 Full Remote Ultrasonic £32.00 |
| OF-513 correction 10p
OF-557 50p | Decca 80 100 £4.50
Grundig TVK 52 £2.50 | K30 Drawer Ass with pots cable
forme £1.00 | 0.0047/1500 10g
.005/1500 10g | 8 C.H. Ultrasonic GEC Full Remote |
| DIODES | 11TBQ [®] Pye 731 £3.00 11THY £4.00 D22 for Pye 18" colour portable £4.00 | TX10 Drawer with 8 way pots. ass. £2.50 | .0105/1500 10
1n8/1500 15
2n2/1500 15 | V New Replacement for G11 Ultrasonic
Full Remote £12.00 |
| BY 126 10p
BY 127 10p | LP 1193/63 £4.00
BG 100/41 £3.25 | TX10 Ex. port with band switch
(drawer) £2.50 | .01/1600 15
G11.8200/2KV 15 | Decca RC 11 £14.00 Decca RC 12 £14.00 Chi for and fail belowed £200 |
| BY 133 10p
BY 134 10p
BY 176 25p | ERO Tripler print type with foacs PO7 BG2087 £5 T/text ultrasonic rec'r panel £14.00 | PHILIPS BATTERIES | 0.1/2KV 20
3n9/2KV 15
0.0015/2KV 10 | Dynatron-Full remote CTV 62, 63, 64
£19.00 |
| BY 179 40p
BY 184 25p | 12-14V 20 for £5.00 200 for £25.00
GEC 8 touch unit assy complete with all | (Small Types) HAND SETS
SR41 25p | 6n2/2KV 15
2n2/2KV 15 | Philips full remote KT3, 16C928/20C934;
7228/7324; K12 26C 797/1ST 66K |
| BY 187 10p
BY 190 40p
BY 196 30p | G11 E.W. Transformer 50p
G11 E.W. coils £1.00 | SR43 25p SR44 25p SR54 25p | 470pf 4KV 10p
 7500pf/2KV 10p | 1826 £12.00 G11, Full remote top button assy. £12.00 G11, Full remote repair service (exchange) |
| BY 198 10p
BY 204/4 8p | G11 Transient Suppressors 245V 20p G11 Scan Coils £5.00 G11 100K tuner pots 12 for £1 | LR43 25p
LR44 25p | 3000PF/3000∨ 10
4n7/2KV 15p
6n2/2KV 10p | (1 C SAA1250) £18.00
(1 C SAA1250) £14.00 |
| BY 206 – BY 407 Eqv. 8p
BY 208/800 8p | KT3 IF panel £6.00
KT3 line OSC transformer £1 | LR54 25p
CR2032 25p | 7n1/1500V 10
8n2/1500V 10 | Philips infra red full remote 9 channel for
60 CP2605 £6.00 |
| BY 210/400 5p
BY 210/800 10p
BY 223 60p | KT3/K30 infra-red receiver
head £1
K30 drawer unit with 1C's | 10 500PF 2KV 20p
.22/1000 20p | 9n1/2000∨ i0
8n2/2K∨ 15
 0.0082/2500 15 | for 60 CP2605 £12.00 |
| BY 224/600: 4.8A/600v bridge 50p
BY 226 15p | (home) £10
K30 drawer unit with IC's | TAA7750 £1.00 HA411485 £1.00 UPC1373 50p | 150/3500 10g
 1800/4K∀ 5g | KT3/K30 Full remote £15.00
KT3 Power supply £4.00 |
| BY 227 15p
BY 228 1500v 20p | (export) £10
KT3 AE Sockets 50p
KT3 receiver panel £8 | M50143 £1.00
4491BB1 £1.00 | 4.7nf/5KV 10j
170/8KV 10j | GEC 8 button full remote £14.00
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| Flat BY229 black 15p BY 299 Red 20p BY 229/400 30p | KT3 line driver transformer 50p
Pye, K30, GEC, etc. Pre-mains stand-by | -458657P 25p
`'50441/550 3p | 180/8KV 100
210/8KV 100
1000/10KV 100 | each
Pve & Philips handset KT3-K30 chassis. |
| BY 299/60p Tag 30p
BY 237 5p | switch £1 Decca 80/100 IF panel £5 NPN PNP 80V 6 Amp TO66 O.P. | 58658P £1.00
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Tube Thermpath 167 £1.00 | Special Price £13.00 |
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| BY 299 10p
BY 406 8p | video with ic SAS 560T/570T £7.00
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G11 8 touch button unit replaces old 6 | | Philips K4 CAP 150M/385V 50 | TX9 with Text £12.50
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| BY 527 20p
BY 407a 10p | P.B.U £24
Tube base + base unit for 820 Euro | C. C 20-25-30 Mains Switches
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RANK & ITT Mains Remote On-Off Swit | coder Parel £3
ch (720R) £1.50 | ITT
T/V & Video Processor 1200 Type £10.00 |
| BY 448 10p
BY 527 10p
BY 602 10p | chassis 54.00
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Portable \$3.00 | RAINK & ITT Remote Switch 2800 ohm
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F 247 10p | CVC 20/25/30/35/40 decoder panel £10
CVC 20/25/30/35/40 decoder panel | 4 amp Mains Switch
GEC Mains Switch 4 amp | 25
30 | We have all parts for Philips Handsets |
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