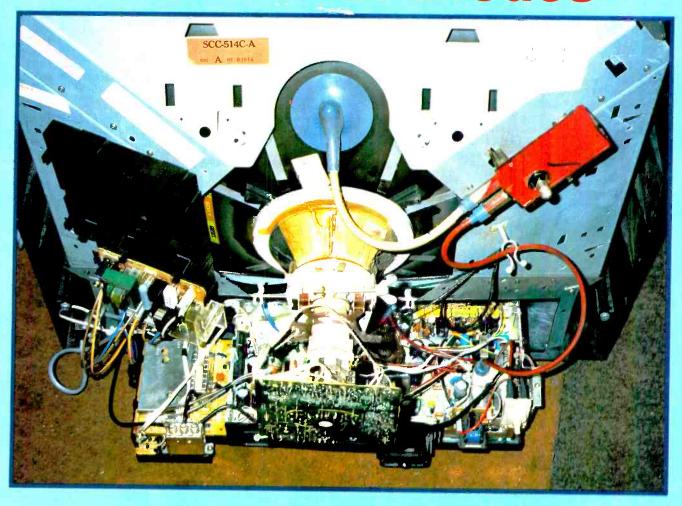
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TEST DEMONSTRATIONS AT 172 **WEST END LANE** 





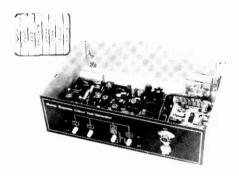
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REPORT DEC. 1982

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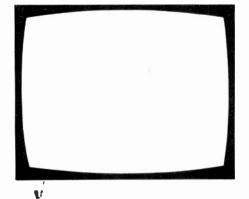
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September 1988

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## this month

813 Leader

814 Servicing Notes on the Panasonic G Deck

Nick Beer

The G deck used in current Panasonic VCRs is a compact unit of innovative design. It can be difficult to work on if you are not familiar with it and some faults can be confusing. Notes on the design and what to do about the usual fault conditions.

815 Next month in Television

816 Haunted

Les Lawry-Johns

Some sets have very predictable faults. Here are some that keep appearing on the bench.

818 Teletoptics

News, comment and developments.

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Roger Bunney

Reports on DX conditions and reception and news from abroad. There was a notable SpE opening in early June with several "firsts".

822 Letters

**VCR Clinic** 

Reports from Eugene Trundle, Dave Dulson, Jim Rainey, J. Olijnyk, Joe Cieszynski, Philip Blundell, Eng. Tech. and Nick Beer.

826 Servicing the Sony Model KV2752

David Botto

This set can cause problems if you are not familiar with it. In particular the dead set symptom requires careful handling. How to go about it – the notes also apply in general to Models KV2762, KV2252 and KV2256.

831 A Simple Anti-theft Device Jim Littler

Thieves, particularly young ones, can all too easily get away with your showroom stock. An inexpensive audible alarm initiated by breaking a wire loop.

832 Practical Computer Programming, Part 7

Mike Phelan

Use of pseudo-code to establish the structure of a proposed program.

J. LeJeune

The Room at the Back 834

Sid Bias and his team solve various servicing conundrums.

Eugene Trundle

835 International TV Standards

Characteristics of the standards in use world-wide with

a detailed country-by-country listing.

838 TV Fault Finding

Reports from Eugene Trundle, Alfred Damp, Philip Blundell, Eng. Tech., G. Hewins, J. R. Armagh, Roger Burchett, Nick Beer and Ian Bowden.

Storing TV Pictures in Chips, Part 4

Eugene Trundle

This concluding instalment deals with the multifunction memory system used in Sanyo VCRs and a purpose-designed Hitachi field store chip.

Service Bureau

**Test Case 309** 848

842

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| 6581 Sou<br>Gen. 7.<br>901225 Cha<br>ROM 3.<br>901226 Bas<br>ROM 6.<br>901227 Kerr<br>ROM 3.<br>ROM 5.   | 79<br>ar.<br>37<br>sic<br>45<br>nel<br>52                       | Fuse Wire 5A, 15A, 30A<br>Fluorescent Starter (4-80W)<br>Battery Press Studs min.<br>Battery Press Studs std   | 05<br>45<br>11<br>15<br>12. 2.59<br>5.75<br>1.00                              |  |
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| AKAI VS9700 3.75 HTACHI VT5000 3.75 SHARP VC530005500 3.75 SONY TC6 GEN 3.75  ★ PRICES ODWN ★  VIDEO IDLER TYRES  0.01a I.Dia Wighth   | HITACHI  VT6500 3HSSHA 25.50  VT7000 3HSSHA 25.50  VT8000 3HSSHA 25.50  SLC7 PS388  VT8700 3HSSHA 25.50  SLC7 PS388  VT9000 3HSSHA 25.50  SLC7 PS388  VT9000 3HSSHA 25.50  SLC7 PS388   | 110 3HSSSP 26.45 381 3HSSSP 26.45 383 3HSSSP 26.95 384 3HSSSP 26.95 385 3HSSSP 26.95 51 19.00 387 3HSSSP 26.95 51 19.00 387 3HSSSP 26.95 51 19.00 387 3HSSSP 26.95 51 19.00 388 3HSSSP 26.95   | MS09   GEC 2040   0.97  |
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| Line 0/P Trans TX9     23.50       Line 0/P Trans TX10     29.95       On/Off Switch (Remote)     1.95       Push Button TX9     16.95       Push Button TX10     16.95       RFI Choke TX9     2.95  | STR6020 (Kit)  | 5.95<br>5.75<br>S<br>18.95<br>31.90<br>2.65  | FERGUSON TX10 16.95 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 ITT CVC57 WAY 11.75 ITT CVC29:9 12.80 ITT CVC20:90 8.50 PHILIPS G8 (S/L 550) 16.50  | Ferguson TX9<br>Ferguson TX10<br>Ferguson TX90<br>Ferguson TX10/<br>Fidelity AVS106<br>Fidelity AVS206<br>Fidelity CTV14F<br>Fidelity CTV14F   | 27.95<br>38.95 (<br>11.95 (<br>0   | Ace Head Assembly  | 33.95<br>27.95<br>1.95<br>4.65<br>1.50<br>19.50  | Ferguson 3V00/22. 5. Ferguson 3V23 (Plug) 8. Ferguson 3V23 (Plug) 8. Ferguson 3V29 (Plug) 8. Hitachi V13000 8. Hitachi V13000 9. Nat. Pan. NV7000 7. Nat. Pan. NV7000 7. Sharp VG8300 7.   |
| Line 0/P Trans TX9     23.50       Line 0/P Trans TX10     29.95       On/Off Switch (Remote)     1.95       Push Button TX9     16.95       Push Button TX10     16.95       RFI Choke TX9     2.95  | STR6020 (Kit) VIDEO SPARES V4000H/VT8000 Audio Head. Capstan Motor FF/Rew Idler. FF/Rew Pulley. Pinch Roller.  | 5.95<br>5.75<br>S<br>  | FERGUSON TX10  FERGUSON TX90  12.95  FIDELITY CTV140 8 WAY  7.95  ITT CVC57 WAY  11.75  ITT CVC29  12.90  ITT CVC290  13.50  ITT CVC45 [PORT.)  19.95  PHILIPS G8 (S4.550)  PYE G11 TIP SWITCH  29.95  | Ferguson TX9<br>Ferguson TX10<br>Ferguson TX10<br>Ferguson TX10<br>Ferguson 1790/<br>Fidelity AVS160<br>Fidelity CTV14P<br>Fidelity CTV20F<br>Fidelity CTV20F  | 27:95<br>38.95<br>11.95<br>0. 15.95<br>1 1.95<br>10 4.95<br>10 4.95<br>1 4.95<br>4.95  | Ace Head Assembly Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head C6 Capstan Motor Pulley Assembly Pinch Roller  | 33.95<br>27.95<br>1.95<br>4.65<br>1.50<br>19.50  | Ferguson 3V00/22     5       Ferguson 3V02/2 (Plug)     8       Ferguson 3V23 (Plug)     8       Ferguson 3V29 (Plug)     8       Hitachi VT8000     8       Hitachi VT8000     9       Nat Pan NV2000     7       Nat Pan NV7000     7       Sharp VC8300     7       Sharp VC9300     19       Universal     5   |
| Line 0/P Trans TX9  | STR6020 (Kit) VIDEO SPARES V4000H/VT8000 Audio Head Capstan Motor FF/Rew Idler FF/Rew Pulley Pinch Roller Play Idler   | 5.95<br>5.75<br>S<br>  | FERGUSON TX10 16.95 FERGUSON TX90 12.95 FERGUSON TX90 12.95 ITT CVC5 7 WAY 11.75 ITT CVC29: 11T CVC29: 11T CVC2030 8.50 ITT CVC45 (PORT.) 19.95 PHILIPS G8 (S7. L550) PSYE G11 TIP SWITCH 29.95 RBM T20A 6 WAY 11.95   | Ferguson TX9<br>Ferguson TX10<br>Ferguson TX10<br>Ferguson TX10<br>Ferguson 1790/<br>Fidelity AVS200<br>Fidelity AVS200<br>Fidelity CTV14R<br>Fidelity CTV20F<br>Fidelity CTV20T<br>GEC C1403H   | 27:95 38.95 11.95 1 1.95 1 1.95 1 0 4.95 0 4.95 1 4.95 1 4.95 2.75   | Ace Head Assembly.  Capstan Motor  Pinch Roller  Rewind Kit.  Timer Lid  Video Head  CS  Capstan Motor  Pulley Assembly.  Pinch Roller  Reel Motor   | 33.95<br>27.95<br>1.95<br>1.50<br>19.50<br>125<br>1.25<br>1.95   | Ferguson 3V00/22   |
| Line 0/P Trans TX9. 23.50 Line 0/P Trans TX10. 29.95 Drive 0/P Trans TX10. 1.95 Push Button TX9. 16.95 Push Button TX10. 16.95 RFI Choke TX9. 2.95 Tuner. 14.95 TX90100 Line 0/P Trans TX90 14" 19.75 Line 0/P Trans TX90 20" 19.75   | STR6020 (Kit) VIDEO SPARES V4000HVT8000 Audio Head Capstan Motor FF/Rew Idler FF/Rew Pulley Pinch Roller Play Idler Video Head   | 5.95<br>5.75<br>S<br>  | FERGUSON TX10 16.95 FERGUSON TX90 12.95 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 ITT CVC5 7 WAY 11.75 ITT CVC29 12.80 ITT CVC2030 8.50 ITT CVC45 (PORT.) 19.95 PHILIPS G8 (S7.1550) 16.50 FPE G91 TIP SWITCH 29.95 RBM T20A 6 WAY 11.95  REMOTE CONTROLS   | Ferguson TX9 Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson 1790 Fidelity AVS166 Fidelity AVS206 Fidelity CTV14F Fidelity CTV20F Fidelity CTV20F GEC C1403H GEC C1405H   | 27.55 38.95 11.95 1 11.95 1 1.95 0 4.95 0 4.95 4.95 4.95 4.95 2.275  | Ace Head Assembly.  Capstan Motor.  Pinch Roller  Rewind Kit.  Timer Lid  Video Head  C5  Capstan Motor  Pulley Assembly.  Pinch Roller  Reel Motor (CSMKII)   |  | Ferguson 3V00/22 5.5 Ferguson 3V00/22 [91 8] Ferguson 3V23 (Plug) 8.8 Ferguson 3V29 (Plug) 8.9 Hitachi V13000 8.9 Nat. Pan. NV2000 7.0 Nat Pan. NV7000 7.5 Sharp VC8300 1.9 Universal 5.5 VIDEO HEADS  Amstrad VCR4500/3000 24.9   |
| Line 0/P Trans TX9. 23.50 Line 0/P Trans TX10. 29.95 Use 0/P Trans TX10. 19.95 Push Button TX9. 16.95 Push Button TX10. 16.95 RFI Choke TX9. 2.9.55 Tuner. 14.95 TX90/100 Line 0/P Trans TX90 14" 19.75 Line 0/P Trans TX90 20" 19.75 Line 0/P Trans TX100 30" 19.95  | STR6020 (Kit) VIDEO SPARES V4000H/V78000 Audio Head. Capstan Motor FF/Rew Idler. FF/Rew Pulley Pinch Roller Play Idler. Video Head. V4100H/V4002H  | 5.95<br>5.75<br>S<br>  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC29 11T CVC29 11T CVC29(0) 11T CVC45 (PORT.) 19.95 PYE G11 TIP SWITCH 29.95 RBM T20A 6 WAY 11.95 FERGUSON TX9 U/S Basic 14.50   | Ferguson TX9. Ferguson TX10 Ferguson TX10 Ferguson TX90 Ferguson 17300 Fidelity AV510C Fidelity AV510C Fidelity CTV14F Fidelity CTV20T GEC C1403H GEC C1405H GEC C1407H FIGELITY FILE GEC C1407H GEC CT407H GEC CTX-E FILE FILE FILE FILE FILE FILE FILE FIL   | 27.55 38.95 11.95 10   | Ace Head Assembly.  Capstan Motor  Pinch Roller  Rewind Kit.  Timer Lid  Video Head  CS  Capstan Motor  Pulley Assembly.  Pinch Roller  Reel Motor   | 33.95<br>27.95<br>4.65<br>1.50<br>19.50<br>23.95<br>1.25<br>1.95<br>1.95<br>1.95<br>1.95   | Ferguson 3V00/22 . 5 . 5 Forguson 3V02/22 . 9 . 8 . 9 Forguson 3V23 (Plug) . 8 . 9 . 9 . 9 . 9 . 9 . 9 . 9 . 9 . 9   |
| Line 0/P Trans TX9. 22,50 Line 0/P Trans TX10. 29,95 Ush 20/P Trans TX10. 195 Push Button TX9. 16,95 Push Button TX10. 16,95 RFI Choke TX9. 2,95 Tuner. 14,95 TX90/100 Line 0/P Trans TX90 14" 19,75 Line 0/P Trans TX90 20" 19,75 Line 0/P Trans TX100 90" 19,95 Line 0/P Trans TX100 110" 20,95   | STR6020 (Kit).  VIDEO SPARES  V4000H/V78000  Audio Head. Capstan Motor FF/Rew Idler. FF/Rew Pulley. Pinch Roller. Play Idler. Video Head. V4100H/V4002H 9300E/9500E  | 5.95<br>5.75<br>S<br>  | FERGUSON TX10 16.95 FERGUSON TX90 12.95 FERGUSON TX90 12.95 ITT CVC57 WAY 11.75 ITT CVC29 ITT CVC29 ITT CVC29 ITT CVC45 (PORT.) 19.95 PHLIPPS GR SIX 1.50) PYE G11 TIP SWITCH 29.95 REMOTE CONTROLS Ferguson TX9/10 N/Text 12.95 Ferguson TX9/10 N/Text 12.95 Ferguson TX9/10 N/Text 12.95   | Ferguson TX9. Ferguson TX10 Ferguson TX10 Ferguson TX00 Ferguson 17300 Fidelity AVS16C Fidelity AVS16C Fidelity CTV20F Fidelity CTV20F Fidelity CTV20F Fidelity CTV20F GEC C1403H GEC C1405H GEC C1405H Fillips CTX-E. Philips CTX-E.  | 27.55 38.95 11.95   1. 11.95   1. 11.95   1. 11.95   1.  | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid. Video Head  Capstan Motor Puley Assembly. Pinch Roller Reel Motor (C6MKII) Rewind Kit. Rewind Kit.  | 33.95<br>27.95<br>1.95<br>4.65<br>1.50<br>19.50<br>125<br>1.95<br>14.95<br>14.95<br>19.90<br>3.45  | Ferguson 3V00/22 5. Ferguson 3V00/22 9. Ferguson 3V23 (Plug) 8. Ferguson 3V23 (Plug) 8. Hitachi VT3000 8. Hitachi VT3000 9. Nat. Pan. NV7000 7. Nat. Pan. NV7000 7. Sharp VC3300 1.9 Universal 5.  WIDEO HEADS  Amstrad VCR4500/9000 24.9 Amstrad VCR4500/9000 26.5 Ferguson 3V00/22/29/39 11.9 Ferguson 3V00/22/29/39 11.9 Ferguson 3V30/22 48.3  |
| Line 0/P Trans TX9  | STR6020 (Kit) VIDEO SPARES V4000H/V78000 Audio Head. Capstan Motor FF/Rew Idler. FF/Rew Pulley Pinch Roller Play Idler. Video Head. V4100H/V4002H  | 5.95<br>5.75<br>\$<br>18.95<br>31.90<br>2.65<br>8.5<br>4.50<br>22.95   | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC29 11T CVC29 11T CVC29(0) 11T CVC45 (PORT.) 19.95 PYE G11 TIP SWITCH 29.95 RBM T20A 6 WAY 11.95 FERGUSON TX9 U/S Basic 14.50   | Ferguson TX9. Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX10 Fidelity AV516C Fidelity AV520C Fidelity CTV14F Fidelity CTV20F Fidelity CTV20F GEC C1405H GEC C1405H Philips CTX-E Philips CTX-E Philips CTX-E.   | 27.50 38.95 11.95 10. 15.95 1 . 195 0 . 4.95 0 . 4.95 4.95 4.95 2.75 2.95 3.50 2.50 3.50 3.50  | Ace Head Assembly.  Capstan Motor  Pinch Roller  Rewind Kit.  Timer Lid  Video Head  CS  Capstan Motor  Pinch Roller  Reel Motor  Reel Motor (C6MKII)  Reewind Kit.  CWideo Head  CS  CS  CS  CS  CS  CS  CS  CS  CS  C  |  | Ferguson 3V00/22 . 5 . 5 Forguson 3V02/22 . 9 . 8 . 9 Forguson 3V23 (Plug) . 8 . 9 . 9 . 9 . 9 . 9 . 9 . 9 . 9 . 9   |
| Line 0/P Trans TX9. 23.50 Line 0/P Trans TX10 29.95 On/Off Switch (Remote) 1.95 Push Button TX9. 16.95 Push Button TX10. 16.95 RFI Choke TX9. 2.95 Tuner. 14.95 TX90100 Line 0/P Trans TX90 14" 19.75 Line 0/P Trans TX90 20" 19.75 Line 0/P Trans TX100 90" 19.95 Line 0/P Trans TX100 110" 20.95 On/Off Switch (Remote) 1.75  | STR6020 (Kit).  VIDEO SPARES  V4000H/V78000  Audio Head. Capstan Motor FF/Rew Idler. FF/Rew Pulley. Pinch Roller Play Idler. Video Head.  V4100H/V400ZH  S000E/S000E  Capstan Motor FF/Rew Idler. FF/Rew Idler. FF/Rew Idler.  | 5.95<br>5.75<br>\$ 18.95<br>31.90<br>2.65<br>85<br>3.95<br>4.50<br>22.95   | FERGUSON TX10 16.95 FERGUSON TX90 12.95 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 ITT CVC8.9 12.90 ITT CVC8.9 12.90 ITT CVC45 (PORT.) 19.95 PHILIPS G8 (S/L 550) 16.50 PHILIPS G8 (S/L 550) 29.95 REMOTE CONTROLS FERGUSON TX9 U/S Basic 14.50 Ferguson TX9 U/S Basic 12.95 Ferguson TX9/10 Text 12.95 Ferguson TX9/10 Text 12.95 Ferguson TX5/10 Text 12.95  | Ferguson TX9. Ferguson TX10 Ferguson TX10 Ferguson TX90 Ferguson TX90 Ferguson TX90 Fidelity AVS16C Fidelity AVS16C Fidelity CTV14F Fidelity CTV20T GEC C1403H GEC C1403H GEC C1407H Thilips CTX-E Philips CTX-E Philips GTX-S Philips KT3   | 27.55 38.95 11.95 10. 15.95 1 . 195 0 . 4.95 0 . 4.95 4.95 4.95 2.75 2.95 2.50 2.50 3.50 3.50 3.50   | Ace Head Assembly.  Capstan Motor  Pinch Roller  Rewind Kit.  Timer Lid  Video Head  C6  Capstan Motor  Pulley Assembly  Pinch Roller  Reel Motor  Reel Motor (C6MKII)  Reewind Kit.  Video Head  C9  C9  C9  C9  C9  C9  C9  C9  C9  C  |  | Ferguson 3V00/22   |
| Line 0/P Trans TX9  | STR6020 (Kit) VIDEO SPARES V4000HV78000 Audio Head   |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC59 12.80 TIT CVC45 (PORT.) 19.95 PHILIPS G8 (S/L 550) 16.50 PYE G11 TIP SWITCH 29.95 RBM T20A 6 WAY 11.95 FERGUSON TX9 US Basic 14.50 Ferguson TX9 US Basic 14.50 Ferguson TX9 US Basic 14.50 Ferguson TX9 US Basic 12.95 Ferguson TX9 US Basic 14.50 Ferguson TX9 US Basic  | Ferguson TX9. Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX10 Fidelity AVS16C Fidelity AVS16C Fidelity CTV14F Fidelity CTV14F Fidelity CTV20F Fidelity CTV | 27.55 38.95 11.95 10. 15.95 1 . 195 10. 4.95 10. | Ace Head Assembly.  Capstan Motor  Pinch Roller  Rewind Kit.  Timer Lid  Video Head  C5  Capstan Motor  Pinch Roller  Reel Motor  Reel Motor (C6MKII)  Rewind Kit.  C9  C9  C9  C9  C9  C9  C9  C9  C9  C  |  | Ferguson 3V00/22   |
| Line 0/P Trans TX9  | STR6020 (Kit).  VIDEO SPARES  V4000H/V78000  Audio Head. Capstan Motor FF/Rew Pulley. Pinch Roller. Play Idler. Video Head. V4100H/V4002H  S00E/S900E  Capstan Motor FF/Rew Pulley. Pirke Welley. Pirke Welley. Pirke Welley. Piay Idler. Pirkew Pulley. Piay Idler. Pirke Welley. Piay Idler. Pinch Roller  | 5.95<br>5.75<br>\$ 18.95<br>31.90<br>2.65<br>3.35<br>4.50<br>22.95<br>31.95<br>1.95<br>85<br>3.395<br>3.395          | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 ITT CVC57 WAY 11.75 ITT CVC39 11T CVC45 (PORT.) 19.95 PILLIPS G8 (S.4.550). PYE G11 TIP SWITCH 29.95 REMOTE CONTROLS Ferguson TX9 U/S Basic 14.50 Ferguson TX9 U/S Basic 14.50 Ferguson TX9 U/S Basic 14.50 Ferguson TX9 U/S Basic 12.95 Ferguson TX9 U/S Caption 12.95 Ferguson 3V30 Video 14.50 Ferguson 3V30 Video 14.95 Ferguson 3V31 Video 19.95   | Ferguson TX9. Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX10 Fidelity AVS16C Fidelity AVS16C Fidelity CTV14F Fidelity CTV20T Fidelity CTV20T GEC C1403H GEC C1403H GEC C1407H Thilips CTX-E. Philips CTX-E. Philips G11 Philips K13 Philips K33. Philips K35.   | 27.55 38.95 11.95 1  | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head C6 Capstan Motor Pulley Assembly Pinch Roller Reel Motor (C6MKII) Reel Motor (C6MKII) Reel Motor C7 C8 DC-DC Convertor Door Assembly Front Door Assembly Front Door Assembly Gear Kit   | 33.95<br>.27.95<br>.1.95<br>.4.65<br>.1.50<br>.19.50<br>.23.95<br>.1.25<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95<br>.1.95  | Ferguson 3V00/22   |
| Line 0/P Trans TX9  | STR6020 (Kit).  VIDEO SPARES  V4000H/V78000  Audio Head. Capstan Motor FF/Rew Hulley. Pinch Roller Play Idler. Video Head.  V4100H/V4002H  9300E/9500E  Capstan Motor FF/Rew Hulley. Pinch Roller FF/Rew Pulley. Pinch Roller Pinch Roller Video Head.   | 5.95<br>5.75<br>\$ 18.95<br>31.90<br>2.65<br>3.35<br>4.50<br>22.95<br>31.95<br>1.95<br>85<br>3.395<br>3.395          | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC59 12.80 TIT CVC45 (PORT.) 19.95 PHILIPS G8 (S/L 550) 16.50 PYE G11 TIP SWITCH 29.95 RBM T20A 6 WAY 11.95 FERGUSON TX9 US Basic 14.50 Ferguson TX9 US Basic 14.50 Ferguson TX9 US Basic 14.50 Ferguson TX9 US Basic 12.95 Ferguson TX9 US Basic 14.50 Ferguson TX9 US Basic  | Ferguson TX9. Ferguson TX10 Ferguson TX10 Ferguson TX90 Ferguson 1730 Ferguson 1730 Fidelity AVS16C Fidelity AVS16C Fidelity CTV20F Fidelity FX3 Philips KT3 Philips KT3 Philips KT3 Philips KT3 VIDEO RECOR   | 27.55 38.95 11.95 0. 15.95 1. 1.95 0. 4.95 0. 4.95 4.95 4.95 2.75 2.25 3.50 2.50 3.50 3.50 3.50 3.50 5.95  | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head Capstan Motor Pulley Assembly Pinch Roller Reel Motor (CBMKII) Reel Motor (CBMKII) Reel Motor CDMKII) CO  | 33.95<br>27.95<br>1.95<br>4.65<br>1.50<br>19.50<br>23.95<br>1.25<br>1.25<br>1.90<br>3.45<br>19.90<br>3.45<br>19.50<br>22.95<br>4.95<br>6.70<br>5.95<br>8.50  | Ferguson 3V00/22   |
| Line 0/P Trans TX9  | STR6020 (Kit).  VIDEO SPARES  V4000H/V78000  Audio Head Capstan Motor FF/Rew Idler FF/Rew Pulley Pinch Roller Play Idler Video Head V4100H/V4002H  S300E/9500E Capstan Motor FF/Rew Pulley Play Idler FF/Rew Pulley Play Idler FF/Rew Pulley Play Idler Video Head V4100H/V410E  |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 ITT CVC29 11T C | Ferguson TX9. Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX10 Freguson TX10 Freguson TX10 Fridelity AVS200 GEC C1405H Philips CTX-E Philips CTX-E Philips KT3. Philips KT3. Philips K33. Philips K35. Philips K36. PRIGE GECORE FERGUSON 3725 FERGUSON 3725 FERGUSON TX95 FERG | 27.35 38.95 11.95 10. 15.95 1 . 195 10. 4.95 10. 3.50 10. | Ace Head Assembly.  Capstan Motor  Pinch Roller  Rewind Kit.  Timer Lid  Video Head  CS  Capstan Motor  Piley Assembly  Pinch Roller  Reel Motor  Reel Motor (C6MKII)  Rewind Kit.  C9  DC-DC Convertor.  Door Assembly  Front Door Assembly  Front Door Assembly  Gear Kit.  Guide Pin Kit  | 33.95<br>27.95<br>1.95<br>4.65<br>1.50<br>19.50<br>23.95<br>1.25<br>1.95<br>14.95<br>19.90<br>3.45<br>19.50<br>22.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95   | Ferguson 3V00/22   |
| Line 0/P Trans TX9. 23.50 Line 0/P Trans TX10. 29.95 On/Off Switch (Remote) 1.95 Push Button TX9. 16.95 Push Button TX10. 16.95 FIL Choke TX9. 2.95 Tuner. 14.95 TX90100 Line 0/P Trans TX90 14" 19.75 Line 0/P Trans TX90 20" 19.75 Line 0/P Trans TX90 14" 19.95 Line 0/P Trans TX90 10" 20.95 On/Off Switch (Remote) 1.75 Push Button TX90 12.95 Tuner. 14.35  FERGUSON VIDEO SPARES 3V00/16/22 Capstan Motor 24.95 Drum Motor 24.95   | STR6020 (Kit).  VIDEO SPARES  V4000H/V78000  Audio Head. Capstan Motor FF/Rew Idler. FF/Rew Pulley. Pinch Roller Play Idler. Video Head. V4100H/V4002H  9300E/9500E  Capstan Motor FF/Rew Idler. FF/Rew Pulley. Play Idler. Pinch Roller Video Head. V4100H/V711E  Audio Head. V4100H/V711E  Audio Head.   |  | FERGUSON TX10  FERGUSON TX90  FERGUSON TX90  12.95  FERGUSON TX90  11.75  FERGUSON TX90  11.75  FERGUSON TX90  11.75  FERGUSON TX90  FERGUSON  FER | Ferguson TX9. Ferguson TX10 Fidelity AVS16C Fidelity AVS16C Fidelity AVS16C Fidelity CTV10F Fidelity CTV20F Fidelity CTV20 | 27.35 38.95 11.95 10   | Ace Head Assembly.  Capstan Motor  Pinch Roller  Rewind Kit.  Timer Lid  Video Head  C6  Capstan Motor  Pulley Assembly  Pinch Roller  Reel Motor  Reel Motor (C6MKII)  Reewind Kit.  Video Head  C9  DO-DC Convertor  Door Assembly  Front Door Assembly  Gear Kit.  Guide Pin Kit  Pinch Roller  | 33.95<br>27.95<br>1.95<br>4.65<br>1.50<br>1.950<br>23.95<br>1.25<br>1.4.95<br>19.50<br>23.95<br>14.95<br>19.50<br>22.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4   | Ferguson 3V00/22   |
| Line 0/P Trans TX9  | STR6020 (Kit) VIDEO SPARES V4000HV78000 Audio Head Capstan Motor FF/Rew Idler. FF/Rew Pulley. Pinch Roller Play Idler. Video Head. V4100HV4002H 9300E/9500E Capstan Motor FF/Rew Idler FF/Rew Pulley. Play Idler. Video Head. V4100HV4002H 9300E/9500E Capstan Motor FF/Rew Idler FF/Rew Pulley. Play Idler. Pinch Roller Video Head. V4400HV711E Audio Head. Capstan Motor Capstan Motor Capstan Motor Capstan Motor Capstan Motor City Chapter City Chapte    |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC57 WAY 11.75 TIT CVC45 (PORT.) 19.95 PYE G11 TIP SWITCH 29.95 RBM 720 A 6 WAY 11.95 FERGUSON TX9 U/5 Basic 14.50 FERGUSON TYP U/5 B | Ferguson TX9. Ferguson TX10 Fidelity AVS16C Fidelity AVS16C Fidelity AVS16C Fidelity CTV14F Fidelity CTV20F Fidelity CTV20 | 27.35 38.95 11.95 10. 15.95 1 . 19.5 10. 4.95 10. 3.50 10 | Ace Head Assembly.  Capstan Motor  Pinch Roller  Rewind Kit.  Timer Lid  Video Head  CS  Capstan Motor  Pilley Assembly  Pinch Roller  Reel Motor (C6MKII)  Reewind Kit.  Video Head  CS  DC-DC Convertor.  Door Assembly  Front Door Assembly  Front Door Assembly  Coulde Pinch Roller  Coulde Pinch Roller  Coulde Pinch Roller  Video Head  VIDEO BELT KIT   | 33.95<br>27.95<br>1.95<br>4.65<br>1.50<br>1.950<br>1.23.95<br>1.25<br>1.25<br>1.25<br>1.950<br>3.45<br>1.950<br>22.96<br>4.95<br>6.70<br>5.95<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.70<br>6.7   | Ferguson 3V00/22   |
| Line 0/P Trans TX9  | STR6020 (Kit).  VIDEO SPARES  V4000H/V78000  Audio Head. Capstan Motor FF/Rew Hulley. Pinch Roller. Play Idler. Video Head. V400H/V4002H  9000E/9000E  Capstan Motor FF/Rew Pulley. Play Idler. FF/Rew Pulley. Play Idler. FF/Rew Pulley. Play Idler. FF/Rew Hulley. Play Idler. Capstan Motor Clutch Assy. FF/Rew Idler.  | 5.95<br>5.75<br>S<br>31.90<br>2.65<br>.85<br>.4.50<br>.22.95<br>.3.95<br>.3.95<br>.3.95<br>.22.95<br>.3.95<br>.22.95 | FERGUSON TX10  FERGUSON TX90  12.95  FIDELITY CTV140 8 WAY  7.95  ITT CVC8.9  11T CVC8.9  11T CVC20.90  11T CVC20.90  11T CVC45 [VORT.)  19.95  PHILIPS G8 (S.4. 550).  PYE G11 TIP SWITCH  29.95  RBM 720A 6 WAY  11.95  REMOTE CONTROLS  Ferguson TX9 I/0 S Basic  14.50  Ferguson TX9 I/0 Text  12.95  Ferguson TX9/10 N/Text  12.95  Ferguson TX9/10 Text  12.95  Ferguson TX9/10 Text  12.95  Ferguson 3/32 Video.  14.95  Ferguson 3/33 Video.  14.95  Ferguson 3/33 Video.  17.95  Fidelity CTV14S  12.95  Ferguson 3/35 Video.  14.95  Ferguson 3/35 Video.  17.95  Fidelity Teletext  17.95  Fundig TP160  Fundig TP200  Fundig TP400 Text  12.95  | Ferguson TX9. Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX90 Ferguson TX90 Fidelity AVS16C Fidelity AVS16C Fidelity CTV20F Fidelity FTV20F Fidelity CTV20F Fidelity C | 27.35 38.95 11.95 0. 15.95 1. 1.95 0. 4.95 0. 4.95 1. 4.95 1. 4.95 2.75 2.25 3.50 2.50 3.50 3.50 3.50 3.50 3.50 3.50 3.50 3  | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head CS Capstan Motor Pulley Assembly Pinch Roller Reel Motor (C6MKII) Reel Motor (C6MKII) Reel Motor (C6MKII) Reel Motor (C6MKII) Revind Kit. Video Head CS DC-DC Convertor. Door Assembly Front Door Assembly Gear Kit. Guide Pin Kit. Pinch Roller Video Head VIDEO BELT KIT Amstrad VCR7000  | 33.95<br>27.95<br>1.95<br>4.65<br>1.50<br>19.50<br>23.95<br>1.25<br>1.495<br>1.950<br>3.45<br>19.50<br>22.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95<br>4.95   | Ferguson 3V00/22   8. Ferguson 3V00/22   9. Ferguson 3V22 (Plug)   8. Ferguson 3V29 (Plug)   8. Ferguson 3V29 (Plug)   8. Hitachi VT3000   8. Hitachi VT3000   9. Nat Pan NV7000   7. Nat Pan NV7000   7. Sharp VC8300   1.9 Universal   5.  VIDEO HEADS  Amstrad VCR4500/900   24.9 Amstrad VCR4500/900   24.9 Amstrad VCR4500/900   24.9 Amstrad VCR4500/900   24.9 Hitachi VT8000   24.9 Hitachi VT8000   24.9 Hitachi VT8000   25. Hitachi VT8000   37. NC HR3000/HR0225   37. NC HR3000/HR0225   37. NC HR3000/HR0225   37. NC HR3000   37. NC HR300   3 |
| Line 0/P Trans TX9. 22,50 Line 0/P Trans TX10. 29,95 Push Button TX9. 16,95 Push Button TX9. 16,95 RFI Choke TX9. 2,95 Turner. 14,95 TX90/100 Line 0/P Trans TX90 14" 19,75 Line 0/P Trans TX90 20" 19,75 Line 0/P Trans TX100 10" 20,95 On/Off Switch (Remote) 1,75 Push Button TX90. 12,95 Turner. 14,35  FERGUSON VIDEO SPARES 3V00/16/22 Capstan Motor 24,95 Drum Motor 24,95 Pinch Roller 3,35 Pinch Roller 3,35 Pinch Roller 3,35   | STR6020 (Kit) VIDEO SPARES V4000HV78000 Audio Head Capstan Motor FF/Rew Idler. FF/Rew Pulley. Pinch Roller Play Idler. Video Head. V4100HV4002H 9300E/9500E Capstan Motor FF/Rew Idler FF/Rew Pulley. Play Idler. Video Head. V4100HV4002H 9300E/9500E Capstan Motor FF/Rew Idler FF/Rew Pulley. Play Idler. Pinch Roller Video Head. V4400HV711E Audio Head. Capstan Motor Capstan Motor Capstan Motor Capstan Motor Capstan Motor City Chapter City Chapte    |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC57 WAY 11.75 TIT CVC45 (PORT.) 19.95 PYE G11 TIP SWITCH 29.95 RBM 720 A 6 WAY 11.95 FERGUSON TX9 U/5 Basic 14.50 FERGUSON TYP U/5 B | Ferguson TX9. Ferguson TX10 Fidelity AVS206 Fidelity CTV20F Fidelity CTV20 | 27.35 38.95 11.95 10.15.95 11.95 10.455 10.4 | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head C6 Capstan Motor Pulley Assembly Pinch Roller Reel Motor Reel Motor (C5MKII) Revind Kit Pinch Roller Video Head  VIDEO BELT KII Amstrad VCR7000 Ferguson 3V00/16/22 Ferguson 3V03/3   | 33,95 27,95 1,95 4,65 1,50 1,950 23,95 1,25 1,95 1,950   | Ferguson 3V00/22   |
| Line 0/P Trans TX9. 23.50 Line 0/P Trans TX10. 29.95 Drine 0/P Trans TX10. 1.95 Push Button TX9. 16.95 Push Button TX10. 16.95 PISH Choke TX9. 2.95 TURET. 14.95 TX90/100 Line 0/P Trans TX90 14" 19.75 Line 0/P Trans TX90 20" 19.75 Line 0/P Trans TX100 10" 20.95 Dr. 10   | STR6020 (Kit) VIDEO SPARES V4000H/V78000 Audio Head Capstan Motor FF/Rew Idler FF/Rew Pulley Play Idler Video Head V4100H/V4002H 9300E/9500E Capstan Motor FF/Rew Idler FF/Rew Idler PF/Rew Idler PF/Rew Idler Pinch Roller Video Head V4100H/V711E Audio Head V4100H/V711E Audio Head Capstan Motor Clutch Assy FF/Rew Idler FF/Rew Idler Pinch Roller Vinch Pinch Pinch Roller Vinch Pinch Pinch Pinch Pinch Pinch Pinch Roller Vinch Pinch Pinc   |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC5 7 WAY 11.75 ITT CVC39 11T CVC45 (PORT.) 1175 FERGUSON TX90 11T CVC45 (PORT.) 19.95 PHLIPS G8 (SA. 550) PYE G11 TIP SWITCH 29.95 REMOTE CONTROLS Ferguson TX9 10 N/Text 12.95 Ferguson TX9/10 N/Text 12.95 Ferguson TX9/10 Text 12.95 Ferguson 3/32 Video 14.95 Ferguson 3/32 Video 14.95 Ferguson 3/32 Video 14.95 Ferguson 3/35 Video 17.95 Fidelity CTV145 12.95 Grundig TP160 14.95 Grundig TP160 14.95 Grundig TP400 Text 12.95 Firundig TP400 Text 12.95 Firundig TP400 Text 12.95 Fidility Fiell Text 12.95 Fidility Fiell Text 12.95 Fidility TV145 Fill Fiell Type Fiell Fill Type Fill Fill Fill Fill Fill Fill Fill Fil   | Ferguson TX9. Ferguson TX10 Fidelity AVS206 Fidelity CTV20F Fidelity CTV20 | 27.35 38.95 11.95 10. 15.95 1 . 1.95 10. 4.95 10. 3.50 10 | Ace Head Assembly.  Capstan Motor  Pinch Roller  Rewind Kit.  Timer Lid  Video Head  CS  Capstan Motor  Pulley Assembly  Pinch Roller  Reel Motor  Reel Motor (C6MKII)  Reewind Kit.  Video Head  C9  DC-DC Convertor  Door Assembly  Front Door Assembly  Gear Kit.  Quide Pin Kit  Pinch Roller  Wideo Head  Video Head  Video Head  Video Head  Video Head  Forguson 3V30/16/22  Ferguson 3V23  Ferguson 3V23  Ferguson 3V23  Ferguson 3V23   | 33.95<br>27.95<br>1.95<br>4.65<br>1.50<br>19.50<br>19.50<br>1.23<br>1.25<br>1.25<br>1.25<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1.95<br>1. | Ferguson 3V00/22   |
| Line 0/P Trans TX9. 23.50 Line 0/P Trans TX10. 29.95 Push Button TX9. 16.95 Push Button TX9. 16.95 Push Button TX10. 16.95 FIC hoke TX9. 2.95 Tuner. 14.95 TX90/100 Line 0/P Trans TX90 14" 19.75 Line 0/P Trans TX90 20" 19.75 Line 0/P Trans TX90 20" 19.75 Line 0/P Trans TX100 90" 19.95 Line 0/P Trans TX100 90" 19.95 Line 0/P Trans TX100 90" 19.95 Un 0/P Trans TX100 90" 19.95 Dr. Off Switch (Remote) 1.75 Push Button TX90 12.95 Tuner. 14.35  FERGUSON VIDEO SPARES 3V00/16/22 Capstan Motor 24.95 Drum Motor 24.95 Pinch Roller 3.95 Take-Up Clutch (Small) 5.565 Take-Up Clutch (Large) 5.95 Video Head 17.95 3V29/30 Booster. 22.95  | STR6020 (Kit).  VIDEO SPARES  V4000H/V78000  Audio Head. Capstan Motor FF/Rew Idler FF/Rew Pulley. Pinch Roller Play Idler S9006-95006  Capstan Motor FF/Rew Idler Pinch Roller Video Head.  V4100H/V711E  Audio Head. Capstan Motor Clutch Assy. FF/Rew Idler FF/Rew Idler Pinch Roller Video Head.  V4100H/V7131E  Audio Head. Capstan Motor Clutch Assy. FF/Rew Idler Pinch Roller Video Head.  V4004H/V733E Capstan Motor Clagstan Motor Clutch Assy. FF/Rew Idler Pinch Roller Video Head.   |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC57 WAY 11.75 TIT CVC39 12.80 TIT CVC45 (PORT.) 19.95 PYE G11 TIP SWITCH 29.95 RBM T20A 6 WAY 11.95 FERGUSON TX9 U/S Basic 14.50 FERGUSON TYPE U/S  | Ferguson TX9. Ferguson TX10 Fidelity AVS206 Fidelity CTV20F Fidelity CTV20 | 27.35 38.95 11.95 10. 15.95 1 . 1.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 5.95 10 | Ace Head Assembly.  Capstan Motor  Pinch Roller  Rewind Kit.  Timer Lid  Video Head  CS  Capstan Motor  Pilley Assembly  Pinch Roller  Reel Motor (C6MKII)  Reewind Kit.  Video Head  CS  DC-DC Convertor.  Door Assembly  Front Door Assembly  Front Door Assembly  Video Head  VIDEO BELT KIT  Amstrason VCR7000  Ferguson 3V23  Ferguson 3V23  Ferguson 3V23 (J Petrs (5).  | 33,95 27,95 1,95 4,65 1,50 19,50 23,95 1,25 1,25 1,95 1,495 1,950 22,95 4,95 4,95 4,95 4,95 4,95 4,95 4,95 4   | Ferguson 3V00/22   |
| Line 0/P Trans TX9  | STR6020 (Kit) .  VIDEO SPARES  V4000H/V78000  Audio Head . Capstan Motor . FF/Rew Idler . FF/Rew Pulley . Pinch Roller . V1400H/V4002H  S300E/9500E  Capstan Motor . FF/Rew Idler . FF/Rew Pulley . Play Idler . Pinch Roller . V4100H/V711E  Audio Head . Capstan Motor . Clutch Assy . FF/Rew Idler . Pinch Roller . Video Head . V4004H/V733E  Capstan Motor . Clutch Assy . FF/Rew Idler . Pinch Roller . V4004H/V733E  Capstan Motor . Clutch Assy . FF/Rew Idler . Pinch Roller . V4004H/V733E  Capstan Motor . Clutch Assy . FF/Rew Idler . FF/Rew Idler . FF/Rew Idler . FF/Rew Idler .  |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 FIT CVC59 11T CVC45 (PORT.) 19.95 PHILIPS G8 (S.4.550). PYE G11 TIP SWITCH 29.95 RBM T2DA 6 WAY 11.95 FERGUSON TX9 IUS Basic 14.50 FERGUSON TX9 IUS Basic FERGUSON TYS  | Ferguson TX9. Ferguson TX10 Fidelity CTV20F Fide | 27.35 38.95 11.95 10. 15.95 1 1.95 10. 4.95 10. 3.50 10.  | Ace Head Assembly.  Capstan Motor  Pinch Roller  Rewind Kit.  Timer Lid  Video Head  CS  Capstan Motor  Pulley Assembly  Pinch Roller  Reel Motor (C6MKII)  Reewind Kit.  Video Head  C9  DC-DC Convertor.  Door Assembly  Front Door Assembly  Front Door Assembly  Video Head  VIDEO BELT KIT  Amstraad VCR7000  Ferguson 3V23  Ferguson 3V23  Ferguson 3V23 (Delts (5).  Ferguson 3V31 (Delts (5).  Ferguson 3V35/33  | 33,95 27,95 1,95 4,65 1,50 1,50 1,50 1,50 1,50 1,50 1,50 1,5   | Ferguson 3V00/22   |
| Line 0/P Trans TX9  | STR6020 (Kit).  VIDEO SPARES  V4000H/V78000  Audio Head. Capstan Motor FF/Rew Pulley. Pinch Roller. Play Idler. Video Head. V4100H/V4002H  9000E/9500E  Capstan Motor FF/Rew Pulley. Play Idler. FF/Rew Pulley. Play Idler. FF/Rew Pulley. Play Idler. Pinch Roller Video Head. V4100H/V711E  Audio Head. Capstan Motor Clutch Assy. FF/Rew Idler. Pinch Roller Video Head. Capstan Motor Clutch Assy. FF/Rew Idler. Pinch Roller Video Head. Capstan Motor Clutch Assy. FF/Rew Idler. Pinch Roller Video Head. V4004H/V713E Capstan Motor FF/Rew Idler. Video Head. V4004H/V713E Capstan Motor FF/Rew Idler. Video Head. V4004H/V713E Capstan Motor FF/Rew Idler. Video Head.   |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC57 WAY 11.75 TIT CVC45 (PORT.) 12.80 ITT CVC45 (PORT.) 19.95 PHILIPS G8 (S.1.550) PYE G11 TIP SWITCH 29.95 RBM T20A 6 WAY 11.95 FERGUSON TX9 U/S Basic 14.50 FERGUSON TX9 U/S EVEN 14.50 FERGUSON TYPE U/S FERGUSON 17.55 FIGURIO TYPE 14.50 FURGUSON TYPE 14.50 FURGUSON TYPE 15.50 F | Ferguson TX9. Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX10 Fidelity AVS16C Fidelity AVS16C Fidelity CTV14F Fidelity CTV20F Fidelity CTV | 27.35 38.95 11.95 10. 15.95 1 . 1.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 5.95 10 | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head CS Capstan Motor Pulley Assembly Pinch Roller Reel Motor (C6MKII) Revind Kit Pinch Roller Video Head VIDEO BELT KII Amstrad VCR7000 Ferguson 3V00/16/22 Ferguson 3V23 Ferguson 3V29/30 Ferguson 3V29/30 Ferguson 3V29/30 Ferguson 3V31 Ferguson 3V31 Ferguson 3V31 Ferguson 3V35/39 Hitlach iv T80000   | 33,95 27,95 31,95 4,65 1,50 19,50 19,50 23,95 1,25 1,95 1,95 1,95 1,95 1,95 1,95 1,95 1,9  | Ferguson 3V00/22   8 Ferguson 3V02/2 (Plug)   8 Ferguson 3V23 (Plug)   8 Ferguson 3V29 (Plug)   8 Hitachi VT3000   8 Hitachi VT3000   9 Nat Pan NV2000   7 Nat Pan NV7000   7 Sharp VC8300   1,9 Universal   5  VIDEO HEADS  Amstrad VCR4500/900   24,9 Amstrad VCR4500/900   24,9 Amstrad VCR4500/900   24,9 Ferguson 3V00/22/29/39   17,9 Ferguson 3V00/22/29/39   17,9 Ferguson 3V42/44/45/47/50   37,5 Ferguson 3V42/44/45/47/50   37,5 Ferguson 3V42/44/45/47/50   37,5 Ferguson 3V42/44/45/47/50   37,5 Hitachi VT8000   22,9 Hitachi VT8000   22,9 Hitachi VT8000   22,9 Hitachi VT8000/HIC2/5   17,9 JVC HR3000/HIC2/5   17,9 JVC HR300/HIC2/5   48,1 JVC HR7655   48,1 JVC HR7657   48,1 JVC HR767   48,1 JVC HR7657   48,1 JVC H |
| Line 0/P Trans TX9  | STR6020 (Kit).  VIDEO SPARES  V4000HV718000  Audio Head. Capstan Motor FF/Rew Idler, FF/Rew Pulley. Pinch Roller Play Idler. Video Head.  V4100HV4002H  S000E/S000E Capstan Motor FF/Rew Idler, FF/Rew Idler, FF/Rew Idler, Pinch Roller Video Head.  V4100HV711E  Audio Head.  V4100HV711E  Audio Head.  Capstan Motor Clutch Assy. FF/Rew Idler Pinch Roller Video Head.  V4004HV733E Capstan Motor FF/Rew Idler Pinch Roller Video Head.  V4004HV733E Capstan Motor FF/Rew Idler Pinch Roller Video Head.  V4004HV733E Capstan Motor FF/Rew Idler Pinch Roller Video Head.  V4004HV733E Capstan Motor FF/Rew Idler Pinch Roller Video Head.  V4004HV733E  |  | FERGUSON TX10  FERGUSON TX90  12.95  FIDELITY CTV140 8 WAY  7.95  ITT CVC57 WAY  11.75  ITT CVC59  11T CVC45 (PORT.)  19.95  PHILIPS G8 (S.4.550).  PYE G11 TIP SWITCH  29.95  RBM T20A 6 WAY  11.95  Ferguson TX9 IUS Basic  14.50  Ferguson TX9 IUS Basic  12.95  Ferguson 3V33 Video  14.95  Ferguson 3V33 Video  14.95  Ferguson 3V35 Video  17.95  Fidelity CTV14S  Full Rem  19.95  Full Sid IUS Full Rem  19.95  Philips G11 IUS Text  19.95  Philips G11 IUS Text  19.95  Philips G11 IUS Text  13.95  Philips G11 IUR Text  13.95  Philips K13/30 N/Text  12.95  Philips K13/30 N/Text  12.95  Philips K13/30 N/Text  12.95  Philips K13/30 N/Text  12.95  | Ferguson TX9. Ferguson TX10 Fidelity AVS200 Fidelity AVS200 Fidelity CTV20F  | 27.35 38.95 11.95 10. 15.95 11.95 10. 4.95 10. 3.50 10. 3 | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head  C6 Capstan Motor Pulley Assembly Pinch Roller Reel Motor Reel Motor (C6MKII) Reewind Kit. Video Head  C9 DC-DC Convertor Door Assembly Front Door Assembly Gear Kit. Guide Pin Kit Pinch Roller Wideo Head  VIDEO BELT KIT Amstrad VCR7000. Ferguson 3V23 Ferguson 3V23 Ferguson 3V23 Ferguson 3V23 UFBelts (5) Ferguson 3V31 Ferguson 3V31 Ferguson 3V35/39 Hitachi V18000.   |  | Ferguson 3V00/22 . 5 5 Ferguson 3V02/22 . 5 5 Ferguson 3V23 (Plug) . 8 Ferguson 3V23 (Plug) . 9 Nat Pan NY2000 . 7 Nat Pan NY7000 . 7 Sharp VC8300 . 1.9 Universal . 5 VIDEO HEADS  Amstrad VCR4500/9000 . 24.9 Amstrad VCR4500/9000 . 24.9 Amstrad VCR4500/9000 . 24.9 Ferguson 3V32 . 48.1 JVC HR765 . 49.1 J |
| Line 0/P Trans TX9. 23.50 Line 0/P Trans TX10. 29.95 Curber 0/P Trans TX10. 1.95 Push Button TX9. 16.95 Push Button TX9. 16.95 RFI Choke TX9. 2.95 Turner. 14.95 TX90/100 Line 0/P Trans TX90 14" 19.75 Line 0/P Trans TX90 20" 19.75 Line 0/P Trans TX100 10" 20.95 Curber 0/P Trans TX100 110" 20.95 Curber 0/P Trans | STR6020 (Kit)  VIDEO SPARES  V4000H/V78000  Audio Head Capstan Motor FF/Rew Idler FF/Rew Pulley Pinch Roller Play Idler Video Head V4100H/V4002H  S300E/9500E Capstan Motor FF/Rew Idler FF/Rew Pulley Play Idler Pinch Roller Video Head V4100H/V711E  Audio Head Capstan Motor Clutch Assy FF/Rew Idler Pinch Roller Video Head V400H/V713E Capstan Motor Clutch Assy FF/Rew Idler Pinch Roller Video Head V4004H/V733E Capstan Motor FF/Rew Idler Video Head V4004H/V733E Capstan Motor FF/Rew Idler Video Head   |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC59 12.90 ITT CVC45 (PORT.) 19.95 PYE G11 TIP SWITCH 29.96 RBM T20A 6 WAY 11.95 FERGUSON TX9 U/S Basic 14.50 FERGUSON TYS U/S U/S U/S U/S U/S U/S U/S U/S U/S U/   | Ferguson TX9. Ferguson TX10 Fidelity AVS206 GEC C1407H GEC C1403H GEC C1407H Philips CTX- E. Philips CTX- E. Philips CTX- E. Philips GTX- E. Sony CS  | 27.35 38.95 11.95 10. 15.95 1 . 1.95 10. 4.95 10. 5.95 11.95 11.95  | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head C6 Capstan Motor Pulley Assembly Pinch Roller Reel Motor Reel Motor (C6MKII) Reewind Kit. Video Head C7 C9 DOC-DC Convertor Door Assembly Front Door Assembly Gear Kit. Guide Pin Kit Pinch Roller Reel Motor C9 The Wideo Head The Wi | 33,95 27,95 1,95 4,65 1,50 1,50 1,50 1,50 1,50 1,50 1,50 1,5   | Ferguson 3V00/22   |
| Line 0/P Trans TX9  | STR6020 (Kit).  VIDEO SPARES  V4000HV718000  Audio Head. Capstan Motor FF/Rew Idler, FF/Rew Pulley. Pinch Roller Play Idler. Video Head.  V4100HV4002H  S000E/S000E Capstan Motor FF/Rew Idler, FF/Rew Idler, FF/Rew Idler, Pinch Roller Video Head.  V4100HV711E  Audio Head.  V4100HV711E  Audio Head.  Capstan Motor Clutch Assy. FF/Rew Idler Pinch Roller Video Head.  V4004HV733E Capstan Motor FF/Rew Idler Pinch Roller Video Head.  V4004HV733E Capstan Motor FF/Rew Idler Pinch Roller Video Head.  V4004HV733E Capstan Motor FF/Rew Idler Pinch Roller Video Head.  V4004HV733E Capstan Motor FF/Rew Idler Pinch Roller Video Head.  V4004HV733E  |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC59 11T CVC45 (PORT.) 11.95 PHILIPS GB (Sr. 1.50) PYE G11 TIP SWITCH 29.95 REMOTE CONTROLS FERGUSON TX9 U/S Basic 14.50 FERGUSON TX9 U/S E1 FERGUSON TYPE FERGUSON | Ferguson TX9. Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX10 Ferguson TX10 Fidelity AVS16C Fidelity AVS16C Fidelity CTV14F Fidelity CTV20F Fidelity CTV | 27.35 38.95 11.95 10. 15.95 11.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 11.95 11.95 11.95 11.95 11.95   | Ace Head Assembly. Capstan Motor Pinch Roller Pinch Roller Pinch Roller Rewind Kit. Immer Lid Video Head C6 Capstan Motor Pulley Assembly Pinch Roller Reel Motor Reel Motor (C5MKII) Pinch Roller Video Head  VIDEO BELT KII Amstrad VCR7000 Ferguson 3V30 (V6T22 Ferguson 3V30 (V6T22 Ferguson 3V31 Ferguson 3V31 Ferguson 3V35/39 Hitachi V19300 Hitachi V19300 Hitachi V19300 JVC HR7560   | 33,95 27,95 1,95 4,65 1,50 1,50 1,50 1,50 1,50 1,50 1,50 1,5   | Ferguson 3V00/22   |
| Line 0/P Trans TX9. 23.50 Line 0/P Trans TX10. 29.95 Curber 0/P Trans TX10. 1.95 Push Button TX9. 16.95 Push Button TX9. 16.95 RFI Choke TX9. 2.95 Turner. 14.95 TX90/100 Line 0/P Trans TX90 14" 19.75 Line 0/P Trans TX90 20" 19.75 Line 0/P Trans TX100 10" 20.95 Curber 0/P Trans TX100 110" 20.95 Curber 0/P Trans | STR6020 (Kit).  VIDEO SPARES  V4000H/V78000  Audio Head. Capstan Motor FF/Rew Pulley. Pinch Roller Play Idler. Video Head. V4100H/V4002H  9300E/9500E Capstan Motor FF/Rew Pulley. Play Idler. Pinch Roller Pinch Roller Video Head. V4100H/V711E Audio Head. Capstan Motor Clutch Assy. FF/Rew Idler Pinch Roller Video Head. Capstan Motor Clutch Assy. FF/Rew Idler Pinch Roller Video Head. V4100H/V713E Capstan Motor FF/Rew Idler Video Head. V4004H/V73SE Capstan Motor FF/Rew Idler Video Head. V4005H/V73SE Capstan Motor FF/Rew Idler Video Head. V4005H/V73SE Capstan Motor FF/Rew Idler Video Head. V4005H/V75SE   |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC57 WAY 11.75 TIT CVC59 12.80 ITT CVC45 (PORT.) 19.95 PYE G11 TIP SWITCH 29.95 RBM T20A 6 WAY 11.95 FERGUSON TX9 U/S Basic 14.50 FIGUSON TX9 U/S B | Ferguson TX9. Ferguson TX10 Fidelity AVS106 Fidelity AVS106 Fidelity CTV20F Fi | 27.35 38.95 11.95 10. 15.95 11.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 10. 10. 10. 10. 10. 10. 10. 10. 10.  | Ace Head Assembly.  Capstan Motor  Pinch Roller  Rewind Kit.  Timer Lid  Video Head  CS  Capstan Motor  Pulley Assembly  Pinch Roller  Reel Motor  Boel Motor (C6MKII)  Reel Motor (C6MKII)  Revind Kit.  Video Head  CS  DO-DC COnvertor  Dor Assembly  Front Door Assembly  Gear Kit  Guide Pin Kit  Pinch Roller  Video Head  VIDEO BELT KIT  Amstrad VCR7000  Ferguson 3V23  Ferguson 3V23  Ferguson 3V23  Ferguson 3V23  Ferguson 3V25/39  Hitachi VT9300/9500  Hitachi VT9300/9500  Hitachi VT9300  JVC HR7200  JVC HR7500   | 33,95 27,95 1,95 4,65 1,50 1,50 1,50 1,50 1,50 1,50 1,50 1,5   | Ferguson 3V00/22   8. Ferguson 3V00/22   9. Ferguson 3V22 (Plug)   8. Ferguson 3V23 (Plug)   8. Ferguson 3V29 (Plug)   8. Hitachi VT3000   8. Hitachi VT3000   9. Nat Pan NV2000   7. Sharp VC8300   1.9. Universal   5.  VIDEO HEADS  Amstrad VCR4500/900   24.9. Amstrad VCR7000   25.9. Ferguson 3V00/22/29/39   17.9. Ferguson 3V00/22/29/39   17.9. Ferguson 3V02/2/44/45/47/50   37.5. Ferguson 3V42/44/45/47/50   37.5. Ferguson 3V42/44/45/47/50   37.5. Hitachi VT8000   22.9. Hitachi VT8000/HIC2/5   17. JVC HR7655   48. JVC HR7655   48. JVC HR7655   49. JVC HR7655   49. JVC HR7655   49. Nat Pan NV333   17. Nat Pan NV330   24. Nat Pan NV300   24. Nat Pan NV300   37. Nat Pan NV300   17. Nat Pan NV700   17. Nat Pan NV700   17. Nat Pan NV700   17. Nat Pan NV700   17. Philips VCR6462   38. Sanyo VHC5000   36. Sanyo VHR1500   48. Sharp VCS801/S8/862   25.   |
| Line 0/P Trans TX9  | STR6020 (Kit) VIDEO SPARES V4000HV718000 Audio Head Capstan Motor FF/Rew Idler FF/Rew Pulley Pinch Roller Play Idler S9006-95006 Capstan Motor FF/Rew Idler FF/Rew Idler FF/Rew Idler FF/Rew Idler FF/Rew Idler FF/Rew Idler Pinch Roller Video Head V4100HV711E Audio Head Capstan Motor Clutch Assy FF/Rew Idler Pinch Roller Video Head V4100HV711E Audio Head Capstan Motor Clutch Assy FF/Rew Idler Pinch Roller Video Head V4004HV7133E Capstan Motor FF/Rew Idler Video Head V4005HV7153E Capstan Motor EF/Rew Idler Video Head V4005HV7153E Capstan Motor EF/Rew Idler Video Head V4005HV7153E Capstan Motor End Sensor Video Head   |  | FERGUSON TX10  FERGUSON TX90  FIDELITY CTV140 8 WAY  7.55  FIDELITY CTV140 8 WAY  7.55  FIT CVC8.9  ITT CVC8.9  FERGUSON TX.9  FERGU | Ferguson TX9. Ferguson TX9. Ferguson TX10 Fidelity AVS200 GEC C1405H GEC C1405H GEC C1405H Philips CTX-E. Philips CTX-E. Philips CTX-E. Philips K30. Philips K30. Philips K35. Philips K35. Philips K35. Philips K36. Philips K30. Phili | 27.35 38.95 11.95 10. 15.95 11.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 19.95 10. 19.95 10. 19.95 10. 19.95 10. 19.95 10. 19.95 10. 19.95 10. 19.95 11.95 11.95 11.95 11.95 11.95   | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head CS Capstan Motor Pulley Assembly Pinch Roller Reel Motor (C6MKII) Revind Kit Pinch Roller Video Head VIDEO BELT KII Amstrad VCR7000 Ferguson 3V074 Ferguson 3V23 Ferguson 3V29/30 Ferguson 3V29/30 Hatchi VIS300/9500 Hitachi VIS300/9500 Hitachi VIS300/9500 Hitachi VIS300/9500 Hitachi VIS300/9500 JVC HR7500 JVC HR7500 JVC HR7500 JVC HR7500 JVC HR7500 JVC HR7700 JVC HR7700 JVC HR7700 JVC HR7700 JVC HR7700 JVA LPAN EVASSA   | 33,95 27,95 1,95 4,65 1,50 1,9   | Ferguson 3V00/22   8. Ferguson 3V00/22   9. Ferguson 3V22 (Plug)   8. Ferguson 3V23 (Plug)   8. Ferguson 3V29 (Plug)   8. Hitachi V13000   8. Hitachi V13000   9. Nat Pan NV2000   7. Sharp VC8300   1.9. Universal   5.  VIDEO HEADS  Amstrad VCR4500/900   24.9 Amstrad VCR4500/900   24.9 Amstrad VCR4500/900   24.9 Ferguson 3V02/2/29/39   17.9 Ferguson 3V02/2/29/39   17.9 Ferguson 3V02/2/29/39   17.9 Ferguson 3V02/2/29/39   17.9 Ferguson 3V02/2/24/4/4/3/19/30   27.9 Hitachi V11/33E (genuine)   27.9 Hitachi V11/33E (genuine)   27. Hitachi V11/3B  |
| Line 0/P Trans TX9  | STR6020 (Kit).  VIDEO SPARES  V4000H/V78000  Audio Head. Capstan Motor FF/Rew Pulley. Pinch Roller Play Idler. Video Head. V4100H/V4002H  9300E/9500E Capstan Motor FF/Rew Pulley. Play Idler. Pinch Roller Pinch Roller Video Head. V4100H/V711E Audio Head. Capstan Motor Clutch Assy. FF/Rew Idler Pinch Roller Video Head. Capstan Motor Clutch Assy. FF/Rew Idler Pinch Roller Video Head. V4100H/V713E Capstan Motor FF/Rew Idler Video Head. V4004H/V73SE Capstan Motor FF/Rew Idler Video Head. V4005H/V73SE Capstan Motor FF/Rew Idler Video Head. V4005H/V73SE Capstan Motor FF/Rew Idler Video Head. V4005H/V75SE Capstan Motor Video Head. V4005H/V75SE  |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC57 WAY 11.75 TIT CVC45 (PORT.) 19.95 PYE G11 TIP SWITCH 29.95 RBM T20A 6 WAY 11.95 FERGUSON TX9 U/S Basic 14.50 FILIT Digivision 15.55 Philips G11 U/S Full Rem 15.95 Philips G11 U/S Full Rem 15.95 Philips G11 U/S Text 13.95 Philips G11 U/S Text 13.95 Philips RG1 U/S Text 13.95 Philips RG1 U/S Text 13.95 Philips RG1 Genuvinen 14.50 SONY RM604-RM606 14.50 SONY RM615 14.50 SONY RM630-RM635 14.50   | Ferguson TX9. Ferguson TX9. Ferguson TX10 Fidelity CTV20F Fidelity | 27.35 38.95 11.95 10. 15.95 11.95 10. 4.95 10. 5.95 10. 5.95 10. 5.95 10. 5.95 10. 5.95 10. 5.95 10. 5.95 11.95 11.95 11.95 11.95 11.95 11.95   | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head C6 Capstan Motor Pulley Assembly Pinch Roller Reel Motor Reel Motor (C6MKII) Reewind Kit. Video Head C7 C9 DC-DC Convertor DD-DC Convertor DD-DC Convertor DD-DC Convertor DD-DC Convertor DO-DC Convertor DO-D | 33,95 27,95 1,95 4,65 1,50 1,50 1,50 1,50 1,50 1,50 1,50 1,5   | Ferguson 3V00/22   |
| Line 0/P Trans TX9  | STR6020 (Kit).  VIDEO SPARES  V4000H/V78000  Audio Head. Capstan Motor FF/Rew Holler Play Idler Play Idler Capstan Motor FF/Rew Holler Play Idler Sy000E  Capstan Motor FF/Rew Idler FF/Rew Idler FF/Rew Holler Play Idler Play Idler Capstan Motor FF/Rew Holler Play Idler Video Head.  V4100H/V7131E  Audio Head. Capstan Motor Clutch Assy FF/Rew Idler Plich Roller Video Head.  V4004H/V733E Capstan Motor FF/Rew Idler Plich Roller Video Head.  V4005H/V71S3E Capstan Motor End Sensor Video Head.  NAT. PAN.  VIDEO SPARE  NV333 Peul Idler  |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC59 12.90 ITT CVC45 (PORT.) 19.95 PYE G11 TIP SWITCH 29.95 RBM T20A 6 WAY 11.95 FERGUSON TX9 U/S Basic 14.50 FILIP TS U/S FURL TX9 U/S  | Ferguson TX9. Ferguson TX9. Ferguson TX10 Fidelity AVS206 Fidelity CTV20F Fi | 27.35 38.95 11.95 10. 15.95 11.95 10. 4.95 10. 5.95 10. 5.95 10. 5.95 10. 5.95 10. 5.95 10. 5.95 10. 5.95 11.95 11.95 11.95 11.95 11.95 11.95 11.95 11.95   | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head C6 Capstan Motor Pulley Assembly Pinch Roller Reel Motor Reel Motor (C6MKII) Reel Motor | 33,95 27,95 1,95 4,65 1,50 1,50 1,95 1,25 1,95 1,95 1,95 1,95 1,95 1,95 1,95 1,9   | Ferguson 3V00/22   |
| Line 0/P Trans TX9  | STR6020 (Kit).  VIDEO SPARES  V4000HV778000  Audio Head Capstan Motor FF/Rew Pulley. Pinch Roller Play Idler. Video Head V4100HV4002H  S300E/9500E Capstan Motor FF/Rew Pulley. Pinch Roller Play Idler. Video Head V4100HV4002H  S300E/9500E Capstan Motor FF/Rew Pulley. Play Idler. Pinch Roller Video Head V4100HVT11E Audio Head Capstan Motor Clutch Assy. FF/Rew Idler Pinch Roller Video Head V400HVT13E Capstan Motor FF/Rew Idler Pinch Roller Video Head V400HVT33E Capstan Motor FF/Rew Idler Video Head V400SHVT33E Capstan Motor FF/Rew Idler Video Head NAT. PAN. VIDEO SPARE NV333 Reel Idler NV333 Pinch Roller NV333 Pinch Roller  |  | FERGUSON TX10  FERGUSON TX90  12.95  FIDELITY CTV140 8 WAY  7.95  FIT CVC57 WAY  11.75  TIT CVC57 WAY  11.75  TIT CVC45 (PORT.)  12.80  ITT CVC45 (PORT.)  19.95  PHILIPS GB (S.4.550)  PYE G11 TIP SWITCH  29.95  RBM T20A 6 WAY  11.95  FERGUSON TX9 U/S Basic  14.50  FILIP SIT U/S FURL REM  15.95  Philips G11 U/S Text  15.95  Philips RC5 IG equivalent)  14.50  SONY RMG03-RMG05  14.50  REPAIR KITS  Philips KT3-30 N/Text  14.50  FREPAIR KITS  Philips KT3-30 N/Text  16.50  FREPAIR KITS   | Ferguson TX9. Ferguson TX10 Fidelity CTV20F Fidelity CTV | 27.35 38.95 11.95 10. 15.95 11.95 10. 4.95 10. 5.95 10. 5.95 10. 5.95 10. 5.95 10. 5.95 10. 5.95 11.95  | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head C6 Capstan Motor Pulley Assembly Pinch Roller Reel Motor Reel Motor (C5MKII) Reel Motor Reel Motor (C5MKII) Reel Motor | 33,95 27,95 1,95 4,65 1,50 1,50 1,50 1,50 1,50 1,50 1,50 1,5   | Ferguson 3V00/22   |
| Line 0/P Trans TX9  | STR6020 (Kit).  VIDEO SPARES  V4000HV778000  Audio Head Capstan Motor FF/Rew Hulley. Pinch Roller Play Idler. Video Head V4100HV4002H  9300E/9500E Capstan Motor FF/Rew Hulley. Play Idler. FF/Rew Hulley. Play Idler. Pinch Roller Pinch Roller Video Head. V4100HV711E  Audio Head. Capstan Motor Clutch Assy. FF/Rew Idler Pinch Roller Video Head. V400HV7713E Capstan Motor Clutch Assy. FF/Rew Idler Pinch Roller Video Head. V400HV7733E Capstan Motor FF/Rew Idler Pinch Roller Video Head. V4005HV763E Capstan Motor FF/Rew Idler Pinch Roller Video Head. V4005HV763E V333 Pinch Roller NV333 Pinch Roller   |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC59 12.90 ITT CVC45 (PORT.) 19.95 PYE G11 TIP SWITCH 29.95 RBM T20A 6 WAY 11.95 FERGUSON TX9 U/S Basic 14.50 FILIP TS U/S FURL TX9 U/S  | Ferguson TX9. Ferguson TX10 Fidelity AVS200 Fidelity CTV20F Fi | 27.35 38.95 11.95 10. 15.95 11.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 10. 10. 10. 10. 10. 10. 10. 10. 10.  | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head CS Capstan Motor Pulley Assembly Pinch Roller Reel Motor Reel Motor (C6MKII) Revind Kit. Video Head CS OC-DC Convertor. Door Assembly Front Door Assembly Gear Kit. Guide Pin Kit. Pinch Roller Video Head  VIDEO BELT KIT Amstrad VCR7000 Ferguson 3V00/16/27 Ferguson 3V29/30 Ferguson 3V29/30 Ferguson 3V29/30 Hatchi VT11E JVC HR7200 JVC HR7700 JVC HR7500 JVC HR7500 JVC HR700 Nat Pan. NV333 Nat Pan. NV3300 Nat Pan. NV3300 Nat Pan. NV3300 Nat Pan. NV3300 Nat Pan. NV3000 Nap. Pan. NV7000 Nap. Pan. | 33,95 27,95 1,95 4,65 1,50 1,50 1,50 1,50 1,50 1,50 1,50 1,5   | Ferguson 3V00/22   |
| Line 0/P Trans TX9  | STR6020 (Kit)  VIDEO SPARES  V4000H/V78000  Audio Head Capstan Motor FF/Rew Idler FF/Rew Pulley Pinch Roller Play Idler V4100H/V4002H  S300E/9500E  Capstan Motor FF/Rew Idler FF/Rew Idler FF/Rew Idler FF/Rew Idler FF/Rew Idler FF/Rew Pulley Play Idler Pinch Roller Video Head  V4100H/V711E  Audio Head  Capstan Motor Clutch Assy FF/Rew Idler Pinch Roller Video Head  V4004H/V733E  Capstan Motor FF/Rew Idler FF/Rew Idler Video Head  V4005H/VT63E  Capstan Motor End Sensor Video Head  V4005H/VT63E  NY333 Pinch Roller  NY330 Pinch Roller  NY330 Pinch Roller  NY330 Pinch Roller  NY370 Idler Amm  |  | FERGUSON TX10  FERGUSON TX90  12.95  FIDELITY CTV140 8 WAY  7.95  FIT CVC57 WAY  11.75  TIT CVC57 WAY  11.75  TIT CVC45 (PORT.)  12.80  ITT CVC45 (PORT.)  19.95  PHILIPS GB (S.4.550)  PYE G11 TIP SWITCH  29.95  RBM T20A 6 WAY  11.95  FERGUSON TX9 U/S Basic  14.50  FILIP SIT U/S FURL REM  15.95  Philips G11 U/S Text  15.95  Philips RC5 IG equivalent)  14.50  SONY RMG03-RMG05  14.50  REPAIR KITS  Philips KT3-30 N/Text  14.50  FREPAIR KITS  Philips KT3-30 N/Text  16.50  FREPAIR KITS   | Ferguson TX9. Ferguson TX9. Ferguson TX10 Fidelity AVS16C Fidelity CTV20F Fi | 27.35 38.95 11.95 10. 15.95 11.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 10. 10. 10. 10. 10. 10. 10. 10. 10.  | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head C6 Capstan Motor Pulley Assembly Pinch Roller Reel Motor Reel Motor (C6MKII) Reewind Kit. Video Head C7 Reel Motor (C6MKII) Revind Kit. Video Head C9 DC-DC Convertor Door Assembly Gear Kit. Guide Pin Kit. Pinch Roller Video Head VIDEO BELT KIT Amstrad VCR7000. Ferguson 3V30 (V622 Ferguson 3V23 (V642) Ferguson 3V23 (V642) Ferguson 3V23 (V642) Ferguson 3V23 (V642) Ferguson 3V31 Ferguson 3V35/93 Hitachi V18000 Hitachi V18000 JVC HR7650 JVC HR7700 JVC HR7700 JVC HR7700 JVC HR7700 Nat Pan NV3303 Nat Pan NV3300 Nat Pan NV3300 Nat Pan NV3000 Nat Pan NV3000 Nat Pan NV3000 Nat Pan NV3000 Nat Pan NV7000 Sanyo VTC5000 Sanyo VTC5000 Sanyo VTC5000  | 33,95 27,95 1,95 4,65 1,50 1,50 1,50 1,50 1,50 1,50 1,50 1,5   | Ferguson 3V00/22 . 5 5 Forguson 3V23 (Plug) . 8 Forguson 3V23 (Plug) . 9 Nat. Pan. NY2000 . 7 Nat. Pan. NY7000 . 7 Sharp VC8300 1 Sharp VC8300 2 Sharp VC8404 Sharp VC8300 Sharp VC8300 Sharp VC8300 Sharp VC8300 Sharp VC8300 Sharp VC8507 UR Sharp VC9500 . 3 Sharp VC8300 Sharp VC8507 UR Sharp VC8500 Sharp VC8507 UR Sharp VC8300 Sharp VC8300 Sharp VC8507 UR Sharp VC8300 Sharp VC8500 UR Sharp VC8300 Sharp  |
| Line 0/P Trans TX9  | STR6020 (Kit) VIDEO SPARES V4000HV78000 Audio Head Capstan Motor FF/Rew Idler FF/Rew Pulley Pinch Roller Play Idler S900E/9500E Capstan Motor FF/Rew Idler FF/Rew Idler FF/Rew Idler FF/Rew Idler FF/Rew Idler FF/Rew Idler Pinch Roller Video Head V4100HV711E Audio Head Capstan Motor Clutch Assy FF/Rew Idler Pinch Roller Video Head V4100HV711E Capstan Motor Clutch Assy FF/Rew Idler Pinch Roller Video Head V400HV713E Capstan Motor FF/Rew Idler Pinch Roller Video Head V400HV713E Capstan Motor FF/Rew Idler Pinch Sensor Video Head V4005HV713E Capstan Motor FF/Rew Idler NV333 Pinch Roller NV330 Pinch Roller NV330 Pinch Roller NV370 Idler Arm NV777 Reel Idler NV370 Idler Arm  |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC59 12.90 ITT CVC45 (PORT.) 19.95 PHILIPS G8 (54.550). PYE G11 TIP SWITCH 29.96 RBM T20A 6 WAY 11.95 FERGUSON TX9 U/S Basic 14.50 FUNDAMENTAL TX9 FINIT DIGNISION TX9 FINIT DIGNISION TX9 FINIT DIGNISION TX9 FINIT DIGNISION TX9 FINIT SCS (Genuine) 19.95 PHILIPS RCS (Genuine) 19.95 PHILIPS RCS (Genuine) 19.95 PHILIPS RCS (Genuine) 19.95 PHILIPS RCS (FEGUSON TX9 FREPAIR KITS FINIT SPHILIPS FAISON TX9 FREPAIR KITS FINIT SPHILIPS FAISON TX9 FINIT SCS (FEGUSON TX9 FREPAIR KITS FINIT SPHILIPS FAISON TX9 FREPAIR KITS FRE | Ferguson TX9. Ferguson TX10 Fidelity AVS16C Fidelity CTV14F Fidelity CTV20F Fi | 27.35 38.95 11.95 10. 15.95 11.95 10. 4.95 10. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5.   | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head C6 Capstan Motor Pulley Assembly Pinch Roller Reel Motor Reel Motor (C6MKII) Reewind Kit. Video Head C7 C9 DOC-DC Convertor Door Assembly Pinch Roller Reel Motor (C6MKII) Reewind Kit. Video Head C9 C9 DO-DC Convertor Door Assembly Gear Kit. Guide Pin Kit Pinch Roller Video Head VIDEO BELT KIT Amstrad VCR7000 Ferguson 3V23 Ferguson 3V25 Fergu | 33,95 27,95 1,95 4,65 1,50 1,95 1,23,95 1,25 1,25 1,25 1,25 1,25 1,25 1,25 1,2   | Ferguson 3V00/22   |
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| Line 0/P Trans TX9  | STR6020 (Kit).  VIDEO SPARES  V4000H/V78000  Audio Head. Capstan Motor FF/Rew Pulley. Pinch Roller Play Idler. Video Head. V4100H/V4002H  9000E/9500E Capstan Motor FF/Rew Pulley. Play Idler. Pinch Roller Pinch Roller Video Head. V4100H/V711E Audio Head. Capstan Motor Clutch Assy. FF/Rew Idler Pinch Roller Video Head. V4100H/V713E Capstan Motor Clutch Assy. FF/Rew Idler Video Head. V4004H/V733E Capstan Motor FF/Rew Idler Video Head. V4005H/V733E Capstan Motor FF/Rew Idler Video Head. V4005H/V733E Capstan Motor FF/Rew Idler Video Head. V4005H/V733B Capstan Motor FF/Rew Idler Video Head. V4005H/V733B Capstan Motor FF/Rew Idler NV300 Finch Roller NV333 Pinch Roller NV330 Reel Idler NV330 Reel Idler NV370 Reel Idler NV370 Reel Idler NV370 Reel Idler NV2000 Reel Idler   |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC59 12.90 ITT CVC45 (PORT.) 19.95 PYE G11 TIP SWITCH 29.95 RBM T20A 6 WAY 11.95 FERGUSON TX9 US Basic 14.50 FILIP STATUS US BASIC PHILIPS KT3/30 UTEXT 14.50 FON PIMEIO FILIP STAT/30 US EXT FILIP  | Ferguson TX9. Ferguson TX9. Ferguson TX10 Fidelity AVS16C Fidelity CTV20F Fide | 27.35 38.95 11.95 10. 15.95 11.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 10. 10. 10. 10. 10. 10. 10. 10. 10.  | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head CS Capstan Motor Pulley Assembly Pinch Roller Reel Motor Reel Motor Beel Motor COBNIC COBNI | 33,95 27,95 1,95 4,65 1,50 1,9   | Ferguson 3V00/22   |
| Line 0/P Trans TX9  | STR6020 (Kit)  VIDEO SPARES  V4000H/V78000  Audio Head. Capstan Motor FF/Rew Idler. FF/Rew Pulley. Pinch Roller  Video Head.  V4100H/V4002H  S300E/9500E  Capstan Motor FF/Rew Idler FF/Rew Idler  FF/Rew Idler  FF/Rew Pulley. Play Idler  Play Idler  Play Idler  Play Idler  Play Idler  Pinch Roller  Video Head.  V4100H/V711E  Audio Head.  Capstan Motor  Clutch Assy. FF/Rew Idler  Pinch Roller  Video Head.  V4004H/V733E  Capstan Motor  FF/Rew Idler  Video Head.  V4005H/VT63E  Capstan Motor  End Sensor  Video Head.  V4005H/VT63E  NV333 Piay Idler  NV330 Idler Arm  NV7707 Reel Idler  NV2000 Pinch Roller  NV2000 Diay Idler  NV2000 Piay Idler  |  | FERGUSON TX10 FERGUSON TX90 12.95 FIDELITY CTV140 8 WAY 7.95 FIDELITY CTV140 8 WAY 7.95 FIT CVC57 WAY 11.75 TIT CVC59 11.70 FIT CVC45 (PORT.) 11.70 FIT CVC45 (PORT.) 11.70 FILLIPS G8 (S.4.550) PYE G11 TIP SWITCH 29.95 RBM T20A 6 WAY 11.95 FERGUSON TX9 U/S Basic 14.50 FERGUSON TX9 U/S ERGUSON 17.55 FERGUSON TX9 U/S ERGUSON 17.55 FIDELITY TYS U/S U/S ERGUSON 17.55 FIDELITY TYS U/S U/S U/S U/S U/S U/S U/S U/S U/S U/  | Ferguson TX9. Ferguson TX10 Fidelity CTV20F Fidelity C | 27.35 38.95 11.95 10. 15.95 11.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 4.95 10. 10. 10. 10. 10. 10. 10. 10. 10. 10.  | Ace Head Assembly. Capstan Motor Pinch Roller Rewind Kit. Timer Lid Video Head CS Capstan Motor Pulley Assembly Pinch Roller Reel Motor Reel Motor (C6MKII) Round (C6MKII) Round (C7MKII) Round (C7MKIII) Ro | 33,95 27,95 1,95 4,65 1,50 1,9   | Ferguson 3V00/22 . 5 5 Forguson 3V03/29 (Plug) . 8 Forguson 3V23 (Plug) . 8 Forguson 3V23 (Plug) . 8 Forguson 3V23 (Plug) . 8 Forguson 3V29 (Plug) . 8 Forguson 3V29 (Plug) . 9 Nat Pan NY2000 . 7 Nat Pan NY2000 . 7 Nat Pan NY7000 . 7 Sharp VC8300 7 Sharp VC8300 1.9 Universal   |
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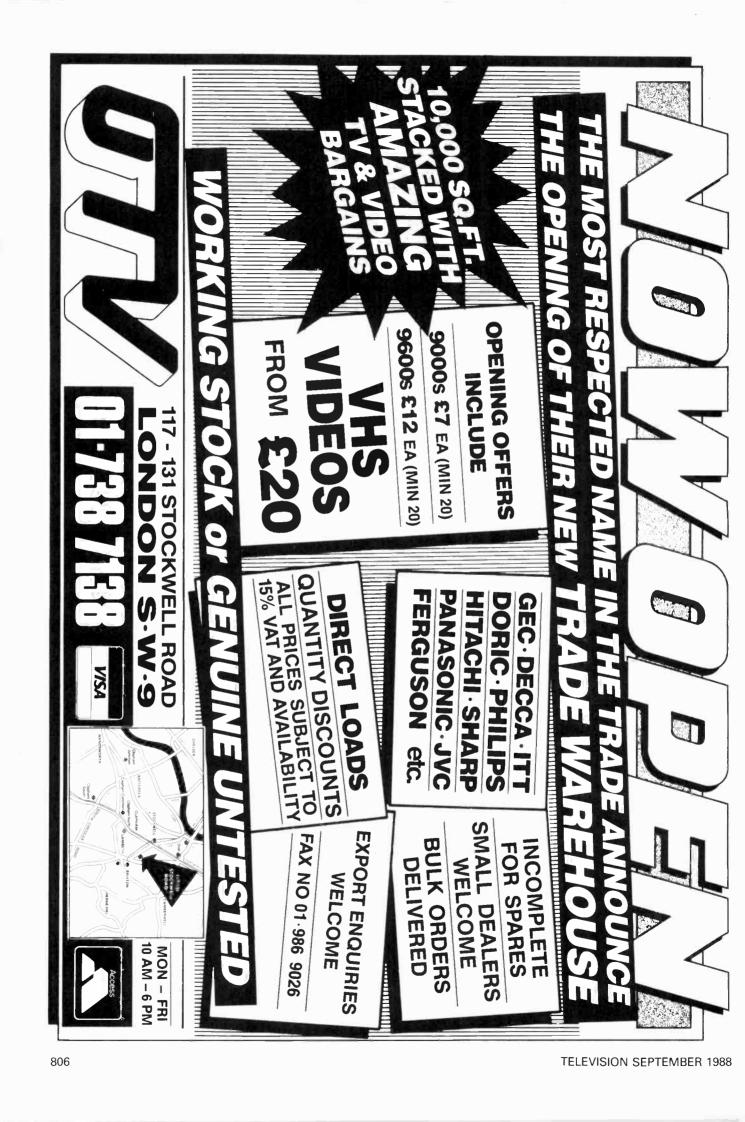
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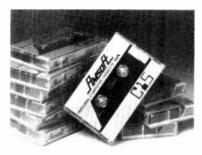


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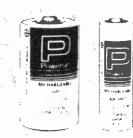
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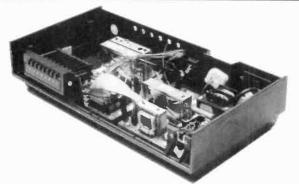
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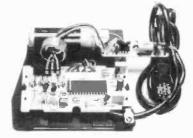


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**CONVERGED AS ORIGINAL MULTIPOLE UNIT NOT** 





## Get on the hot-line today!

**TUBE FAILED?** 

#### SAVE £££s

KEEP THAT OLDER SET PURCHASE A NEW 56-410 OR 47-342/3 TUBE FOR ONLY £5 + CARRIAGE 681

most types of Inline Re-builds or new ex-stock PRICES SUBJECT TO GLASS EXCHANGE

#### Delta Rebuilds I

| Up to 19"      | £2       | 8 |
|----------------|----------|---|
| Up to 22"      | £3(      | 0 |
| Up to 26"      | £34      | 4 |
| 110° up to 22" | £34      | 4 |
| 110° up to 26" | £3       | В |
| Low focus      | +£       | 2 |
| A47 342 New.   | £2       | В |
| 17FHP New      | £30      | 0 |
| 470EHB New.    | £30      | 0 |
| Delta only Li  | ess 5% 5 | + |

#### Inline Rebuilds

| Up to 22" From | £40 |
|----------------|-----|
| Up to 26" From | £45 |
| A56 - 540x     | £56 |
| A66 - 540x     |     |
| Bonded Coil    | +£5 |

ALL SIZES OF NEW AND **REBUILT MONO TUBES** AT COMPETITIVE PRICES

#### IN LINE TYPES (NOT REBUILOS) PHONE RE STOCK POS.

Please 370 HFB-A37-590 370 HUB £50 AXT 37-001 £50 420 CSB. 420 EDB-A42-590 £50 420 EZB ..... £50 420 ERB... £50 470 KUB £50 510 UFB..... .£67 510 VSB AXT51-001 £67 560 DYB-560 DTF: £67 560 EGB ..... £67 560 CGB .£67

enquire types not listed AXT 56-001 670 CZB £80 A66-540 £125 420FSB £60 14" (A34); 16" (A38); 21' (A51); FST now available at special low prices

> MIN. CARRIAGE £5 £10 if glass collected. TERMS Cash with order ALL PRICES **EXCLUSIVE OF VAT**

NOTE Surcharge without exch. glass.

560 DMB

★ WE PURCHASE SURPLUS STOCKS OF INLINE TUBES: ALSO A56/ 66 - 510/540 ETC. OLD GLASS DELIVERY: By return on all stock items.

THE COMPANY WHO PUT HIGH STANDARDS FIRST

£67

CHROMAVAC LTD., PUMP STREET. HOLLINWOOD, OLDHAM OL9 7LR

Ask for Mr Butterworth ON: 061-681 2959

#### HOW TO INCREASE YOUR PROFITS, IMPROVE YOUR SERVICE, WITH COST EFFECTIVE TEST EQUIPMENT.

HAMEG OSCILLOSCOPES

HAMEG are Europe's top selling DUAL TRACE OSCILLOSCOPES. Select from four superb models. All incorporate a useful COMPONENT TESTER. Size – all models – 285mm x 145mm x 380mm. Clear display 8 x 10cms. Mains supply 110/125/220/240V AC 50/60Hz. 2 YEAR WARRANTY

#### HM203-6 20MHz Standard



#### FREE Securicor Delivery

#### SPECIFICATION

- Bandwidth DC-20Mi Sens, Ch1, Ch2, 2ml

- Trigger DC-40MHz AC, DC, HF, LF, (TV Frame) Active TV Sinc, Sep.
- Invertiboth chann
- Variable hold-off 10.
- Calibrator
   Plus many more features

Price £314.00 + £47.10 V.A.T. Including two probes

#### **FREE Securicor Delivery**

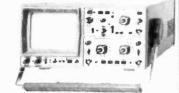
#### HM204-2 20MHz Multi-function

#### SPECIFICATION

- Bandwidth DC-20MHz
   Sens. Ch1, Ch2, 1mV/cm
   Delay Line
   Time Base 1-25s/cm 10ns/cm
- Delayed Sweep 100ns 0 hs Trigger DC-50MHz AC, DC, HF, LF, (TV Frame) Variable hold-off 10 h
- variable hold-off 10.1 Overscan LED indicators Calibrator

- Plus many more features

Price £418.00 + £62.70 V.A.T.



#### HM205 20MHz Digital Storage **FREE Securicor Delivery**

#### SPECIFICATION

- Digital Storage
  Analogue Real Time (Same as 203-6)
  Bandwidth DC-20MHz
- Sens. Ch1, Ch2. 2mV/cm
   Trigger DC-40MHz AC, DC, HP, LF, (TV Frame).
- 100KHz Sample Rate
- 2 x 1K Storage Storage Range 1ms-5s/cm Variable hold-off 10:1
- Calibrator

#### Price £498.00 + £74.70 V.A.T. Including two probes

HM605 60MHz Multi-function

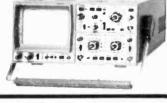
#### **FREE Securicor Delivery**

#### SPECIFICATION

- andwidth DC-60MHz ens. Ch1, Ch2 1mV/cm
- Delay Line
  Delayed Sweep 100ns 0:1s
  Trigger DC-80MHz AC, DC, HF, LF, (TV Frame)
- Variable hold-off 10

- Switchable Calibrator
   Overscan LED indicators
   Plus many more features

Price £583.00 + £87.45 V.A.T.



#### **B.K.'s CRT TESTER-REJUVENATOR**

Tests and rejuvenates blue, green & red guns separately. Fitted with delta and P.I.L. sockets. Compact size 120×65×60 mm. Supply 240V AC

Price £32.00 + £4.80 V.A.T.

#### 0 o @

B.K.'s REVOLUTIONARY DYNAMIC 'LOPT' TESTER Revolutionary L.O.P.T. tester. Operates in dynamic mode which actually tests the L.O.P.T. under high voltage conditions without de-soldering or removal. Size 75×100×40 mm. Supply 240V AC

## \* Pocket Size



- 954
  - ★ 1°C Resolution ± 0.5"LCD
  - · Supplied with

Price £59.50 + £8.92 V.A.T.

## DIGITAL THERMOMETER

- -50°C to + 750°C
- thermocouple

#### **B & K PRECISION CRT ANALYSER-RESTORER**

The number one CRT Test Instrument, Over 5000 U.K. Television engineers wouldn't be without it.

\*\*WOURDIT DE WITHOUT IT.\*

\*\*All CRT's checked identically including all in-line and one gun types.\* Tests all three guns of colour CRT's simultaneously under actual operating conditions (model 467). \*Exclusive multiplex technique (model 467). \*Measures true dynamic beam current that actually passes through GT aperture to screen. \*Measures shorts and leaks — preserving more CRT's.\* \*Tests focus electrodes lead continuity finding faults that other Testers miss.\* Uses most powerful restoration method known with minimum danger to CRT.\* Rejuvenated CRT's guaranteed as new for two years.\* Obsolescence proof: Perpetual set up chart up-dated and new adaptors development.\* Tests and rejuvenates VDU's and Oscilloscope tubes.\* A range of over 40 CRT base adaptors available.\* Increases profit.\* Pays for itself in months.

odel 467 Tri-dynamic three meter instrument Inc. 6 common adaptors £395.00 + £59.25 V.A.T. £344.00 + £51.60 V.A.T. £294.00 + £44.10 V.A.T. £244.00 + £36.60 V.A.T.Without adaptors

Technical leaflets available. GET INTO PROFIT NOW!

#### SADELTA FIELD STRENGTH METER TC-402

THE SADELTA FIELD STRENGTH METER TC-402 has been designed to measure the INE SADELIA PIELUS I NERU I I ME LE I TO - POZ LIAS DEBIT DESIGNED UN INSTANCIO I INS signal levels de levered by the antenna to a TV or TM receiver, in order to test the performance of the antenna and evaluate the best conditions during installation etc. To facilitate urements, the tuning frequency readout is shown on a digital display

#### **FEATURES**

- \* Covering FM and all TV bands (UHF/VHF) including CATV freq.
- ⋆ Digital tuning display (3 digits) for direct frequency readout.
- \* Accurate 10 turn tuning potentiometer
- Built-in loudspeaker enables monitoring of sound in AM/FM.
- ⋆ Meter measurement in voltage and dB from 20µV (26dB/µV).
- \* Continuity tester 0-500 ohms
- \* Fully portable (battery)
- \* Sturdy carry case.

Price £249.00 + £37.35 V.A.T.



## SADELTA COLOUR PATTERN GENERATORS THE SADELTA RANGE OF HAND HELD COLOUR PATTERN GENERATORS is intended

for use in production, installation and service of both colour and monochrome TV sets, video and computer monitors. In order to control and adjust the various parameters eight switchable patterns are provided. The technician has ready access to Laboratory, workshop and field use as the Generator has been designed using the latest micro-technology to achieve truly pocket size instruments, internal re-chargeable Ni-Cd's. Supplied with 9V power supply charger.

T.V. PATTERN GENERATOR PAL MC11B UK

- Band IV (21-34)
   Band III (5-12)
   O/Put 10mV into 75ohms
   Sound output

- Price £124.95 + £18.74 V A T

#### PAL VIDEO COMPOSITE GENERATOR

- PAL B.G.I.
  Audio O/Put 10mV
  O/Put 1Vp.p. (a 750hms \* Switching 12V (a 4K70hms

  - Price £124 95 + £18 74 V A T

#### SECAM VIDEO COMPOSITE GENERATOR

- . SECAMB.G.D.K.L.
- SECAM B.G.D.K.L. Audio O/Put 10mV
  O/Put 1V p.p. (ii) 75ohms Switching 12V (ii) 4K7ohms
  - Price £124.95 + £18.74 V.A.T.

#### R.G.B. PATTERN GENERATOR

- O/Put sigs. Pos RGB
   Neg. Composite
   O/Put TTL 5V P-P
   Blank Pulse etc. CCIR
  - Price £111.95 + £16.79 V.A.T.

#### 200MHz DIG, FREQ, METER \* Pocket Size



- \* 8 Dia, LED Display
- \* Freq. Range 20Hz to 200MHz \* Resolution 0.1Hz
- Sensitivity 10mV

PRICE

Price £75.50 + £11.32 V.A.T.

#### DIGITAL CAPACITANCE METER ★ High Accuracy ★ 8 Ranges ★ 0.1nf-2 000uf ★ LCD display ★ Full scale ±1 digit Case Included

## ★ Accuracy ±0.5%

£38.00 + £5.70 VAT

## The THANDAR TP1 LOGIC PROBE and TP2 LOGIC

**PULSER** are effective and economical tools for checking both TTL and CMOS circuits. TP1 can show 14 different circuit conditions and can detect pulses down to typically

Price £23.00

Price £23.00

+ £3.45 V.A.T.

each

each

eightigs

each

Sales State of the State of the



#### INSULATION TESTER 500V

Price £65.00 + £9.75 V.A.T.

DIGITAL LCR METER LCD Display

Ø . Ø ... Ø **...** 

Price £195.00 + £29.25 V.A.T.

- 18 Ranges Inductance 1 µH - 2H Capacitance 1pf - 200 µf
- High acuracy Price £95.00 + £14.25 V.A.T.



Price £25.99 + £3.90 V.A.T.

THANDAR SC110A PORTABLE OSCILLOSCOPE • Full trig. fac. inc. TV frame etc

Only 2½" thick

Fits in a brief case
 Sens. 10mV

\* Bandwidth 10MHz

\* Electronic battery

operated Measuring Voltage 500V DC Measuring Range

**ACCESSORIES** 

. Battery or mains adaptor

Size 255mm x 148mm x 50mm

Carry Case £6.25 + £0.93 V.A.T. Probe £7.50 + £1.30 V.A.T. Mains Adaptor £7.30 + £1.09 V.A.T

0-100Mohm \* Centre scale 2Mohm



U.K. POST PAID, export enquiries welcome. Visa/Access or cheque with order, payable B.K. Electronics. Official Orders welcome from Govt. Depts Colleges, P.L.C.'s etc. Large S.A.E. for technical leaflets of complete range Delivery normally within seven days







BD13

BD22

RD20

BD42

BD91

#### 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 extreme left of the pack ref number and the next figure is the quantity of items in the pack, finally a short description.

| BD2 | 5 | 13A spurs pro | vide a | fused | outlet | to a ri | ng main |
|-----|---|---------------|--------|-------|--------|---------|---------|
|     |   | where device  | such   | as a  | clock  | must    | not be  |
|     |   | switched off  |        |       |        |         |         |

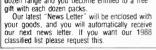
- 4 in flex switches with neon on/off lights, saves BD7 leaving things switched on 6v. 1A mains transformers upright mounting with
- BD9 fixed clamps
- 6½" speaker cabinet ideal for extensions, takes BD11
  - 61½" speaker cabinet ideal for extensions, takes your speaker. Ref BD137 30 wath reed switches, it's surprising what you can make with these burglar alarms, secret switches, relay etc etc.
    - 25 watt loud speaker two unti cross-overs
    - B.O.A.C. stereo unit is wonderful value nicad constant current chargers adapt to charge
- almost any nicad battery humidity switches, as the air becomes damper the membrane stretches and operates a microswitch BD32 BD34
  - 2 meter length of connecting wire all colour coded 13A rocker switch three tags on/off, or change over with centre off
- 24hr time switch, ex-Electricity Board, automatically adjust for lengthening and shortening day, Original cost £40 each BD45 BD49 with series resistors, these make neon valves.
- good night lights mini uniselector, one use is for an electric jigsaw puzzle, we give circuit diagram for this. One pulse BD56
- BD59
- pluzzle, we give crount origination for this. One puse into motor, moves switch through one pole flat solenoids you could make your multi-tester read AC amps with this suck or blow operated pressure switch, or it can be operated by any low pressure variation such as water level in water tanks **BD67** 
  - mains operated motors with gearbox. Final speed
- 16rpm, 2 watt rated 6 750MA power supply, nicely cased with input BD103A
- and outout leads RD120
- stripper boards each contains a 400v 2A bridge rectifier and 14 other diodes and rectifiers as well as dozens of condensers etc. RD122
- twin screened flex with white pvc cover very fine drills for p.c.b. boards etc. Normal cost about 80p each
- plastic boxes approx, 3" cube with square hole through top so ideal for interrupted beam switch motors for model aeroplanes, spin to start so RD132 2 BD134 10 needs no switch
- BD139 microphone inserts - magnetic 400 ohm also act 6 as speakers
- reed relay kits you get 16 reed switches and 4 coil BD148 4 sets with notes on making c/o relays and other gadgets
- safety cover for 13A sockets prevent those BD149
- inquisitive little fingers getting nasty shocks neon indicators in panel mounting holders with BD180 lens RD193 6 5 amp 3 pin flush mounting sockets make a low
- cost disco panel in flex simmerstat - keeps your soldering iron etc BD196
- always at the ready BD199
- always at the leady mains solenoid very powerful has 1" pull or could push if modified keyboard switches made for computers but have BD200 8
- many other applications transistors type 2N3055 probably the most useful RD210 power transistor
- RD211 electric clock mains operated put this in a box and you need never be late
  12v alarms make a noise about as loud as a car
- BD221 RD242 2
- hom. Slightly solled but OK  $6^{\circ} \times 4^{\circ}$  speakers 4 ohm made from Radiomobile so very good quality tacho generators, generates one volt per 100 revs
- RD252 panostat, controls output of boiling ring from immer up boil BD259 leads with push on  $\frac{1}{4}$ " 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 BD263
- fitted into pattress RD268
- mini 1 watt amp for record player, Will also change speed of record player motor. Guitar mic clip on type suits most amps mild steel boxes approx. 3" × 3" × 1" deep BD275
- BD283 standard electrical mixed silicon diodes
- BD296 car plugs with lead, fits into lighter socket
- BD305 1 tubular dynamic mic with optional table rest
  Most other packs still available and you can choose any as your free BD305 one.

#### **5A BATTERY CHARGER KIT**

All parts including case. Only £5 plus £1 postage

## OVER 400 GIFTS

YOU CAN CHOOSE FROM
There is a total of over 400 packs in our Baker's
dozen range and you become entitled to a free





#### FIDD BARGAIN

3½ floppy Disk Drive, made by the Chinon Company of Japan. Beautifully made and probably the most compact device of lis kind as it weighs only 600g and measures only 104mm wide, 162mm deep and has a height of only 32mm. 104mm wide, 104mm deep and has a height of only samm, other features are high precision head positioning — single push loading and eject — direct drive brushless motor—Shugart compatible Interface—standard connections—interchangeable with most other 3½ and 5¼ drives. Brand new with copy of makers manual. Offered this month at £28.50 post and VAT included.

 $\textbf{CASE} - \text{adaptable for } 3'' \text{ or } 3^1\!2'' \text{ FDD, has room for power supply components price only } \textbf{$\Omega$} \text{ includes circuit of PSU. Our Ref 4P7.}$ 

POWER SUPPLY FOR FDD - 5V and 12V voltage regulated elete kit of parts will fit into case 4P7 price £8 or with case £11. Our ref. 11P2

#### 9" MONITOR

Ideal to work with computer or video camera uses Philips black and white tube ref M24/306W. Which tube is implosion and X-Ray radiation protected. VDU is brand new and has a time base and EHT circuitry. Regulres only a 16V dc supply to-set it going. It's made up in a lacquered metal framework but has open sides so should be cased. The VDU comes complete with circuit diagram and has been line tested and has our six months quarantee. Offered at a lot less than some firms are asking for the tube alone, only £16 plus £5 post.

#### CASE FOR 9" MONITOR

We have arranged with a metal worker to make cases for the 9" Monitor. Delivery promised for the end of May and the price £12 plus £2 post. The case will be made from coated sheet steel, overall size approx 10in x 10in x 7in high which will give ample space for the Power Supply and external controls if you fit them.

FLIP-OVER DIGITAL CLOCK — Quite an eyecatcher, this is mains operated. The figures flip-over per minute and per hour and give a larger than usual visual display. Supplied complete with front and perspex panels to glue together to make its case. 12.00 each. Our ref 2P205.

#### 3" FDD HITACHI 305SXA

This has standard Shugarf connections and will work with most computers but is particularly suitable for Amstrads, in fact it was recommended in a recent "Computing with Amstrad" Price £30 + £3 post

TORROIDAL MAINS TRANSFORMER with twin outputs. 6.3v 2amps and 12v lamp, so ideal for FDD power supply. Price £5.00. Our reference 5P122.

DOUBLE MICRO CASSETTE DECK made by the Japanese ABS Company This takes two micro cassettes and is complete with motors, solonoids to select the deck to use and record and playback heads. Price £10.00. Our

#### THIS MONTH'S SNIP

LASER TUBE. Made by Phillips Electrical. New and unused. This is helium-neon and has a typical power rating of 9mW. It emits random polarised light and is completely safe provided you do not look directly into the beam when eye damage could result. Do not use in the presence of children unless a diverging lens is litted, DON'T MISS THIS SPECIAL BARGAIN! Price £29.95 plus £3.00 insured delivery

QUICK FIX MAINS COMNECTOR - A must for your workshop. Saves putting on plugs as you just push the wires under the spring Automatically off when lid is up. Price £7.50. Our reference 7P5/1

BT HANDSET with curly lead terminating at BT plug. Colour cream. Price \$5.00. Our reference 5P123.

STEREO SPEAKERS – Each 10watts 80hm and twin speakers mounted in Watnut-Iniish cabinets, size 16in high × 10in wide × 6in deep. Front is black Dozron and the finish is very pleasing. Price £7.00 per pair. Extra postage and packing £3.00. Our reference 7P6.

DO YOU WANT TO MEASURE AC AMPS? - We have found a few more of the 50hz 0-40amp AC 2½in diameter panel meters, made for RAF equipment these are very reliable and robust. Price \$5.00 each. Our reference 5P105

#### GPO TEST METER 12/C1

20,000 opv. 19 AC/DC ranges, including all the usual ones and a very useful low ohms range, also shunt provision for reading up to 10a DC It is in a real leather carrying case and comes complete with leads. prods and croc clips. Price \$7 Ref. 7P5.

#### 8" GREEN SCREEN MONITOR

O GREEN SCHEEN MONTI OH

Complete and in a case with optional till stand for improved viewing angle. A very compact unit measuring only 10½"×10½"×7½" high operates from a 15V DC supply—composite input so ideal for use with Electron or similar computers. Used, but we test before despatch and guarantee 6 months. Price £17.50—Our Ref: 17P1—please add £3

CAMERA TUBE - Mullard PLUMBICON ref XQ1020G. Believed unused

 $\begin{array}{l} \textbf{UNUSUAL MAINS MOTOR} = \textbf{Q} \text{uite small}, \ \text{measures only } 2\text{in} \times 2\text{ln} \times 1\text{in} \\ \text{approx.}, \ \text{but is surprisingly powerful.} \ \text{it revs at } 3,000\text{rpm and is reversible.} \\ \text{It has good length } 1\text{/8in diameter spindle. } \ \text{Price £1.00.} \ \text{Order ref BD640.} \\ \end{array}$ 

#### POWERFUL IONISER

Generates approx. 10 times more IONS than the ETI and similar circuits. Will refresh your home, office, shop, workroom etc. Makes you feel better and work harder – a complete mains operated kit, case included £11.50 + £3 P&P.

#### J & N BULL ELECTRICAL Dept. T.V., 250 PORTLAND ROAD, HOVE,

BRIGHTON, SUSSEX BN3 5QT.
MAIL ORDER TERMS: Cash, P.O. or cheque with order. Orders
220 add £1 service charge. Monthly account orders accepted fro
schools and public companies. Access & B.card orders accepted
Brighton (0273) 734648 or 203500.

#### **NEW ITEMS**

Some of the many described in our current list which you will receive with your parcel.

RE-CHARGEABLE MICADS 'D' SIZE these are tagged for easy joining tog but tags can easily be removed, virtually unused, tested and gntd. \$2.00 but tags can easily be removed, ref 2P141, 6 for £10 ref 10P47.

BRIGHT LIGHT SWITCH will control mains circuits up to 10 amps, gets switch pulses from car headlights, bright daylight, etc, so it does not obatteries and its sessor is completely isolated from the mains, with full instruction supplied. Price £10 ret 10P46

POWERFUL 12V MOTOR was intended for Sinclair Electric Car, rating approx

3 INCH FDD Hitachi ref. HFD 205SXA. Ideal replacement or second drive in most computers, especially Amstrad 6128, etc. Price £30 plus £3 post.

SOLAR POWERED INI-CAD CHARGER 4 NI-CAD batteries AA (HP7) charged in eight hours or two in only 4 hours Price £6. Our ref. 3P3.

50v 20A TRANSFURMER 'C' Core constluction so quite easy to adapt for other outputs—tapped mains input, only £25, but very heavy so please add £5, if no collecting, order Ref. 25P4

FREE POWER! Can be yours if you use our solar cells—sturdily made modules with new system fluible magnifiers to concentrate the light and so eliminate the need for actual sureshine—they work just as well in bright light. Voltage input is 45—you, join in series to get desired voltage—and in parallel or more anallel or

SWITCH AC LOADS WITH YOUR COMPUTER This is easy and reliable if you awith ALLUAIS with YOUR COMPUTER This is easy and reliable if you use our solid state relay. This has no moving parts, has high input resistance and acts as a noise barner and provides 4kW isolation between logic terminals. The furn-on voltage is not critical, anything between 3 and 30V, internal resistance is about 1K ohm. AC loads up to 10A can be switched. Price is £2 each. Ref. 2P183.

METAL PROJECT BOX Ideal size for battery charger, power supply etc. sprayed grey, size  $8^{\circ} \times 4^{\dagger}4^{\circ} \times 4^{\circ}$  high, ends are louvered for ventilation other sides ar flat and undrilled urder Ref. 2P191 price  $\Omega$ 2.

BIG SMOOTHING CAPACITOR. Sprague powerlytic 39,000uF at 50V £3. Our Ref. 3P41

4-CORE FLEX CABLE. Cores separately insulated and grey PVC covered overall Each copper core size 7.0.2mm. Ideal for long lelephone runs or similar applications even at mains voltage. 20 metres £2. Our ref. 2P196 or 100 metres coil £8. Odder ref. 8P19.

TWIN GANG TUNING CAPACITOR, Each section is .0005uF with trimmers and good length  $\frac{1}{4}$ sin spindle. Old but unused and in very good condition. £1 each Our ref. 80630.

13A PLUGS. Good British make complete with fuse, parcel of 5 for £2. Order

13A ADAPTERS - Takes 2 13A plugs, packet of 3 for £2, order Ref. 2P187. 20v=0=20v= Mains transformers  $2^{1}\!/\!2$  amp (100 watt) loading, tapped primary 200-245 upright mountings £4 order Ref. 4P24.

BENCH ISOLATION TRANSFORMERS 500 watt - 230v in and out with plenty of

BURGLAR ALARM BELL  $-6^{\prime\prime\prime}$  gong - OK to fix outside in the rain and shelter mains operation.  $\mathfrak{D}8.$  Ref. 8p2

24 HOUR TIME SWITCH – 16A changeover contacts, up to 6 on/offs per day Nicely cased, intended for wall mounting. Price £8, Ref. 8P6.

CAPACITOR BARGAIN — axial ended — 4700uf (a 25v Jap made. Normally 50p each, but you will get 4 for £1. Ref. 613.

PIEZO ELECTRIC FAM an unusual fan, more like the one used by Madame Butterfly, than the conventional type, it does not rotate. The air movement caused by two viorating arms. It is American made, mains operated, very economical and causes no interference. So it is ideal for computer and instrument cooling. Price is only £1 each. Ref. B0605.

SPRING LDADED TEST PRODS — heavy duty, made by the famous Bulgin company. Very good quality. Price four for  $\mathfrak L1$ . Ref. B0599.

CURLY LEAD – four core, standard replacement for telephone handset, extends to nearly two metres. Price £1 each. Ref. B0599

TELEPHONE BELLS - these will work off our standard mans through a transformer, but lo sound exactly like a telephone, they then must be led with 25Hz 50V. So with these bells we give a circuit for a suitable power supply. Price 2 bells for £1. Ref. BD600.

ASTEC PSU. Mains operated switch mode so very compact ( $6^{1}2^{\circ}$  approx.). Outputs: +5 Volts 3.5 amp. +12 Volts 1.5 amp. -5 V Brand new. Normal price £30+. Our price only £10. Ref. 10P34.

APPLIANCE THERMOSTATS — spindle adjust type suitable for convector heaters or similar. Price 2 for £1 Ref. 80582.

3 CORE FLEX B&RGAIN No.1 – Core size 5mm so ideal for long extension leads carrying up to 5 amps or short leads up to 10 amps. 15mm for £2, order Ref. 2P189.

3 CORE FLEX BARGAIN No.2 - Core size 1.25mm so suitable for long extension leads "arrying up to 13 amps - or short leads up to 25A, 10m for 52, order Ref. 2P190. CASE WITH 13A PRONGS - to go into 13A spoket, nice size and suitable for

plenty of projects such as car battery trickle charger, speed controller, tin switch, night light, noise suppressor, dimmers etc. Price – 2 for £1. Ref.

ALPHA-NUMERIC KEYBOARD - this keyboard has 73 keys with contactless capacitance switches giving long trouble free life and no contact bounce. The keys are arranged in two groups, the main area field is a 0WERTY array and on the right is a 15 key number pad, board size x5 approx.  $13^x$  x4" - brand new but offered at only a fraction of its cost namely £3, plus £1 post. Ref. 3P27.

TELEPHONE EXTENSIONS — it is now legal for you to undertake the wining of telephone extensions. For this we can supply 4 core telephone cable, 100m cot % 5.0. Extension BT sockets £2.95. Packet of 50 plastic headed staples £2. Obtain adaptor for taking two appliances from one socket £3.95. Leads with BT plug for changing old phones 3 for £2.

WIRE BARGAIN—500 metres 0.7mm solid copper tinned and p.v.c. covered. Only  $\mathfrak{C}3+\mathfrak{C}1$  per metre, and this wire is ideal for push on connections.

trigger when a steady beam of infra-red or ordinary light is broken. Main components — rislay photo transistor, resistors and caps etc. Circuit diagram but no case. Price £2. Ref. 2P15.

3-30V VARIABLE VOLTAGE POWER SUPPLY UNIT — with 1 amp DC output 3-30V VARIABLE VOLTAGE POWER SUPPLY UNIT — with 1 amp DC output Intended for use on the bench for experimenters, students, inventors, service engineers etc. This is probably the most important piece of equipment you can own. (After a multi range test meter! It gives a variable output, from 3-30 volts and has an automatic short circuit and overload protection, which operates all 1. The property of the prope has a voltmeter on the front panel in addition to the output control knob and the output terminals. Price for complete kit with full instructions is £15. Ref. 15P7.

TRANSMITTER SURVEILLANCE (BUG) — tiny, easily hidden, but which will enable conversation to be picked up with FM radio. Can be housed in a matchbox. All electronic parts and circuit. Price £2. Ref. 2P52



## **EAST CORNWALL COMPONENTS**

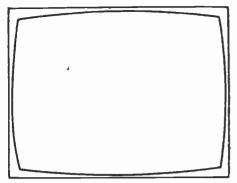


CATALOGUE available – range of components greatly increased – over 136 pages fully illustrated. Price £1.00 per copy (free upon request with orders over £15). Credit Tickets (3), Special Offer Sheets, Order Form and Pre-Paid Envelope. Order your copy now.

| E15). Credit Tickets (3), Special Offer Sheets,   |  | NEW REDUCED PRICES  |  | TRANSISTORS +   | DIODES                               | Type Pri   | ice (£)                       |
|---|--|---|--|---|--------------------------------------|--|-------------------------------|
| SEPTEMBER SPECIAL   | T.V. AERIAL ACCESSORIES  Co Ax Cable 75 Ohm 100 Metre Reel £11.00 1+ 10+ Co-Ax Metal Plug 200, 18p   |   | ION SPARES   | Type Price (£)  |                                      | BF185<br>BF194A<br>BF195   | 0.28<br>0.15<br>0.12          |
| ONLY  | Co-Ax Line Socket 25p, 22p<br>Co-Ax Line Connector 12p, 10p  | REPLACEMENT<br>VIDEO  | NAT. PAN. Cont.<br>NV390 21.45<br>NV450 36.45<br>NV470 36.45   | AC128K 0.38<br>AC141 0.58<br>AC141K 0.38                        | BC238<br>BC251/A/B<br>BC262          | 0.12<br>0.12<br>BF224J<br>BF240<br>BF241                             | 0.20<br>0.15<br>0.18          |
| £5.25 XS SOLDERING  | TV/Video/Computer Combiner 7042 £4.05<br>TV Indoor Amplifier 7253<br>Improves signal 3 times £16.95  | AKAI<br>VS1 29.45   | NV470 36.45<br>NV480 36.45<br>NV600 35.45<br>NV777 35.45       | AC142 0.40<br>AC142K 0.38<br>AC152 0.48                         | A B<br>BC301<br>BC302                | 0.29 BF257<br>0.36 BF258<br>0.38 BF259                               | 0.22<br>0.26<br>0.30          |
| & PACK OF   | Second Set Amplifier 7243 Improves signal to 2 sets 50% £15.75 CB Interference Suppressor 9700 Minimises CB interference on TV £5.55   | V\$2 29.45<br>V\$3 29.45<br>V\$5 29.45<br>V\$10 29.45                         | NV861 21.45<br>NV2900 21.45<br>NV3000 21.45                    | AC153K 0.46<br>AC176K 0.32<br>AC187 0.40<br>AC187K 0.42         | BC303<br>BC307A<br>BC317B<br>BC323   | 0.36 BF262<br>0.15 BF263<br>0.15 BF270<br>0.90 BF271                 | 0.34<br>0.38<br>0.30<br>0.28  |
| SOLDER  | Minimises CB interference on TV £5.55<br>TV/FM Diplexer 9006<br>Separates UHF TV signals from FM radio signals from FM radio signals from FM radio signals   | V\$77 29.45<br>V\$88 29.45<br>V\$7100 29.45                                   | NV7:00 21.45<br>NV7:200 21.45<br>NV7:500 21.45                 | AC188 0.24<br>AC188K 0.38<br>ACY22 1.50                         | BC323<br>BC327<br>BC328<br>BC337     | 0.10 BF273<br>0.10 BF274<br>0.08 BF294                               | 0.22<br>0.34<br>0.46          |
| SPECIAL OFFERS WHILE STOCKS LAST  | VALVES Enquiries are wel-  | V\$9300 29.45<br>V\$9500 29.45<br>V\$9700 29.45                               | NV7800 21.45<br>NV7850 21.45<br>NV8170 21.45<br>NV8200 21.45   | AD142 0.88<br>AD149 0.95<br>AD161/162 1,20                      | BC338<br>BC350A<br>BC351             | 0.10 BF336<br>0.24 BF337<br>0.16 BF338                               | 0.40<br>0.38<br>0.28          |
| PIEZO – 3.25" – SUPER HORN<br>Flush Flange Expotential Horn<br>Size: 3.25" Round  | comed for any other valve not listed here.  Type Price (£) PC900 1.45  | VS9800 29.45<br>FERGUSON<br>3V00 21.45  | NV8÷00 21.45<br>NV8÷00 21.45<br>NV8÷20 21.45                   | AF114 0.88<br>AF115 2.10<br>AF116 2.10                          | BC516<br>BC547<br>BC440              | 0.35 BF355<br>0.08 BF371<br>0.36 BF450                               | 0.42<br>0.27<br>0.30          |
| Impedance: 1,000 ohm (ii: 1KHz<br>Power Nominal: 16V<br>Power Max:: 35V   | AZ31 4.55 PCC89 0.80<br>AZ41 2.06 PCC189 0.90  | 3V01 21.45<br>3V06 21.45<br>3V16 21.45<br>3V22 21.45                          | NEC<br>PV7E0 23.45<br>PV7E4 23.45                              | AF121 0.66<br>AF124 0.70<br>AF125 0.50<br>AF126 0.50            | BC548<br>A B or C<br>BC549<br>A or B | 0.08 BF457<br>0.10 BFR51<br>0.08 BFR61<br>0.10 BFR90                 | 0.36<br>0.36<br>0.32<br>0.86  |
| Frequency Response: 3KHz-25KHz<br>Output SPL: 100 dB<br>Weight: 62g<br>Dimensions: 85 × 85 × 74 mm  | DAF96         1.05         PCF80         0.95           DF96         0.80         PCF82         1.00           DK96         2.70         PCF84         0.80           DM71         3.00         PCF86         1.30 | 3V23 21.45<br>3V24 21.45<br>3V29 21.45<br>3V30 21.45                          | PV774 23.45<br>N83G 21.45<br>N83T 21.45                        | AF127 0.50<br>AF139 0.56<br>AF178 1.50                          | BC550<br>A or B<br>BC557A            | 0.10 BFT41<br>0.10 BFT43<br>0.10 BFY50                               | 0.68<br>0.38<br>0.32          |
| Order Code – AUD/KSN1095A 1+ 10+ Price – £5.00 £4.50  Rear Mounting Expotential Horn.   | DY86/87         0.70         PCF87         0.60           DY802         0.95         PCF200         2.00           CV850         2.55         PCF201         2.00  | 3V31 21.45<br>3V35 21.45<br>3V36 21.45  | N832 21.45<br>N833 21.45<br>PV2300 23,45<br>PV2430 23.45       | AF239 0.65<br>AF279S 1.40<br>ASY80 5.20                         | BC558A<br>BCY70<br>BCZ10             | 0.10 BFY51<br>0.36 BFY52<br>3.21 BFY90                               | 0.32<br>0.32<br>0.80          |
| Idential to the above Piezo, but Rear Mounting.   Order Code – AUD/KSN1001A 1+ 10+   Price – £5.20 £4.70  | CV4015 2.85 PCF800 1.25<br>E180F 6.55 PCF801 1.10<br>EABC80 0.85 PCF802 1.10   | 8903 21.45<br>HITACHI<br>VT6500 25.00<br>VT7000 25.00                         | SHARP<br>110 26.45<br>381 26.45                                | ASZ17 2.00<br>AU110 2.90<br>AY102 4.32<br>B40C200 1.03          | BCZ11<br>BD124P<br>BD129<br>BD130Y   | 2.60 BFY90S<br>1.20 BR100<br>0.90 BR101<br>0.68 BR103                | 1,34<br>0.20<br>0.76<br>0.60  |
| HALOGEN LAMP - 500 Watt Tungsten Halogen Lamp for use in external Halogen Light Fittings.   | EAF42 1.55 PCF805 1.75 EB91 1.35 PCF806 1.25 EBC41 3.50 PCF808 1.65 FBF80 0.80 PCL82 1.05  | VT8000 25.00<br>VT8040 25.00<br>VT8100 25.00                                  | 383 26.45<br>384 26.45<br>385 26.45                            | BA115 0.12<br>BA121 0.40<br>BA148 0.16                          | BD131<br>BD132<br>BD135              | 0.46 BR303<br>0.50 BRY39<br>0.26 BRY56                               | 2.75<br>0.80<br>0.42          |
| Voltage: 240Vac Watts: 500. Order Code SO/023 Price: 3,50 Per 10: £3.00 each END NIPPERS - Economy  | ECC81 1.05 PCL83 2.55<br>ECC82 0.95 PCL84 1.05<br>ECC83 1.20 PCL86 0.90  | VT8500 25.00<br>VT8700 25.00<br>VT9000F 25.00                                 | 386 26.45<br>387 26.45<br>388 26.45                            | BA155 0.12<br>BA157 0.20<br>BB105B 0.32                         | BD136<br>BD137<br>BD138<br>BD138     | 0.26 BSX20<br>0.28 BSY52<br>0.30 BSY95A                              | 0.20<br>0.35<br>0.25          |
| Yellow insul. handles. Length 4 <sup>1</sup> /2" Order Code SO/024 Price: £1.00 Per 10: 90p each FLAT NOSE PLIERS – Economy   | ECC84 0.85 PCL88 2.55<br>ECC85 1.00 PCL805 1.05<br>ECC88 1.25 PD500 2.95   | VT9300 25.00<br>VT9500S 25.00<br>VT9700 25.00<br>VT9900 25.00<br>VT4000 25.00 | 481 26.45<br>482 26.45<br>2000 26.45<br>3300 26.45             | BB105G 0.30<br>BB110B 0.42<br>BC108 0.10<br>A B or C 0.14       | BD139<br>BD140<br>BD142<br>BD145     | 0.30 BT100A/02<br>0.29 BT101/300<br>1.60 BT101/500<br>1.82 BT102/300 | 0.90<br>2.75<br>3.25<br>3.60  |
| Yellow insul handles Length 4 Price. £1.00 Per 10: 90p each ALUMINIUM SHEETS  | ECC189 0.90 PFL200 1.80<br>ECF80 0.85 PL33 1.55<br>ECF82 0.90 PL36 1.80<br>FCFR3 1.95 PL82 0.80  | VT4000 25.00<br>VT4200 25.00<br>VT5000 25.00<br>VT5500 25.00                  | 9100 26.45<br>9300 26.45<br>9400 26.45                         | BC109 0.10<br>A,B or C 0.14<br>BC115 0.15                       | BD150B<br>BD160<br>BD165             | 0.50 BT106<br>1.58 BT116<br>0.45 BT119                               | 2.05<br>1.20<br>3.30          |
| Dimensions. 125mm x 220mm (Approx.) Order Code. 50/01 Price 50p Per 10 45 each NI-CAD BATTERY CHARGER   | ECH35 3.80 PL95 2.05<br>ECH81 1.45 PL504 1.55<br>ECH84 1.55 PL508 2.75   | ORION<br>VH1 21.45<br>VH2 21.45   | 9500 <b>26.45</b><br>9600 <b>26.45</b><br>9700 <b>26.45</b>    | BC117 0.28<br>BC118 0.20<br>BC119 0.43                          | 8D183<br>BD201<br>BD202              | 0.70 BT138/600<br>0.52 BT151/560R<br>0.57 BTY79/400R                 | 0.98<br>0.90<br>2.80          |
| Universal. PRICE: 1+ £4.50 each 10+ £4.25 each  | ECL85 0.80 PL519/509 5.20<br>ECL86 1.80 PL802 5.55<br>EF80 0.80 PY81/800 1.15  | JVC<br>HRD110 21,45<br>HRD111 21,45   | SANYO/FISHER<br>FVHP915 34,50<br>FVHP910 34,50                 | BC125 0.14<br>BC140 0.48<br>BC141 0.36<br>BC142 0.26            | BD222<br>BD225<br>BD232<br>BD234     | 0.80 BU104<br>0.40 BU105<br>0.52 BU108<br>0.30 BU126                 | 1.80<br>1.40<br>1.90<br>1.60  |
| NI-CAD BATTERIES  | EF86   1.85   PY82   1.80  <br>  EF91   2.05   PY88   0.80  <br>  EF95   1.70   PY500A   2.25  <br>  EF183   0.95   PY801   0.75   | HRD120 21.45<br>HRD121 21.45<br>HRD220 21.45                                  | PHILIPS<br>DV46½ 25.45<br>6460 25.45                           | BC143 0.36<br>BC147B 0.16<br>BC148 0.10                         | BD235<br>BD236<br>BD237              | 0.30 BU133<br>0.36 BU204<br>0.38 BU205                               | 1.90<br>1.60<br>1.40          |
| AAA   | EF184 1.05 UABC80 0.90<br>EH90 1.00 UAF42 1.30<br>EL34 3.45 UBC41 4.35   | HH2200 21.45<br>HR3300 21.45<br>HR3320 21.45                                  | 6520 25.45<br>SONY<br>SLF1 29.45                               | BC148B 0.12<br>BC149 0.12<br>BC149C 0.14                        | BD410<br>BD438<br>BD439              | 0.76 BU208A<br>0.64 BU326S<br>0.85 BU407                             | 1.50<br>1.75<br>1.40          |
| PP3 £4.10 £3.90 ea/10<br>20mm FUSES   | EL36 2.30 UBC81 1.75<br>EL81 7.00 UCC85 0.80<br>EL84 2.40 UCF80 1.25   | HR3330 21.45<br>HR3350 21.45<br>HR3360 21.45<br>HR3660 21.45                  | SLC5 23.45<br>SLC6 23.45<br>SLC7 23.45<br>SLC8 39.45           | BC159 0.14<br>B/C 0.16<br>BC160 0.38<br>BC161 0.30              | 8D441<br>8D507<br>8D520<br>8D587     | 0.85 BUX80<br>1.05 BUY20<br>1.20 BUY69A<br>0.88 BUY69B               | 2.90<br>2.75<br>2.90<br>1.98  |
| QUICK BLOW – 80mA, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1A, 125, 1.5, 1.6, 2, 2.5, 3.15, 4, 5, 6.3 45p/10 TIME DELAY – 50mA, 60, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1A, 1,25, 1.6, 2, 2.5, 3.15, 4, 5, 6.3, 10 90o/10   | EL85 5.00 UCH42 5.65<br>EL86 6.95 UCH81 2.05<br>EL509 7.90 UCL82 1.85<br>FL519 8.00 UCL83 3.30   | HR4000 21.45<br>HR4100 21.45<br>HR7200 21.45<br>HR7600 21.45                  | SLC20 29.45<br>SLC24 29.45<br>SLC36 29.45                      | BC168B 0.25<br>BC170/A/B/C 0.12<br>BC171/A/B 0.10               | BD707<br>BDX18<br>BDX32              | 0.80 BY100<br>1.00 BY103<br>1.75 BY122                               | 0.80<br>0.50<br>0.60          |
| 11 DOMESTIC MAINS FUSES ALL 13A, FUSED WITH NEON INDICATOR  | EM80 0.90 UF41 1.30<br>EM84 1.80 UF89 2.55<br>EM87 3.90 UL84 1.30  | HR7610 21.45<br>HR7650 21.45<br>HR7700 21.45                                  | SLC33 29.45<br>SLC40 29.45<br>SLC50 39.45<br>SLC66 39.45       | BC172/B/C 0.12<br>BC177/B/C 0.24<br>BC182/A/B/C 0.10            | BF115<br>BF117<br>BF119              | 0.32 BY126<br>0.50 BY127<br>0.82 BY133<br>0.42 BY135                 | 0.10<br>0.08<br>0.10          |
| 2A, 3A, 5A, 13A £1.00/10  1 1/4" QUICK FUSES  500mA, 1A 1.25A, 2A, 12A 50p/10   | EY51 0.95 UY85 1.20<br>EY86/87 0.70 2D21 2.65<br>EY88 0.80 6AT6 1.30   | NATIONAL<br>PANASONIC<br>NV100 25.45<br>NV230 36.45                           | SLC6G 39.45<br>SLK9E 39.45<br>SL20G 39.45<br>SL30GD 25.00      | BC182L 0.10<br>LA LB LC 0.12<br>BC183/A/B/C 0.10<br>BC183L 0.10 | BF125<br>BF127<br>BF154<br>BF157     | 0.42 BY135<br>0.44 BY164<br>0.14 BY179<br>0.46 BY182                 | 0.35<br>0.45<br>0.60<br>0.80  |
| BT APPROVED EQUIPMENT  Master Socket (Flush) £2.90 Extension Lead 5 Mtr £2.90   | EY500A 2.20 6AU6 1.05<br>EZ41 2.85 6C4 1.05<br>EZ81 0.85 6GH8A 1.25<br>GY501 1.45 6J5GT 2.55   | NV250 36.45<br>NV270 36.45<br>NV280 36.45                                     | SL8000 24.50<br>SL8080 24.50<br>TOSHIBA                        | LA LB LC 0.12<br>BC184 0.08<br>A B CL LC LB 0.10                | BF160<br>BF167<br>BF177              | 0.23 BY184<br>0.32 BY187<br>0.42 BY189                               | 0.38<br>0.65<br>6.75          |
| Master Socket (Surface)   62.75   Wiring Tool   369     Secondary Socket (Flush)   £1.90   Plug - 431   259     Secondary Socket (Surface)   £1.70   Slimtel Phone   £17.35   | GZ32 1.25 6K7G 2.05<br>KT66(G.E.C.) 18.00 6K8G 2.80<br>KT77 11.50 6KD6 6.55  | NV300 21.45<br>NV322 21.45<br>NV330 35.45<br>NV333 21.45                      | V31 29.50<br>V33 29.50<br>V55 21.45                            | BC212/A/B/C 0.10<br>BC212L 0.10<br>LA LB 0.10                   | BF178<br>BF180<br>BF181<br>BF182     | 0.36 BY198<br>0.27 BY199<br>0.27 BY206<br>0.32 BY207                 | 0.64<br>0.72<br>0.14<br>0.16  |
| B.T. Cable (per metre) 15p Viscount Phone £26.04<br>Per 100 metres £12.00 Conversion Kit &<br>Line Jack Cord with Plug £1.25 Wiring Diag £6.90  | KT88(G.E.C.)   19.00   6X4   1.55  <br>  PC88   1.45   30FL2   1.75  <br>  PC92   3.05   30FL12   1.65   | NV340 21.45<br>NV370 25.45<br>NV380 25.45                                     | V57 21.45<br>V5470 24.50<br>V9600 29.50                        | BC213/A/B/C 0.10<br>BC213L 0.10<br>LA LB LC 0.10                |                                      | 0.32 BY210/400<br>0.47 BY210/800                                     | 0.21<br>0.22                  |
| ORVX PORTASOL GAS SOLDERING IRON PRICE 16.00 each   | 13A TEST PLUG – useful for testing 13A sockets.  | INTEGRATED CIRCUITS   | MOTORS FERGUSON/JVC C  | apstan Motor 3V00-  | SONY                                 | SLC5/7   | 1.64                          |
| SPARE TIPS - 1, 2.4, 3.2, 4.8mm <b>£4.00</b> each <b>RESISTORS - CARBON FILM 5%</b>   | PRICE: 99p ea. 10 off 90p ea.  TEST PRODS – FUSED – 99p pair   | 741 0.16<br>CA810QM 1.20  | 3V22<br>FERG JSON/JVC Drt<br>3V0D-3V22                         | 35.00   |                                      | SL8000/8600/8600<br>SL3000UB<br>SLC6                                 | 2.60<br>2.05<br>1.85          |
| 1/4W 1RO to 10M (E12 Range)   | SAFEBLOC - Quicktest - Mains -<br>£6.75 each   | CA3020 2.10<br>CA3065 1.60<br>HA1366WR 1.59                                   | SANYO Reel Motor   |   | THORN                                | T9<br>3V29/HR7200  | 2.15                          |
| 2W 10R to 2M2 (E6 Range) 8p each. 60p/10. 5.00/100 RESISTOR KITS — each value individually packed   | HELPING HANDS WITH MAGNIFIER £3.99   | LA4422 3.20<br>LC7131 4.90<br>LM324N 0.40                                     | SHARP Reel Motor SONY DC Motor BH<br>FERGUSON/JVC Ca           | F/1100D C7 30.50  | TOSHIBA                              | V8600<br>V7540   | 1.40                          |
| 1/4W pack 10 each value E12 – 10R to 1M 610 pieces 1/4W pack 5 each value E12 – 10R to 1M 305 pieces 2.95 1/4W pack Popular – 10R to 10M 1000 pieces 5.50 1/4W pack Popular – | ALL 13A, FUSED WITH NEON INDICATOR   | LM380N8-P 0.80<br>LM380N14-P 1.80<br>LM1011N 3.20<br>LM1458N 1.35             | IDLERS   |   | AMSTRAD                              | 9600<br>7000   | 1.15                          |
| 1/2W pack 10 each value E12 - 2R2 to 2M2 730 pieces     7.75       1/2W pack 5 each value E12 - 2R2 to 2M2 365 pieces     4.70       1/2W pack 5 each value E12 - 2R2 to 1M 353 pieces     9.50       1W pack 5 each value E12 - 2R2 to 1M 353 pieces     13.75   | 2-WAY £2.75 each £2.50ea/5<br>3-WAY £3.80 each £3.50ea/5<br>4-WAY £3.99 each £3.75ea/5<br>4-WAY with lead & plug £5.75 each £5.25ea/10+  | LM3900N 0.50<br>M51513L 2.30<br>M51515L 3.15                                  | FERGUSON/JVC Tai<br>3V00-3V16<br>HITACHI F/Fwd Rew             | 4.80<br>vind 686 1471 2.25                                      |                                      | HR3300/3320/3360<br>HR7000   | 2.00                          |
| 2W pack 5 each value E6 – 10R to 2M2 317 pieces 21.75 ADDITIONAL KITS   | PLUGS 13A 3-pin fused £0.46 each £0.42ea/10  | MC1307P 1 99<br>MC1327P 1.50<br>ML237B 2 30                                   | HITACHI F/Fwd Rew<br>HITACHI Idler 64136<br>SANYO Reel Idler A |   | GENUINE                              |  |                               |
| DISC CERAMIC 50V         125 pieces         £3.50           ZENER DIODES 5ea         55 pieces         £3.50           ELECTROLYTICS R.         100 pieces         £7.50  | DATA VOLUME 1 – Trans. data & drawings<br>A-BUY £9.99<br>DATA VOLUME 2 – as above C-Z £10.75   | NE555   | 662T 01201<br>SHARP Idler NIDL 0<br>SHARP Idler NIDL 0         | 5.95<br>005 GE22 1.90   |                                      | 8903/3V00/3V01/3<br>3V16/3V22/3V23/3<br>3V29/3V30                    | V06/<br>3∨24/<br><b>39.50</b> |
| FUSES 0/BLOW 20mm 80 pieces £3.75<br>FUSES T/DELAY 20mm 80 pieces £7.50<br>PRE-SET POTS-H 120 pieces £7.50  | DATA VOLUME 3 - 2N-2N6735 £10.20 DATA VOLUME 4 - 2SA & on £13.50 DIODES VOLUME 1 £10.75  | SAS590 2.85<br>SN76226DN 1.30<br>SN76227N 1.10                                | SONY Rewind Kit A  | -670-634-8B 4.95  | JAC                                  | All sets   | 39.50                         |
| PRE-SET POTS-V 120 pieces £6.74  SOLDER: 60% TIN 40% ALLOY  | DIODES VOLUME 2  | SN76533N 1.75<br>STK015 6.20<br>TA7203P 2.50                                  | VIDEO BELT K   | ITS<br>/9500/9800 2.00  | 1                                    |  | /8620<br><b>39.50</b>         |
| 22g. Non-corrosive Multi-core Solder.<br>500gm Reel £4.99 each — 10 Reels £3.75 each  | I.C. TTL £19.50 I.C. LIN VOLUME 1 £6.95 I.C. LIN VOLUME 2 £6.99  | TA7204P 2.50<br>TA7205AP 1.80<br>TAA550 0.50<br>TAA611A12 3.50                | HITACHI 5000<br>8000   | 1.35  |                                      | VEH0120/31<br>VEH0218<br>VEH0177                                     | 39.50<br>38.35<br>52.50       |
| SOLDERING SECTION CS 18W, as above 10.90 Soldering Station complete with 30W Antex 15W iron 5.40  | Both volumes   | TA120B 1.30<br>SA/SQ 1.30<br>TBA520 1.50                                      |  | 1.05<br>650-3V31 .68  | SANYO                                | VTC9300/9455/9500  | 52.50<br>52.50                |
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#### **COVER PHOTO**

This month's cover photograph shows the Sony Model KV2752UB - rear view with the back removed. See servicing article on pages 826-831. The photograph was taken by Nigel Hunt of JNB Television.

# 

**Industrial Strategies** 

A trio of reports published by the National Economic Development Office has once more highlighted the shortcomings of the UK's electronics industry. It's as well that this should be done from time to time, and an Action Group has been set up to try to force the pace of remedial action. But one can't help feeling, with deep regret, that not a lot will come of it. After all, the problems are not new and many in the industry have been

struggling to do something about them for a long time.

The main report, Strengthening the Competitiveness of UK Electronics, was prepared for the NEDC by management consultants McKinsey. It compares the performance of eight of the largest UK electronics groups with twenty two of their competitors in Europe, the USA, Japan and Korea. This report is supplemented by *Government IT Policies in Competitive Countries*, prepared by the Science Policy Research Unit at the University of Sussex, and Comparative Education and Training Strategies, prepared by NEDC staff. The McKinsey report criticises the outdated management style of UK electronics companies and their failure to develop markets because of lack of investment. It highlights a need for less dependence on the domestic UK market, in particular on defence electronics and telecommunications, and proposes a five-point strategy for survival in the increasingly competitive but still expanding world electronics market. The industry is urged to (1) focus on fewer, core electronics businesses and invest to achieve critical mass, i.e. production levels suited to a global market, (2) develop management structures and leadership styles that will support long-term strategies, (3) communicate these strategies to the financial market to correct the view that the industry concentrates solely on short-term profitability, (4) work with suppliers to create an improved components sector, and (5) create world-class skills and make better use of individual talent, in particular to compensate for the deficiencies in British education.

The report points out that while the UK electronics market grew by 9.4 per cent a year in real terms between 1976 and 1987, a growth rate as rapid as in any major world market except Japan, the sales of UK electronics companies rose by only 2.6 per cent during the period. It comments that major UK electronics companies were amongst the slowest growing of the thirty evaluated worldwide. During the period UK electronics companies reduced employment by 1.5 per cent a year while employment by their US and Japanese counterparts expanded by about 4.5 per cent a year. A sorry but by now familiar story. Nothing wrong with the "strategy for survival" – the report poses the question of whether much of an electronics industry will remain in the UK in a decade's time – except that it is really too vague a statement of good intentions to be capable of

having much practical effect.

It's sad to note that the UK was once a world leader in electronics but has been unable to build on the technical achievements of earlier generations. It's decidedly worrying to reflect on the fact that electronics is a key factor in a modern, developed economy. Is it too late for the UK industry to re-establish a major presence in the international electronics market? Problems that have always been with us have included the relatively small domestic market and unfortunate timing – all too often times when major initiatives should have been taken have coincided with periods when the government of the day has imposed a regime of austerity to correct one or other sort of economic imbalance. It takes an iron will to press on with investment in the middle of a recession, combined with a grasp of market opportunities all too rare amongst the leaders of UK industry.

It should not be thought that the UK is alone in failing to take the right decisions at the right time and implement them. Philips for example has just announced appalling second quarter results, with earnings reduced by 44 per cent to the lowest quarterly level for five years. This despite the fact that the company has for some time been striving to get its act right. It has always invested heavily in research, but has often failed to make the most of the resultant know-how. It has been striving to impose a more effective management system on its world-wide activities, i.e. do the sorts of things suggested by the McKinsey "five-point strategy". One can but wish Philips well. One of Philips problems of course is its heavy dependence on the highly competitive consumer electronics market. It's extraordinarily difficult to cope with the cut-throat competition from new firms in South East Asia's developing economies, operating as they do in a lost-cost environment. Difficult but not impossible, as Japanese industry has shown. The sort of thing required is highlighted by the investment made for example by Hitachi in VCR production. Between 1983-87 output per worker at Hitachi's Tokai VCR plant in Japan increased nine-fold, assembly time per machine being halved to just over one and a half minutes. But how many companies could hope to match that sort of performance?

The situation seems to be terminal as far as the UK's indigenous consumer electronics

industry is concerned. Amstrad has shown that it's possible to become a major supplier of consumer electronics goods on an international basis despite the fierce competition, but to do so has had to rely on ingenious off-shore manufacturing operations. Its Hong Kong Asia base switches production between plants in a number of South East Asian countries, with quality control initially achieved by supervising and paying for the installation of tooling for its products and by having its own engineers working full-time in subcontractors, plants while new products are being introduced. A team of inspectors monitors quality control afterwards. Maybe this is how things will have to go. It is after all a development of a well-established practice – as far back as the early sixties US semiconductor manufacturers were having their device encapsulation done in off-shore

plants.

## Servicing Notes on the Panasonic G Deck

Nick Beer

The Panasonic G tape deck mechanism has been with us now for some eighteen months. It's fitted to VCRs with model numbers NV-G21/25/40/45, NV-H65, NV-D48 and NV-D80. Rather illogically perhaps, it was not used in Models NV-G7/10/12. These had the D1 mechanism. Matters are further confused by the fact that the NV-D48 and NV-D80 D series machines (D for digital) have the G rather than the D mechanism. Ah well!

The G deck is a rather innovative design. Apart from the direct-drive drum unit there's only one motor which is used as the direct-drive capstan and also provides the drive for the reels, loading, mode selection and front loading! The latter is achieved by the use of a clever rack and lever system. The direct-drive drum unit is of considerably reduced height. In combination with the overall compactness of the new design, this enables a very small VCR to be built, typically only 82mm high. There's only one belt in the mechanism, a toothed timing belt (VDV0159) that transfers drive from the capstan motor to the reel and loading mechanisms. Instead of being engaged in the normal "swing in" fashion, the pinch roller descends from above on a worm shaft – again driven by the loading system. A rotary mode switch provides the syscon with mode detection, the first time that Panasonic has used such a device (a linear device was previously used), also the first time that it has been mounted on the top of the mechanism. It can be seen at the rear, righthand side of the mechanism – a white, toothed wheel.

One novel feature of these machines is the real-time counter. This is done by reading the off-tape control pulses, so the tape has to be in contact with the control head at all times. The half-lace feature helps here: as soon as the tape is inserted it laces to the half-way position, in contact with the audio/control head. So the head is decidedly offset from its usual position in a VHS deck.

All these features go to produce what is probably the best range of VCRs currently on the market. But there have been a few teething troubles with the deck – this has been the experience of dealers here in North Devon anyway. This short article aims to help by providing a roundup of stock faults to date and what to do about them. It seems that Panasonic has stopped distributing technical bulletins, so you get to know about modifications only when you phone them. As a result you could spend several hours on a deck only to find that the job could have been done in ten minutes had the appropriate information been available.

These decks can be difficult to work on if you don't know them, but when you do know their habits there are none nicer. They are very light and fairly accessible. Once you've had a few to regear you get to know them intimately. The only problem is that some of the faults have unlikely causes. So you can easily be caught if you don't know them.

#### **Creased or Chewed Tapes**

The most common complaint we've had has been of creased or chewed tapes. This usually starts off with a rolling picture or a varying sound level. The cause is that the pinch roller becomes barrel shaped. As a result the tape rides up over the adjacent post P4, and this can be reflected back to the audio/control head. The remedy is to

fit the modified pinch roller, part no. VXL1473. To tell the difference between the old and the new type, look at the colour of the roller's metal insert bearing. If it's brass it's the old type and should be changed regardless – if it hasn't caused trouble it soon will. The new type has an aluminium coloured insert. I've had one or two of these fail, giving the same trouble, but they are a great deal more reliable.

Pinch roller replacement is fairly straightforward – simply release the plastic cap above the assembly and slide the roller up. On earlier machines this cap tends to foul the front of the cassette carriage as you pull it up, so you should gently lever it forwards and up. Panasonic recommend that the cap (part no. VMX1078) is replaced at the same time as the roller.

#### **Head Failure**

The next common problem we've had has been failure of the VEH0343 video head used in Models NV-G21/25. Symptoms range from excessive noise bars in the trick modes to grainy recordings or no picture at all in any mode. Cleaning improves matters but the heads will still not give perfect results. In the vast majority of cases I've found that the back tension has been excessive – typically twice the specified level of 20-25g! I would suggest that this is checked whenever you work on one of these decks, and certainly every time a head is cleaned or replaced.

To remove the head drum, first take off the discharge angle (back on top again with the G deck) then withdraw the two large screws that hold the head to the lower drum. Next thoroughly remove all the solder from the eight arrowed connections to the head and ensure that each of the pins is free. If the head is stiff on its shaft, even after using a hairdryer to apply heat, use the Panasonic head puller (part no. VFK0341) for which these heads have the appropriate threaded holes. Never touch the three gold screws in the centre spindle of the direct-drive unit.

This problem is rather alarming as the trade price of the heads is over £50, which is a hefty charge for the customer or renter to bear now that these machines are approaching the end of their guarantee period. Panasonic tell me that the problem is under investigation. Even more alarming is the fact that we have had failure of five or more of the direct-drive units themselves. These cost over £220 trade, plus VAT of course. Until now they have been under guarantee. The problem has been that the leads from the rotary transformer to the bottom of the pins that come up to connect to the head tend to break, giving rise to faults that look as if the heads are clogging and cleaning themselves as the machine plays or records, but of course the places where they do so aren't constant.

#### Timing Problems

We've had a number of odd faults that have caused timing problems. On a few occasions the timing belt has slipped, upsetting things. The symptoms are things like failure to accept a cassette, or ejection of the tape as soon as it goes in, or going into fast forward then switching off. The general rule to follow is that all the gears should line up hole to hole as per the manual for the deck – note that the manuals for the individual VCRs don't carry this

information. Unfortunately the instructions are not very accurate. Alignment should be done in the stop mode. But after this you are told how to reinstall the cassette carriage in the eject mode (page 14). So if you follow the list of instructions you'll find that things won't work – not only will they not work but the timing will go haywire again. You have to turn the page and fit the carriage as in the stop mode (page 16) – the mode to which you aligned the rest of the mechanism – though you aren't told that. Even here there's an error: in Fig. A20, page 16, second tooth of rack gear A should read first tooth. If you align the mechanism as per the manual (stop mode) and then want to run it without the carriage in you should connect a  $2.2k\Omega$  resistor across pins 4 and 3 of the flexible connector (P1503) that plugs into the carriage to trick the syscon into thinking that the insert switch has been operated. This isn't explained in the manual but is fairly obvious if you look at the circuit.

#### **Audio/control Head Setting**

Another fairly common fault was the subject of a recent Test Case, though that one related to another machine. The symptom is a line of noise at the bottom of the picture with the machine's own recordings, the line disappearing in the last two or so seconds. The cause of the trouble is that the audio/control head is set too high, the control head erasing the bottom part of the video track. The customer will usually complain about low sound as well.

#### Play Arm Sticking

The play arm sticking is something we've not encountered very often ourselves, though I know of other dealers who have. It means that the tape will be left looped out when the cassette is ejected, so you get crunched tape. Other cases have resulted in no take-up in play. Replace the arm (part no. VXL1490) and oil its pivot.

#### **Noisy Machine**

A final selection of faults can be grouped under one heading, "machine noisy". The usual area where noise is generated is the capstan flywheel/rotor. At the bottom of this unit, where the timing belt engages, there's a plastic pulley that's very weak and tends to run eccentrically, causing a cyclic knocking. A similar rubbing noise can be the result of a worn capstan brake pad. Replacement of these two parts is very easy. Excessive back tension can cause a louder than normal "thrumm" from the drum. Bear in mind that as these machines have no screening can or PCB over the mechanism, while the lid is very thin, the drum tick is more noticeable. We've had the odd complaint about this, but only from someone who's being pretty fussy.

#### In Conclusion

When servicing one of these decks it's always wise to check the tension of the timing belt. If it appears to be too slack and the machine has been in use for any length of time, don't be tempted to adjust the position of the jockey pulley – fit a new belt. There's at all times a certain amount of slack. Experience will show what's correct.

The electrical faults we've had with these machines will be included in VCR Clinic. We hope that things will soon settle down on the mechanical front. We've not yet had a fault on the latest series.

## next month in

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#### FREE NEXT MONTH

Next month's issue carries a cover-mounted mini screwdriver set. The two small screwdrivers with hardened tips, one each straight and crosshead, are ideal for removing screws and carrying out adjustments where space is restricted.

## • SERVICING THE DECCA 120/130 SERIES CHASSIS

These popular chassis, the 120 for 90° deflection and the 130 for 110° deflection, were used in Decca, Tatung and other brand receivers. Nick Beer reports on the stock faults and some no-so-common faults encountered over the seven years since the sets first appeared in 1981.

#### ● VCR SERVO SYSTEMS

Many VCR troubles are caused by faults in the servos and much time can be wasted if you are uncertain how these work. Joe Cieszynski's article breaks servos down into their various loops, describing their purpose and operation and concluding with practical advice on rapid identificat on of the defective part of a servo. The aim is to help the busy service engineer seeking easy-to-follow guidance on servo operation and fault finding.

#### SMD UHF OSCILLATOR

Den's Mott requried an oscillator to extend the range of a video modulated signal generator by providing an output at the upper end of the u.h.f. band. This called for a stable oscillator as small as possible physically. The solution adopted is a strictine design using surface-mounted components on a small board measuring only 20 x 30mm.

#### OSCILLOSCOPE REVIEW

The appearance of compact disc players in the workshop has introduced the need to be able to disclay very slow waveforms. So when deciding to obtain a new scope Alfred Damp sought one able to display both very high and very low frenquencies. The Hameg HM205 with its storage system meets these requirements.

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## Haunted

#### Les Lawry-Johns

I seem to be haunted by Fidelity colour portables of late. If not of the ZX2000 series, then the later ZX3000 version. One that stopped me in my tracks for a while came in the other day. It was a CTV14S, fitted with the ZX3000 chassis. Its trouble was no green. Checks on the tube base panel revealed that the voltages in the green output stage were way out. It took some time to find that the  $100 k\Omega$  bias resistor R214 was open-circuit. Fitting a replacement restored the green and my flagging spirits. The equivalent resistors in the red and blue channels are R224 and R204 respectively. So the moral is, if one colour goes check the relevant bias resistor on the tube base panel before you consider changing the TDA3562A colour decoder chip with its 28 pins.

The Philips KT3 chassis is also getting to be all too predictable. Quite apart from the  $4.7\Omega$  surge limiting resistor on the power supply panel and the tripler, which sometimes kills the line output transistor, it's now common to find that the tube is faulty. Sometimes you find that for some while only one colour appears, the other two finally coming on after a struggle. In this event I usually short out one of the heater chokes on the tube base to liven up the heaters so that the lazy colours are not so long in coming through. This seems to satisfy most people. But not Mrs. Grouser.

"I want the proper picture when I switch on. I don't see

why you can't do it."

"I can for about eighty pounds Mrs. Grouser."

"What? I'm not paying that sort of money on this old set."

"Well you'll have to get a new one then."

"I will too. Snippers down the road have some nice ones. Quite cheap too."

"O.K. Mrs. Grouser. Just see if they're prepared to repair it if anything goes wrong."

So out she went, hoping to get something for nothing as they all do. Or nearly all.

#### Pete's 9600

Shortly afterwards this chap struggled in with an Ultra set fitted with the Thorn 9600 chassis. I vaguely recognised him but couldn't put a name to him. H.B. came into the shop from the kitchen. "Hullo Pete" she said. "Hullo love" said Pete.

I whipped the back off. The 2.5A mains fuse on the left-hand side had blown and a meter check showed that the chopper transistor on the right-hand side was short-circuit. I also noticed that the brown lead to plug 511 on the chopper power supply panel had been disconnected from the plug and soldered directly to the panel. "Some rough work has been done on this set" I commented.

Pete looked at me but didn't say anything.

"Pick it up later on?" I asked.

So he left, saying he'd be back before we closed.

When he'd gone H.B. asked me why I didn't recognise him as we'd sold him the set some years ago and had always looked after it. This meant that I'd done the rough work. Oh dear.

Still in a muddle, I prepared to replace the chopper transistor, stupidly unsoldering the base and emitter contacts, one of which broke off. When I removed the two screws that hold the transistor I was able to pull it out of its holder. So in fact I'd messed up the holder. This took some time to repair, but at last it was done and a new chopper transistor was fitted. I checked the circuit carefully but couldn't find anything else amiss. So I plugged the thing in and switched on. There was a flash from the right-hand side panel and the new transistor was dead. What had killed it? Closer examination showed that plug 511 had a poor neutral lead connection in addition to the previously attended to live lead connection. So the plug came out altogether and the neutral lead was soldered to the panel as the live one had been. If I'd done this years ago when the live lead gave trouble I wouldn't have had to fit another chopper transistor. Very rough work indeed, and all my own fault. Sorry, very sorry.

#### Another Blunder

A few years ago I sold a Philips CTX-E colour portable to a lady who phoned the other day to say that it had gone wrong. I nipped over and picked it up, not having time to do it on the spot. Back in the shop I plugged the set in and switched it on. Nothing happened. So I slid the chassis out and found that there was a full 300V at the chopper transistor's collector and nothing at its emitter. I searched everywhere and after an hour or so I gave up.

Later on I had another go and this time I looked at the front. The standby light was on. When I pressed the selector button I heard the set start up. All that mucking about over nothing. How stupid can I get? With an aerial connected the sound boomed out but there was nothing on the screen. A bell rang in the back of my mind. When I turned up the first anode control there was a white line across the screen. So I checked the voltages around the TDA3651 field output chip. The supply was present but there were no other voltages. I unsoldered the pins and removed it on its heatsink. It was marked TDA3653. Oh well. As I couldn't find one of these I ended up fitting a TDA3652, which worked just as well. I now had a very bright picture, so I had to turn the first anode control down again. Ten minutes later the set's owner turned up to collect it. She'd got her boss to run her up. What next?

#### The Next Disaster

The next disaster was a Thorn 9000 I'd sold some years ago. Its owner had mucked about with the fuses. Having got these right I checked the diode (W702) in series with the syclops transistor — on the transistor's surround — and found that it was short-circuit. So I replaced it and checked the syclops transistor itself and the  $47\Omega$  resistor connected between its base and emitter. This was well down in value, so I removed it — the test was made with one end disconnected — and fitted another. I then switched the set on. All I could hear was a soft tripping noise. I disconnected this, that and the other (the tripler etc.) but the tripping continued. So I put the set on one side and got on with some less mysterious jobs.

Having polished these off I returned to the 9000, this time on its side, and found that there was a short across one of the rectifiers (W706) supplied by the syclops transformer. It wasn't a dead short, so I made another check on the other side of the  $5\Omega$  surge limiting resistor R712 and this time found a dead short due to the reservoir capacitor C715 ( $22\mu F$ ). This was removed and the set was tried again. It started up nicely, so I switched off and fitted a replacement electrolytic. The set behaved itself and sat there as good as gold, waiting to be collected.

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# **Teletopics**

#### SATELLITE TV

Amstrad has produced and tested a prototype of the £199 satellite TV receiving equipment it plans to start selling early next year for reception of Rupert Murdoch's Sky Television services from the Astra satellite. In a progress report Alan Sugar commented that he was "delighted with the quality of the picture" – reception was from one of the current satellites – and that he was confident the equipment would be available in quantity next year.

Meanwhile Sky Television has signed an agreement to lease a fourth transponder on the Astra satellite. This will be used for the multilingual Eurosports channel which is to be a joint venture between News International and a consortium of EBU members including the BBC. In a recent statement Rupert Murdoch commented that he expects the Sky Television services, including the existing Sky Channel, to loose £100-£150m before breaking even. Running the Sky Television services will initially cost some £100m a year, which suggests that breakeven is envisaged quite soon after the start of the new services.

The Maxwell Communications-W.H. Smith satellite TV broadcasting consortium is still deciding whether to use the Astra satellite or one of the 16-channel Eutelsat birds that will be launched in 1990.

Ariane Flight 24 successfully launched Eutelsat I-F5 in orbit on July 21st. It's located at 13°E where Eutelsat I-F1 is at present positioned and will take over F1's TV and radio channels when the latter satellite is moved to 16°E.

Eutelsat has completed technical and economic studies for a DBS service it plans to start in the mid-1990s. The project is known as Europesat and would provide a multinational service using DBS frequencies. Further talks between Eutelsat signatories on implementing the project are planned for the autumn. The present proposal is to use two co-located satellites each with 14 channels. Each satellite would have a number of overlapping downlink beams to cater for regional and linguistic requirements. An e.i.r.p. of 55dBW would be available at the edge of each beam's coverage, corresponding to a TWT amplifier output of 100-150W. The orbital location proposed is 29°E, though 19°W would be possible provided Eutelsat member countries with allocations at this slot would be prepared to modify them for Europesat use.

Telstar's satellite stereo sound processor has been launched on the UK market at £139 plus post and packing and VAT. This stand-alone unit is capable of handling all the stereo systems at present in use. Seven presets enable stations to be preselected and the unit incorporates a noise reduction system. For further details contact Telstar Satellite TV Ltd., Unit 9 Longspring, Porterswood, St. Albans, Herts AL3 6EN (telephone 0727 34 596).

#### **BROADCASTING NEWS**

The government has dropped the idea of restricting BBC-2 and Ch. 4 to satellite transmission. At the same time the government has confirmed its intention to launch a fifth national terrestrial TV channel as soon as this is technically possible – the present aim is in early 1992. A further proposal is to change the way in which the ITV companies are taxed from the present levy on profits to a levy on turnover, starting in 1990. The ITV companies have warned that this suggestion would remove any incentive to

produce high-quality programmes.

The IBA has placed a contract for the supply of dual-channel sound distribution equipment with Re Instruments Ltd. of Crowthorne. The new system will be used for the ITV and Ch. 4 networks and will employ the sound-in-syncs technique. The equipment consists of NICAM encoders for coding two audio channels into the NICAM 728kbit format; DSIS encoders and decoders for distributing the 728kbit digital signal; transmitter input equipment to supply a QPSK (quadrature phase shift keyed) signal for modulating the transmitters with the 728kbit signal; and NICAM 728 decoders for studio use and for deriving a compatible mono signal. The IBA plans to introduce dual-channel/stereo sound via transmitters covering more than 70 per cent of the population by the end of 1990.

According to a report in the US publication *Radio-Electronics* NBC is conducting a test on the transmission of TV surround-sound along with the MTS stereo-sound signal. The surround-sound information can be matrixed into two channels. The aim of the tests is to check on the retrievability of surround-sound under a variety of conditions and the amount of degradation that occurs. Reception calls for a surround-sound decoder – apparently these are already being built into some higher priced sets – and one or two rear-facing speakers.

#### CABLE TV

Recent JICCAR figures show that the take up of subscriptions by those within reach of the new broadband cable systems increased from 11·4 per cent in April 1986 to 14·7 per cent in January 1988. This is still barely half of what most cable operators consider to be necessary to provide an economically viable service. According to the Cable Authority's annual report the average monthly subscription fell from £18·50 to £17·86 last year.

The third Cable and Satellite exhibition and conference will be held on March 16-19th 1989 at the National Hall, Olympia, London.

#### TRADE NEWS

The European Commission plans to impose duties of up to 30 per cent on VCRs from South Korea. This follows a substantial increase in VCR exports to Europe – during the first six months of the year the total was almost one million.

The French government has received European Commission approval to place a restriction on the import of colour TV receivers produced by Japanese companies in other European countries. Imports will be limited to 30,000 until the end of February 1989. The French government had complained about screwdriver operations that failed to achieve a 45 per cent value added in Europe, the EC criterion for classifying sets as European.

SEME Ltd., Unit 2E Saxby Road Industrial Estate, Melton Mowbray, Leicestershire LE13 1BS (0664 65392/66881) has just published a new 160-page trade catalogue listing over 11,500 items. The catalogue was produced inhouse on the company's new desk-top publishing system. The copy we've received is extremely well laid out and easy to use.

Ex-rental VCR and TV wholesaler Bi-Tech (UK) Ltd. has opened a 7,500 sq. ft. depot in Glasgow. The depot will be managed by Jack Swan, formerly with Supertel Glasgow, and is located off the M8 on the Hillington Industrial Estate – Unit 9, Colquhoun Avenue, Glasgow (telephone 041 883 2610). Further expansion of the Lon-

don depot will soon take place. Refurbishment of sets for the export market will be concentrated in Glasgow.

Despite a 51 per cent increase in sales in the year to April 30th Dixons group profits were virtually unchanged at £103·1 million. Sales reached £1·68 billion. Profits declined during the second half by slightly more than the increase achieved in the first half.

#### **RED FACES!**

A Reuter report states that the local Communist Party chief and the head of a TV station in NE China have been dismissed after broadcasting by mistake twelve minutes of a pornographic film that was being viewed by employees . . .

#### **VIDEO NEWS**

Ferguson has introduced its first digital VCR, Model FV26D, at the competitive suggested retail price of around £479.99. Features include picture-in-picture, multipicture-in-picture, digital freeze frame, digital slow, plus special effects including solarisation, mosaic and strobe.

Hi-fi sound is to be added to some VHS-C machines on sale in the USA later this year. The small head drum will

have four video and four audio heads. A flying erase head will be used.

George Cole writes: JVC has announced that it is to market professional Super-VHS and MII equipment in the UK. The Pro S-VHS specification will be identical to the domestic version, with an f.m. deviation of 5·4-7MHz giving a horizontal resolution of over 400 lines. There will be three Pro S-VHS recorders, Model BR-S610E, the portable BR-S410E and the full-function editing Model BR-S810E. A series of cameras and high-resolution monitors suitable for S-VHS will also be introduced. Pro S-VHS equipment is aimed at the industrial, business and educational markets.

For broadcasting purposes JVC is backing the MII system developed by Matsushita and the Japanese broadcasting corporation NHK. The format uses half-inch metal particle tape and separate tracks for the luminance and chroma signals. Three JVC MII VCRs have been announced, the KR-M800E and KR-M860E editing machines and the KR-M260E portable.

No prices or release dates have been announced for this equipment.

JVC has set up three new companies in the UK, West Germany and Italy to serve the professional market.

# Long-distance Television

#### Roger Bunney

June was a very active and unusual month for Sporadic E reception. Activity on several days was intense, with quite remarkable results. Improved tropospheric conditions occurred at mid-month, and two minor auroral events were noted in Scotland on June 8th and 15th. The general SpE log follows. It's rather packed but reception of particular interest will be discussed later.

5/6/88 RAI (Italy) ch. IA, B; Telemarket (Italian free station) ch. E2; RTS (Albania) ch. IC; JRT (Yugoslavia) E3, 4; MTV (Hungary) R1, 2; TVP (Poland) R1, 2, 3; TVR (Rumania) R2, 3; ORF (Austria) E2a, 4; CST (Czechoslovakia) R1, 2; ARD (West Germany) E2, 4; DR (Denmark) E3, 4; TSS (USSR) R1, 2, 3, 4, 5; NRK (Norway) E2, 3, 4; SVT (Sweden) E2, 3, 4; YLE (Finland) E3, 4; RUV (Iceland) E2, 3, 4; +PTT (Switzerland) E2; TDF (Canal Plus, France) L2, 3, 4; TVE (Spain) E2, 3, 4; RTP (Portugal) E2, 3.

6/6/88 TSS R1, 2, 3; ORF E2a, 4; MTV R1, 2; CST R1, 2, 4; TVP R1, 2; TDF L2, 3, 4; +PTT E2; ARD E2, 3, 4; SVT E2, 3, 4; NRK E2, 3; DR E3; YLE E3, 4; TVE E2, 3, 4; TVE-2 E2; RTP E2, 3; RAI IA, B, TVA (Italian free station) IA; RUV E3, 4.

7/6/88 TSS R1, 2, 3; SVT E2, 3, 4; NRK E4; YLE E3, 4; RUV E3; TVP R1, 2; CST R1; ARD E2; TVE E2, 3, 4; RTP E2, 3; ORF E2a; TDF L4; RTE (Eire) IB.

8/6/88 TVE E2, 3, 4; TVE-2 E2; RAI IA, B; RTP E2, 3; JRT E3, 4; EPT (Greece) E3; MTV R1, 2; Syria E3; ARD E4; SVT E2, 3; NRK E2; CST R1, 2; TSS R1, 2; +PTT E2, 4; RUV E4.

9/6/88 NRK E2, 3, 4; TVE E2, 3, 4; TVE-2 E2; RTP E3, 4.

10/6/88 TVE E3; NRK E2, 3; CST R2.

12/6/88 TVE E2, 3, 4; RTP E2, 3; RAI IA.

14/6/88 TSS R1; TVE E3; RTP E3.

15/6/88 TVE E2, 3, 4; RTP E2.

16/6/88 TVE E2, 3, 4; RTP E2, 3.

17/6/88 TVE E2, 3, 4; TVE-2 E2; RTP E3; +PTT E2, 3; TDF L2, 4; RAI IA, B; TSS R1, 2.

18/6/88 RAI IA; TSS R1, 2; MTV R1, 2; DR E3; SVT E2, 3, 4.

19/6/88 TVE E2, 3, 4; RTP E2, 3; RAI IA; Arabic football match on ch. E4, origin not known.

20/6/88 TVE E2, 3.

21/6/88 YLE E3; SVT E2, 3, 4; MTV R1, 2; TSS R1; ARD E2; TVE E2; RTP E2; EPT E3; RAI IA, B; TVA IA; ORF E2a, 4.

22/6/88 RAI IA, B; JRT E3, 4; TVE E3; CST R2; NRK E2; SVT E3; TSS R1,2.

23/6/88 TVE E2, 3; RAI IA; DR E3; RUV E3, 4; TVP R1; CST R1, 2; TSS R1; MTV R2.

24/6/88 TSS R1, 2; YLE E3, 4; NRK E2, 3, 4; SVT E2, 4; TVP R1, 2; CST R1; RUV E4;TDF L3; RTP E2, 3.

25/6/88 RA1 IA; JRT E3; TVE E2; RTP E3; MTV R1; ARD E2; CST R2; TSS R1, 2, 3; NRK E2, 3, 4; SVT E2, 3; TVP R1, 2; RUV E4.

26/6/88 TSS R1, 2; TVP R1, 2; YLE E3; ORF E2a; RAI IA, B; TDF L3, 4; TVE E2; RUV E4.

27/6/88 NRK E2, 3, 4; SVT E2, 3, 4; YLE E4; TSS R1, 2, 3; MTV R1, 2; CST R1, 2; ARD E2; +PTT E3; TVP R1; RAI IA, B; TDF L4; TVE E2, 3, 4.

28/6/88 TVE E2, 3, 4; RTP E3; RAI IA, B; TDF L2, 3, 4;

28/6/88 TVE E2, 3, 4; RTP E3; RAI IA, B; TDF L2, 3, 4; ORF E2a, 4; ARD E2; CST R1, 2; JRT E3, 4; MTV R1, 2; TSS R1, 2, 3; TVP R2; SVT E2; NRK E2; RTB-F (Belgium) E3.

29/6/88 TVE E2, 3, 4; RTP E3; RAI IA, B; JRT E3; TDF L4; TSS R1; TVP R1, 2, 5; NRK E2, 3.

30/6/88 TVE E2, 3, 4; RTP E2, 3; SVT E3; NRK E3.

2/7/88 TVE E2, 3, 4; RTP E3.

3/7/88 MTV R1; TVE E2, 3; JRT E3.

Blanketing SpE conditions were present on the 25th. June 1988 will certainly go into the record books!

On the 5th Simon Hamer in Powys logged Band III signals (chs. E6 and 7) from RUV (Iceland) at 1220 BST. RUV signals on chs. E2, 3 and 4 were also present. This represents quite remarkable conditions – the PM5544 test pattern clearly identified the source. Band III RUV is a UK first! At about the same time ch. A4 signals were received from N. America, identified by the reduced height and rolling frame

The following day produced increased excitment for many enthusiasts including myself. At about 2300 BST, as

RUV chs. E3 and 4 were fading towards the end of a European SpE opening, System M (N. American) signals started to appear (first identified by rolling frame etc.). For the next two hours or more intense US/Canadian signals were present on chs. A2, 3, 4 and 5. Here in Romsey, Hants ch. A2 was unusable due to the many. signals present. It was in effect jammed, but by tuning to the offset sound carriers at least three individual signals could be heard, all on programme. The main carrier was just distorted buzz and hum! Chs. A3 and 4 produced good quality signals at times. At 2400 ch. A3 produced a "News 3" caption while "LA Law" appeared on ch. A4. Here at Romsey ch. A5 just made it with a locked though very weak picture. Garry Smith in Derby confirmed reception of the NTV network with advertisements etc., the signal being from Grand Falls, Newfoundland (CJCN-TV) on ch. A4. Nearby Keith Hamer heard the CBS identification on ch. A3 - it could have been WCAX Vermont. I heard mention of North Carolina and Washington - probably news. Cyril Willis at King's Lynn received a clear identification from WEMY, Greensboro, N. Carolina, also a CBS identification. It was remarkable that despite such a long opening from an English-speaking area so little could be identified. The signal quality was at times excellent, with mainly US type programming and commercials. Chs. A3 and 4 fizzled out by 0150 BST but ch. A2 remained in action - reports suggest that it finally faded out at around 0500 on the 7th!

The following day brought fresh excitment when, at lunchtime, intense SpE conditions produced N. African/Arabic signals in Band III – from Algeria, Tunisia, Libya and Morocco! Again a UK first. DXers who have reported this reception include Keith Hamer, Garry Smith, Kevin Jackson, Dave Shirley and Philip Odell. The signals were strong, with co-channel interference at times. Algeria ch. E5, Tunisia ch. E6, Libya ch. E6 and possibly Morocco ch. M6 were logged. Philip Odell at Northolt, Middx. received very strong ch. E5 colour signals from Algeria using a hand-held indoor 8-element Jaybeam Band III aerial.

By way of an anticlimax June 8th produced Syria ch. E3 for Simon Hamer, with the usual PM5544 "ORTAS DAMAS" identification.

June 25th proved eventful towards midnight, with unidentified System M signals on chs. A2, 3 and 4. According to the BDXC a Dutch amateur logged 50MHz signals from Georgia, Texas, Puerto Rico and Greenland. A new Italian free station with the identification "E2 – Canale 31 5 Tele Ercalano" was seen.

Mid-June was rather quiet on the SpE front. Instead we had improved tropospheric conditions that in their way produced more excitment. The period of enhanced tropo-

spheric propagation over June 9-19th coincided with some remarkably warm and sunny weather in the UK, associated with a high-pressure system. During this period the usual signals were received, i.e. from West and East Germany, France, and the Benelux countries in Band III and at u.h.f. Band III signals from Denmark were also present over much of the UK. Swedish u.h.f. signals were apparent and on the 14th Ryn Muntjewerff in Holland logged 23 SVT-2 u.h.f. outlets and nine SVT-1 v.h.f./ u.h.f. outlets! RTL was seen using its new identification "RTL PLUS KOLN" on ch. E7, and even SSVC ch. E45 was noted. The 17th onwards tended to favour propagation from the French regions. A2, FR3, Canal Plus, La Cinq and M6 reception was widespread.

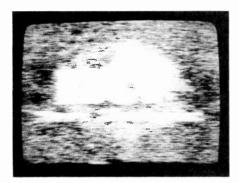
This intense tropospheric spell covered the whole UK, producing both the usual and some unusual signals – even AFRTS ch. A80 made it to North Wales! Iain Menzies reports perhaps the most unusual reception – from the Ekofisk North Sea oilfield. On two days Iain logged "EKOFISK TV CH. I" and "EKOFISK CH. 2" on chs. E50 and E49 respectively. The ch. 1 service consists of mainly NRK (Norway) material while ch. 2 carries various offerings from Filmnet, Royal Club, Night Club and anything else that's selected from the available satellite services. The oilfield is run by Phillips Petroleum and is some 270 miles from Newcastle. Up to 1,000 men work there. This reception by Iain occurred on the 12th and 26th. Iain is seeking technical information on the transmitters.

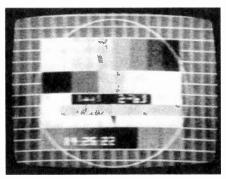
On the 5th Simon Hamer logged AFRTS Spain, BFBS and GBC Gibraltar on his f.m. radio. The "Brud Med Studio" caption seen on the 7th originates from NRK. On the 14th SVT1/2 were noted with tests of scrambled TV. A report from Holland mentions reception of new AFRTS outlets on chs. E32/5/7 and RTL on chs. 35/6/45.

Certainly a throbbing month! My thanks to David Oliver (Birmingham), Peter Schubert (Rainham), Dave Shirley (Hastings), Tim Anderson (St. Leonards), Brian Renforth (Newcastle), Garry Smith (Derby), Keith Hamer (Derby), Keith Watkins (Redruth), Roger Fussell (Torpoint), Keith Chaplin (Leicester), Bill Cotterill (Tipton), Simon Hamer (Powys), Cyril Willis (King's Lynn), Dr. Duncan (Fife), Mark Baldwin (Rushden), Iain Menzies (Aberdeen) and Ryn Muntjewerff (Holland) for sending in details of their reception.

#### News Items

West Germany: RTL+/Tele 5 Hamburg ch. E46 is now running at full power (15kW e.r.p.) – RTL provides a regional programme (Schlag 6) from 1800-1845 (local







Photos of reception by Garry Smith, Derby, during the SpE opening on July 7th. Left, the NTV logo from Grand Falls, Newfoundland on ch. A4 – CJCN-TV relaying CJON-TV ch. A6. Centre, test pattern from the 20kW Libyan transmitter at Tripoli, ch. E6. Right, presumed Algeria ch. E7, possibly from the Constantine transmitter.

time) weekdays. The Hamburg ch. E48 SAT-1 transmitter is now running at 2kW e.r.p. Helgoland ch. E34 is on test with 30W and Aachen ch. E26 has a local service programme on test with directional transmission towards 220° – the caption shows Aachen cathedral and carries the identification "Lokaler TV Sender Aachen K26, Storungsannahme tel 1174". Dusseldorf/Burscheid ch. E36 local TV is on air with 20kW and a similar caption though relating to Dusseldorf. A new UK Services SSVC transmitter is in operation at Goch, on ch. E23.

**Sweden:** A high power, thought to be 1,000kW e.r.p., transmitter covering central Sweden is now providing the TV2 service from Vasteraas, on ch. E44.

**USSR:** A limited number of commercials provided by the Italian TV magnate Silvio Berlusconi are to be shown over a three-year period on all three networks. The thirty second to six minute slots will not break into the programmes themselves.

Yugoslavia: A local third programme service has started in Zagreb, for two-three hours daily.

China: Though not TV, it's of interest that the first f.m./v.h.f. radio service in English has started on 107-7MHz in the Shanghai region.

#### Satellite TV

Latinvision, a satellite news exchange service for the Caribbean/Central American region, is expected to be in operation shortly.

The first transmissions from the Astra satellite will use PAL with a main 6.5MHz audio carrier and four additional audio carriers at 7.02, 7.2, 7.38 and 7.56MHz, the latter being for stereo (Wegener/Panda 1 system) or multilanguage sound. About ten channels, six English and four German, will probably use PAL with the others using MAC.

It seems that Intelsat VA F11 at 27.5°W has a fault that prevents the West spot beam being pointed any further north than Biscay. Hence a reduction in the downlink signal level to the UK – the beam should be centred on Birmingham.

#### **Publications**

Scanners 2, the international v.h.f./u.h.f. communications guide for enthusiasts operating scanning equipment, has been published by Argus books at £9.95. Although intended for enthusiasts operating scanning equipment the book contains some very interesting preamplifier circuits for aerial/indoor use, including several v.h.f. circuits covering 50-250MHz. These use BF199 or BF981 transistors



and have various gain figures between 12dB and 20dB. The book is written by Peter Rouse and is recommended, particularly if you are into general v.h.f./u.h.f. monitoring.

Aerial Techniques report that the second edition of the test card book *TV-Bild Katalog* is now available from them at £6.95 including postage within the UK. It was published in April and is essential reading for those seeking a definitive guide to test card/pattern/logo use within the European broadcasting area (excluding North Africa and the Middle East).

#### From our Correspondents . . .

Congratulations to George Gaskin whose 33 years with the Gibraltar fire service was marked by the award of a



Ekofisk TV Ch. 1 received by lain Menzies in Aberdeen on ch. 50, The Ekofisk North Sea oilfield is operated by Phillips Petroleum.

## **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 BEM in the Queen's Birthday Honours List.

Robert Copeman reports from Perth, Western Australia, that a new commercial TV station "NEW 10 PERTH" came into operation in May. It's the first new station for some years in that region and uses the standard FUBK test pattern.

A West Country DXer comments that in rocky sea locations you could well monitor the RNLI 49MHz helmet radios used for cliff rescues. Despite the small helical helmet aerials these US sourced devices have been received at distances of up to five miles!

Jean-Louis Dubler is now associated with the Urbatel cable system in Lausanne, Switzerland. This network has a 40 channel capability and at present carries three Swiss, three French, two German and one Austrian service plus

Telecine (pay-TV), RAI Uno, TV5 and Sky. He reports that the La Dole transmitter now has a second audio carrier for stereo/bilingual use and that a fourth national network is planned, mainly for sports and EBU programme exchanges.

#### Help Wanted

R. Hastie of 41 Elm Grove Drive, Dawlish, Devon EX7 0EY is seeking valve type Denco coils for the 30-50MHz range (range 6 or 7 if I remember correctly). He hopes to be able to use them in a low-band v.h.f. converter during the forthcoming solar cycle. It seems that Denco has closed down and the coils are no longer available.

## Letters

#### **REMOTE HANDSET REPAIR**

A meek and gentle old lady brought her Sony remote control handset into our workshop recently. We were given the usual reminder about the desperate financial state of the country's pensioners, followed by "if it costs more than a few pounds I'll have to do without". Normally we have to harden our hearts, but on this occasion she got through our armour.

Her complaint was that some of the buttons wouldn't work. Sure enough we found that the conductive coating on the business end of the rubber push buttons concerned had worn away. A few minutes' deliberation was followed by a flash of inspiration from one of our young men – a very carefully placed smear of adhesive covered with the scrapings from a salvaged carbon brush. A last resort maybe, but it worked. A feather in our young man's cap, our good deed for the day and a bit of good P.R. Exit one happy senior citizen.

Tom Robbins, Service Manager, TV and Video Repairs, Newcastle upon Tyne.

#### **BRYAN TUCKFIELD DEFENDED**

Bryan Tuckfield received rather a battering in the Letters pages last month. I feel I must come to his defence. To my mind the arrogant, greedy and self-centred views expressed my some of your correspondents indicate that they shouldn't be in business. Their attitudes are all too common however and do very little for the reputation of our trade.

We're all in this business to earn a living. I see nothing wrong in supplying spares to the public, provided they are prepared to pay for them (after adding our mark-up of course). If they don't like the price, that's tough! They can try elsewhere. It seems that your contributors haven't the initiative to demand payment before ordering parts for Joe Public, nor to apply legitimate disclaimers such as "goods not exchanged or refunds given unless faulty". If the customer gives you the wrong part number or description that's his problem. We can't be held responsible for their ignorance in such matters. I've found that some of the disadvantages mentioned are actually advantages, in that the customer may come back with his equipment for repair.

I wholly agree with Bryan Tuckfield when he says that many dealers are interested in only meaty jobs with nice big profits. This applies to other trades as well. The term for this attitude is greed. Talking of which Mastercare supply the reel idler for the Saisho VR605 at £9 plus VAT plus post and packing while Willow Vale supply the same item under their Sharp order code 27361C at £3 plus VAT (post and packing is free on orders over £30).

Not all of us share the bigoted opinions expressed last month. We're genuinely interested in offering our services to Joe Public — without losing money of course. Remember that the public has a right to have its goods repaired. What is one dealer's loss will often be a worthy repairer's gain. The most important person in any business is the customer, who provides our bread and butter. It doesn't do to overlook this fact and it's nonsensical to refuse the old £.s.d.

I agree that our trade is soul destroying, as many people have pointed out in these pages. But I think that this is partly due to those who share the "Bodge and Bodge Co." school of thought and advertise free this, free that and free everything else. How can we earn a decent crust when this mentality is so prevalent? Who can blame Joe Public for refusing an estimate of £80.90 to replace video heads when one of the less reputable local emporiums advertises in our local rag that it can do the job for £40? Joe Public gets what he deserves in this case, and I've no sympathy for him. So remember fellow sufferers, chin up, keep smiling and never let them get you down (during business hours anyway!).

Martin's TV Services, Dewsbury, West Yorkshire.

#### **DECCA 70/90 SERIES CHASSIS**

In the April TV Fault Finding feature Nick Beer suggested using a BU426A to replace the BUW81A chopper resistor in the Decca 70/90 series chassis. We've tried this but find that the BU426A always fails. Its rating is less and it's not a Darlington device.

We find that even when a new BUW81A is fitted in one of these sets and the correct drive waveform is present the device sometimes blows (D608 and D610 having been replaced as well). Has anyone any ideas on this? *K. Booth*,

Audiovision, Coventry.

**Editorial note:** This chassis employs a rather unusual complementary-symmetry chopper driver stage. Possibly slight leakage in one of the devices here could affect the operation of the circuit. Anyone wish to comment?

#### **AVAILABILITY OF SPARES**

I would like to see more independent rather than trade views expressed in your letters pages. On the subject of selling parts to the public it would be nice to see them available in blister packs at supermarket style outlets. A lot of us have the knowledge and skill to do our own repairs. The parts would have the make, model number and location shown and there would be a shelf full of manuals and circuits — just as they do for cars! There are no plans to stop DIY car servicing even though the result can be a misadjusted brake.

Difficulty in obtaining parts and manuals makes it hard for young people to take an interest in the subject. In the past many of us got started by buying ex-government bits and pieces with circuits. There are endless complaints about youngsters being simply out for kicks, yet they are told they can't do this and can't do that. Finally, on the subject of safety, how many of us have opened the back of a TV set to find a sticky mess on the flying leads and a dried up piece of tape on the circuit board?! Not to mention cookers with controls behind a steaming pan and the main switch even higher on the wall over that same pan. What Safety?!

Ex-valve set dabbler.

Editorial comment: But cars have to pass an MOT test, which at least cuts down on some of the dangers. We can't see that the public would take kindly to paying for its TV sets etc. to be examined for safety every so often, or how this could be enforced. Much has been done in recent year to improve safety through BEAB testing.

#### **USE OF BULBS - AND A CORRECTION**

A point in connection with the use of a bulb (Servicing with a Variac and Bulbs, July) as a dummy load in place of the line output stage is that a bulb can sometimes cause confusion by providing an excessive load on the power supply being checked. On several occasions when I was repairing TV sets rather than VCRs I loaded a power supply with a bulb only to find that it tripped due to the excessive load – trying the power supply out in a known good set proved its innocence. This was particularly noted with Sony and Hitachi sets, more so the earlier ones. To overcome the problem I made up a dummy load of  $250\Omega$ at 100W, using four RS 1kΩ 25W resistors in parallel mounted in a case with sockets to connect a meter to monitor the rail. The d.c. resistance figures Eugene gives lead me to wonder whether the sets in question had some strange anomalies with switch-on surges, or that maybe

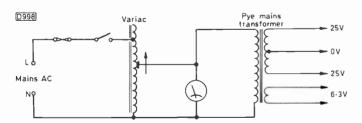


Fig. 1: Safe method of obtaining up to 25-0-25V from a variac – by using it in conjunction with a mains transformer from the Pye hybrid CTV chassis.

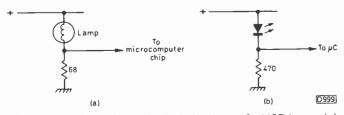


Fig. 2: Use of an LED or IR diode in place of a VCR lamp. (a) Original circuit. (b) Modified circuit.

|   | <b>VIDEO HEADS AT UNBEATABLE PRIC</b>  | ES                |
|---|--|-------------------|
|   | FERGUSON/JVC/AKAI UNIVERSAL 3HSSV £16.5  | 0                 |
|   | FERGUSON 3V32 JVC HR7655.<br>FERGUSON 3V4344/45/46/47/50<br>FERGUSON 3V48 JVC HRD565                     | £35.99            |
| l | SONY REPLACEMENT HEADS<br>SONY UNIVERSAL 1 PIN C5/C6/C7<br>SONY SLF-1/C20/C30/F30/C40/SLT20ME SLT30ME    | £18.50<br>£24.50  |
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the manufacture of some types of bulb is suspect? I've always been a great user of variacs and bulbs in TV servicing and have more recently adopted this approach in dealing with the ever more complex power supplies used in VCRs. I know that some engineers don't do this but I've never had a straight answer as to why not.

There was an editorial error in one of my notes in TV Fault Finding in the July issue. The heading Panasonic Alpha-2 chassis should have read Alpha-1 chassis. It should also be noted that the first batch of modification kits were not suitable for use with Model TX-C78.

Nick Beer,

Bideford, Devon.

#### SAFE VARIAC USE

In his article on servicing with a variac (July) Eugene Trundle mentioned the use of a variac to replace a low-voltage secondary winding. A safer method, which also provides a centre tap, is to use the mains transformer from an old Pye hybrid colour chassis, supplying this from the variac as shown in Fig. 1. The original 25-0-25V output can then be varied to suit the equipment being supplied. *Peter Westbury*, *G8PDI*,

#### VCR BULB MODIFICATION

In connection with the recent letter regarding the high cost and failure rate of the lamps used in older VCRs I'd like to suggest the modification shown in Fig. 2. Replace the lamp with a LED or an infra-red emitting diode and change the series resistor to  $470\Omega$ ,  $\frac{1}{2}W$ .

A. R. Lloyd,

Plymouth, Devon.

Bournemouth, Dorset.

## VCR Clinic

#### Tatung VRH8400/JVC HRD120/Ferguson 3V35

The problem with this one was that it would go to stop for a few seconds after embarking on any mode. It was quickly established that the cause lay with the reel-rotation sensor system – the machine would happily remain in the pause mode. The infra-red sensors used consist of a sender and a receiver, either of which can cause trouble. In this case the fault lay with the supply spool's optocoupler, whose receiver (phototransistor) was leaky.

E.T.

#### **JVC HRD180**

We've had several cases of failure of the large STK5481 power supply chip used in this and allied models. The switched 5V output fails while circuit protector CP3 remains intact. You'll find that the symptoms are no on-LED indication, no drum rotation when playback or record is selected, and shutdown after a few seconds in the fast forward or rewind modes. None of the replacement chips has failed to date, so maybe it was batch problems – or perhaps the design of the chip has improved.

E.T.

#### Panasonic NV180

These portable VCRs have had a longer production run than most, having been kept going to support Panasonic's excellent range of semi-professional cameras. This one came to us with the complaint that it wouldn't play. On investigation the capstan appeared to be seized solid. When the machine had been dismantled we found that the rotor of the direct-drive capstan motor was rubbing against the stator coils. Normally such contact is prevented by means of a springy clip in the bearing assembly – it clips into a waist in the motor shaft. What had happened was that the upper bearing (deck topside) had become dislodged, maybe due to an impact. Pushing this bearing home and relocating its protective cap did the trick.

#### JVC GRC1/Ferguson 3V41

"Going on holiday tomorrow, camcorder no go" said the job ticket. Clearly a priority job... The machine wouldn't switch on, and after dismantling it we found that circuit protector CP5 had gone open-circuit. After replacing it we discovered what had happened. The cassette front flap opener had stuck in the "high" position, preventing the flap from opening. The loading motor, now thwarted in its attempts to load the tape, stalled. As a result a high current passed through CP5 until it opened. Worth remembering, especially if it should happen on an intermittent basis.

#### Hitachi VT11 and Clones

Don't be fooled by what we thought was an intermittent fault in this and similar machines. If you touch or move C602, which is the control-track head coupler on the regulator/servo panel, the tape speed slows and the sound becomes slurred. The effect is due to 50Hz hum pick-up from your finger. This is at twice the normal control pulse rate, so the machine thinks it's got an LP tape and attempts to restore normality by switching to the LP

#### Reports from Eugene Trundle, Dave Dulson, Jim Rainey, J. Olijnyk, Joe Cieszynski, Philip Blundell, Eng. Tech. and Nick Beer

mode. Perhaps this is obvious, especially with hindsight! In TV sets we used to prod and poke with a pen or a screwdriver handle, for fear of shock. No such nonsense could then arise.

E.T.

#### Hitachi VT410

This machine would load a tape then shut down. If the operate switch was pressed the machine would come on for another thirty seconds and then switch off. No deck functions worked. The power supply was working correctly and checks around the syscon microcomputer chip failed to reveal anything amiss. A clue was given by pins 8 and 9 of IC901, the outputs that control the loading motor: pin 9 was high at 4.7V while pin 8 was at 0V. The system control was trying to unload but the loading motor wasn't doing anything. A quick check on the loading motor drive chip IC902 (BA6209U2) showed that its inputs were correct but there was no output. Replacing the i.c. cured the fault.

#### Hitachi VT11

This machine would select one mode no matter which button was pressed. We found that D453 was leaky. J.R.

#### Hinari VHL3/VHX3

If you require a play idler for this machine you can use a Sharp type, part number NIDL-0006GEZZ. They are the same unit.

J.R.

#### Panasonic NV333

The fault was no playback picture. When I read the job card I thought it would be a simple head cleaning job, but I was wrong. No picture in fact meant a blank raster. After a lot of mucking about I found that D3012 (MA165) was short-circuit, damping the output from IC3003. J.O.

#### **JVC GRC7 Camcorder**

This machine would go off after three seconds. When I'd found the right page in the service manual and got the machine apart (please God, what are the chances of getting the thing back together?!) I soon found that R218 had come off print. Resoldering this put matters right. I did get it back together (just!), after several hours and several cups of coffee (black).

#### Saisho VR705

The reported faults were no picture and poor rewind. Many thanks for a simple job this time. Replacement heads and a new reel idler were all that were required.

J.O.

#### Grundig 2 × 4 Super

This machine wouldn't accept a cassette or carry out any function. We found that the relay didn't stay in when power-on was selected. The cause of the trouble was that C446 (470 $\mu$ F) had lost capacitance.

Another of these machines stopped playing after a few seconds as the head drum was rotating very slowly. A quick check on the supply lines revealed a 5V ripple on the 15VR rail. C451 was low in value. It should be replaced with a Grundig part – if a standard capacitor is used there is still some ripple and the servos take a long time to lock in.

P.B.

#### Philips VR6843-05

The problem with this machine was intermittent failure to select record. When this happened the cassette would eject. The cause of the problem was an intermittent short across the record inhibit switch. It was on the end sensor PCB, where the leads to pins 26 and 27 had been left too long.

P.B.

#### Hitachi VT8300

The complaint was that at switch on smoke poured from the machine and it went dead. Initial inspection revealed that the drum motor drive amplifier was the source of the smoke - both i.c.s were cracked open. Having a scrap machine in the workshop was an immense help. Within no time a replacement panel was fitted, but it was difficult to know whether the drum motor had been damaged. So, with the drive panel disconnected, I checked that the power supply was correct and proceeded to switch on fully. There was no smoke, but neither was there any drum rotation. The 9V and 15V rails were reaching the drive panel via connector CN502, but there was no Hall bias at pin 4. Now having no Hall bias is the same as having a brush-type motor with no brushes! The 2.4V bias comes from Q513 on the main servo panel, and resistance checks showed that this was open-circuit base-to-emitter. Fitting a new transistor restored full operation - thankfully the drum motor was o.k.

#### Hitachi VT33

This one belonged to a girl who lived in Zambia. She brought it back on a visit after a local service engineer had said he couldn't repair it due to lack of information and spares. The player was dead, though the clock functioned. Checks around the power supply chip IC151 revealed that the always 12V line was present but the switched 9·5, 12 and 16V outputs were missing. The power-on signal from the microcomputer should bring in the 16V regulator via pin 13 of the chip, which in turn switches on the 9·5 and 12V lines via R153 and R151/2. Replacing the 16V output with an external supply restored all the power rails. Normal operation was obtained when IC151 had been replaced, but before returning the machine to Zambia I decided that a new idler and set of belts would be prudent. J.C.

#### Ferguson 3V35/JVC HRD120

This machine was brought in with the complaints "grainy picture and intermittent failure to lace up". As I'd just fitted a sensor lamp in a chargeable 3V30 I thought I'd stay with the easy ones. Things started well enough. The loading fault was due to a stretched belt. A new one was carefully fitted without removing the whole motor assembly, but there was no take-up – the belt was so slack that if it hadn't been for the flywheel bracket it would have dropped off its pulleys! This attended to I put the machine in play and noticed that the exit guide was very sluggish and didn't reach the end of its travel. The baseplate on the

loading ring had become disengaged: its pip was worn with the result that it didn't remain in its slot, consequently the spring had become undone.

Rather than struggling with what was going to be a long job anyway I decided to remove the entire mechanism from the machine, a matter of unplugging and then removing eight screws including those for the carriage. To gain access to the loading rings I then had to take out six or so screws to release the top plate with the head drum and motor, the guide poles and audio/control head etc. A further three screws held the rings in place. I tried to refit everything but the exit guide baseplate was too worn. A new assembly had to be ordered and fitted after which reassembly went remarkably well.

#### Panasonic NV7200

This loan machine produced a recorded picture with high chrominance and low luminance – playback was fine. On removing the bottom cover I noticed a very small amount of spillage on the board just below the white clip control. This was cleaned off with 1-1-1 trichloroethane (RS Solvent Cleaner). The waveforms were wrong not far into the circuit, but were not drastically out. So I decided to see if the circuit could be set up as per the manual. After carrying out the dark and white clip and the luminance and chroma record current adjustments the machine performed well. One thing to note is on the white/dark clip adjustment: you should adjust the lower peak of the waveform for 175 per cent not 150 per cent as on the oscillogram.

#### Sony CCD-V30

This was a brand new stock machine - the autofocus version of the Handycam. When switched on in the camera mode the picture, in both the electronic viewfinder and via the external monitor, would be o.k. for twenty-thirty seconds after which vertical bars at regular intervals appeared across the screen, very faint at first then becoming darker, though you could see the picture through them. After a further thirty-six seconds the picture and bars disappeared, giving way to a white raster, with a pink tinge, that appeared to have no line sync (bars across it). We'd not yet received a manual, but the shop wanted the camcorder sorted out quickly. So it was dismantled, which is no mean feat. Inside the case we found a very basic block diagram, showing the PCB locations. I located the camera d.c.-d.c. converter, which seemed to be the most likely cause of the trouble, and sure enough application of heat and freezer proved that it was thermally sensitive.

Replacing the converter is a long job, as is reassembly. The camera section is enclosed in a can, and there are all sorts of small supports. A modicum of force is required because as well as all the screws that hold it together there are some snap-fit clips. Luckily we found that when the converter had been removed the part number was written on it (1-464-727-11), saving several days' delay.

N.B.

#### B and O VHS63

The customer said that this machine chewed tapes. Why they continued to feed tapes in after one had been chewed is not clear, but you know customers! What had happened was that the customer had been over enthusiastic with the furniture polish. It had covered the drum and eaten into the metal – the cassette had been inserted while the drum was still wet. A new drum had to be fitted.

N.B.

## Servicing the Sony Model KV2752

**David Botto** 

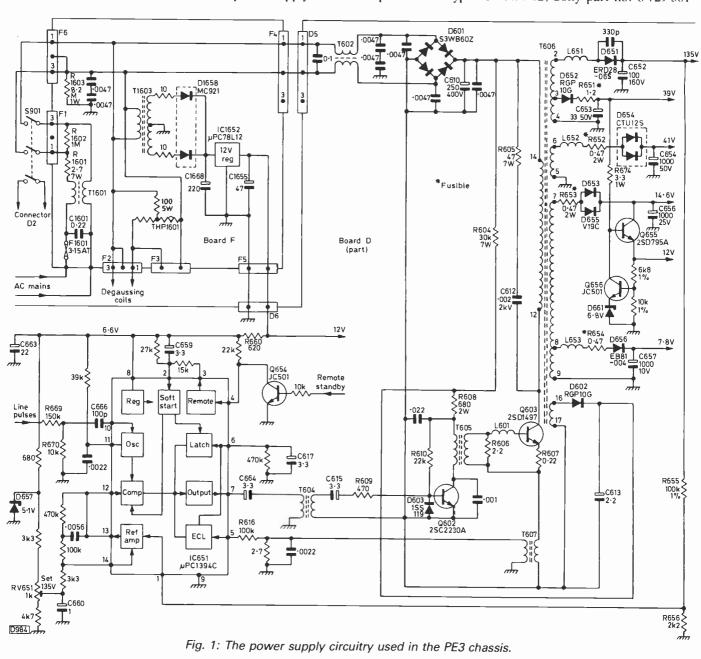
The Sony Model KV2752 is a 27in. receiver that provides a first-rate picture. It has two loudspeakers which together produce over 10W of high-quality audio output. The teletext version is Model KV2762 – a teletext panel can however be added to the KV2752. Full remote control is by means of the "Remote Commander" infra-red unit. The same basic chassis are used in the 22in. Models KV2252 and KV2256, so much of the information in this article applies to these sets as well. The circuitry is arranged on a number of printed boards that are identified by means of letters: we'll use the same board identification letters that Sony use.

Earlier versions are fitted with the PE3 chassis, latter versions being fitted with the RX chassis. It's quite easy to see which chassis you've got on the bench. In the RX chassis the complete power supply is mounted on board F. In the earlier PE3 chassis most of the power supply is on

the main board D, the small F board containing a rectifier/regulator circuit that provides a 12V output. The main D panel also contains the CX523-017P system control chip, the memory, the timebase circuitry, the colour decoder and the audio circuits.

#### The Usual Symptom

These sets have a tendency to go dead suddenly after working well for a time. This is especially so with the PE3 chassis. You'll probably find that the mains fuse F1601 (3·15A time-lag) has blown and that the chopper transistor Q603 is short-circuit. More often than not you'll find that the line output transistor Q802 has also failed. These two transistors have to be obtained from Sony (or a Sony agent) and are very expensive. It's vital that Q603 is replaced with type 2SD1497-02, Sony part no. 8-729-301-



00, and that Q802 is type 2SD1497-06, part no. 8-729-300-90. These two transistors are **not** interchangeable.

The logical way of going about things would be to check for shorts and then, if all's well, to replace the fuse and the two transistors. Unless further action is taken however the result is likely to be further failure of these items either at switch on, after an hour or two or after several days. This will remind many of you of the Sony Model KV1810.

#### **PE3 Chassis Power Supply Circuit**

Before tackling these sets it's best to take a little time to find out how the power supply section works. We'll consider the circuitry in the PE3 chassis – see Fig. 1.

While the power supply circuitry is quite complex, things are not as bad as they might seem since the circuit breaks down into a number of easy to understand sections.

The a.c. mains input goes first to fuse F1601 on board F, then to the filter coil T1601. The  $0.22\mu$ F filter capacitor C1601 has proved to be reliable, though it can fail, blowing F1601. There follows the surge limiter resistor R1601 ( $2.7\Omega$ , 7W special nonflammable) after which the supply is taken via connectors and the on/off power switch S901 to transformer T1603 on board F and choke T602 on board D. Note that S901 has a third pole which applies 5V d.c. to pin 17 (power on) of the control chip IC001. The mains a.c. input is also applied to the degaussing circuit of course.

T1603 drives two diodes which are encapsulated in one block, D1658 (MC921). These develop about 18V across the reservoir capacitor C1668 to feed the 12V regulator IC1652 ( $\mu$ PC78L12).

The supply to the chopper circuit passes via filter choke T602 to the bridge rectifier D601 (S3WB60Z) which produces about 270-280V across the reservoir capacitor C610 to feed the primary winding of the chopper transformer T606 at pin 14.

The 12V regulated output from panel F goes to the remote control circuitry, provides a start-up supply for the timebase generator chip and, via R660 which drops the voltage to 6.6V, provides the supply for the chopper control chip IC651 ( $\mu$ PC1394). This chip contains quite a lot of complex circuitry. Its output at pin 7 is coupled via C664/T604/C615/R609 to the base of the chopper driver transistor Q602. This transistor receives a start-up supply via R604 (30k $\Omega$ , 7W cemented). Its supply is provided by D602/C613 when the circuit has got going. The output from Q602 is transformer coupled (T605) to the base of the chopper transistor Q603. Notice that Sony use a transformer (T607) as the sensing device for the excess current limiting circuit in IC651. The primary winding of T607 is in series with the emitter of the chopper transistor while the secondary is connected via R616 to pin 5 of IC651. The oscillator in IC651 is locked to the line frequency by pulses from pin 10 of the line output transformer. These are coupled to pin 10 of the chip via the voltage divider network R669/670 and C666. Q654, connected to pin 4 of the chip, switches the set to standby. Its base receives the standby signal from pin 10 of the control chip IC001. In this mode there is no output from the chopper power supply. Feedback for voltage regulation is applied to pin 1 of IC651 via the voltage divider network R655/6 from the 135V h.t. line.

Secondary windings on the chopper transformer feed five more rectifier circuits. To save you the time and stress involved in tracing the destinations of these various supplies we'll list them here.

D651 produces 135V across its reservoir capacitor C652. This supply is used by the line output stage. As already mentioned any variation in this supply is sensed by IC651 which then adjusts the drive at its output pin. Preset RV651 is used to set up the 135V output.

D652 produces 39V across its reservoir capacitor C653. This supply is used by the line driver transistor Q801, by the tuning circuit, by Q656 in the 12V regulator circuit, and is also fed to the CY coils on the scan yoke via pin 3 of connector DY-3.

D654 produces 41V across its reservoir capacitor C654. This supply is used by the STK4362 audio output chip IC252.

Diodes D653 and D655 produce 14·6V across reservoir capacitor C656. This supply is used by the transistors that drive the CY coils – they are mounted on board D1 – and is fed to a second 12V regulator consisting of Q655/6 and zener diode D661. The 12V regulator works hard. It supplies the sync/timebase generator chip IC551, the pincushion correction chip IC553 and most of the signal circuitry. A 9V regulator that supplies the i.f. chip on panel A is fed from the 12V line.

Diode D656 develops 7.8V across its reservoir capacitor C657. The main use of this supply is to feed the 5V regulator in the system control circuit.

#### **RX Chassis Power Supply Circuit**

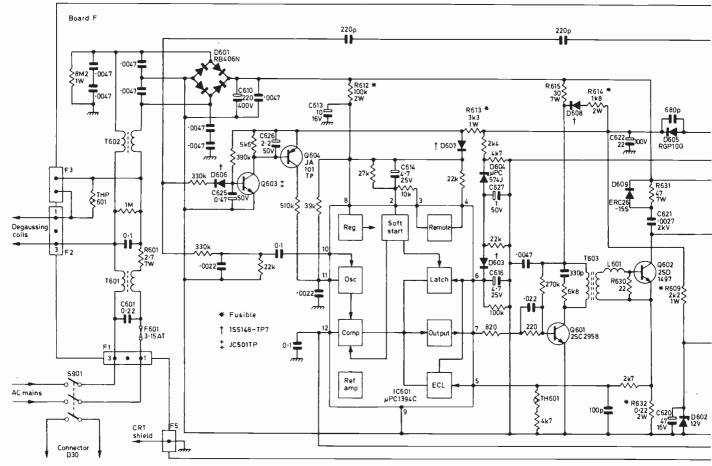
The RX chassis used in later models has a redesigned chopper power supply – see Fig. 2. The whole circuit is mounted on board F. You will notice that the excess current sensing transformer is no longer present and that feedback for regulation is fed via a  $\mu$ PC4558C voltage comparator (IC651) and the TLP581 optocoupler IC602 to pin 12 of the  $\mu$ PC1394C power supply chip IC601. In our experience this power supply arrangement has proved to be more reliable than that used in the PE3 chassis. One of the rectifiers provides a -30V supply which, in the PE3 chassis, is derived from a line output transformer fed rectifier. This negative supply is used by the memory chip in the control system.

#### **PE3 Chassis Layout**

We will concentrate on the PE3 chassis in this article, as it's the one we usually find in the sets we encounter.

The back cover comes away after removing six screws. The two loudspeakers are mounted at the rear – they look rather like two wings. When the back cover is off you'll get no sound. Inside, the boards are positioned as follows (see Fig. 3). The H1 board that contains the seven-segment LED indicator and the customer controls is at the front left (viewed from the rear), mounted upright. Next to it is the H2 board which contains three LED indicators. Also at the front, just above the H1 board, is the remote control preamplifier board N. At the bottom left, mounted horizontally, you'll find the tuner/i.f. panel A. At the front of this are panel S which contains a relay for switching between aerial and H1T inputs and panel S2 which contains the relay driver – these two panels may not be present in some sets.

The large panel D across the bottom is mounted in a plastic frame. It contains most of the circuitry, as previously mentioned, and can be slid out of the cabinet after removing four screws. To work on the underside the board must be balanced on one end. A number of plastic strips make access to the print rather difficult. The print is



very fine and is easily damaged, so be careful or you may end up with a few new faults.

There are four subpanels on the right, D1, D2, D3 and J2. Board D1 houses circuitry concerned with raster correction etc. Board D2 houses a few components concerned with dynamic focus correction. Board D3 houses a single transistor amplifier concerned with pulling correction. Board J2 provides connections to the loudspeakers. The small J1 panel at the front houses the external audio jack sockets. Tube base panel C houses the RGB output stages, a video muting transistor (Q713) and the velocity modulation amplifier and output stages (Q751-4). The latter circuit drives a coil on the tube neck. The F power supply panel is mounted on the c.r.t.'s degaussing shield.

#### Servicing the PE3 Power Supply

Servicing the power supply is not particularly easy. You must have a means of varying the mains input from about 60V to 240V – either a variac or a tapped mains transformer can be used. Since the print is easily damaged it's vital to use a temperature-controlled soldering iron when removing and replacing components.

If the set is completely dead, examine fuse F1601. If it has blown and is not blackened it may have failed from old age, but this is not very likely with these models. You'll most likely find that it's a nice black colour, indicating that Q603 has almost certainly failed and probably Q802 as well. Use only the correct Sony replacements and make sure that you also replace the insulating washers.

After replacing Q603, and possibly Q802 as well, proceed as follows before connecting to the mains supply. First carefully examine – best done with a high-power magnifying glass – all the printed circuitry in the power supply, line driver and line output stage areas of board D.

Fig. 2: The power supply circuit in the RX chassis.

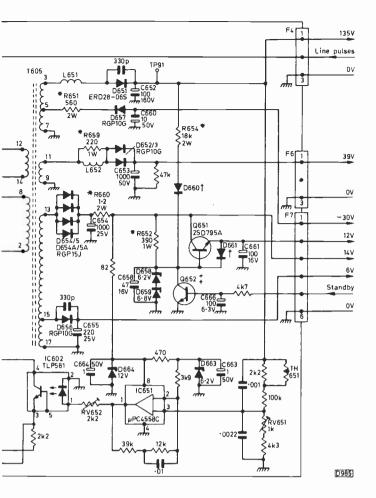
Then inspect all the small electrolytic capacitors in the power supply and line timebase for signs of drying out or corrosion. Be sure to take your time over these two jobs – it could save you a lot of problems.

If you can't find a dry-joint or a leaky capacitor, start by disconnecting the collectors of Q603 and Q802. Next check C1655 on board F. Then, with the mains supply still disconnected, push the power switch S901 to the on position and connect the set to your variac (set the a.c. output to zero first). Connect your digital voltmeter across connector F5. It should give you a reading of 12V d.c. as the variac is slowly turned up to give 240V. R660 (620Ω, 1/6W, 5 per cent metal) on board D sometimes goes opencircuit or high-resistance, cutting off the 12V supply to IC651. If this has happened you may be fortunate and find that the set works when R660 has been replaced – provided Q603 has not gone short-circuit.

Measure the voltage at pin 12 of the chopper transformer T606. With no load connected you should read about 270V d.c. here. Connect your oscilloscope (10:1 probe) to pin 7 of IC651 then to the base of Q603. The waveforms should look something like those shown in Fig. 4 (a) and (b) respectively. These waveforms are with the oscillator in IC651 running free: they can vary. Don't assume that all is well if you get these waveforms. It's best not to try to display these waveforms on a working set that's displaying a raster – it's easy to disturb the operation of the chopper power supply and blow up Q603.

Turn the variac to the off position and disconnect it from the mains supply. The fast way to make the following tests is to use your component tester (see *Television* June 1984). With this you won't need to remove the following parts as many of them – but not all – can be checked in circuit.

Start by checking C1655 (47 $\mu$ F, 16V) on panel F and



C610 (250 $\mu$ F, 400V) on panel D. Next check the following capacitors on board D: C663 (22 $\mu$ F, 16V), C615/617/659/664 (all 3·3 $\mu$ F, 50V), C660 (1 $\mu$ F, 50V), C613 (2·2 $\mu$ F, 100V), C652 (100 $\mu$ F, 160V), C653 (33 $\mu$ F, 50V), C654 (1,000 $\mu$ F, 50V), C656 (1,000 $\mu$ F, 25V) and C657 (1,000 $\mu$ F, 10V). Then check D657 (RD5.1E-N2 zener), D602 (RGP10G), D603 (1S119), D651 (ERD28-06S), D654 (CTU12S), D653/5 (both V19C) and D656 (EB81-004). Finally check R604 (30k $\Omega$ , 7W cemented), R608 (680 $\Omega$ , 2W fusible), R605 (47 $\Omega$ , 7W cemented), R606 (2·2 $\Omega$ , ½W) and R607 (0·22 $\Omega$ , ½W wirewound).

If these tests fail to reveal any faulty component and Q802 remained intact when the set failed you can now connect the set to the variac, with the on/off switch S901 at on and the collectors of Q603 and Q802 reconnected, and gradually turn up the mains input to the receiver.

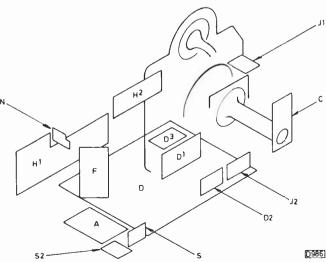


Fig. 3: Board positions in the PE3 chassis.

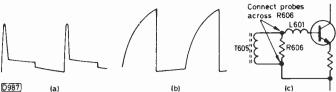


Fig. 4: Chopper drive waveforms, (a) at pin 7 of IC651, (b) at the base of the chopper transistor, measured as shown at (c). These waveforms are with the collectors of Q603 and Q802 disconnected. Since the chopper circuit oscillator is free-running the waveforms may vary a little.



Fig. 5: Line drive waveforms, (a) at pin 11 of IC551, (b) at the junction of L808 and R803, with the collector of the line output transistor  $\Omega802$  disconnected.

Monitor the 135V h.t. line while doing this. If a picture is obtained, leave the TV set running for at least a day before returning it to the customer.

All this sounds a lot of work, which it certainly is, especially as many of the components are difficult to get at. As colleague Pete is fond of telling me however, the longest way is often the quickest. There are no short cuts when repairing one of these receivers. Miss out one of the checks listed and you could end up with a pile of useless 2SD1497s.

If the components tested so far are all o.k. the next step is to unsolder one end of diodes D652, D654, D653/5 and D656 and isolate the collector of Q802. It pays to have a few spares handy when repairing these sets because the next thing to do is to replace IC651 (when faulty this i.c. tends to suddenly give excess output), T605, T604 and T606. Slowly turn up the input voltage from the variac. If the 135V h.t. supply appears, leave in the new chip and transformers. Turn the variac to zero output and check Q655, Q656 and D661. Reconnect D652, D654, D653/5 and D656, and check that there are no shorts across any of the d.c. supply lines. Slowly turn up the output from the variac and all should be well, with no voltage lines missing. If one or more voltages are absent, check the fusible resistors R651, R652, R653 and R654.

With the power supply now running and all the output voltages present, connect the oscilloscope (10:1 probe) to pin 11 of IC551 then to the junction of resistor R803 and choke L808 in the line output transistor's base circuit. Fig. 5 shows the waveforms that should be seen. Assuming that everything is in order, turn off the variac and make the following tests. First check Q802 again, to be on the safe side. Then check R824 (0·47 $\Omega$ , 2W fusible), R825 (1·2k $\Omega$ , 1W fusible), C803 (330pF, 1·5kV), C804 (0·01 $\mu$ F, 3kV), D805/6 (both ERC26-15S), D801 (ERD29-08J) and the gate controlled switch Q803 (2SG264A). Always change these three diodes if Q803 has failed. You can now reconnect the collector of Q802. Gradually turn up the variac's output while monitoring the 135V line.

When the set has run for about an hour, readjust RV651 if necessary for a meter reading of 135V.

Sometimes you'll find that the power supply is dead and transistor Q603 is o.k. In this case check the 2SC2230A driver transistor Q602. If it's faulty, replace it with a 2SC2230A-GR and replace R610 with a  $12k\Omega$  resistor. Note that Q602 can sometimes cause distortion on the vertical lines in a picture: if you get this problem replace Q602 and R610 using the type and value just mentioned.

Another cause of a dead power supply when the components so far mentioned all seem to be o.k. is failure of the JC501 standby switch transistor Q654.

Sometimes these sets switch to standby for no apparent reason. The cure is to fit a 100pF, 50V capacitor between pin 1 of IC651 and the chassis end of R656.

#### Servicing the RX Power Supply

You'll find that the power supply in the RX chassis is far more engineer-friendly. It's all on board F which can be removed from the receiver so that you can rapidly check through the circuitry with your component tester. First check all the transistors – the chopper transistor Q602 (2SD1497-02), the driver transistor Q601 (2SC2958), the two transistors Q603 (JC501TP) and Q604 (JA101TP) in the over-voltage protection circuit, the 12V regulator transistor Q651 (2SD795A) and the standby switching transistor Q652 (JC501TP). Also check the zener diodes D604 ( $\mu$ PC574J), D602 and D664 (both RD12E-B2TN) and D663 (RD6.2E-N2TN). As with the PE3 chassis, by disconnecting the collector of the chopper transistor Q602 you can check the drive waveform at the collector of Q601 with your scope.

Again as with the PE3, never omit a careful check of the power supply for dry soldered joints and examine all the small electrolytics for any signs of corrosion or leakage. As yet we've experienced no failures of IC602 and IC651.

#### **Line Timebase Faults**

Faults that can cause the line output transistor Q802 to fail (and sometimes the diode modulator driver Q803 as well) are failure of or shorted-turns in the driver transformer T801. If you suspect this, replace it. Check the line driver transistor Q801 (2SD1138) at the same time. Hard to spot dry-joints in this area can also cause failure of Q802 or cut off its drive signal.

Failure of Q803 can kill the line output stage. The associated diodes D801/5/6 can go open-circuit under load. As previously mentioned, the diodes should be replaced if it's necessary to change Q803.

The small electrolytics in the line timebase circuitry can also be the cause of Q802 going short-circuit. Begin by checking C811 (0·47 $\mu$ F, 50V), then the small electrolytics associated with IC551 (TDA2578A), i.e. C531 ( $10\mu$ F, 16V), C507 ( $220\mu$ F, 16V), C509 ( $10\mu$ F, 16V) and C523 ( $4\cdot7\mu$ F, 25V).

Sometimes the receiver will sit on your bench with one number (usually zero) showing in its seven-segment LED indicator while it makes a sort of "mee mee" noise as if it's trying to start up but can't. The cause of this is failure of the line output transformer T802. Fortunately there's usually no other damage when this happens.

When you find that Q802 has failed, leave the collector of its replacement disconnected to start with. Then make sure that 12V is present at the emitter of Q655 and that this voltage is arriving at pin 10 of IC551. With the RX chassis the voltage at pin 10 of IC551 should be 11·3V: if it's missing, suspect diode D501 (1SS119) on board D and check C510 (470 $\mu$ F, 16V) for loss of capacitance. Next connect your scope (10:1 probe) to pin 11 of IC551 and then to the base of Q802. The waveforms should be roughly as shown in Fig. 5. Provided you've made a thorough check on the line timebase circuitry you can now connect the collector of Q802 – disconnect the mains supply first of course. Gingerly increase the input from the

variac until you obtain a picture.

A nasty line jitter effect, which may be intermittent, can be caused by the line frequency control RV501 (4-7k $\Omega$  preset). Don't try to clean it – fit a replacement. At the same time check C531 (10 $\mu$ F, 16V).

Amongst the supplies provided by the line output transformer are 200V for the RGB output stages and 26V which is used by the field timebase and the velocity modulation circuit. The 26V rectifier diode D804 is protected by surge limiter R811 (1·2 $\Omega$ , ½W fusible). When this resistor goes high in value the result is field distortion – a line across the picture about a quarter to one third of the way down from the top of the raster.

Line linearity problems, the symptom being a thin black line at the left of the picture, occur when R825 ( $1.2k\Omega$ , 1W fusible) goes high in value. At the same time check C803 (330pF, 1.5kV ceramic), C804 ( $0.01\mu$ F, 3kV ceramic) and C805 ( $0.015\mu$ F, 400V mylar). These components, also R824 ( $0.47\Omega$ , 2W wirewound fusible), should always be checked when Q802 has to be replaced.

#### **PE3 Chassis Field Timebase**

The field generator is contained in IC551 which in the PE3 chassis is a TDA2578A. To date we've had no trouble with this chip. The field output at pin 1 is fed via R518 to pins 1 and 3 of the TDA3652 field output chip IC552. Complete or partial field collapse is usually caused by failure of this i.c. When replacing it, always fit a mica washer (Sony part no. 436 973 201) between the chip and chassis. Field collapse can also be caused by failure of zener diode D502 (EQA01-22R2) or D503 (EQA01-24R2). When this happens both diodes should be replaced.

#### **RX Chassis Field Timebase**

In the RX chassis IC551 is a TDA2579 and a discrete component field driver/output circuit is used. Pin 1 of IC551 drives Q508 (2SC2958) which in turn drives the output transistors Q506 (2SC2690A) and Q507 (2SC1220A). On rare occasions these transistors fail. When they do, check R556/548 (both  $1.2\Omega$ , 1W) and R527 ( $10\Omega$ ,  $\frac{1}{2}$ W) before fitting replacements.

#### Miscellaneous Faults

The D1 board has given us few troubles. It contains the pincushion correction circuitry and the horizontal centring and amplitude circuitry. Horizontal centring can be upset when R1551/2 ( $4.7\Omega$ , 1/4W fusible) go high in value or open-circuit. The convergence will suffer if zener diode D1557 (EQB01-13) leaks or goes open-circuit. If D1552 (1SS119) suffers from the same problems the horizontal amplitude control RV1555 will not operate correctly.

Board A contains the tuner and the i.f. and a.f.c. circuitry. The tuner is very reliable. On the rare occasions when trouble is experienced it's best to fit a replacement. If the 9V supply at pins 19 and 21 of the i.f. chip IC101 (CX20015A) is missing or incorrect, check Q106 (2SD773). At the same time ensure that C138 ( $10\mu$ F, 16V) has not lost capacitance.

Tube base panel C has seventeen transistors mounted on it. Intermittent loss of picture, often after changing channels, can be due to failure of Q704, Q705 or Q706 (all 2SC2278). Use your component tester to check them – it will show up the slightest fault in a transistor. Check diodes D701/2/3 (1SS119) at the same time.

The usual problem with the teletext board is failure of the SAA5050 ROM IC4. When replacing it solder a  $22\mu\text{F}$ , 25V electrolytic capacitor between pins 1 and 18, positive side to pin 18.

In the control circuitry on board D resistor R060 (330 $\Omega$ , 1/6W metal) can fail, interfering with standby operation. Be sure to test zener diode D061 (RD5.6E-B2) when you

replace it.

R237 ( $1M\Omega$ , 1/6W metal) and R238 ( $10k\Omega$ , 1/6W metal) on board D, at the base of transistor Q206 (JA101), can cause some puzzling symptoms. If R237 goes high in value the picture search doesn't stop. If both R237 and R238 vary in value the result can be no picture at all. Q206 acts as a sync separator feeding pulses to pin 16 of the control chip IC001.

Most of the chroma circuitry is contained in IC301 (TDA3562A). We've had few problems with the colour decoder. Before replacing a suspect IC301, examine the surrounding print carefully for dry-joints. Key waveforms for a colour-bar input are shown in Fig. 6. The crystal (X361) frequency is 8·867MHz.

#### In Conclusion

Only the panels on which we've experienced faults have been mentioned in this article. The others, in the sets we've handled, have as yet been trouble free. All component reference numbers have been for the PE3 chassis unless the RX version has been specifically mentioned.

There were quite a few modifications to the models in this series. The following notes refer to modifications of use to the service engineer.

To prevent mechanical buzz that varies in note as the picture changes, solder a 1,000pF, 50V capacitor in parallel with R655 (100k $\Omega$ ) and replace R610 with a 12k $\Omega$ ,  $^{1}/_{6}W$  resistor. Be very careful when carrying out this modification or you could end up with transistor Q603 shorted.

Model KV2252 sets after serial number 508,101 had a

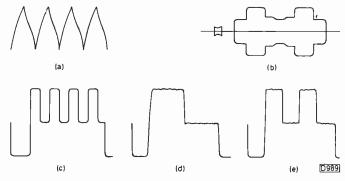


Fig. 6: Key colour decoder waveforms: (a) 8:867MHz at pin 26 of IC301; (b) the cotton-reel at pin 4; (c), (d) and (e) the blue, green and red output waveforms at pins 17, 15 and 13 respectively.

modified D panel with boards D3 and D4 omitted.

With KV2252 sets before serial number 504,001 and KV2256 sets before serial number 501,001, to prevent failure of transistors Q603 and Q802 after a short period of use replace R616 with a 330 $\Omega$ , ¼W metal type, solder an extra 2.7 $\Omega$ , ¼W resistor in parallel with R612 and add a 6.8k $\Omega$ , ¼W resistor between pins 5 and 8 of IC651. Don't carry out this modification to a set that's working satisfactorily.

These are quite complex sets with a fair amount of unusual circuitry. We've referred to the dynamic focus and velocity modulation circuits. There's an interesting sharpness circuit and the audio circuit has left- and right-hand channels. Several stages are associated with the SCART socket. You'll probably never have to worry about such niceties however.

It's essential to use only official Sony parts – if you don't you'll make lots of extra work for yourself. A thin coat of circuit varnish sprayed on any panels you've soldered makes a professional job and helps to prevent future problems. Run the set for at least a day before returning it to the customer.

## A Simple Anti-theft Circuit

Jim Littler

It was Saturday and the shop was busy, so not much notice was taken of the three small girls who came in. The eldest was about fourteen. Then one went in front of the window display, two behind it. In five seconds they were outside with two Walkmans. The scene may be familiar to some of you, but it was new to me. I decided to do something about it. On enquiry I discovered that the price of commercially available wire-loop alarm systems seemed to be a bit high for what they are, so I designed the circuit shown in Fig. 1 to serve the purpose.

The device is powered by a PP9 battery. When thyristor Th1 is fired, power is applied to Tr2-4. Tr2-3 comprise a

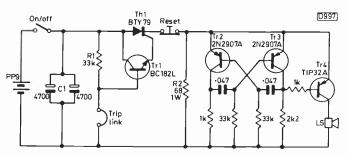


Fig. 1: Circuit of the anti-theft device.

straightforward astable multivibrator, the output transistor Tr4 driving a telephone earpiece type loudspeaker. Tr1 is used to fire the thyristor. Its base is normally shorted to the earth side of the circuit by the wire trip link, which prevents it conducting. When the link is broken, base bias via R1 turns Tr1 on. This applies gate current to the thyristor which in turn switches on, starting the oscillator to sound the alarm. I found that the use of the switching transistor resulted in better battery economy than just switching the thyristor's gate – the quiescent current is  $300\mu A$  compared to several milliamps with the trip connected directy to the gate. R2 draws sufficient current to maintain Th1 in conduction: the current is then about 180 mA. A 1W carbon film resistor is used in this position.

The large capacitor C1, comprising two  $4,700\mu$ F electrolytics in parallel, is included simply to enable the device to work in the event of someone accidentally switching it off. Larger value capacitors could be used if available or, if a key switch is used, C1 could probably be dispensed with.

While this is not strictly speaking a TV/video circuit, I'm sure it will be of interest to anyone who runs a shop, especially if you've had the sort of experience related above.

## Practical Computer Programming

Part 7 Mike Phelan

By now you should have an assortment of pieces of paper with screen layouts, report layouts and file structures, also some notes on what the system should do. The latter need expanding into something that can be converted into a computer program in a high-level language.

#### Pseudo-code

One of the best tools for this job is something known as "pseudo-code". It's a restricted subset of English that reflects the structure of a program, i.e. loops and conditions are indented to make the operation clear. In case this is difficult to follow, an example should make things easier. Consider the following pseudo-code fragment that deals with amending a name and address file. The file could be part of a service database or anything else – in fact the code could be applied to the maintenance of any file since the things we need to do are usually the same, namely to add to, change or delete a record and possibly supply a list of its contents on the screen:

```
open files
repeat
  repeat
    get entry to amend
    check entry is a valid record
    if not valid
       print message
    else
       go to record
    end if
  until valid entry found
  display record
  get amendments
  ask is this OK to save
  if OK
    save record
  end if
  ask if more amendments
until no more amendments
close files
```

At first this example of pseudo-code looks like a programming language, with IF and REPEAT, but it's actually a way of describing the operation of a program. It can be converted to a high-level language after testing. But wait a minute! How can you test a piece of writing? Here's how!

#### **Modules**

When you start to design a system, as opposed to designing a program (that will come later), you start with a generalised description of the whole thing and then gradually break it down into detail, with individual modules written in pseudo-code. How do we decide what constitutes a module? A typical application will be some sort of database interrogation system that will be menu driven. The pseudo-code for the menus need be only a list of choices and explanations, and the lowest level will call a piece of program that may be a subroutine, function or

procedure depending on the language chosen. Each of these is a "module" which does one job or a number of jobs that are conveniently grouped together.

Such a module can be expressed in pseudo-code and tested. To do this, imagine that you are the compiler or interpreter reading the program and carrying out each process literally. This will show up any serious inherent faults in the logic. In addition, ask yourself what will happen if the user does something wrong. This technique is known as a "walk-through". It may seem to be rather pointless, but it's a very useful method of curing faults at the design stage and decreasing the number of bugs in the final program.

#### **Preventing Crashes**

The one thing that must not happen is that the program "crashes" or returns the user to the command level. This would mean that the program has stopped its execution. The program error that caused this must be found and preventive action taken.

For example, say we have a program that accepts a code letter for something, e.g. a repair category. This code would normally be a capital (upper case) letter. Suppose that a lower case letter is entered by mistake. The program then crashes. There's little excuse for this sort of thing, even if the program was written by the user. Taking this example, there are at least four solutions:

- (1) Put a message on the screen that either the CAPS LOCK key must be on or the entry made in upper case.
- (2) Make the software force the CAPS LOCK key on.
- (3) Make the software reject lower case entries.
- (4) Allow either type of entry.

These solutions to the problem vary from bad to good. Clearly (1) is a lazy way out and is not really acceptable. (2) is better, but what happens if someone uses the key again and leaves it switched off? (3) would work but would waste user time by rejecting entries which then have to be re-entered. Clearly the only really acceptable

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solution is (4), which is bullet-proof and ensures that an incorrect entry is not made.

The same approach can be applied to other areas of a program, for example a menu where you have to choose a letter between say A to F. To print an error message if a lower case letter or say G is entered instead is just a waste of time – and very soon becomes tiresome. Lower case should be accepted, and nothing at all should happen if a letter outside the range is chosen.

For the upper case conversion, most languages have a case conversion function. Or we can subtract 32 from the ASCII code or AND it with 223 which will give the same effect: 223 is 1101 1111 in binary, so the AND will clear the 32 bit which is clear in 223. All the lower case characters are the upper case codes with this bit set, i.e. +32.

#### Module Re-use

When designing a module it's sometimes better if we can "re-use" it. Some things have to happen several times at various places in a system, maybe with slight variations. To give a few examples:

Print a message on the screen and ask for a Y or N response.

Print a message on the screen saying that the computer is doing something, please wait.

Print a message and prompt the user to press a key.

I find myself using these three umpteen times in everything that I design. The only thing that varies is the printed message – or part of it. Other modules can supply the missing bit, i.e. the variable part of the message. Here are some examples, in pseudo-code:

- Y or N response module
   message = variable part of message
   message = message + '? Y/N'
   print message on screen
   repeat
   get response
   convert to U.C.
   until response is Y or N
   clear message and response from screen
   return true if Y
- (2) Please wait module
  message = variable part of message
  message = 'Please wait ' + message
  print message on screen
  return nothing
- (3) Press a key module
  message = variable part of message
  message = message + ' press any key'
  print message on screen
  wait for keypress
  clear message
  return nothing

#### **Conventions**

We'll see what these actually look like in real code next month. For now, on with the design. It will be necessary to adopt a convention in our pseudo-code for passing control to a module. CALL (module name) is as good as anything. We can adopt upper case for our key words, i.e. those that are part of the pseudo-code language, and lower case for everything else, and precede each module with a short description of what it does. We'll stick to the term "module" until a choice of language has been made, as there are different types of modules in different languages, sometimes several. Another convention is to use for each module a name that will be valid in real code and may describe what it does.

#### File Maintenance Menu

An example of a file maintenance menu would be something like this, together with one of the modules that can be called up:

```
MODULE f_menu
* Provides maintenance of customer file *
* by calling further modules *
CLEAR SCREEN
PRINT title
PRINT rest of menu
(A) Add a new customer
(B) Change customer details
(C) Delete a customer
(D) List customers on screen
Press ESC to return to main menu
GET keypress and convert to UC
CASE A CALL custadd
CASE B CALL custamnd
CASE C CALL custdel
CASE D CALL custlist
CASE ESC RETURN
MODULE custadel
```

```
* Deletes customer from file *
OPEN customer file
REPEAT
  ASK for customer to delete
  SEARCH file
  IF not found
    CALL press_key with 'Not on file'
  ELSE
    DISPLAY details
    CALL y_or_n with 'Are you sure'
      DELETE record
      CALL press_key with 'Deletion aborted'
    END IF
  END IF
  CALL y_or_n with 'Any more deletions'
UNTIL no
CLOSE file
RETURN
```

We can improve upon this. For example, what happens if the user selects the delete option my mistake? They would have to go through the motions of searching and replying 'N' to the 'Are you sure? Y/N' prompt. It would be better if the program could test say for ESC being pressed in response to the prompt for the name or number of the customer, thus returning the user to the previous menu.

#### **Next Month**

Next month a look at program design.

# The Room at the Back

J. LeJeune

Sid Bias, service manager at Topcuts of Millthorpe, was not in the best of moods. He felt that vulgar changes at the front of the store were transforming what was an old family run business into a facsimile of any High Street electrical chain store. It even had what Sid called "a salesman with a lean and hungry look", in the person of Terry Green, Ralph Topcut's latest recruit. "The whole thing's going to pot" he said as he sat down heavily on the stool beside his bench. This brought him face-to-face with his current dislike, a Pye 2615. He'd been trying to eliminate striations for two days and was close to giving up, but still had his pride. He knew that Norman was itching to have a go at it, but as it was still unsold stock there was no one anxiously awaiting its return. The otherwise excellent picture had some striations that were about an eighth of an inch wide.

Norman and Andy were poring over a Toshiba turntable with linear tracking, attempting to discover its inner secrets without the aid of a service sheet. It had come in for "no left-hand channel".

Sid once more turned his attention to the Pye while his assistants were thus preoccupied. He was busily checking some plugs and sockets, steadying the circuit board with his left hand, when he glanced at the mirror and discovered that the striations were no longer present. Surprised, he took hold of the mirror and angled it to get a better view. The striations had returned. He steadied the chassis, preparatory to wriggling the plugs and sockets once more, and noticed that the close proximity of his fingers to the area of the main PCB near the teletext decoder diminished or even removed the striations! This seemed to be the only cure that would work. As Sid was pondering on the possibility of being able to sell Gareth along with the set, thus killing two birds with one stone, Nigel from Grandview came in through the back door, looking for a cup of tea. Grandview is a family-run business about twenty miles away: Nigel is the only son, and the only service engineer.

"Good morning Sid" beamed Nigel, "got a brew going yet?"

"You've got to earn it this time" replied Sid, "I've a lovely Pye for you to repair!"

"Doesn't look too bad from here" said Nigel. Then, coming closer, "oh, you've got those striations. We've had them as well – but we've got rid of them now."

"Well tell us what you did" said Sid, "don't keep us in suspense."

"We spoke to Philips Service about it. They told us to change plug and socket 9. We did, and it worked."

"Thank you" said Sid, smiling weakly, "how on earth can changing a plug and socket get rid of striations?"

"Same way as garlic wards off evil spirits I suppose! Now, have I earned that cuppa?"

Attention in the workshop shifted to the Toshiba. Norman and Gareth surfaced from contemplating its innermost secrets and became sociable again. But not for long.

"Righto then" said Sid, "have our resident genius and his assistant got to the bottom of the problem, or are we on too high a level at present to consider the possibility of a faulty pickup cartridge?"

"The problem," Norman commented, "is that the cartridge is glued into the tracking arm during manufacture. I understand we'll have to replace the whole assembly."

#### The Ferguson TX90

Terry came through the door from the shop with a little Ferguson TX90, one of the white colour portables. "Lady brought this back just now, says it's got a rustling noise on sound" he informed them. Norman took the set and placed it on an empty bench, then connected it to an aerial and the mains supply. When he switched on a good picture quickly appeared. As the sound was turned up the colour disappeared. Turning down the volume restored the colour again.

"She forgot to mention the second problem" moaned Sid. Nigel said nothing as he sipped at some tea. Gareth looked slightly odd, as though he was about to utter a profound wisdom. "I've something at the back of my mind that says we've had this one before" he said, "a dry-joint or something — I'll look in my notebook."

Gareth had taken to keeping a big book in which he wrote down all the faults they encountered on particular chassis. The book was divided into manufacturers and chassis, but his writing was so bad that it took him a time to find what he wanted.

"Here it is!" he exclaimed. "A dry-joint in the sound circuit, on C166. Makes the audio amplifier go into oscillation, causing noise on sound and interfering with the colour decoder."

Sid beamed with pleasure. "An hour ago I was contemplating selling you off with a faulty set, as resident engineer, but maybe I should change my mind. Here, let's have a look at that book."

Norman removed the back and started to look for C166. "Got you" he said, wriggling the component to show that it was indeed the culprit. "I wish they were all as easy as that, but Gareth's big black book has certainly earned its keep today."

Nigel stood up to leave. "Must be getting back to my side of the mountain."

Norman now had a Thorens TD105 turntable on his bench – and a baffled look.

"Got you stumped has it?" said Sid.

"Think I'll take an early lunch and come back to it" replied Norman, picking up the small service manual.

#### More Problems

Sid retired to his desk to shuffle papers, while Gareth turned his attention to an Hitachi set, NP81 chassis, with cramping at the bottom of the picture. The field output stage module was the first suspect, but changing it made no difference. The h.t. was correct at 111V, but there was insufficient peak current to scan the lower half of the c.r.t. fully. The set was o.k. in every other respect. Sid sauntered across and peered into the back. "Got a sticky one?" he said.

"Everything looks normal but the bottom is cramped" explained Gareth, "I've change the field output module and the h.t. supply is correct."

"Have you thought about the supply decoupling at pin 1 of the module?" asked Sid, "C608 to be precise." He gave Gareth a thoughtful look as he went to the component drawer for a replacement  $22\mu\text{F}$ , 160V electrolytic.

Silence reigned while Gareth removed the suspect, which did look a little careworn, and fitted the replacement. When he'd done this the picture filled the screen.

"Never forget decoupling" said Sid, "it can save you a lot of time."

Norman returned and went straight to his bench.

"Are we to be enlightened about the fault on the simple gramophone turntable?" asked Sid. Norman admitted to being stumped, but said he'd had an idea he wanted to try. "Works properly at 33 r.p.m." he added, "but won't run at 45 r.p.m."

Checks with the meter showed that the speed selection process was working, but no motor voltage was applied. The operational-amplifier driving the emitter-follower that fed the voltage to the motor was cut off.

"It's either T109 or D210" suggested Gareth. "I'd go for D210 as it's an LED and they do go open-circuit, whereas transistors normally go short-circuit when they fail."

Norman was astounded. "Fifty pence in my pocket says

you're wrong!"

"Well we'll have to try it then" said Gareth.

Norman went to the LED, which serves to indicate the speed selected and is in the d.c. feed to T109. With no collector supply, the input current requirements of the motor drive operational-amplifier couldn't be satisfied. Fitting a new LED restored correct operation, and Gareth was duly congratulated. Sid reflected on how quickly the young learn.

Terry put his head through the door frame. "Can we fix 8mm projectors?" he asked.

"No" said Sid.

Terry came all the way in with a cardboard box containing a Eumig Model M. "Good" he said, "now's the time to learn."

For once Sid was speechless.

# International TV Standards

Eugene Trundle

There's a steadily increasing interest in world-wide TV standards. Amongst the reasons for this are: the popularity of DX-TV; the increasing number of satellites whose footprints overlap national boundaries; the greater mobility of people, who hope to be able to take hardware and software around with them; the trend amongst manufacturers to design TV and video equipment for world-wide markets, tailoring the final product to suit its destination; the growing availability of transcoding modules which are now, for example, incorporated as a standard feature of Video-8 format machines sold in SECAM areas; the requirement to exchange video tapes between people in different countries; and the wide availability of multistandard VCRs, TV sets and monitors.

With multistandard equipment it's important to bear in mind that while each item will operate with all the standards specified for it, it cannot change the standard. Thus a PAL/SECAM/NTSC VCR cannot replay a US tape via a UK receiver unless the latter is also equipped for multistandard operation. Similarly a three-system TV set or monitor will make no sense of a US tape played via a standard UK VCR. Many multistandard designs use a hybrid system called NTSC 4-43 when dealing with system M signals in PAL or SECAM areas. Here the signal is to the NTSC specification in all respects apart from the colour subcarrier frequency which is 4-433619MHz instead

of 3.579545MHz. This simplifies the design and reduces the cost of the equipment: with this arrangement the NTSC signal recorded on the tape remains in standard form.

The original French colour system (SECAM V) used only field-rate ident signals. More recent versions include line-rate ident signals.

Table 1 shows the main characteristics of all the TV systems in current use, with a general indication of the areas where they are used. For satellite transmissions the basic scanning standards and encoding systems in general hold good, though f.m. is used for the vision signal and scrambling systems are widely employed. The MAC type transmissions are quite different of course.

Table 2 provides a comprehensive listing of countries of the world with details of their TV systems. As much information as we can obtain has been included on Bands, channels and mains supply characteristics. A few countries still don't have a colour TV service, and some islands tend to use whatever equipment and transmissions they chance upon! Any additions, corrections or updates would be welcome for future use.

An article in the January 1988 issue of *Television* dealt in a general way with the conversion of video and TV equipment from abroad for use in the UK – the principles operate both ways of course.

Table 1: TV Systems.

| System              | Lines | Channel<br>bandwidth | Vision<br>bandwidth | Sound<br>spacing | Vision<br>modulation<br>sense | Sound<br>modulation | Geographical<br>areas   |
|---------------------|-------|----------------------|---------------------|------------------|-------------------------------|---------------------|---|
| В                   | 625   | 7MHz                 | 5MHz                | +5·5MHz          | Negative                      | f.m.                | Western Europe, India, Australasia,<br>parts of Africa, Middle East and Far<br>East. V.H.F.                     |
| D                   | 625   | 8MHz                 | 6MHz                | +6.5MHz          | Negative                      | f.m.                | Eastern Europe, USSR, China.  |
| G, H*               | 625   | 8MHz                 | 5MHz                | +5·5MHz          | Negative                      | f.m.                | Western Europe. U.H.F.  |
| <b> *</b>           | 625   | 8MHz                 | 5·5MHz              | +6MHz            | Negative                      | f.m.                | UK, Ireland, Hong Kong.   |
| K, K <sup>1</sup> * | 625   | 8MHz                 | 6MHz                | +6·5MHz          | Negative                      | f.m.                | French overseas territories.  |
| L*                  | 625   | 8MHz                 | 6MHz                | +6·5MHz          | Positive                      | a.m.                | France (U.H.F.), Luxembourg.  |
| M                   | 525   | 6MHz                 | 4·2MHz              | +4·5MHz          | Negative                      | f.m.                | North and South America, Japan,<br>Caribbean, parts of Pacific and Far<br>East, US Forces Broadcasting (AFRTS). |
| N                   | 625   | 6MHz                 | 4·2MHz              | +4.5MHz          | Negative                      | f.m.                | Argentina, Bolivia, Uruguay.  |

<sup>\*</sup>Vestigial sideband 1.25MHz - all others 0.75MHz

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| <b>Table</b> |

| Table 2:                 | Interna       | Table 2: International TV | / Stan                                | Standards.                              |                  | Kampuchea              | ∑<br>• <b>≥</b> a | SECAM        | + 4.5              | A7-13           | 220/50           |
|--------------------------|---------------|---------------------------|---------------------------------------|---|------------------|------------------------|-------------------|--------------|--------------------|-----------------|------------------|
|                          |               |                           | Sound                                 |   |                  | Korea, North           |                   | SECAM        | + 6.5              | R5-12           | 110/60           |
| Country                  | Svstem        | Colour                    | carrier<br>(MHz)                      | Channels                                | Mains<br>supply  | Korea, South<br>Kuwait | B, <b>⊠</b><br>G  | NTSC<br>PAL  | + 4·5<br>+ 5·5     | A4-13<br>E5-10  | 110/60<br>240/50 |
| :                        |               |                           | l                                     |   |                  | Laos                   | Σα                | PAL          | +4.5               | A8, 10          | 220/50           |
| Abu Dhabi<br>Afahanistan | و<br>م<br>م   | PAL<br>PAL                | -<br>+<br>+<br>+<br>+<br>+            | E5-11, 35-48<br>E5                      | 240/50<br>220/50 | Lebanon<br>Leeward Is. | ≥ ه               | NTSC         | + +5:5<br>+4:5     | A7-8            | 230/60           |
| Albania                  | . 60          | SECAM                     | +6.5                                  | 1                                       | 220/50           | Lesotho                |                   | PAL          | 9+                 | 10, 25, 29      | 220/50           |
| Algeria                  | В             | PAL                       | +5.5                                  | E5-11                                   | 220/50           | Liberia                | В, Н              | PAL          | +2.5               | E6-10           | 120/60           |
| Andorra                  | В             | PAL                       | +5.5                                  | 1                                       | 220/50           | Libya                  |                   | SECAM        | +5.5               | E5-11           | 230/50           |
| Angola                   | _             | PAL                       | 9+                                    | E3                                      | 220/50           | Liechtenstein          |                   | PAL          | +5.5               | E2-12, 21-69    | 220/50           |
| Antigua and Barbuda      | Σ             | NTSC                      | +4.5                                  | A7-10                                   | 230/60           | Luxembourg             |                   | PAL          | +2.5               | E7, 21          | 220/50           |
| Antiles                  | Σ             | NTSC                      | +4.5                                  | A3-13                                   | 120/60           | Macao                  | _ :               | PAL          | +2:2               | 21-38           | 110/50           |
| Argentina                | z <u>-</u>    | PAL                       | +4.5                                  | A2-13                                   | 220/50           | Madagascar             | <b>∠</b> 0        | SECAM        | + <del>+</del> 6.5 | K5<br>EE 12     | 220/50           |
| Ascension is.            | _ 0           | ¥ .                       | 0 L                                   | 200                                     | 1000             | Madella                |                   | 7 - 4        | )<br> -<br> -      | E3-12           | 220/30           |
| Australia<br>Δuetria     | ى<br>تە ھ     | PAL<br>PAI                | + +<br>5<br>5<br>5                    | 0-11, 28-69<br>1-12, 21-68              | 240/50           | Malawi                 | o (c              | PAL          | + +<br>52.53       | -<br>F2-10      | 230/50           |
| Azores                   | )<br>()<br>() | PAL                       | + 22.52                               | E7-9                                    | 220/50           | Maldives               |                   | PAL          | +5.5               | E7 ::           | 220/50           |
| (US Forces)              | Σ             | NTSC                      | +4.5                                  | A5                                      |                  | Mali                   | ↘                 | SECAM        | +6.5               | 1               | 220/50           |
| Bahamas                  | Σ             | NTSC                      | +4.5                                  | A13                                     | 120/60           | Malta                  | B, G              | PAL          | +5.5               | E10             | 240/50           |
| Bahrain                  | В             | PAL                       | +2.5                                  | E4                                      | 230/50           | Martinique             | ¥                 | SECAM        | +6.5               | K4-8            | 220/50           |
| Bangladesh               | В             | PAL                       | +5.5                                  | E5-11                                   | 230/50           | Mauretania             | ¥                 | SECAM        | +6.5               | E5              | 220/50           |
| Barbados                 | Z             | NTSC                      | +4.5                                  | A3                                      | 110/50           | Mauritius              | <b>а</b> :        | SECAM        | +2.2               | E4-11           | 230/50           |
| Belgium                  | B, G          | PAL                       | +5.5                                  | 1-12, 21-68                             | 220/50           | Mexico                 | Σ                 | NISC         | +4.5               | A2-13, 14-45    | 120/60           |
| Belize                   | Σ:            | NTSC                      | +4.5                                  | ı                                       | į                | Micronesia             | Σ:                | NISC         | + 4.5<br>5 r       | <b>A</b> 4      | 120/60           |
| Benin                    | <b>∠</b> ∶    | SECAM                     | +6.5                                  | ;<br>;                                  | 220/50           | Midway Is.             | ≥ c               | NISC         | + 4<br>5 7         | A4<br>740<br>90 | 120/60           |
| Bermuda                  | ∑ մ           | NISC<br>01                | 44.5                                  | A8-10                                   | 120/60           | Monaco                 | ۇ د<br>ب          | SECAM        | က်<br>ကို<br>ကို   | E 10, 30, 35    | 127/50           |
| brutar<br>Polivia        | o 2           | MTCC                      | + +<br>                               | 62<br>A7 10                             | 120/50           | Monteorrat             | 2 د               | NTSC         | + +<br>2.5.5       | C-17<br>A7      | 230/60           |
| Bolivia                  | Z _           | NI SC                     | + +<br>• •                            | 71-68                                   | 220/50           | Morocco                | I<br>m            | SECAM        | + -                | M4-10           | 220/50           |
| Brazil                   | . ≥           | PAI                       | +4.5                                  | A2-13                                   | 110/50           | Mozambiaue             |                   | PAL          | + 2.5              | E3              | 220/50           |
| Brunei                   | <u> </u>      | PAL                       | + 2.5                                 | E5-8                                    | 230/50           | Namibia                | ) _               | PAL          | 9+                 | SA4-10          | 220/50           |
| Bulgaria                 | Ω             | SECAM                     | +6.5                                  | R7-12                                   | 220/50           | Nepal                  |                   | PAL          | +5.5               | E3              | 230/50           |
| Burma                    | Σ             | NTSC                      | +4.5                                  | ı                                       | 220/50           | Netherlands            | മ്<br>വ           | PAL          | +2.5               | E1-12           | 220/50           |
| Burundi                  | ⊻:            | SECAM                     | +6.5                                  | ı                                       | 220/50           | New Caledonia          | <u>-</u> (        | SECAM        | +6.5               | K4-10           | 220/50           |
| Cameroon                 | <b>∠</b> ∶    | SECAM                     | +6.5                                  | 1 4 0 4 0 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 127/50           | New Zealand            | n Z               | PAL          | + 5.5<br>2 4       | NZ1-9           | 230/50           |
| Canada                   | . Σα          | )<br> <br> <br> <br>      | + + + + + + + + + + + + + + + + + + + | AZ-13, A15-30<br>E3-10                  | 220/50           | Nicer                  | ≅ ⊻               | SECAM        | + +<br>5 4<br>5 7  | K4-9            | 220/50           |
| Central African Rep.     | 2 <b>×</b>    | SECAM                     | +6.5                                  | 2 1                                     | 220/50           | Nigeria                | 2 00              | PAL          | +2.5               | E2-10           | 230/50           |
| Chad                     | ¥             | SECAM                     | +6.5                                  | I                                       | 220/50           | Norway                 | В, G              | PAL          | +5.5               | E2-10, 44       | 230/50           |
| Chile .                  | Σ             | NTSC                      | +4.5                                  | A2-13                                   | 220/50           | Okinawa                |                   | NTSC         | +4.5               | A8, J6          | 100/60           |
| China                    | ٥             | PAL                       | +6.5                                  | R1-5                                    | 220/50           | Oman                   | B, G              | PAL          | +5.2               | E5-12           | 220/50           |
| Colombia                 | ∑ (           | SECAM                     | +4.5                                  | A2-13                                   | 110/60           | Pakistan               | m :               | PAL          | + 5<br>- 5<br>- 1  | E4-10           | 230/50           |
| Congo                    | <b>a</b> :    | SECAM                     | +6.5                                  | ۳/<br>:                                 | 220/50           | Panama<br>S            |                   | אומ<br>פייני | +<br>0 i           | A2-12           | 120/60           |
| Costa Rica               | ΣΣ            | NISC                      | +4.5                                  | A2-12                                   | 120/60           | Papua-New Guinea       | ъ, <b>х</b>       | PAL          | + -<br>5 -<br>5 -  | 1 <             | 240/50           |
| Cuba                     | 2 2           | NI OC                     | + -<br>5 4                            |   | 220/60           | raiaguay               | ∑ ≥               | NTO C        | + +<br>+ 5<br>5 K  | Δ2-13           | 220/20           |
| Curação                  |               | SECAM                     | + +<br>•                              | Ao-13, A19<br>F6-11, 35-38              | 240/50           | Philippines            | Σ≊                | NTSC         | + + 45             | A2-13           | 110/60           |
| Cyprus (Turkish)         | ე <u>თ</u>    | PAL                       | + 2.5                                 | E5-11, 24-33                            | 20121            | Poland                 | ,<br>7            | SECAM        | +6.5               | R1-12,21-37     | 220/50           |
| Czechoslovakia           |               | SECAM                     | +6.5                                  | R1-12, 21-39                            | 220/50           | Portugal               | В, G              | PAL          | +5.5               | E2-11, 25-46    | 220/50           |
|                          |               |                           |                                       |   |                  |                        |                   |              |                    |                 |                  |

| 120/60<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50<br>220/50   |
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| K4  A8  K5  -  A2-13  E2-12, 33-41  A2-10  E3-11  A2-20  E2  E2  E2  E2  E2  E2  E3-11  E3-13  E3-14  A3-13  E3-14  A3-13  E4-7  E4-10  E5-11, 24-56  AA-1, 21-68  E5-11, 24-36  A3-13  B1-12, 24-36  A-1, 24-56  A-1, 24-34  A-1, 21-34          |
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# TV Fault Finding

#### Mitsubishi CT2224B etc

Several Mitsubishi sets have chassis that are similar to the one in this model and the following tip seems worth passing on – we've encountered the same fault several times. The symptom is a very elusive intermittent loss of sound and picture and the cause is dry-joints at the legs of the line driver transformer T751. The bad joints are not always obvious on inspection. Flux and solder all four pins.

#### Panasonic TC2110

This set was dead with the chopper transistor Q803 short-circuit. With many of today's switch-mode power supplies the demise of a power transistor can be due to an open-circuit resistor (usually of high value), a short-circuit diode, etc. This was no exception: R803  $(330k\Omega)$  was open-circuit.

#### Ferguson 20E1 (TX90 Chassis)

This one had field collapse and the customer had left the set running while listening to the snooker commentary. The field output transistors TR104 and TR105 and zener diode D137 were all short-circuit. Replacing these components still left us with field collapse and further checks revealed that the collector of TR104 was at 40V instead of 100V. Zener diode D106 was suspected but in fact the feed resistor R268 was open-circuit. Note that some of these items are present only in the 20in. version of the chassis.

A.D.

#### GEC 20AX Mk II Chassis

This fault could apply to any of these sets with the combined decoder with i.f. module and tuner. The symptom was an intermittently blue picture. Remove the back and the fault cleared of course. As a first step the TDA2530 chip was replaced since this is the only component common to the missing green and red outputs, but the fault persisted and couldn't be provoked by heating, freezing or prodding around. Eventually it stayed on long enough for measurements to be made around the chip. We found that the blue output pin was at 7.5V while the red and green output pins were at 11V. At these voltage levels the red and green output stages should have been fully on, not off. Further checks revealed that the blue output transistor's emitter voltage was correct at 6.8V but the voltage at the emitters of the red and green output transistors was 11V. The cause of the fault was a feedthrough solder rivet in the print - it disconnected the green and red output stages from the 6-8V reference line.

A.D

#### Ferguson TX10 Chassis

For low width check the resistance value of the width control RV851. In one case recently it had fallen from  $220k\Omega$  to  $70k\Omega$ .

#### **Grundig P1223 Portable**

I've had a spate of Grundig monochrome portables recently with low gain. They have a combined tuner/i.f.

Reports from Eugene Trundle, Alfred Damp, Philip Blundell, Eng. Tech., G. Hewins, J. R. Armagh, Roger Burchett, Nick Beer and Ian Bowden.

unit that's expensive, even on an exchange basis. A rough test for the r.f. f.e.t. is to measure across R2007 (the  $100k\Omega$  resistor between its gate and source) with a digital meter. If the f.e.t. is faulty you'll get a reading of about  $2k\Omega$ . If the set is being used in an area with a reasonable signal you can fit the BF961 transistor from the v.h.f. r.f. amplifier stage in the u.h.f. position.

#### Pye K30 Chassis

The versions of the K30 chassis that use a slide-out tuning draw have a tendency to suffer from tuning drift. If caught in the early stages, resoldering the crimped plug connections on the drawer and switchbank usually does the trick, but if the drawer has been slid out a lot of times the solid cored wires can break.

P.B.

#### Some Quickies

Here are some quickies with a common theme. In each case an i.c. was wrongly suspected!

Ferguson 38000 (1696 chassis): The fault was loss of sync and field collapse after running for a few minutes. The TDA1044 field timebase chip was suspected but the cause was the series regulator transistor. A TIP42A seems to work quite happily in this position.

**Grundig 4400 etc.:** The fault was buzz on sound after about two hours. The TDA120U chip was changed but the culprit was the  $3.3\mu$ F tantalum capacitor C2216 (C216 in some chassis) which was leaky.

Ferguson 3878: The brightness increased over a period of about half an hour until the picture "swamped". The TDA2560 chip in the decoder was suspected but the cause of the trouble was the  $1\mu$ F tantalum capacitor CG05 connected to pin 12. This is the 14in. colour portable manufactured by NordMende.

**Grundig CUC120 chassis:** There was field collapse and R2761 (6·8 $\Omega$ ) was burnt. Naturally the TDA1170 chip was suspected but C2762 (1,000 $\mu$ F, 35V) was short-circuit. **Ferguson TX90 chassis:** The symptom was patterning but

no picture. The TDA4500 chip was changed but the trouble was due to C121 (0.01 $\mu$ F) being leaky. G.H.

#### Hitachi CPT1455

After repairing a dead power supply we got a picture with a few vertical striations on the left-hand side. A scope check at the tube's first anode produced a tell-tale pulse and ring display. Adding extra capacitance did nothing to help so the earth print had to be open-circuit. It was – there was an almost invisible crack on the c.r.t. base panel. It had been caused by the drag of the leads to chassis while I had the chassis out. I've been bothered by this sort of thing several times recently, on new sets of various makes, especially on very large panels.

J.R.A.

#### Fidelity F14

In the June issue I mentioned a problem with teletext lines over the top third of the raster, the picture being otherwise o.k. (Hitachi NP81CQ chassis), and asked whether such a display is usual in other sets when the blanking fails. Then this Fidelity F14 came in with identical symp-

toms. So straight to the blanking circuit where C63 was found to be open-circuit. Just to help, it's carefully disguised on the chassis layout as a wire link, near the back of the set. These are the only two blanking faults I've had in years!

J.R.A.

#### Hinari CT4/5/6/7

We've had several of these sets where the tuning has been critical to keep the colour on. The solution is to turn the a.f.c. on when tuned as near as you can then adjust L131 slightly – we find that one quarter or one eighth of a turn is enough. As always in such cases, mark the position before you start. It's best to carry out this adjustment in the field as the problem may show up in the customer's home when the set worked all right in the workshop.

J.R.A.

#### Hitachi CNP190/192 etc

There was colour in the central area but monochrome only on the left- and right-hand sides. Now the modern whiz kid doesn't need to know about the  $7.8 \mathrm{kHz}$  ripple from the burst detector being rectified, smoothed and used to operate the colour killer, but being an old hand I did. I went straight to C561 ( $22\mu\mathrm{F}$ ) and for once got it right first time.

J.R.A.

#### Thorn 3000 with Spectrum 128K

The computer worked well with an elderly GEC C2110 series set but with this even older model the sound was very low with considerable background noise. Off-air sound was acceptable. Careful readjustment of the 33·5MHz rejector coil L101 improved matters no end. Spectrum modulators are not all that good, and this one was particularly bad. Both these old sets accepted the Spectrum's sync pulses with no problems – no bouncing or line twitching at all.

#### **More Quickies**

**Philips CTX-S chassis:** A common complaint now is "picture just fades away, sound remains o.k." The cure is to resolder all the line output transformer pins – they'll usually need it. The ones that cause this particular fault are 2 and 8 which provide the tube's heater supply.

Rank T26 chassis: For intermittent lack of sound resolder the pins of the audio chip (top left of the i.f./decoder panel, with the large heatsink).

R.B.

#### **Amstrad CTV2000**

This set would intermittently trip. By looking in at the back under dim lighting conditions we could see that the case of the line output transformer was breaking down and arcing to chassis.

N.B.

#### Ferguson 20C3 (TX100 Chassis)

This set came from the shop with the complaint "dead" and it sure was! The 2.5A mains fuse was open-circuit – well blackened – so attention was centred on the chopper transistor TR6. A check revealed that it was short-circuit all ways round. We also found that D13 in its base circuit had shorted. After replacing these two items everything seemed to be o.k. so we switched on. Bang! There was a flash that made the three fluorescent lights look dim and

FS1 and TR6 had again bitten the dust. This time D13 had survived but the h.t. rectifier D15 was short-circuit, which it hadn't been two minutes previously.

A new BY299 h.t. rectifier was fitted and the other items were replaced, along with D13 for good measure, and bless my soul the set ran – for about two and a half minutes. The whole lot had gone again! Now the 119V h.t. supply is used by the tuning circuit as well as the line output stage, and although the aerial had been plugged in there had been no tuning. Interesting! The ZTK33ADPD tuning voltage regulator IC2006 was suspect but the culprit turned out to be the nearby transistor TR2016 (BF460) which was short-circuit collector to emitter. It's associated with the memory in IC2007. When this was put right the set continued to run.

#### B and O 77XX Series

This set wouldn't switch on from standby. There had been a complaint about intermittent trouble a week earlier and a field engineer had resoldered some suspect joints in the deflection circuit. Now the fault was permanent and the set was in the workshop. When this fault arises I usually dive for the 5·2V supply on the tuning/control panel (PCB55). This voltage is critical and any intermittent trouble of this sort can usually be cured by careful adjustment. In this case the rail, which can be conveniently measured across C7, was low at about 3·7V, so I knew I was on the right lines. It didn't take long to find that TR9 (BC547) was very high resistance between its base and emitter.

#### Panasonic TC2207 (U2 Chassis)

The complaint was of a generally low picture. A colleague had checked the ever-suspect A56-540X tube, but it was tracking well. He'd also discovered that the ABL potentiometer R555 had no effect. When we traced the line back to the TDA2560 chip on the signals panel we discovered that R305 (820k $\Omega$ ) was open-circuit. It's situated right underneath plug CO-2AP.

#### **Decca Series 10 Chassis**

The complaint was no sync. Switching the set on confirmed this, but the fault cleared after about ten minutes. It was affected as soon as the back was removed or replaced. The cause was located by prodding and poking: there were dry joints on the i.f. panel's multi-pin plug.

N.B.

#### B and O 39XX (Beovision 5000, 6000)

When this set was first switched on the protection circuit would operate once then the set would be all right. The fault was narrowed down to the 25V supply. If this is low, due to excessive current, the protection circuit detects this and closes down the power supply. The cause of the trouble turned out to be a faulty reservoir capacitor, 0C2  $(3,300\mu\text{F},35\text{V})$ .

#### Salora 1H4 (Ipsalo 2)

This set was dead. Both the primary switching transistors TB700 and TB701 in the power supply were short-circuit and the  $22\Omega$  filter resistor RB713 was open-circuit. The cause of the fault was traced to the scan coil coupling capacitor CB532 (0·33 $\mu$ F, 250V) which had a dry-joint at the left-hand side. This made it heat up and expand. **I.B.** 

| EC   | 10                                   | NON   | Ш                                    | C D  | ΕV                                     | /IC   | ES                                   | PO  | E                                    | OX   |  | 5, V   | 10                                     | LVE   | E                                      | HA   | M  | PTO  | N  | , W  | V2   | 4.4  | Z  |
|--|--------------------------------------|---|--------------------------------------|--|--|---|--------------------------------------|---|--------------------------------------|--|--|--|--|---|--|--|--|--|--|--|--|--|--|
| 15/80H<br>15/85R<br>17052<br>17053<br>17974              | 3.30<br>3.30<br>5.61<br>5.61<br>9.30 | 2SC1826<br>2SC1829<br>2SC1875<br>2SC1893<br>2SC1906 | 0.67<br>2.22<br>4.50<br>3.02<br>0.98 | AN206<br>AN208<br>AN210<br>AN211<br>AN2140     | 2.58<br>3.55<br>2.28<br>3.25<br>2.40   | BC207<br>BC212B<br>BC213L<br>BC214<br>BC225   | 0.14<br>0.26<br>0.10<br>0.10<br>0.40 | 8DX54B<br>BDX62A<br>BDX63A<br>BDY20<br>BDY81            | 2.15<br>2.15<br>1.96<br>1.21<br>1.05 | BU205<br>BU206<br>BU207<br>BU208<br>BU208/02                 | 1.15<br>1.27<br>1.65<br>1.20<br>1.97     | HA1196<br>HA13001<br>HA1306<br>HA13402<br>HA13342            | 7.43<br>1.73<br>2.26<br>7.87<br>2.65   | MC1351P<br>MC1352P<br>MC1357P<br>MC1358P<br>MC14001     | 2.96<br>2.50<br>2.15<br>1.35<br>2.40   | SAS560T<br>SAS570T<br>SAS570S<br>SAS580<br>SAS6600           | 5.42<br>5.42<br>2.61<br>2.25                   | STR440<br>STR451<br>STR453<br>STR454<br>STR6020              | 4.78<br>5.36<br>8.16<br>4.95                 | TBA940<br>TBA950<br>TBA970<br>TBA990                           | 1.87<br>1.84<br>3.56<br>1.98                 | TDA4431<br>TDA4440<br>TDA4442<br>TDA4500                       | 2.27<br>3.26<br>4.15<br>4.75                 |
| 17089<br>17127<br>17376<br>1N4001                        | 3.45<br>2.50<br>1.58<br>0.04         | 2SC1921<br>2SC1923<br>2SC1929<br>2SC1942            | 1.37<br>0.30<br>2.25<br>1.65         | AN234<br>AN236<br>AN240P<br>AN241              | 5.92<br>3.78<br>1.25                   | BC237<br>BC238<br>BC238B<br>BC239B            | 0.10<br>0.10<br>0.08<br>0.25         | BF115<br>BF117<br>BF118<br>BF121                        | 0.40<br>0.66<br>0.67<br>0.25         | BU208A<br>BU208D<br>BU209<br>BU226                           | 1.12<br>1.95<br>1.50<br>2.45             | HA13365<br>HA1366WR<br>HA1367<br>HA1368R                     | 4.02<br>1.51<br>2.75<br>2.45           | MC14001<br>MC14013<br>MC14493P<br>MC14494P<br>MC14497   | 0.41<br>7.65<br>2.15<br>3.46           | SAS660<br>SAS6700<br>SAS670<br>SAS6710                       | 1.33<br>2.97<br>1.33<br>3.96<br>2.21           | T6029V<br>T6035V<br>T6036<br>T6037                           | 5.25<br>5.75<br>0.73<br>0.67<br>2.11         | T8A990Q<br>TCA270Q<br>TCA270S<br>TCA270SQ<br>TCA290A           | 1.68<br>1.86<br>0.95<br>1.05<br>2.39         | TDA4600-2<br>TDA4610<br>TDA4620<br>TDA5500<br>TDA5700          | 2.10<br>6.88<br>4.78<br>6.20<br>2.75         |
| 1N4002<br>1N4003<br>1N4004<br>1N4005                     | 0.06<br>0.06<br>0.05<br>0.05         | 2SC1959<br>2SC1957<br>2SC1953<br>2SC1962            | 0.26<br>1.09<br>1.93<br>1.93         | AN245<br>AN253<br>AN260<br>AN272               | 4,50<br>1,80<br>3,85<br>8,25           | BC251A<br>BC294<br>BC300<br>BC301             | 0,31<br>0.50<br>0.35<br>0.45         | BF123<br>BF127<br>BF137<br>BF153                        | 0.21<br>0.13<br>0.29<br>0.58         | BU326<br>BU326A<br>BU406<br>BU406D                           | 2.00<br>2.20<br>1.49<br>1.79             | HA1368<br>HA1370<br>HA1374<br>AA117                          | 1.76<br>3.30<br>4.80<br>9              | MC14510BAL<br>MC14511BCP<br>MC14528BCP<br>MC1712        | 3.75<br>1.10<br>2.15<br>3.88           | SBA750<br>SC84203<br>SC9504P<br>SDA2006                      | 1.61<br>19.35<br>1.46<br>17.95                 | T6044V<br>16045<br>16049<br>16052V                           | 0.97<br>1.20<br>1.45<br>0.87                 | TCA420A<br>TCA440<br>TCA530<br>TCA640                          | 2.16<br>2.25<br>2.24<br>2.25                 | 1DA7270S<br>1DA8190<br>1DA9403<br>TDA9503                      | 2.75<br>2.75<br>3.15<br>1.95                 |
| 1N4006<br>1N4007<br>1N4148<br>1N4448<br>1N5401           | 0.08<br>0.07<br>0.03<br>0.05         | 2SC1969<br>2SC1983<br>2SC1985<br>2SC2009            | 2.04<br>2.21<br>1.55<br>0.34         | AN301<br>AN302<br>AN305                        | 5.52<br>2.00<br>1.93<br>3.20           | BC302<br>BC303<br>BC307A<br>BC308A            | 0.53<br>1.04<br>0.08<br>0.11         | BF154<br>BF157<br>BF158<br>BF159                        | 0.26<br>0.33<br>0.18<br>0.18         | BU407<br>BU412<br>BU426A<br>BU500                            | 0.82<br>5.29<br>1.13<br>1.45             | HA1389R<br>HA1389R<br>HA1389<br>HA1392                       | 1.75<br>2.05<br>2.39<br>2.17           | MC5192<br>MC7724CP<br>MC7818C<br>MCR106-5/6             | 19.50<br>3.49<br>2.18<br>0.95          | SDA2112/2<br>SG264A<br>SG613<br>SG629                        | 12.85<br>6.45<br>10.75<br>8.27                 | T6058<br>T6059<br>T9003V<br>T9005V                           | 3.06<br>2.77<br>1.25<br>2.38                 | TCA650<br>TCA6608<br>TCA730<br>TCA750                          | 3.05<br>2.60<br>3.81<br>2.25                 | TDA9513<br>TDB1033<br>TDE1081<br>TEA1002                       | 3.15<br>2.68<br>7.05<br>2.30                 |
| 1N5402<br>1N5403<br>1N5404<br>1N5408                     | 0.15<br>0.16<br>0.15<br>0.35         | 2SC2029<br>2SC2028<br>2SC2063<br>2SC2078<br>2SC2073 | 2.33<br>2.11<br>0.99<br>3.11<br>2.25 | AN315<br>AN316<br>AN318<br>AN320<br>AN321      | 1.29<br>3.50<br>4.41<br>5.47<br>2.25   | BC309<br>BC317A<br>BC327<br>BC328<br>BC337    | 0.17<br>0.13<br>0.15<br>0.10<br>0.09 | BF160<br>BF167<br>BF173<br>BF177<br>BF178               | 0.31<br>0.38<br>0.34<br>0.35<br>0.40 | 8U508A<br>8U536<br>8U608<br>8U705<br>BU806                   | 1.25<br>1.65<br>1.80<br>2.95<br>1.79     | HA1394<br>HA1397<br>HA1398<br>HA1406<br>HA1452               | 1.95<br>2.17<br>2.29<br>1.30<br>0.85   | MCR220/7<br>ME0411<br>ME6002<br>ME6102<br>ME8001        | 0.28<br>0.26<br>0.28<br>0.34           | SG6533<br>S11125H<br>S11225HD<br>S11630HD<br>SKE2F1/04       | 11.96<br>7.50<br>18.35<br>20.50<br>1.39        | T9011V<br>T9013V<br>T9014V<br>T9016<br>T9019VV               | 1.40<br>4.95<br>2.42<br>1.02                 | TCA8000<br>TCA830S<br>TCA890<br>TCA900                         | 6.95<br>2.38<br>5.44<br>2.04                 | TEA1009<br>TEA1014<br>TEA1020SP<br>TIC106C                     | 1.50<br>2.50<br>8.21<br>0.61                 |
| 1N914<br>1S1555<br>1S44<br>1S921                         | 0.04<br>0.31<br>0.10<br>0.10         | 2SC2085-Q<br>2SC2091<br>2SC2141<br>2SC2166          | 1.65<br>1.30<br>2.44                 | AN322<br>AN337<br>AN340P<br>AN355              | 5.85<br>5.37<br>1.17<br>5.98           | BC338<br>BC368<br>BC440<br>BC441              | 0.10<br>0.24<br>0.69<br>0.44         | BF179<br>BF180<br>BF181<br>BF182                        | 0.36<br>0.36<br>0.32<br>0.34         | BU807<br>BU826A<br>BUW84<br>BUX84                            | 0.80<br>1.95<br>1.39<br>1.00             | HD14538<br>HD38702-A2<br>HD38750A53<br>HD38750A-7            | 2.07<br>7.95<br>10.44<br>7.25          | ME0411<br>MJ2501<br>MJ3001<br>MJ481                     | 0.75<br>3.30<br>1.76<br>1.53           | SKE2G3/04<br>SKE4F1/06<br>SKE4F2/08<br>SKE4F2/06             | 0.85<br>0.35<br>1.07                           | T9034V<br>F9035V<br>T9051<br>T9054V                          | 1.98<br>1.45<br>1.95<br>6.95<br>5.34         | TCA910<br>TCA940<br>TCA940E<br>TD3F800R<br>TD3F900H            | 2.04<br>2.47<br>2.93<br>3.66<br>4.16         | TIC106M<br>TIC44<br>TIC45<br>TIC47<br>TIP120                   | 0.77<br>0.72<br>0.50<br>0.35<br>1.06         |
| 2N2219A<br>2N3053<br>2N3054<br>2N3055<br>2N3442          | 0.33<br>0.35<br>0.99<br>0.61<br>1.56 | 2SC2216<br>2SC2233<br>2SC2236<br>2SC2278<br>2SC2314 | 1.65<br>1.69                         | AN362<br>AN370<br>AN5111<br>AN5120N<br>AN5132  | 1.32<br>3.95<br>3.43<br>4.50<br>5.39   | BC454<br>BC460<br>BC461<br>BC462<br>BC463     | 0.36<br>0.42<br>0.35<br>1.15         | BF183<br>BF184<br>BF185<br>BF194                        | 0.39<br>0.43<br>0.39<br>0.14         | BUX85<br>BY126<br>BY127<br>BY133                             | 1.10<br>0.13<br>9.08<br>0.12             | HD38800A50<br>HD44801A05<br>HISH1010<br>HISH1004             | 14.09<br>19.98<br>8.59<br>6.00         | MJ802<br>MJE2955<br>MJE3055<br>MJE340                   | 4.90<br>1.89<br>1.25<br>0.49           | SKE4F2/10<br>SKE4G2/02<br>SKE5F3/10<br>SKS1/10               | 1.24<br>0.96<br>1.60<br>2.15                   | 19057V<br>19062V<br>19064<br>TA7027                          | 0.70<br>0.49<br>1.25<br>4.80                 | TD62706P<br>TDA10018<br>TDA1003A<br>TDA1005A                   | 4.50<br>2.31<br>2.25<br>2.38                 | TIP110<br>TIP112<br>TIP117<br>TIP121                           | 0.45<br>0.54<br>0.50<br>0.50                 |
| 2N3702<br>2N3703<br>2N3705<br>2N3706                     | 0 14<br>0 18<br>0 16<br>0 14         |   | 12.95<br>1.26<br>3.92                | AN5250<br>AN5610<br>AN5612<br>AN5613           | 4,40<br>5,50<br>2,30<br>4,20           | BC478<br>BC479<br>BC532<br>BC546              | 0.64<br>0.22<br>0.41<br>0.28<br>0.08 | BF195<br>BF196<br>BF197<br>BF198<br>BF199               | 0.14<br>0.17<br>0.18<br>0.17<br>0.17 | BY164<br>BY176<br>BY179<br>BY182<br>BY187                    | 0.44<br>0.52<br>1.08<br>0.95<br>0.77     | HISH1002<br>HM6231<br>HM6232<br>HM6251<br>HM7103             | 9.50<br>9.81<br>5.25<br>5.25<br>4.85   | MJE520<br>ML231<br>ML232B<br>ML237B<br>ML238            | 0.49<br>3.33<br>3.01<br>2.51<br>5.77   | SL1310<br>SL1430T<br>SL414<br>SL432A<br>SL439                | 3.14<br>0.89<br>3.69<br>3.44<br>2.48           | TA7050<br>TA7051<br>TA7054<br>TA7060AP<br>TA7061AP           | 1.74<br>1.74<br>0.80<br>0.71<br>1.27         | TDA1006A<br>TDA1010AF<br>TDA1011<br>TDA1010<br>TDA1011A        | 2.11<br>4.25<br>0.95<br>1.28<br>1.03         | TIP126<br>TIP132<br>TIP137<br>TIP29<br>TIP2955                 | 0.73<br>0.99<br>1.50<br>0.84<br>0.95         |
| 2N3707<br>2N3711<br>2N3771<br>2N3772<br>2N3773           | 0.16<br>0.13<br>0.70<br>1.71         | 2SC2577<br>2SC2578<br>2SC2671<br>2SC288A            | 6.75<br>1.99<br>1.85                 | AN5630<br>AN5701N<br>AN6250<br>AN6300          | 3.95<br>1.66<br>0.33<br>4.40           | BC547<br>BC548<br>BC549<br>BC550              | 0.10<br>0.12<br>0.10<br>0.10         | BF200<br>BF218<br>BF224<br>BF237                        | 0.37<br>0.36<br>0.17<br>0.65         | BY189<br>BY198<br>BY207<br>BY208                             | 1.79<br>1.52<br>0.22<br>0.46             | HM9032<br>HM9012<br>HM9015<br>HT4207                         | 9.98<br>3.22<br>3.24<br>17.16          | ML923<br>ML926<br>MM5314N<br>MM5316N                    | 3.00<br>3.98<br>8.99<br>9.16           | SL471<br>SL480<br>SL490<br>SL901B                            | 2.50<br>3.98<br>1.25<br>6.95                   | TA7069<br>TA7070P<br>TA7072P<br>TA7074P                      | 3.13<br>1.83<br>2.57<br>1.98                 | TDA1028<br>TDA1034B<br>TDA1035S<br>TDA10351                    | 2.45<br>2.42<br>2.95<br>1.85                 | TIP29A<br>TIP29B<br>TIP29C<br>TIP29D                           | 0.46<br>0.63<br>0.40<br>0.75                 |
| 2N3819<br>2N3823<br>2N3904<br>2N3908                     | 2.00<br>0.54<br>1.17<br>0.62<br>0.62 | 2SC3153<br>2SC372<br>2SC373<br>2SC383<br>2SC388     | 1.40                                 | AN6310<br>AN6340<br>AN6341<br>AN6363<br>AN6531 | 4.54<br>10.14<br>1.43<br>16.00<br>1.95 | BC556<br>BC557<br>BC558<br>BC559<br>BC560C    | 0.10<br>0.10<br>0.10<br>0.10         | BF240<br>BF241<br>BF245<br>BF245B<br>BF246A             | 0.17<br>0.15<br>0.50<br>0.49<br>2.52 | BY210 400<br>BY210 600<br>BY210 800<br>BY218<br>BY223        | 0.19<br>0.27<br>0.30<br>1.64<br>1.23     | HT4208<br>KA2101<br>KC581C<br>KC582C<br>L200CV               | 20.65<br>2.92<br>7.60<br>3.97<br>1.69  | MM5318N<br>MM5369N<br>MM5387AA/N<br>MM5841N<br>MN1400VL | 3.11<br>2.01<br>6.20<br>6.64<br>13.65  | SL918A<br>SN16861ANO<br>SN16862AN<br>SN16966N<br>SN29717N    | 9.07<br>1.95<br>2.98<br>10.25<br>7.19          | 1A7076P<br>1A7089P<br>TA7092P<br>TA7093P<br>TA7102P          | 7.80<br>2.82<br>8.65<br>3.99                 | TDA1037<br>TDA1037D<br>TDA1044<br>TDA1047                      | 1.95<br>2.05<br>1.95<br>3.25                 | TIP3055<br>TIP30A<br>TIP30C<br>TIP31A                          | 0.75<br>0.41<br>0.16<br>0.34                 |
| 2N4101<br>2N4240<br>2N4444<br>2N5293                     | 1.73<br>3.30<br>0.99<br>0.50         | 2SC494V<br>2SC403C<br>2SC458<br>2SC495              | 0.81<br>0.60<br>0.15<br>0.92         | AN6551<br>AN6552<br>AN6610<br>AN7111           | 1.35<br>0.68<br>2.40<br>1.25           | BC635<br>BC636<br>BC637<br>BC639              | 0.36<br>0.28<br>0.24<br>0.20         | BF255<br>BF256<br>BF257<br>BF258                        | 0.20<br>0.38<br>0.34<br>0.36         | BY224 600<br>BY226<br>BY227<br>BY228                         | 1.88<br>0.25<br>0.20<br>0.50             | LA1201<br>LA1210<br>LA1230<br>LA1320                         | 0.75<br>1.33<br>1.05<br>2.87           | MN1405<br>MN1435VX<br>MP1192<br>MP2794                  | 12.50<br>12.40<br>5.07<br>4.00         | SN29715N<br>SN29715N<br>SN29722<br>SN29723AN                 | 3.66<br>6.04<br>11.95<br>8.77                  | TA7108P<br>TA7109<br>TA7122B/P<br>TA7124P                    | 5.88<br>1.61<br>3.71<br>0.92<br>2.34         | TDA 1059B<br>TDA 1054M<br>TDA 1060<br>TDA 1082<br>TDA 1151     | 0.98<br>1.35<br>2.60<br>3.25<br>1.22         | TIP318<br>TIP31C<br>TIP32A<br>TIP32B<br>TIP32C                 | 0.30<br>0.50<br>0.35<br>0.69<br>0.40         |
| 2N5294<br>2N5296<br>2N5297<br>2N5298<br>2N6109           | 0.50<br>0.49<br>0.50<br>0.61<br>1.58 | 2SC515A<br>2SC535<br>2SC536<br>2SC537<br>2SC606L    | 0.79<br>0.45<br>0.54                 | AN7115<br>AN7145<br>AN7146<br>AN7151<br>AN7156 | 3,38<br>1.68<br>2.05<br>2.37<br>2.85   | BC640<br>BCX34<br>BD115<br>BD116<br>BD124     | 0.24<br>0.18<br>0.34<br>0.70<br>1.31 | BF259<br>BF262<br>BF263<br>BF271<br>BF273               | 0.34<br>0.28<br>0.57<br>0.34<br>0.20 | BY229 1000<br>BY229 600<br>BY255<br>BY295-600<br>BY298       | 1.12<br>0.92<br>0.66<br>1.03<br>0.36     | LA1357N<br>LA1363<br>LA1364<br>LA1365J<br>LA1385             | 11.07<br>1.05<br>3.02<br>2.08          | MP2812<br>MP8512<br>MPC596<br>MPF256C<br>MPS6570        | 5.07<br>1.57<br>2.13<br>0.60           | SN29764AN<br>SN29767<br>SN29770BN<br>SN29772BN               | 1.65<br>4.90<br>1.95<br>4.91                   | TA7129P<br>TA7130P<br>TA7136AP<br>TA7137P                    | 1.50<br>0.63<br>1.89<br>0.73                 | TDA1190<br>TDA1190Z<br>TDA1200<br>TDA1235                      | 2.11<br>3.96<br>1.51<br>3.88                 | TIP33<br>TIP33A<br>TIP33C<br>TIP34                             | 0.85<br>1.05<br>0.80<br>0.50                 |
| 2N6130<br>2N6133<br>2N6180<br>2N6292                     | 0.80<br>1.25<br>0.95<br>1.65         | 2SC620<br>2SC643A<br>2SC668<br>2SC681               | 0.95<br>1.54<br>0.67                 | AN7158<br>AN7218<br>AN7223<br>AU107            | 2.34<br>1.64<br>4.25<br>3.50           | BD131<br>BD132<br>BD133<br>BD135              | 0.57<br>0.20<br>0.53<br>0.36         | BF274<br>BF324<br>BF336<br>BF337                        | 0.20<br>0.35<br>0.33<br>0.45         | BY299<br>BY407<br>BY409<br>BY448                             | 0.45<br>0.90<br>1.49<br>1.35             | LA1387<br>LA3350<br>LA3361<br>LA3390                         | 1.53<br>5.95<br>1.00<br>0.91<br>5.52   | MPSA42<br>MPSA56<br>MPSA92<br>MPSU05                    | 0.48<br>0.65<br>0.27<br>0.72<br>0.86   | SN29771BN<br>SN29791<br>SN29798N<br>SN2709<br>SN7400N        | 1,65<br>2,98<br>5,56<br>0,44<br>0,34           | TA7141AP<br>TA7146<br>TA7146P<br>TA7148P<br>TA7149P          | 3.87<br>2.50<br>4.23<br>1.67<br>3.26         | TDA1236<br>TDA1270<br>IDA1327A<br>TDA1412<br>TDA1420           | 4.30<br>3.55<br>1.33<br>0.92<br>2.55         | TIP41A<br>TIP41B<br>TIP41C<br>TIP42A<br>TIP42B                 | 0.49<br>0.65<br>0.25<br>0.49<br>0.53         |
| 2SA1006<br>2SA1011<br>2SA1015<br>2SA1012<br>2SA1020Y     | 1.50<br>1.65<br>0.49<br>1.25         | 2SC682<br>2SC684<br>2SC693<br>2SC710                | 1.65<br>0.63<br>0.69                 | AU110<br>AU113<br>AY105K<br>AY106              | 2.25<br>6.40<br>2.08<br>1.09           | BD136<br>BD137<br>BD138<br>BD139              | 0.26<br>0.26<br>0.33<br>0.28         | BF338<br>BF355<br>BF362<br>BF363                        | 0.33<br>0.49<br>0.62<br>0.50         | BY713<br>BYW56<br>BYX55-600<br>BYX71 600                     | 0.65<br>0.14<br>0.23<br>0.85             | LA4032P<br>LA4100<br>LA4101<br>LA4102                        | 1.40<br>0.87<br>0.94<br>0.75           | MPSU10<br>MPSU56<br>MPSU60<br>MR818                     | 1.45<br>0.78<br>1.98<br>0.33           | SN7401N<br>SN7402N<br>SN7404N<br>SN7408N                     | 0.36<br>0.65<br>0.52<br>0.27                   | TA7152P<br>TA7161P<br>TA7162P<br>TA7172P                     | 2.72<br>4.50<br>3.61<br>1.41                 | TDA1440<br>TDA1470<br>TDA1470P<br>TDA1506                      | 3.45<br>2.90<br>4.25<br>7.85                 | TIP42C<br>TIP47<br>TIS43<br>TIS90                              | 0.25<br>0.37<br>1.43<br>0.28                 |
| 2SA10207<br>2SA1027R<br>2SA473<br>2SA766S<br>2SC1173Y    | 0.89<br>0.45<br>0.75<br>4.95<br>1.25 | 2SC711A<br>2SC717<br>2SC734<br>2SC761-Y<br>2SC783   | 1.28<br>1.43<br>0.95                 | BA524<br>BA310<br>BA1310<br>BA1320<br>BA1322   | 8.21<br>0.14<br>1.98<br>1.38<br>3.95   | BD140<br>BD144<br>BD150<br>BD157<br>BD160     | 0.29<br>1.70<br>1.25<br>0.67<br>1.60 | BF371<br>BF391<br>BF417<br>BF418<br>BF422               | 0.50<br>0.25<br>0.84<br>1.87<br>0.30 | BYX71-350<br>BYY56<br>BZY93C30<br>BZY88 RANGE<br>BZX61 RANGE | 0.72<br>1.20<br>1.86<br>0.10<br>0.18     | LA4112<br>LA4125<br>LA4138<br>LA4140<br>LA4192               | 0.56<br>1.88<br>4.55<br>0.70<br>1.55   | MR854<br>MR914<br>MSM5816RS<br>MSM5840H<br>MVS460-02    | 0.85<br>1.20<br>17.35<br>15.15<br>0.61 | SN7410N<br>SN74121<br>SN7413N<br>SN74141N<br>SN74151AN       | 0.27<br>1.60<br>0.74<br>2.65<br>1.51           | TA7176P<br>TA7193P<br>TA7204P<br>TA7206P<br>TA7207P          | 1.54<br>3.84<br>2.16<br>12.49<br>2.34        | TDA1510<br>TDA1512<br>TDA1515<br>TDA1559<br>TDA1670            | 4.60<br>3.69<br>2.60<br>3.15<br>4.48         | TE011CP<br>TE494CN<br>TED72CP<br>TMP4320<br>TMS1024NLL         | 0.95<br>8.95<br>2.55<br>15.00<br>13.75       |
| 2SC1474<br>2SC1509<br>2SA1095<br>2SA1103                 | 1.25<br>1.35<br>3.00<br>6.55         | 2SC790Y<br>2SC828<br>2SC867A<br>2SC876              | 1.85<br>0.28<br>3.84<br>0.96         | BA1330<br>BA145<br>BA148<br>BA154              | 2.75<br>0.19<br>0.25<br>0.40           | BD163<br>BD166<br>BD175<br>BD179              | 0.71<br>0.42<br>0.20<br>0.45         | 8F423<br>8F450<br>BF451<br>BF457                        | 0.52<br>0.35<br>0.29<br>0.41         | BZX79 RANGE<br>C106D<br>C106M<br>CA3046                      | 0.10<br>0.46<br>0.76<br>1.55             | LA4220<br>LA4420<br>LA4422<br>LA4430                         | 1,04<br>1,35<br>1,72<br>1,29           | NE542<br>NE555<br>NE556<br>NP1106                       | 2.65<br>0.16<br>0.65<br>7.25           | SN74154N<br>SN74190<br>SN7420N<br>SN7430                     | 1.27<br>1.35<br>0.55<br>0.49                   | TA7208P<br>TA7210P<br>TA7214P<br>TA7215P                     | 1.12<br>1.45<br>3.63<br>2.07                 | TDA1770<br>TDA1905<br>TDA1908<br>TDA1940                       | 6.85<br>1.27<br>2.98<br>1.95                 | TMS1025N<br>TMS3720ANS<br>TMS3748NS<br>TMS3755                 | 16.95<br>S 5.25                              |
| 2SA329<br>2SA489<br>2SA490<br>2SA493<br>2SA562           | 0.40<br>1.17<br>2.25<br>2.25<br>0.57 | 2SC930<br>2SC935<br>2SC940<br>2SD1128<br>2SD1138    | 4.13<br>4.68<br>2.90                 | BA155<br>BA156<br>BA159<br>BA182<br>BA222      | 0.12<br>0.05<br>0.08<br>0.24<br>1.66   | BD181<br>BD182<br>BD183<br>BD184<br>BD187     | 0.99<br>0.99<br>0.99<br>1.21<br>0.53 | BF458<br>BF459<br>BF460<br>BF469<br>BF470               | 0.33<br>0.52<br>1.45<br>0.22<br>0.55 | CA3089<br>CA3090AQ<br>CA3094<br>CA3131EM<br>CD4001           | 0.83<br>3.25<br>2.20<br>2.95<br>0.34     | LA4445<br>LA4460<br>LA4461<br>LA5112N                        | 1.81<br>3.95<br>1.47<br>2.95<br>1.16   | 0A202<br>0A47<br>0A91<br>DA95<br>0C28                   | 0,11<br>0.16<br>0.14<br>0.13<br>2.95   | SN7440N<br>SN7472<br>SN7474N<br>SN7490AN<br>SN74LS26N        | 0.27<br>1.54<br>0.44<br>0.93<br>1.45           | TA7217AP<br>TA7222<br>TA7226<br>TA7229P<br>TA7230P           | 1.45<br>1.12<br>3.57<br>2.13<br>1.30         | TDA1950<br>TDA2005<br>TDA2006<br>TDA2004                       | 2.95<br>1.45<br>1.32<br>1.48                 | TMS3894NL<br>TMS5102NLL<br>TUA2000<br>TY60108                  | 8.98<br>2.97                                 |
| 2SA564<br>2SA614<br>2SA628<br>2SA639S                    | 0.75<br>4.88<br>1.14<br>1.75         | 2SD1273<br>2SD1453<br>2SD152K<br>2SD198             | 1.56<br>1.40<br>2.64<br>4.20         | BA302<br>BA311<br>BA312<br>BA313               | 1.24<br>1.32<br>1.45<br>0.76           | BD 189<br>BD 190<br>BD 201<br>BD 202          | 0.69<br>0.72<br>0.65<br>0.60         | BF471<br>BF472<br>BF479<br>BF480                        | 0.33<br>0.33<br>0.35<br>1.38         | CD4002<br>CD4008<br>CD4011<br>CD4012                         | 0.27<br>1.35<br>0.29<br>0.24             | LA7020<br>LA7025<br>LA7027<br>LA7040                         | 13.86<br>11.97<br>10.92<br>9.20        | DC29<br>OC36<br>OC44<br>DC45                            | 2.15<br>1.28<br>0.35<br>0.18           | SN76001N<br>SN76013ND<br>SN76023N<br>SN76023ND               | 1.65<br>3.50<br>2.75<br>3.96                   | TA7233P<br>TA7240AP<br>TA7245P<br>TA7310P                    | 1 67<br>3 55<br>3 55<br>0 94                 | TDA2002<br>TDA2003<br>TDA2030<br>TDA2140<br>TDA2150            | 0.69<br>1.00<br>1.45<br>1.68<br>6.20         | ULN2204<br>UPA53C<br>UPC1003<br>UPC1009C<br>UPC1025H           | 8.50<br>4.94<br>5.95<br>8.95<br>2.20         |
| 2SA659<br>2SA673<br>2SA684<br>2SA697<br>2SA699           | 0.49<br>1.50<br>1.61<br>1.05<br>1.75 | 2SD234<br>2SD235<br>2SD24<br>2SD257<br>2SD292       | 0.60<br>2.29<br>1.98                 | BA317<br>BA318<br>BA328<br>BA333<br>BA335      | 0.08<br>0.02<br>1.65<br>1.37<br>6.27   | BD203<br>BD204<br>BD207<br>BD208<br>BD222     | 0.50<br>0.41<br>1.79<br>0.34<br>0.50 | BF491<br>BF506<br>BF532<br>BF596<br>BF597               | 2.20<br>0.43<br>0.45<br>0.18<br>0.27 | CD4013<br>CD4016<br>CD4017<br>CD4020<br>CD4021               | 0.33<br>0.46<br>0.82<br>1.23<br>0.39     | LA7042<br>LA7800<br>LA7801<br>LB1274<br>LC7800               | 3.90<br>1.00<br>1.30<br>3.61<br>9.20   | DC72<br>DC75<br>ON236<br>ON782<br>OT121                 | 0.44<br>0.44<br>1.06<br>1.98<br>1.45   | SN76033N<br>SN76110N<br>SN76115AN<br>SN76131                 | 3.65<br>1.13<br>1.61<br>1.92                   | TA7313AP<br>TA7314<br>TA7323P<br>TA7325P                     | 1 36<br>1 90<br>3.15<br>0.61                 | TDA2151<br>TDA2160<br>TDA2161<br>TDA2170<br>TDA2270            | 2.07<br>4.01<br>1.85<br>2.88<br>2.25         | UPC1028H<br>UPC1032H<br>UPC1042C<br>UPC1156H<br>UPC1161C       | 0.86<br>0.62<br>8.95<br>1.45<br>4.98         |
| 2SA715<br>2SA748<br>2SA817<br>2SA835<br>2SA836           | 0.95<br>1.95<br>0.65<br>2.50<br>0.89 | 2SD313<br>2SD325D<br>2SD350<br>2SD353               | 2.65<br>2.26<br>5.20<br>7.50         | BA5102A<br>BA511<br>BA514<br>BA521             | 2.86<br>1.95<br>2.20<br>2.52           | BD225<br>BD228<br>BD229<br>BD232              | 0.49<br>0.63<br>1.05<br>0.50         | BF694<br>BF757<br>BF759<br>BF761                        | 0.22<br>0.59<br>0.47<br>1.05         | CD4023<br>CD4025<br>CD4028<br>CD4040B                        | 0.28<br>0.64<br>0.84<br>0.85             | LD3120<br>LD3150<br>LM1017N<br>LM1877                        | 1.13<br>2.75<br>1.75<br>13.43          | PT6042<br>PT8504<br>R1038<br>R1039                      | 2.45<br>4.98<br>2.19<br>2.19           | SN76227N<br>SN76226DN<br>SN76228N<br>SN76242<br>SN76243      | 0.85<br>2.00<br>3.27<br>8.95<br>8.50           | TA7339P<br>TA7340P<br>TA7607AP<br>TA7609<br>TA7611AP         | 1.85<br>5.95<br>2.10<br>2.65<br>2.32         | TDA2520<br>TDA2522<br>TDA2524<br>TDA2521<br>TDA2525            | 2.37<br>3.46<br>4.50<br>3.71<br>3.80         | UPC1182H<br>UPC1186H<br>UPC1181H<br>UPC1185H<br>UPC1188        | 1.50<br>0.79<br>1.03<br>2.10<br>7.40         |
| 2SA844<br>2SA872<br>2SA884<br>2SA937FI<br>2SA940         | 0.65<br>0.80<br>2.15<br>0.97<br>1.32 | 2SD389<br>2SD401<br>2SD414<br>2SD471<br>2SD560      | 1,40<br>1,98<br>2,13<br>2,95         | BA524<br>BA526<br>BA527<br>BA532<br>BA536      | 8.94<br>7.98<br>2.98<br>1.50<br>2.05   | BD234<br>BD237<br>BD238<br>BD239<br>BD240     | 0.42<br>0.47<br>0.39<br>0.45<br>0.57 | BF762<br>BF869<br>BF870<br>BF959<br>BF960               | 0.50<br>0.47<br>0.30<br>0.42<br>0.49 | CD4047<br>CD4049<br>CD4052<br>CD4066<br>CD4069               | 1.06<br>0.24<br>0.75<br>0.20<br>0.29     | LM2808<br>LM2877<br>LM317CKC<br>LM324N<br>LM339N             | 6.25<br>7.45<br>1.08<br>0.98<br>0.35   | R2008B<br>R2009<br>R2010B<br>R2029<br>R2030             | 1.33<br>1.98<br>1.33<br>1.33<br>1.33   | SN76396<br>SN76533N<br>SN76532N<br>SN76545<br>SN76546N       | 2.90<br>2.47<br>0.95<br>1.95<br>3.30           | TA7616P<br>TA7622AP<br>TA7628P<br>TA7629P<br>TA7630P         | 5.25<br>8.94<br>2.50<br>7.50<br>0.95         | TDA2532<br>TDA2530<br>TDA2541<br>TDA2540<br>TDA25450           | 0.82<br>2.55<br>1.88<br>0.66<br>5.94         | UPC1212C<br>UPC1225H<br>UPC1230<br>UPC1238<br>UPC1278H         | 1.72<br>3.25<br>1.78<br>1.15<br>2.15         |
| 2SA940-2<br>2SA950<br>2SA951<br>2SA966-Y<br>2SA999       | 1.36                                 | 2SD600<br>2SD601R<br>2SD613<br>2SD636<br>2SD639 R   | 0.65<br>1.03<br>0.55<br>0.72         | BA6209<br>BA656<br>BA7100<br>BA841A<br>BA843   | 4.55<br>1.00<br>11.35<br>28.98<br>3.96 | BD241<br>BD242<br>BD243A<br>BD243C<br>BD244   | 0.39<br>0.39<br>0.35<br>0.29<br>0.45 | BF970<br>BFR39<br>BFR61<br>BFR62<br>BFR79               | 0.50<br>0.44<br>0.92<br>0.50<br>0.29 | CD4070<br>CD4081<br>CD4093<br>CD4511<br>CD4528               | 0.66<br>0.35<br>0.72<br>1.10<br>2.04     | LM340K<br>LM348N<br>LM380N<br>LM384N01                       | 11.85<br>2.15<br>2.80<br>3.25          | R2257<br>R2265<br>R2305<br>R2322<br>R2323               | 3,71<br>1,49<br>1,18<br>0,59<br>0,76   | SN76549<br>SN76570<br>SN76611<br>SN76620<br>SN76660N         | 2.59<br>3.08<br>2.59<br>2.59<br>2.48           | TA7640AP<br>TA7672P<br>TA7676P<br>TA7726P<br>TAA320A         | 1.08<br>2.55<br>2.81<br>12.50<br>1.27        | TDA2560<br>TDA2575A<br>TDA2578A<br>TDA2576A<br>TDA2581         | 0.76<br>0.50<br>2.57                         | UPC1351C<br>UPC1350C<br>UPC1353<br>UPC1355C<br>UPC1363         | 1.81<br>1.00<br>1.40<br>2.13<br>1.00         |
| 2SB774<br>2SB185<br>2SB375<br>2SB400<br>2SB405           | 1.15<br>1.13<br>3.87<br>0.40<br>1.03 | 2SD655<br>2SD657<br>2SD661A<br>2SD731<br>2SD773     | 3.50<br>0.80<br>1.05<br>0.60         | 8A854<br>BAV18<br>BAV19<br>BAV20<br>BAV21      | 5.76<br>0.21<br>0.11<br>0.35<br>0.12   | BD244C<br>BD245C<br>BD246C<br>BD253<br>BD278A | 0.79<br>0.99<br>0.77<br>1.05<br>0.60 | BFR81<br>BFR86<br>BFR89<br>BFR90A<br>BFX29              | 1.65<br>1.08<br>1.63<br>0.90<br>0.34 | CD4556<br>CR02AM-8<br>CV12E<br>CX095D<br>CX104               | 1.47<br>1.70<br>4.09<br>3.14<br>9.64     | LM567CN<br>LM6402/011<br>LM6402A093<br>LM748<br>LM8360       | 1.71<br>10.23<br>10.15<br>0.69<br>3.87 | R2354B<br>R2354B<br>R2443<br>R2461<br>R2540             | 2.01<br>2.01<br>0.88<br>1.50<br>1.91   | SN76666N<br>SN76708<br>SN76709N<br>SN76707N<br>SN76705N      | 1.20<br>4.86<br>3.30<br>5.11<br>6.60           | TAA350A<br>TAA570<br>TAA621AX1<br>TAA621A12<br>TAA661B       | 6.45<br>1.85<br>4.85<br>2.14<br>2.62         | TDA2582<br>TDA2591<br>TDA2594<br>TDA2593<br>TDA2595            | 1.80<br>2.50<br>3.40<br>2.47<br>1.69         | UPC1362<br>UPC1365C<br>UPC1366<br>UPC1360C<br>UPC1378H         | 2.64<br>1.65<br>2.25<br>4.51<br>1.25         |
| 2SB511<br>2SB54<br>2SB546<br>2SB56<br>2SB618A            | 2.50<br>1.39<br>0.56<br>2.80<br>2.22 | 2SD811<br>2SD823<br>2SD837<br>2SD841<br>2SD856      | 1.98<br>1.56<br>2.60<br>1.25         | 8AW62<br>BAX12<br>BAX13<br>BAX16<br>BC107B     | 0.11<br>0.48<br>0.11<br>0.11<br>0.18   | BD317<br>BD318<br>BD375<br>BD380<br>BD410     | 2.60<br>2.00<br>0.42<br>0.76<br>0.52 | BFX84<br>BFX85<br>BFX86<br>BFX87<br>BFX88               | 0.37<br>0.41<br>0.36<br>0.55<br>0.34 | CX108<br>CX109<br>CX130<br>CX134<br>CX136                    | 12.48<br>7.86<br>8.76<br>12.32<br>11.49  | LM8361<br>LR3419<br>LR3471<br>LU1141                         | 3.57<br>9.37<br>9.37<br>7.27           | R2540X<br>R2615<br>RCA2060<br>RGP01-15<br>RGP10         | 3.30<br>0.67<br>2.00<br>1.65<br>0.30   | SN76730<br>SN76810N<br>SN76832N<br>SN94041<br>SN94042        | 6.00<br>0.60<br>1.35<br>5.54<br>5.54           | TAA691<br>TAA700<br>TAA930<br>TAA970<br>TAG626-600           | 8.58<br>2.37<br>4.87<br>2.83<br>1.20         | TDA2600<br>TDA2611A0<br>TDA26120<br>TDA2611A<br>TDA2610        | 5.60<br>2.98<br>4.68<br>1.05<br>3.08         | UPC141C<br>UPC1458<br>UPC151C<br>UPC2002<br>UPC30C             | 4.95<br>3.34<br>2.95<br>1.48<br>2.51         |
| 2SB631<br>2SB643<br>2SB669<br>2SB681<br>2SB695           | 1.45<br>0.50<br>3.67<br>3.96<br>1.98 |   | 1.15<br>1.75<br>1.85<br>2.15         | BC108B<br>BC109B<br>BC113<br>BC119<br>BC126    | 0.15<br>0.15<br>0.14<br>0.36<br>0.23   | BD433<br>BD434<br>BD435<br>BD436<br>BD437     | 0.47<br>0.56<br>0.49<br>0.60<br>0.49 | BFX89<br>BFY50<br>BFY51<br>BFY52<br>BFY79               | 0.44<br>0.30<br>0.25<br>0.27<br>0.49 | CX139<br>CX157<br>CX158<br>CX177<br>CX187                    | 11 B3<br>5 52<br>5 50<br>6 46<br>6 84    | LU52012<br>LU52011<br>LU03112<br>M193<br>M21C                | 5.95<br>14.95<br>12.37<br>6.83<br>1.13 | RGP30M<br>RT402<br>RT905A<br>S1299<br>S2800D            | 0.28<br>1.58<br>2.38<br>5.34<br>5.54   | SP8385<br>SPS5384<br>ST1702L<br>STA401<br>STA441C            | 0.55<br>1.98<br>0.99<br>6.76<br>3.00           | TBA120AS<br>TBA120SB<br>TBA120T<br>TBA120U<br>TBA120A        | 0.69<br>1.05<br>0.97<br>0.62<br>1.05         | TDA2620<br>TDA2630<br>TDA2631<br>TDA2640<br>TDA2652            | 2.15<br>1.96<br>2.73<br>2.95<br>13.45        | UPC324C<br>UPC32C<br>UPC339C<br>UPC41C<br>UPC4558C             | 4.17<br>5.25<br>4.35<br>4.10<br>2.15         |
| 2SB774<br>2SB819<br>2SC1096<br>2SC1104<br>2SC1106        | 0.65<br>1.13<br>1.16<br>3.98<br>4.54 | 7812-T022<br>7815<br>7905                           | 0.85<br>0.35<br>0.64<br>0.80         | BC132<br>BC135<br>BC137<br>BC138<br>BC139      | 0.14<br>0.14<br>0.18<br>0.34<br>0.28   | 8D443<br>8D441<br>BD442<br>BD509<br>BD510     | 0.40<br>1.42<br>1.41<br>1.65<br>0.62 | BFY90<br>BLY49<br>BR100<br>BR101<br>BR103               | 0.61<br>2.20<br>0.29<br>0.65<br>0.55 | CX755<br>CX885A<br>E1222<br>E5024<br>E5386                   | 12.95<br>6.85<br>0.40<br>0.28<br>0.25    | M23C<br>M293<br>M51102L<br>M5115P<br>M51203L                 | 1 98<br>6.95<br>1 86<br>5.24<br>3.15   | \$2802<br>\$2818<br>\$3702\$<br>\$40W<br>\$6080B        | 3.47<br>0.85<br>6.15<br>18.64<br>8.80  | STA471C<br>STK0029<br>STK0050<br>STK016<br>STK022            | 7 95<br>3.33<br>5.63<br>8.45<br>5.25           | TBA1440<br>TBA1441<br>TBA240A<br>TBA395<br>TBA395Q           | 1.78<br>1.62<br>2.65<br>1.10<br>1.10         | TDA2653<br>TDA2654<br>TDA2670<br>TDA2680<br>TDA2740            | 2.95<br>6.18<br>2.54<br>3.20<br>6.00         | UPC474<br>UPC554C<br>UPC575C2<br>UPC580C<br>UPC587C2           | 5.11<br>1.21<br>0.72<br>2.85<br>1.34         |
| 2SC1114<br>2SC1116<br>2SC1124<br>2SC1129<br>2SC1131      | 1 65<br>0 64                         | AC133<br>AC127<br>AC128<br>AC138<br>AC141           | 0.27<br>0.34<br>0.24<br>0.29         | BC140<br>BC141<br>BC142<br>BC143<br>BC147      | 0.45<br>0.34<br>0.23<br>0.19<br>0.13   | BD519<br>BD529<br>BD530<br>BD533<br>BD534     | 0.98<br>0.80<br>1.18<br>0.67<br>0.52 | BR303<br>BRC84<br>BRX44<br>BRX49<br>BRY39               | 1.15<br>2.08<br>0.60<br>0.67<br>0.69 | GD243<br>GF758<br>HA11215<br>HA11211<br>HA11225              | 4.34<br>0.84<br>1.75<br>2.53<br>1.12     | M51231P<br>M5134 9341<br>M51353P<br>M51381P<br>M51393AP      | 0.95<br>4.13<br>5.25<br>5.45<br>9.35   | SA8063<br>SAA1006<br>SAA1020<br>SAA1025<br>SAA1024      | 5.17<br>1.85<br>4.76<br>4.40<br>2.81   | STK031<br>STK040<br>STK054<br>STK058<br>STK077               | 12.95<br>13.34<br>7.13<br>27.50<br>5.96        | TBA396<br>TBA400<br>TBA440C<br>TBA480Q<br>TBA510             | 1.20<br>2.39<br>2.34<br>1.30<br>2.11         | TDA2780A0<br>TDA2795<br>TDA2791<br>TDA2910<br>TDA3300B         |  | UPC592H<br>UPC595<br>UPC596<br>UPD1514C<br>UPD2819C            | 2.15<br>1.15<br>1.80<br>4.76<br>4.98         |
| 2SC1158<br>2SC1162<br>2SC1172<br>2SC1195<br>2SC1213      | 0.55<br>2.22<br>3.26<br>0.89         | AC142K<br>AC176<br>AC179<br>AC183<br>AC187          | 0.30<br>0.28<br>0.72<br>0.39         | BC148B<br>BC148C<br>BC149B<br>BC153<br>BC154   | 0.13<br>0.11<br>0.13<br>0.14<br>0.14   | BD535<br>BD536<br>BD537<br>BD538<br>BD544B    | 0.45<br>8.61<br>0.80<br>0.80<br>0.83 | BSS38<br>BSTBD140G<br>BSTC0246<br>BSTC0233<br>BSTCC0143 | 0.87<br>5.25<br>6.99<br>7.25<br>3.07 | HA11229<br>HA11235<br>HA11124<br>HA1125<br>HA1137W           | 1.96<br>1.47<br>5.25<br>1.17<br>1.26     | M51394P<br>M5142P<br>M5144P<br>M51513L<br>M51515BL           | 14.05<br>6.85<br>2.97<br>1.56<br>2.15  | SAA1075<br>SAA1121<br>SAA1124<br>SAA1130<br>SAA1174     | 4.25<br>7.44<br>3.30<br>4.99<br>7.77   | STK1039<br>STK2110<br>STK2145<br>STK2240<br>STK2250          | 5.10<br>7.33<br>16.95<br>16.65<br>18.95        | TBA520<br>TBA5200<br>TBA530<br>TBA530<br>TBA540              | 1.15<br>1.68<br>1.30<br>1.30<br>1.15         | TDA3330<br>TDA3506<br>TDA3501<br>TDA3500<br>TDA3510            | 2.95<br>4.40<br>7.25<br>4.25<br>5.95         | UPD4013B<br>UPD4066B<br>UPD553-164<br>UPD8049C-1<br>X0022CE    | 4.00<br>4.95<br>19.52<br>11.50<br>5.75       |
| 2SC1226<br>2SC1293<br>2SC1306<br>2SC1317<br>2SC1364      | 1.46<br>0.90<br>1.98<br>0.50<br>0.49 | AC188<br>AC188K<br>AD140<br>AD143<br>AD145          | 0.37<br>0.43<br>1.06<br>1.93<br>1.60 | BC159<br>BC160<br>BC161<br>BC168<br>BC169C     | 0.36<br>0.40<br>0.28<br>0.36<br>0.16   | BD677<br>BD679<br>BD680<br>BD681<br>BD696     | 0.69<br>0.57<br>0.76<br>1.48<br>2.47 | BSTD1043<br>BSV57B<br>BSW68<br>BSX19<br>BSX20           | 2.85<br>3.49<br>0.60<br>1.29<br>0.30 | HA1138<br>HA11414<br>HA1156<br>HA1160<br>HA1166X             | 5.03<br>5.65<br>0.80<br>4.78<br>6.43     | M51517L<br>M5192<br>M5194AP<br>M5231L<br>M53274P             | 1.61<br>2.20<br>5.74<br>1.95<br>1.33   | SAA1250<br>SAA1251<br>SAA1351<br>SAA3027P<br>SAA5000    | 4.15<br>3.20<br>8.11<br>2.55<br>2.50   | STK2042<br>STK3044<br>STK4019<br>STK433<br>STK4337           | 4.95<br>5.75<br>4.50<br>6.25<br>4.30           | TBA5400<br>TBA560C<br>TBA560C0<br>TBA570Q<br>TBA570A         | 1.15<br>1.40<br>1.60<br>1.35<br>1.71         | TDA3520<br>TDA3540<br>TDA3541<br>TDA3560<br>TDA3571Q           | 9.71<br>6.99<br>2.22<br>4.25<br>2.83         | X0022CE<br>X0029CE<br>X0031CE<br>X0035TA<br>X0040TA<br>X0042CE | 5.75<br>7.09<br>4.95<br>5.98<br>4.50<br>4.35 |
| 2SC1383<br>2SC1391<br>2SC1398<br>2SC1413A<br>2SC1446     | 1.20<br>2.45<br>9.75<br>3.05<br>1.25 | AD161<br>AD162<br>AF114<br>AF115<br>AF118           | 0.30<br>0.30<br>2.47<br>0.79<br>1.20 | BC170<br>BC171<br>BC172B<br>BC173<br>BC174B    | 0.16<br>0.11<br>0.27<br>0.17<br>0.27   | BD699<br>BD700<br>BD707<br>BD709<br>BD710     | 3.49<br>3.70<br>0.98<br>1.05<br>0.80 | BSY52<br>BSY79<br>BT108<br>BT119<br>BT120               | 0.50<br>0.51<br>1.45<br>1.76<br>2.17 | HA1167<br>HA11706<br>HA11705<br>HA11703<br>HA11701           | 6.45<br>3.61<br>5.00<br>3.84<br>2.98     | M54532P<br>M54544L<br>M58478P<br>M58485P<br>MA06             | 1 88<br>3.45<br>8.77<br>14.25          | SAA5010<br>SAA5012<br>SAA5020<br>SAA5030<br>SAA5050     | 4.40<br>5.50<br>5.78<br>8.25<br>7.74   | STK435<br>STK4352<br>STK436<br>STK437<br>STK4372             | 4.93<br>1.95<br>3.95<br>5.62<br>11.15          | TBA5704<br>TBA651<br>TBA673<br>TBA700<br>TBA720<br>TBA730    | 0.87<br>2.60<br>1.85<br>3.50<br>3.55         | TDA3576<br>TDA3590<br>TDA3591<br>TDA3650<br>TDA3652            | 2.83<br>7.48<br>5.79<br>6.45<br>5.90<br>2.60 | X0042CE<br>X0043CE<br>X0056CE<br>X0057GE<br>X0062CE<br>X0065CE | 2.75<br>6.25<br>6.00<br>8.35                 |
| 2SC1447<br>2SC1475<br>2SC1505<br>2SC1514<br>2SC1573Q     | 2.07<br>0.60<br>1.00<br>1.69         |   | 0.79<br>0.40<br>1.45<br>0.55         | BC177<br>BC178<br>BC179<br>BC182<br>BC182LB    | 0.35<br>0.26<br>0.26<br>0.05<br>0.07   | BD809<br>BD810<br>BD879<br>BD895<br>BD901     | 0.80<br>0.69<br>0.74<br>2.31         | BT121<br>BT123<br>BT151 800A<br>BTT6018<br>BU106        | 2.48<br>1.98<br>0.89<br>2.42<br>2.48 | HA11710<br>HA11713<br>HA11711<br>HA11715<br>HA11714          | 3.13<br>9.75<br>7.50<br>3.25<br>9.75     | MA8001<br>MA8003<br>M83705<br>M83712<br>M83713               | 0.82<br>1.16<br>1.44<br>1.00<br>1.69   | SAB3010<br>SAB3011<br>SAB3013<br>SAB3021<br>SAB3024     | 7.74<br>7.34<br>3.76<br>7.90<br>6.36   | STK460<br>STK466<br>STK4833<br>STK501<br>STK502              | 7.02<br>11.77<br>10.95<br>5.28                 | 18A7500<br>18A7500<br>18A760<br>18A800<br>18A810S<br>18A810T | 2.90<br>1.71<br>0.92<br>1.61                 | TDA3651A0<br>TDA3651A<br>TDA3651A<br>TDA3950                   | 3.95<br>2.95<br>2.96<br>4.50                 | X0074GE<br>X0077GE<br>X0079CE<br>X0092CE                       | 4.60<br>10.00<br>15.96<br>4.95<br>4.95       |
| 2SC 1583<br>2SC 1617<br>2SC 1678<br>2SC 1741<br>2SC 1810 | 0.50<br>3.89<br>1.98<br>1.25<br>1.70 | AF181<br>AF186<br>AF239<br>AF279<br>AN115           | 0.53<br>0.53<br>0.43<br>0.88         | BC183LB<br>BC184<br>BC184LB<br>BC186<br>BC187  | 0.26<br>0.13<br>0.26<br>0.25<br>0.28   | BD902<br>BDW83C<br>BDW84C<br>BDX32<br>BDX53A  | 0.84<br>1.45<br>1.56<br>1.75<br>1.25 | BU108<br>BU109<br>BU110<br>BU125<br>BU126               | 1,50<br>2,65<br>5,69<br>2,48<br>1,45 | HA11716<br>HA11725<br>HA11725MP<br>HA117555P<br>HA11781      | 13.10<br>18.26<br>16.00<br>6.23<br>19.90 | MB3713<br>MB3730<br>MC13002<br>MC1310P<br>MC1327P<br>MC1330P | 2.09<br>3.60<br>0.58<br>0.40<br>1.91   | SAB3209<br>SAB3210<br>SAF1032P<br>SAF1039<br>SAS5010    | 5.82<br>3.10<br>3.58<br>2.95<br>8.39   | STK502<br>STK5314<br>STK5730<br>STK7216<br>STK772<br>STR1096 | 7.25<br>12.40<br>2.99<br>14.50<br>6.95<br>4.98 | TBA8101<br>TBA810AS<br>TBA820<br>TBA820M<br>TBA890<br>TBA920 | 1.50<br>1.00<br>1.52<br>0.82<br>2.50<br>1.53 | TDA4280<br>TDA4280<br>TDA4290<br>TDA4400<br>TDA4420<br>TDA4420 | 3.95<br>5.95<br>4.47<br>2.27<br>2.55         | X0096CE<br>X0109CE<br>X0113CE<br>X0195CE<br>X0204CE<br>Y0261CE | 5.95<br>11.25<br>2.07<br>7.50<br>8.74        |
| 2SC1815  | 0.45                                 | AN155<br>IT LISTED AS                               | 1.89                                 | BC204  | 0.16                                   | BDX53B  | 1.85                                 | BU137   | 6.53                                 | HA1180   | 5.15                                     | MC1350P  | 1.66                                   | SASS60S   | 1.86                                   | STR4090  | 10.55  | TBA9200  | 1.53<br>2.31<br>T.OROE                       | TDA4422<br>TDA4427S  | 3.65<br>9.00<br>I. AOO 1F                    | X0261CE<br>ZPY120<br>% VAT 10                                  | 1.75<br>3.25<br>TOTAL                        |

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**HIGH QUALITY VIDEO SPARES** (FAST EX-STOCK)

|  |                | OI EX OIOON  |        |                              |                            |
|--|----------------|--|--------|------------------------------|----------------------------|
| AKAI<br>Machine Nos.: VP77 VP88 VP7100 VP7200 VS1 VS2 VS3 VS5  | •              | NATIONAL PANASONIC Head Part Nos.: VEH0099 0103 0115 0121 0131   |        | HEADS<br>Head                | Price                      |
| VS10 VS9300 VS9500 VS9700 VS-P1 VS-P5  | VHS P          | Machine Nos.: NV300 NV322 NV332 NV333 NV340 NV390 NV2000<br>NV3000 NV7000 NV7200 NV7500 NV7800 NV7850 NV8170 | 1      | Part No.<br>BETA A           | 1 +<br>£24.50              |
| AMSTRAD  |                | NV8200 NV8400 NV8600 NV8610 NV8620   | VHS B  | BETA B<br>BETA D             | £22.50<br>£39.50           |
| Machine Nos.: VCR4500 VCR5200<br>Machine Nos.: VCR7000   | VHS T          | Head Part Nos.: VEH0171 VEH0218<br>Machine No.: NV370 NV3708   | VHS M  | BETA E<br>BETA T             | £42.95<br>£30.85           |
| VCR4600 VCR9000  | VHS T          | Head Part Nos.: VEH0171<br>Machine No.: NV330 NV777  | VHS.N  | BETA W<br>BETA X             | £28.99<br>£39.50           |
| FERGUSON/JVC<br>Machine Nos.: 3292 8903 3V00 3V01 3V06 3V16 3V22 3V23 3V24   |                | Head Part Nos.: VEH0286<br>Machine No.: NV430  | VHS W  | VHS VIDEO                    |                            |
| 3V29 3V30 3V31 3V35 3V36 3V38 3V39 3V49  | VHS A          | Head Part Nos.: VEH0174<br>Machine No.: NV366  | VHS X  | VHS A<br>VHS B               | £21.50<br>£21.50           |
| FISHER Machine Nos.: FVH — D520 D530 D620 D720 P420 P510 P520  |                | SHARP  | - 1    | VHS C<br>VHS D               | £26.95<br>£83.00           |
| P530 P615 P620 P622 P710 P720 P721 P722  | VHS U          | Head Part Nos.: DDRMU 0002 HE17/21/27<br>Machine No.: VC581/2/3 651 681/2/3/5 659 699                        | VHS S  | VHS E<br>VHS F<br>VHS H      | £76.38<br>£83.10<br>£25.99 |
| GEC<br>Head Part Nos.: 5458161 5458165   |                | Head Part Nos.: DDRMU 0001 HE00 0002 HE02 04 05 06<br>Machine No.: 2C9 VC110 VC200 VC220 VC300 VC381 VC384   |        | VHS I<br>VHS K               | £24.50<br>£24.50           |
| Machine Nos.: 4000H 4001H 4002H<br>Head Part Nos.: 5458282 5458413 5458415 5458992                                 | VHS I          | VC386 VC387 VC388 VC477 VC481 VC482 VC930 VC970 VC3300 VC9100 VC9300 VC9400 VC9500 VC9600 VC9700             | VHS C  | VHS L<br>VHS M               | £82.95<br>£25.99           |
| Machine Nos.: 4001H 4004H  | VHS K          | Head Part Nos.: DDRMU 0001 HE09<br>Machine No.: VC7300 VC7700 VC7750   | VHS D  | VHS N<br>VHS P               | £35.99<br>£25.99           |
| HITACHI<br>Machine Nos.: VT3000  | VHS A          | Head Part Nos.: DDRMU 0001 HE10<br>Machine No.: VC6300   | VHS E  | VHS R<br>VHS S               | £26.95<br>£26.95           |
| Head Part Nos.: \$458104<br>Machine Nos.: VT4000 VT4200 VT5000 VT5500  | VHS H          | Head Part Nos.: DDRMU 0001 HE12<br>Machine No.: VC8300   | VHS L  | VHS T<br>VHS U               | £25.99<br>£26.95           |
| Head Part Nos.: 5458161 5458165<br>Machine Nos.: VT6500 VT7000 VT8000 VT8040 VT8100 VT8500                         | *****          | Head Part Nos.: DDRMU 0001 HE14<br>Machine No.: VC2300   | VHS F  | VHS V<br>VHS W               | £35.99<br>£28.25           |
| VT8700 VT9000 VT9300 VT9500 VT9700 VT9900  | VHS I          | SANYO  |        | VHS X ORIGINAL FERGUSON      | £42.35                     |
| Head Part Nos.: 5458282 5458413 5458415 5458992<br>Machine Nos.: VT11 V14 VT33 VT34 VT330 VT340 VT5030 VTP10 VTP30 | VHS K          | Head Part Nos.: 1430242 T01700 1430242 T22300<br>Machine No.: VTC5000 VTC5150 VTC5300 VTC5400                | BETA D | 01X0 003 222<br>01X0 027 085 | £31.35<br>£46.02           |
| ш  |                | Head Part Nos.: 1430242 T02200<br>Machine No.: VTC5350 VTC5500   | BETA D | 01X0 033 825<br>01X0 040 002 | £47.05<br>£48.32           |
| Machine Nos.: VR3605 VR3033 VR3905 VR3913 VR3914 VR3935<br>VR3943 VR3963 VR3993 VR3975 VR3985 VR3986 VR3833        | VHS A          | Head Part Nos.: 1430762 T02000<br>Machine No.: VTC9300 VTC9455 VTC9500                                       | BETA X | 01X0 056 013<br>01X0 057 002 | £61.55<br>£31.36           |
| JVC (see also Ferguson)  |                | Head Part Nos.: 143072 T02100<br>Machine No.: VTC9300PS VTC9350  | BETA X | 01X0 082 001<br>01X0 083 063 | £46.02<br>£66.03           |
| Machine Nos.: HP4000 HR2200 HR3300 HR3320 HR3330 HR3350<br>HR3360 HR3660 HR3750 HR3860 HR4100 HR7200 HR7600        |                | SONY<br>Head Part Nos.; A6762 044A, 044B, 054A, 147A   |        | PHILIPS<br>310 274 44        | POA                        |
| HR7610 HRD111 HRD120 HRD121 HRD140 HR0150  | VHS A          | Machine No.: \$1,3000, 8000, 8080, \$1.T 6Me, 7, 7E, 7ME<br>Head Part Nos.: A6762 012A, 038A, 055A, 129A     | BETA A | 691 200 54<br>691 200 98     | £49.68<br>£62.02           |
| MITSUBISHI   |                | Machine No.: SLSW, 5000 5100 SLC5, C6, C7<br>Head Part Nos.: A6762 072A, 122A, 136A, 139A, 213A              | BETA 8 | 691 201 12<br>691 201 66     | £61.66<br>£61.93           |
| Machine No.: HS200<br>HS7008   | VHS A<br>VH700 | Machine No.: SLC20, C30, C33, C40, C44<br>SLF1, F30, HF72, HF100, T20, T30                                   | BETA W | 691 201 78<br>691 202 87     | £49.96<br>£55.37           |
| 101000   |                | 2007   |        |                              |                            |
| FERGUSON/JVC   |                | nei nei  | VE     | BELTS                        |                            |
| VID1 01X0-003-381 Tension band T3292/PU54590   | )4A            | 2.55 DNI   |        |                              |                            |

| VIDI           | 0170-003-301            | Tension band 132321 0343504A                       | E.00           |                      |                       |                |                    |                      |                |
|----------------|-------------------------|--|----------------|----------------------|-----------------------|----------------|--------------------|----------------------|----------------|
| VID2           | 01X0-018-024            | Take up idler T3292/PU47752                        | 5.00           |                      | AKAI                  |                |                    | JVC                  |                |
| VID3           | 01X0-018-025            | Rewind idler assembly T3V16/PU49282                | 6.20           | VP 77                | 2 DBK135              | CO 05          | HP 2200            | 2 DBK137             | £0.75          |
| VID4           | 01X0-01B-729            | Take up idler T3V00/PU49280                        | 6.95           | VP 68                | 2 DBK135              | £0.95<br>£0.95 | HR 2200<br>HR 3300 | 9 DBK107             | £2.95          |
| VID5           | 01X0-040-006            | Loading belt T3V29/30/PU48941-2                    | 0.50           | VP 7100              | 1 DBK103              | £1.95          | HR 3330            | 7 DBK126             | \$2.50         |
| VID6           | 01X0-033-454            | Roller Assy. (cass. Housing) T3V23/PU49042         | 4.50           | VS 1                 | 2 DBK134              | £1.20          | HR 3360            | 7 DBK103             | £1.95          |
| VID7           | 01X0-040-007            | Take up idler 3V29/30/PU48967B                     | 2.90           | VS 2 EG              | 5 DBK101              | £1.95          | HR 3600            | 7 DBK107             | <b>£2</b> .95  |
| VID8           | 01X0-040-017            | Reel motor assembly 3V29/30/PU51381V               | 27.95          | VS 3                 | 2 DBK134              | £1.20          | HR 3660            | 7 DBK103             | £1.95          |
| VID9           | 01X0-065-009            | Capston motor 3V35/36/38/39/PU55371V               | 27.00          | VS 5 EG              | 6 DBK101              | £1.95          | HR 4100            | 7 DBK127             | £2.50<br>£0.95 |
| VID10          | 01X0-065-016            | Cass. housing Assy. 3V35/36/38/39/PU29825          | 27.00          | VS 10<br>VS 9300     | 2 DBK136<br>7 DBK103  | £0.75<br>£1.95 | HR 7200<br>HR 7600 | 3 DBK139<br>3 DBK138 | £0.95          |
| 1.5.15         | \$1110 000 010          |  |                | VS 9500              | 7 DBK103              | £1.95          | HR 7650            | 3 DBK132             | €0.95          |
| OFC/W          | ITACHI                  |  |                | VS 9700              | 6 DBK102              | \$2.20         |                    | 3 DBK108             | £1.95          |
|                | ITACHI                  | 050 110010 1315115                                 | 04.00          | VS 9800              | 7 DBK103              | £1.95          |                    | NAL PANAS            |                |
| VID11          | V5577355                | GEC 4100/Hitachi VT11E capston motor               | 21.90          | 1                    |                       |                | NIV 200            | 5 DBK110             | £1.95          |
| VID12          | V6413663                | GEC 4000/Hitachi VT33 I/f rewind arm               | 2.10           |                      | FERGUSON              |                | NV 300<br>NV 330   | 5 DBK110             | £1.95          |
| VID13          | V6861471                | GEC 4001/2/Hitachi 93/9500 f/f rewind arm          | 1.70           | 3292                 | 7 DBK103              | £1.95          | NV 777             | 4 DBK131             | £1.20          |
| VID14          | V6861482                | GEC 4001/2/Hitachi 93/9500 play idler assy.        | 4.75           | 3 V 00<br>3 V 01     | 7 DBK103<br>7 DBK103  | £1.95<br>£1.95 | NV 2000            | 5 DBK109             | £1.95          |
| VID15          | V6886971                | GEC 4004/Hitachi VT33 t/f rewind arm               | 1.80           | 3 V 16               | 7 DBK103              | £1.95          | NV 3000            | 6 DBK113             | £1.95          |
| VID16          | V2423461                | ET541 Tuner Unit                                   | 21.90          | 3 V 22               | 7 DBK103              | £1.95          | NV 7000            | 5 DBK111             | £1.95          |
|                |                         |  |                | 3 V 23               | 3 DBK106              | £1.95          | NV 7200<br>NV 8600 | 5 DBK140<br>7 DBK112 | £1.50<br>£1.95 |
| NATIO          | NAL PANASON             | IC .   |                | 3 V 24               | 2 DBK137              | £0.75          | MA OOOG            |                      | £1.90          |
| VID17          | VXP0329                 | Fast forward idler NV2000                          | 0.85           |                      | EIGHED                |                | 140 004            | SHARP                | 00.05          |
| VID18          | VXP0344                 |  | 0.85           | VDC 7000             | FISHER                | €2.95          | VC 381<br>VC 383   | 4 D8K116<br>4 DBK116 | £2.95<br>£2.95 |
| VID19          | VXZ0078                 | Idler NV7000/7200 Tension Band NV7000  PLEASE NOTE | 2.95           | VBS 7000<br>VBS 7600 | 4 DBK146<br>5 DBK105  | £2.60          |                    | 4 DBK116             | £2.95          |
| VID20          | VXP0521                 |  | 2.50           | VBS 7000             | 6 DBK105              | \$2.60         | VC 388             | 4 DBK116             | £2.95          |
| VID21          | VXP0463                 | Reel Idler NV777 ALL VIDEO SPARES                  | 3.25           | VBS 9000             | 3 DBK108              | £1.95          | VC 6000            | 5 DBK117             | £1.95          |
| VID22          | VXP0432                 | D: 1 D-II- 11/000                                  | 8.50           |                      | 050                   |                | VC 6300            | 5 DBK117             | £1.95          |
| VID23          | VXP0401                 | Idler wheel NV333  Idler wheel NV333  HANDLING     | 0.90           |                      | GEC                   |                | VC 6500            | 5 DBK117             | £1.95          |
| VIDES          | VXI 0401                |  | 5.00           | V 4000 H             | 3 DBK129              | £0.75<br>£0.75 | VC 7300            | 5 DBK117             | £1.95<br>£1.95 |
| CANIVO         | VEIGHED                 | $\mathfrak{E}1.25 + VAT$                           |                | V 4001 H<br>V 4002 H | 3 DBK129<br>3 DBK129  | £0.75          | VC 7700<br>VC 7750 | 5 DBK118<br>5 DBK118 | £1.95          |
|                | D/FISHER                |  | 8.00           | V 4100 H             | 5 DBK125              | £1.80          | VC 8300            | 5 DBK119             | £1.95          |
| VID24          | 4529V10800              | Reel motor VTC5000/5150                            | 5.00           | 7 4100 11            |                       | 21.00          | VC 9300            | 5 DBK120             | £1.95          |
| VID25          | 1430662T01201           | Reet drive pulley<br>Pinch roller VTC5000/5150     | 3.85           |                      | HITACHI               |                | VC 9500            | 5 DBK120             | £1.95          |
| VID26<br>VID27 | PR2758<br>1430490400900 | Gear idler Fisher FVH-P615                         | 6.50           | VT 11                | 5 DBK126              | £1.50          | VC 9700            | 3 DBK121             | €3.30          |
| VID28          | 1430490400900           | Heart idler Fisher FVH-P615                        | 6.05           | VT 3000              | 7 DBK103              | £1.95          |                    | SONY                 | 1              |
| VIDZO          | 1430420400300           | Heart wer risher rymrots                           | 0.03           | VT 6000<br>VT 6500   | 7 DBK126-<br>4 DBK142 | £2.60<br>£0.75 | SL 8000<br>SL 8080 | 6 DBK115             | €2.95          |
| SHARE          |                         |  |                | VT 7000              | 3 DBK143              | £0.75          | SL 8080            | 6 DBK115             | \$2.95         |
|                |                         | 0  | 33.55          | VT 8000              | 3 DBK129              | €0.75          | SL 8500            | 6 DBK115             | \$2.95         |
| VID29<br>VID30 | RMOTP1029<br>RMOTV1008  | Capston motor 73/9300<br>Reel motor VC9700         | 33.55<br>16.85 | VT 8500              | 3 DBK144              | £0.75          | SL 8600<br>SLC 6   | 6 DBK115<br>6 DBK100 | £2.95<br>£1.95 |
| VID30<br>VID31 | NIDL0006                | Idler VC387H etc                                   | 1.95           | VT 9300              | 3 DBK129              | €0.75          | SLC 7              | 6 DBK100             | £1.95          |
| VID32          | NIDL0005                | Reel idler VC9300 etc                              | 1.85           | VT 9500              | 3 DBK129              | <b>£0</b> .75  | SLC 9              | 6 DBK130             | £1.95          |
| VID32          | NIDL0003                | Idler wheel VC2300                                 | 1.60           |                      | SANYO                 |                | SLJ 7              | 6 DBK100             | £1.95          |
| 1,000          | 14100004                |  |                | VTC 5300             | 5 DBK106              | €2.60          | SLT 7 ME           | 6 DBK100             | €1.95          |
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# Storing TV Pictures in Chips

Part 4 Eugene Trundle

In previous instalments we've dealt with memory arrangements for freeze frame, graphics effects and other applications where a complete TV field has to be stored, and for picture-in-picture displays where the memory capacity required is much less. This month we'll take a look at the multi-function memory system used in current Sanyo digital VCRs.

#### Sanyo System

The Sanyo VHRD500/700 series of VCRs offers a comprehensive range of digital functions. Picture information is quantised in six-bit form and is stored in three memory chips, two for the luminance (Y) data and one for chrominance (U, V) data. The total memory capacity available is just under 1.5Mbits, of which 1.232Mbits are used. Because the PIP feature is included, the video signal to be stored is first decoded to YUV form – as described last month – before AD conversion and is subsequently recoded to PAL form for display.

#### **Outline**

An outline of the system, in block diagram form, is shown in Fig. 22. In the freeze frame and mono-strobe modes the stored picture occupies the full screen area, so considerable detail must be committed to memory. Hence the separate Y and chroma AD conversion and memory sections. 10MHz/100nsec sampling with 6-bit quantisation is used for the Y signal, giving an overall frequency response of about 4MHz, which is comparable with the resolution capabilities of an ordinary tube. The decoded V and U signals are alternately selected by a time-division-multiplex switch before being sampled at a rate of 2.5MHz and then stored in 6-bit form.

#### AD Conversion

AD conversion details for the YUV signals are shown in Fig. 23. A.G.C. is used to maintain the luminance component within 1V (from black level to white), then the black level is clamped at 2·75V. The sync pulses are not sampled or AD converted: in the full-screen memory modes sync pulses are generated and inserted between memory read-out lines. The chrominance components can

be positive- or negative-going: the zero crossover point is clamped at 3-25V and the maximum signal excursion is limited to 1V peak-to-peak by a.g.c. action. Alternate sampling of the U and V signals is controlled by a control multiplex (CMPX) signal that's generated by the memory-control chip.

#### Memory Arrangement

The arrangement of one of the RAM chips is shown in Fig. 24. The incoming data first enters a  $256 \times 6$  bit register, shown at the top, and is then transferred to individual memory cells. The main RAM section, shown at the centre, is arranged in 256 rows and 320 columns, giving a storage capacity of 491,520 bits. An output data register completes the system. This is similar to the line buffer memory previously mentioned, and enables reading and writing to be done at different rates.

The use of two memory chips for the Y data is interesting. The 6-bit data is fed to both chips in parallel, each chip being alternately enabled by SIC (serial in clock) and /SIC pulses – see Fig. 25. This allows slow memories to be used. During the readout each chip is enabled in turn by the Y1A and Y1B pulses: the outputs are selected by the Y multiplex switch which is driven by an identical squarewave to Y1A. Waveforms 1-11 in Fig. 25 clarify the process and show how the data is shared between the two memories and then reassembled for DA conversion.

#### Chroma Memory

The lower part of Fig. 25 illustrates the operation of the chroma memory. As previously mentioned, the U and V signals are time multiplexed. The data entering the memory, slower than in the case of the luminance data, corresponds to waveform 12 in Fig. 25. Storage in the memory is controlled by the 5MHz SIC signal, which is divided by two within the chip. Readout is controlled by the SOC (serial out clock) signal, the interleaved U and V data being passed to two DA converters. Each latches only its own data, under control of the DACK and / DACK signals respectively. Waveforms 15-18 show the readout and DA processes and the derivation of continuous U and V signals.

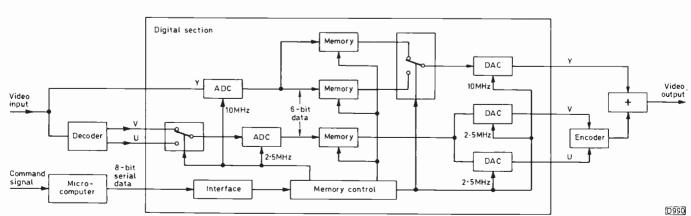


Fig. 22: Signal/data routing and memory arrangement used in the Sanyo VHRD500 VCR.

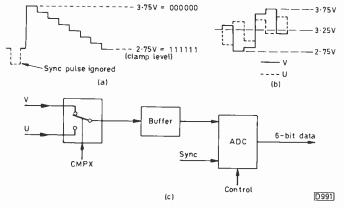


Fig. 23: Clamping, AD conversion and the chroma multiplex system used in the Sanyo VHRD500. (a) Luminance waveform, (b) chroma waveform, (c) simplified block diagram for chroma AD conversion.

An area of  $248 \times 276 \times 6$  is used in each of the three memory chips, making a total of 1,232,064 stored bits.

#### PIP Memory Map

Fig. 25 showed the use of the memory in the still mode, in which the stored data provides a whole-screen display. In the PIP mode the memory area is divided, rather like the screen itself. Fig. 26 shows the Y data for a single PIP display stored in one corner of the memory array, occupying about one ninth of its area. Waveform I represents the incoming Y signal. Two out of every three lines and two

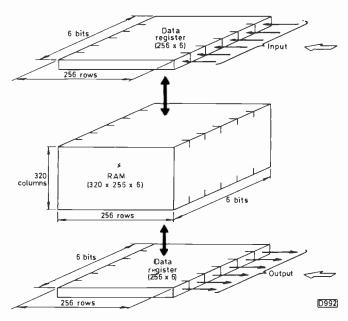


Fig. 24: Three-dimensional representation of the RAM chips used in the Sanyo VCR. The machine uses three such RAMs, two for luminance and one for chroma data.

out of every three pixels in the stored lines are discarded so that the input for the PIP display is effectively compressed to one ninth of its original area. The SIC trains, waveforms 2 and 3, also run at a third of the normal 5MHz rate, i.e. 1.67MHz. As before the Y data is

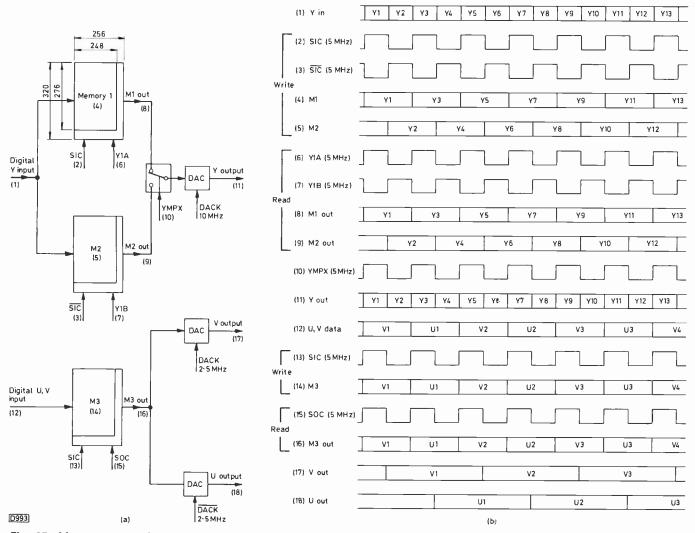


Fig. 25: Memory maps for the full-screen still mode. The time-related chart shows data-transfer timing.

alternately fed into the two storage chips, so memory one stores Y1, Y7, Y13 etc. while memory two stores Y4, Y10, Y16 etc., as shown in waveforms 4 and 5. The memories thus become loaded to the extent of 82 rows and 92 columns during a full field period. Clearly there's room for another eight PIPs if required.

Waveforms 6-11 illustrate PIP readout. Signals Y1A and Y1B interrogate the memory chips alternately, reading Y1, Y7, Y13 etc. from memory one interleaved with Y4, Y10, Y16 etc. from memory two. The Y multiplexing switch is again driven by squarewave Y1A to produce continuous Y data, now in time-compressed form – see waveform 11. A PIP line readout takes one third of a normal line period, and all the lines will have been read out by the time the field scan is one third of the way down the screen.

The chroma read and write processes in memory three are very similar, following the same time-warp rules in synchronism with the memory one and memory two read and write sequences. Thus the top left-hand corner of memory three is used for chroma storage, employing the same 82 row by 92 column block.

All memory write/read processes, the AD and DA clocks etc. are controlled by a complex memory control chip.

#### Features of the Sanyo VHRD500

The memory arrangement just described can, in conjunction with the versatile control chip, provide an impressive repertoire of trick displays. We'll describe each in turn briefly, giving a short account of the processing involved. Each mode is called up by the remote control handset. Instructions enter the control microcomputer in the form of an 8-bit word – this is referred to as mode control data. Not all the 256 possible combinations are used! The four most significant bits indicate the mode (freeze frame, strobe, PIP etc.) while the four least significant bits give information like strobe speed, zoom ratio etc.

In the still mode writing into the memory is inhibited while readout continues, giving a full-screen freeze frame image from tape or off-air.

The mono strobe mode operates as above but a write cycle is performed at regular intervals to give a frame-advance effect, updating the still each time. The strobe rate can be selected by the user.

In the basic PIP mode the PIP display can be positioned in any of the four corners of the screen by starting the memory readout at the appropriate time during the main display's line and field scans. The main and PIP pictures can be interchanged.

In the multi-PIP mode the screen is divided into nine sections, each fed by one block of memory in the manner shown in Fig. 26. This is used for the cycle strobe feature, where the screen centre shows a normal moving picture surrounded by eight stills, each representing a frame-advance sequence cycling around the central picture, with adjustable strobe speed. Each "outer" block of memory is read continuously and written intermittently in this mode. If required the centre block of memory can also be frozen, by inhibiting its write cycle.

The multi-PIP mode is also used for the multi-TV programme scan feature, in which the u.h.f. tuner tunes to available TV channels in turn, the VCR loading the signal from each into a different section of its memory. With the multi-index scan feature the start of each recording or scene on tape, indexed by the user during

record, is loaded into different memory sections and frozen in turn as the tape is quickly wound forwards or backwards. The tape transport system slows down to give five seconds of normal playback at each index point.

In the zoom mode the memory writing rate remains normal but the readout rate is decreased to give the picture a magnification effect. By this means the central area of the picture can be enlarged by  $\times 4$ ,  $\times 9$  or  $\times 16$ . The central area of the memory is used for this variable speed readout. By slow readout from the memories' outer areas any individual quarter of the screen can be enlarged by  $\times 4$  and made to occupy the full screen area.

The solarisation mode is similar to the graphic effect described earlier in connection with the Panasonic system (see Fig. 16, July). Three degrees of solarisation can be selected by the user. These knock out two, three or four of the least significant bits from the 6-bit video data. Selection is achieved by disabling the appropriate DA converter input lines.

For the mosaic effect the pixel count in the displayed picture is reduced in three stages selected by the user. This is done by reducing the rate at which the DA converters are clocked during memory readout. The data is latched at progressively longer intervals to give the picture a "coloured squares" effect. For weak, medium and strong mosaic effects the DA converter clock rates, which are normally 10MHz for Y and 2·5MHz for the chroma signals, become 2·5, 1·25 and 0·625MHz respectively for both the Y and the chroma DA converters.

#### Advanced Field Store Chip

To round off our first excursion into TV field storage we'll take a look at a newly developed memory chip. Many of the memory chips currently used were not specifically designed for TV field store applications. As a result, some of their capacity and capabilities are lost when they are pressed into service for TV/video use. With a purpose-designed chip advantage can be taken of the sequential nature of a TV signal and the fact that data is stored and retrieved in a series of blocks representing pixels and complete TV lines.

Fig. 27 shows in simplified block diagram form the internal arrangements used in the Hitachi HM514256 CMOS TV memory chip. This chip has a capacity of 1Mbits which are arranged as four pages consisting of 1,024 columns by 256 rows. Each row is divided into eight blocks of 32 bits. These blocks have their own addresses, giving access for sequential TV data transfer. Any one of the 8,192 block addresses can be selected at random. To define 8K different addresses calls for 13 bits, and since both read and write addresses are required the total number of address bits is theoretically 26. In fact the total is 29, with three for random access control. A serial addressing system (SAD) is used, within 32 clock pulses.

Thus independent access is available to each 32 × 4 bit block for both reading and writing. For random access the memory array is serially addressed, starting at the point specified by the input address data, after which internally generated addresses are used until new data appears on the SAD line. Only three pins are required for addressing: SAD, SAS (serial address strobe) and TAS (transfer address strobe). The latter two are used for random access applications. This greatly simpilfies the wiring and memory-control arrangements.

Two such memory chips are required for a TV field store. Each stores four bits of the 8-bit video data words. Separate input and output ports are provided. The write

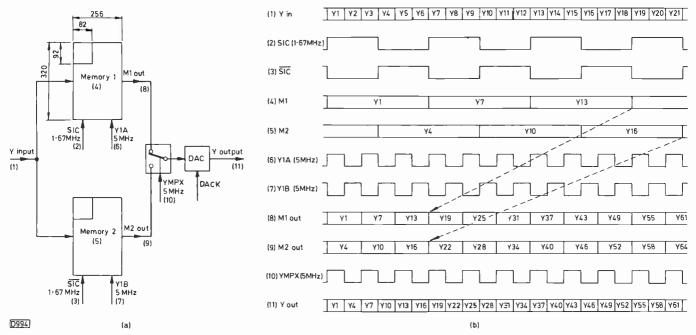


Fig. 26: Luminance memory map for PIP operation. At all times the total memory area corresponds to the full display screen area. Thus the single PIP shown here occupies one ninth of the screen area. The timing chart shows the time-warp effect of different writing and reading rates.

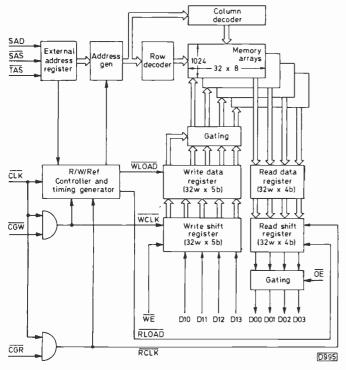


Fig. 27: Simplified block diagram of the purpose-designed Hitachi 1Mbit TV field memory chip.

and read shift registers are latched by the CGW (clock gate write) and CGR (clock gate read) inputs.

A typical way of using these inputs is shown in Fig. 28 – for PIP sampling. Here the clock and horizontal drive pulses of an incoming signal are each divided by three and fed to the inputs of a nand gate. The /CGW pulse thus produced loads data into the memory on only every third TV line, and then only on every third clock pulse. This, like the latched DA converters etc. described in the previous examples, reduces both the vertical and horizontal picture size by a factor of three to give a one ninth area PIP display – and, if required, multi-PIP with data for nine small images distributed around the memory in similar fashion to the map in Fig. 26.

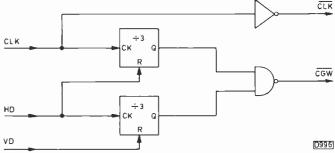


Fig. 28: The simple external divider system shown here provides selective latching pulses for PIP sampling within the memory.

This chip, which is intended for frame comb filtering and digital noise reduction as well as freeze frame and effect applications, has several outstanding features. It's very fast, with an access time of 35nsec, and can hold data for 8msec between refresh cycles. Internal refreshing is carried out at intervals of 32 CLK pulses, permitting operation over a wide range of clock frequencies – from 4MHz to over 20MHz. The memory also has a word-masking function, carried out by a 32-bit WE data register and a 32-bit WE shift register: this is primarily intended for dropout compensation in VCRs.

Sophisticated though this memory system is, it will undoubtedly be replaced by more advanced types as time marches on. Digital picture processing is at present the fastest developing technology in consumer electronics equipment. The next step is the elimination of flicker, cross-colour and the visible line structure in domestic TV sets. Watch this space! The development in recent times of techniques like these is beginning to make the existing picture transmission and display systems decidely old hat.

#### Acknowledgement

Information on the systems used for digital signal processing in consumer electronic products is somewhat sparse at present. I'm indebted to the technical departments of Hitachi, Panasonic and Sanyo for the considerable trouble they went to in seeking and providing information on their equipment.

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| ITT CVC20 to 45 PANELS Set<br>MULLARD TEL-TEX DECOL<br>2431851<br>2432211   |  |  | TR   | ANSFORMERS   | A F2048/11   | AT2076/711  |   |
| TTT CVC20 to 45 PANELS Set<br>MULLARD TEL-TEX DECOI<br>2431851<br>2432211<br>2432301<br>2432404   |  | 3,3651   | 1 1 1 1 1 1  |  | A 12055  | AT2080/15   |   |
| ITT CVC20 to 45 PANELS Set<br>MULLARD TELFTEX DECOL<br>2431851<br>2432211<br>2432201<br>2432461<br>2432491  | SPLIT-DIADE  | 3,3651   | 1111   |  | AT2076-35  | RCO ST CT3325   | 040   |
| ITT CVC20 to 45 PANELS Sci<br>MULLARD TEL-TEX DECOL<br>2431851<br>2432211<br>2432301<br>2432461<br>2432491<br>2432491<br>2432871  | SPLIT-DIODE  | 33651<br>36072<br>36362 <b>L.O.P.T.</b>  | 3112   | 338-30942 £1.00  |  |   | £10   |
| ITT CVC20 to 45 PANELS Set<br>MULLARD TELFTEX DECOL<br>2431851<br>2432211<br>2432201<br>2432401<br>2432401<br>2432491<br>2432871<br>2432871   |  | 33681<br>36072<br>36362<br>36383 CDLIT DIGI  | DE 3112-   | 338-30633 £1.00  | A I2076/38   | O12041  |   |
| TTT CVC20 to 45 PANELS Sci<br>MULLARD TEL-TEX DECOL<br>2431851<br>2432211<br>2432301<br>2432301<br>2432301<br>2432301<br>2432301<br>2432301<br>2432301<br>2432301<br>2432301<br>2432301<br>2432304<br>2432304<br>2432304  | SPLIT-DIODE<br>£6 EACH   | 33651<br>36072<br>36362<br>36383<br>36482 <b>SPLIT DIOI</b>  | DE 3112-   | 338-30633 £1.00<br>268-30050 £1.00   | AT2076/51  | FB165KA Orion   | EVUR  |
| TIT CVC20 to 45 PANELS Set<br>MULLARD TELFTEX DECOL<br>2431851<br>2432211<br>2432301<br>2432401<br>2432401<br>2432401<br>243281<br>243284<br>243284<br>2433212<br>243384<br>2433212<br>243384   |  | 33/65 <br>36/92 L.O.P.T.<br>36/83<br>36/83<br>36/81 SPLIT DIOI   | DE 3112-<br>3112-<br>3111-<br>3112-                  | 338-30633 £1.00<br>268-30050 £1.00<br>138-98094 £1.00  |  |   | EACH  |
| ITT CVC20 to 45 PANELS Set MULLARD TEL-TEX DECOL 2431851 2432211 2432301 2432401 2432401 2432801 2432801 2432801 2432802 2432802 2433802 2433808 2433808 2433808 2433808  |  | 33651<br>36072<br>36362<br>36383<br>36482 <b>SPLIT DIOI</b>  | DE 3112-<br>3112-<br>3112-<br>3112-<br>3112-         | 3,38-30833 £1,00<br>268-30050 £1,00<br>138-98094 £1,00<br>338-30634 £2,00  | AT2076/51  | FB165KA Orion   | EACH  |
| FIT CVC20 to 45 PANELS Sci<br>MULLARD TELTEX DECOL<br>241821 241221 1<br>241221 1<br>2412301 2412301<br>2412401 2412401<br>2412401 2412401<br>2412401 2412401<br>2412401 2412401<br>2412401 2412401<br>241321 2413401<br>241331 2412401<br>241331 2413401<br>2413351 2413401 241351 241   | £6 EACH  | 33651<br>96472<br>96362<br>36383<br>86482<br>36761<br>36832<br>36832<br>36832<br>36833   | DE 3112-<br>3112-<br>3112-<br>3112-<br>312-<br>312-  | 338-30633 £1.00<br>268-30050 £1.00<br>138-98094 £1.00<br>338-30634 £2.00<br>138-96044 £1.00  | AT2076/51  | FB165KA Orion   | EACH  |
| ITT CVC20 to 45 PANELS Set MULLARD TEL-TEX DECOL 2431851 2432211 2432201 24322401 24322401 24322401 2432281 243281 243381 243381 2433881 2433881 2433881 2433881 2433881 2433881  |  | 3461<br>4072<br>5082<br>3083<br>50482<br>3676<br>3681<br>5682<br>3683<br>36921779<br><b>L.O.P.T.</b><br><b>SPLIT DIOI</b><br><b>PHILIPS</b><br>3683<br>36921779<br><b>£5 EACH</b>  | DE 3112-<br>3112-<br>3112-<br>312-<br>3122-<br>3122- | 338-30633 £1.00<br>268-38050 £1.00<br>138-98094 £1.00<br>338-30634 £2.00<br>138-98944 £1.00<br>138-53861 £1.00   | AT2076/51<br>CVC 820p  | FB165KA Orion<br>2076/51  |   |
| ITT CVC20 to 48 PANELS Sci<br>MULLARD TEL-TEX DECOL<br>2431851<br>2432211<br>2432201<br>2432301<br>2432301<br>2432301<br>2432301<br>2432301<br>2432301<br>2432301<br>2432301<br>2432301<br>2432301<br>2433301<br>2433301<br>2433301<br>2433301<br>2433301<br>2433301<br>2433301<br>2433301<br>2433301   | £6 EACH  | 33651<br>96472<br>96362<br>36383<br>86482<br>36761<br>36832<br>36832<br>36832<br>36833   | DE 3112-<br>3112-<br>3112-<br>312-<br>3122-<br>3122- | 338-30633 £1.00<br>268-30050 £1.00<br>138-98094 £1.00<br>338-30634 £2.00<br>138-96044 £1.00  | AT2076/51<br>CVC 820p<br>REGULATED   | FB165KA Orion<br>2076/\$1<br>POWER SUPPLY, Size 6"×   | 5*×2 <sup>1</sup> 2*                          |
| ITT CVC20 to 45 PANELS Set MULLARD TEL-TEX DECOL 2431851 2432241 243240 243240 243240 243241 243241 243241 243242 243441 243342 243441 243342 243441 243342 243441 243342 243441 243342 243441 243342 243441   | £6 EACH<br>L.O.P.T.  | 3461<br>4072<br>5082<br>3083<br>50482<br>3676<br>3681<br>5682<br>3683<br>36921779<br><b>L.O.P.T.</b><br><b>SPLIT DIOI</b><br><b>PHILIPS</b><br>3683<br>36921779<br><b>£5 EACH</b>  | DE 3112-<br>3112-<br>3112-<br>312-<br>3122-<br>3122- | 338-30633 £1.00<br>268-38050 £1.00<br>138-98094 £1.00<br>338-30634 £2.00<br>138-98944 £1.00<br>138-53861 £1.00   | AT2076/51<br>CVC 820p  | FB165KA Orion<br>2076/\$1<br>POWER SUPPLY, Size 6"×   |   |
| TTT CVC20 to 45 PANELS Set MULLARD TEL-TEX DECOL 431851 3432211 3432301 343240 3432301 343240 3432801 343280 343280 343280 343380 343380 343380 343380 343380 343380 343380 343380  | £6 EACH  | 3461<br>3472<br>36762<br>36383<br>36482<br>36761<br>36812<br>36812<br>36812<br>36812<br>36821779<br>36921779<br>36922779   | DE 3112-3112-3112-3122-3122-                         | 338-30633 £1.00<br>268-30350 £1.00<br>188-39694 £1.00<br>338-30634 £2.00<br>138-96444 £1.00<br>138-53861 £1.00<br>138-98994 £1.75  | AT2076/51<br>CVC 820p<br>REGULATED<br>0/3y = 0/4/5y =                                      | FB165KA Orion<br>2076 \$1<br>POWER SUPPLY, Size 6°×<br>0-6v lamp  | 5*×2 <sup>1</sup> 2*                          |
| ### CYC20 to 45 PANELS Set ####################################   | £6 EACH L.O.P.T.  I.C. Holders   | 3461<br>3472<br>36762<br>36383<br>36482<br>36761<br>36812<br>36812<br>36812<br>36812<br>36821779<br>36921779<br>36922779   | DE 3112-3112-3112-3122-3122-                         | 338-30633 £1.00<br>268-30350 £1.00<br>188-39694 £1.00<br>338-30634 £2.00<br>138-96444 £1.00<br>138-53861 £1.00<br>138-98994 £1.75  | AT2076/51<br>CVC 820p<br>REGULATED<br>0/3y = 0/4/5y =                                      | FB165KA Orion<br>2076 \$1<br>POWER SUPPLY, Size 6°×<br>0-6v lamp  | 5*×2 <sup>1</sup> 2*                          |
| ### CYC20 to 45 PANELS Set ####################################   | £6 EACH  L.O.P.T.  I.C. Holders  DIL - DIL   | 3461<br>3472<br>36762<br>36383<br>36482<br>36761<br>36812<br>36812<br>36812<br>36812<br>36821779<br>36921779<br>36922779   | DE 3112-3112-3112-3122-3122-                         | 338-30633 £1.00<br>268-30350 £1.00<br>188-39694 £1.00<br>338-30634 £2.00<br>138-96444 £1.00<br>138-53861 £1.00<br>138-98994 £1.75  | AT2076/51<br>CVC 820p<br>REGULATED<br>0/3y = 0/4/5y =                                      | FB165KA Orion<br>2076 \$1<br>POWER SUPPLY, Size 6°×<br>0-6v lamp  | 5*×2 <sup>1</sup> 2*                          |
| TTT CVC20 to 45 PANELS Set MULLARD TEL-TEX DECOL 431851 3432211 3432461 3432461 3432461 3432461 3432861 3432861 3432861 2433861 2433781 2433781 2433781 2433781 2433781 2433781 2433781 243481 2433781 243481 243481 243481 243481 243481 243481 243481 243481 243784 243881 2437861 243881 2437861 243881 2438  | £6 EACH  L.O.P.T.  I.C. Holders  DIL DB.  Al Po x 4  | 3461<br>3472<br>36762<br>36383<br>36482<br>36761<br>36812<br>36812<br>36812<br>36812<br>36821779<br>36921779<br>36922779   | DE 3112-3112-3112-3122-3122-                         | 338-30633 £1.00<br>268-30350 £1.00<br>188-39694 £1.00<br>338-30634 £2.00<br>138-96444 £1.00<br>138-53861 £1.00<br>138-98994 £1.75  | AT2076/51<br>CVC 820p<br>REGULATED<br>0/3y = 0/4/5y =                                      | FB165KA Orion<br>2076 \$1<br>POWER SUPPLY, Size 6°×<br>0-6v lamp  | 5*×2 <sup>1</sup> 2*                          |
| ### CYC20 to 45 PANELS Sci ####################################   | £6 EACH  L.O.P.T.  I.C. Holders  DIL - DIL 40 Pin × 4  | 3461<br>3472<br>3676<br>3683<br>3683<br>3683<br>3682<br>3683<br>3692179<br>3692279   | DE 3112-3112-3112-3122-3122-3122-                    | 338-94643  | AT2076/5)<br>CVC 820p<br>REGULATED<br>0-3v = 0-4 5v =                                      | POWER SUPPLY, Size 6°× 168 Tamp   | 5"×21"/2"<br>£5.00 Post L2 00                 |
| TTT CVC20 to 45 PANELS Sci<br>MULLARD TEL-TEX DECOL<br>2431851<br>2432211<br>2432201<br>2432301<br>2432401<br>2432801<br>2432801<br>2432801<br>2432801<br>243281<br>243381<br>2433751<br>243381<br>2433751<br>243381<br>2433751<br>243381<br>2433751<br>243381<br>2433751<br>243381<br>2433751<br>243381<br>2433751<br>243381<br>2433751<br>243381<br>2433751<br>243381<br>2433751<br>243382<br>243480<br>243380<br>243380<br>243380<br>243380<br>243090<br>243080<br>ZHO CHO THORN<br>243082<br>ZHO CHO THORN<br>ZHO CHO TH  | £6 EACH  L.O.P.T.  I.C. Holders  DIL - DIL 40 Pm × 5   | 3461<br>3472<br>36762<br>36383<br>36482<br>36761<br>36812<br>36812<br>36812<br>36812<br>36821779<br>36921779<br>36922779   | DE 3112-3112-3112-3122-3122-3122-                    | 338-94643  | AT2076/5)<br>CVC 820p<br>REGULATED<br>0-3v = 0-4 5v =                                      | POWER SUPPLY, Size 6°× 168 Tamp   | 5"×21 2"<br>£5.00 Post £2.00                  |
| TT CVC20 to 45 PANELS Set MULLARD TELETEX DECOL 2431851 2432211 2432401 2432401 2432401 2432401 243281 243281 243284 243284 2433284 2433284 2433284 2433284 243386 2433284 243386 24386 2  | £6 EACH  L.O.P.T.  I.C. Holders  DIL - DIL | 3461<br>3472<br>3676<br>3683<br>3683<br>3683<br>3682<br>3683<br>3692179<br>3692279   | DE 3112-3112-3112-3112-3112-3112-3112-3112           | 338-94643  | REGULATED 0-3x - 0-4 5y -  | POWER SUPPLY, Size 6°× 168 Tamp   | 5"×21 2"<br>£5.00 Post £2.00                  |
| ### CYC20 to 45 PANELS Set ####################################   | £6 EACH  L.O.P.T.  L.C. Holders  DIL DH. 40 Pm × 4   | 34/51<br>90/72<br>90/82<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90 | DE 3102-3102-3102-3102-3102-3102-3102-3102-          | 338-94643  | REGULATED 0-3x - 0-4 5x -  | POWER SUPPLY, Size 6°× 10-6s lamp  IENTS ESSEX SS3  | 5"×2 <sup>1</sup> 2"<br>£5,00 Post £2.00      |
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Holders  DIL - DIL  40 Pm × 5 (1.00) 42 Pm × 5 (1.00) 16 Pm × 10 70p 24 Pm × 5 75p   | 34/51<br>90/72<br>90/82<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90/81<br>90 | DE 3102-3102-3102-3102-3102-3102-3102-3102-          | 338-94643  | REGULATED 0-3x - 0-4 5x -  | POWER SUPPLY, Size 6°× 10-6s lamp  IENTS ESSEX SS3  | 5"×2 <sup>1</sup> 2"<br>£5.00 Post £2.00      |
| ### CVC20 to 45 PANELS Set  ###################################   | £6 EACH  L.O.P.T.  I.C. Holders  DIL DIL. 40 Pm × 4 £1.00 42 Pm × 5 £1.00 18 Pm × 5 £0.00 19 Pm × 10 70p 14 Pm × 10 70p 18 Pm × 10 70p 18 Pm × 10 80p  | 33/61<br>30/72<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30 | DE 3112-3112-3112-3112-3112-3112-3112-3112           | 338-94643  | REGULATED 0-3x - 0-4.5x -  | POWER SUPPLY, Size 6°× 1-6v lamp  IENTS ESSEX SS3 S: No Credit  | 5"×212"<br>£5.00 Post £2.00                   |
| ### CYC20 to 45 PANELS Sci ####################################   | £6 EACH  L.O.P.T.  I.C. Holders  DH DH. 40 Pm × 4  | 33/61<br>30/72<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30 | DE 3112-3112-3112-3112-3112-3112-3112-3112           | 338-94643  | REGULATED 0-3x - 0-4.5x -  | POWER SUPPLY, Size 6°× 1-6v lamp  IENTS ESSEX SS3 S: No Credit  | 5"×212"<br>£5.00 Post £2.00                   |
| ### CYC20 to 45 PANELS Sci ####################################   | £6 EACH  L.O.P.T.  I.C. Holders  DIL. – DIL. 40 Pm × 4 £1.00 42 Pm × 5 £1.00 52 Pm × 5 80p 16 Pm × 10 70p 24 Pm × 5 75p 14 Pm × 10 70p 18 Pm × 10 80p  BOL – QIL. 16 Pm × 10 £1.00   | 33/61<br>30/72<br>30/82<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30 | DE 3112-3112-3112-3112-3122-3122-3122-3122           | 388-9844 £1.00<br>268-39594 £1.00<br>278-98994 £1.00<br>238-39643 £1.00<br>138-3864 £1.00<br>138-3864 £1.00<br>138-3864 £1.00<br>138-3864 £1.00<br>MS STORE £1.00<br>N, SHOEBU<br>ME DAY SE<br>ilability. No<br>rder/Chequ   | REGULATED 0-3v - 0-4 5v -  MPON RYNESS, ERVICE Account e with or                           | POWER SUPPLY, Size 6°× 10-6v lamp  IENTS ESSEX SS3 s: No Credit der.  | 5"×212"<br>£5,00 Post £2.00<br>8AF.<br>Cards. |
| ### TYC20 to 45 PANELS Sci ####################################   | £6 EACH  L.O.P.T.  I.C. Holders  DIL DIL.  40 Pm × 4   | 33/61<br>30/72<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/82<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30 | DE 3112-3112-3112-3112-3122-3122-3122-3122           | 388-9844 £1.00<br>268-39594 £1.00<br>278-98994 £1.00<br>238-39643 £1.00<br>138-3864 £1.00<br>138-3864 £1.00<br>138-3864 £1.00<br>138-3864 £1.00<br>MS STORE £1.00<br>N, SHOEBU<br>ME DAY SE<br>ilability. No<br>rder/Chequ   | REGULATED 0-3v - 0-4 5v -  MPON RYNESS, ERVICE Account e with or                           | POWER SUPPLY, Size 6°× 10-6v lamp  IENTS ESSEX SS3 s: No Credit der.  | 5"×212"<br>£5,00 Post t2 00<br>8AF.<br>Cards. |
| ### TYCV20 to 45 PANELS Sci ####################################  | £6 EACH  L.O.P.T.  I.C. Holders DHL - DH, 40 Pm × 4  | 33/61<br>30/72<br>30/82<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30/83<br>30 | DE 3112-3112-3112-3112-3122-3122-3122-3122           | 388-9849 £1.00 21-38-98494 £1.00 21-38-98494 £1.00 238-58694 £ | REGULATED 0-3v - 0-4 5v -  OMPON RYNESS, ERVICE Account e with or Add Post:                | POWER SUPPLY, Size 6°× 10-6v lamp  IENTS ESSEX SS3 s: No Credit der.  | 5"×212"<br>£5,00 Post t2 00<br>8AF.<br>Cards. |
| ### CVC20 to 45 PANELS Sci ####################################   | £6 EACH  L.O.P.T.  I.C. Holders  DIL DIL.  40 Pm × 4 £1.00 42 Pm × 5 £1.00 70p 24 Pm × 5 80p 16 Pm × 10 70p 24 Pm × 5 75p 14 Pm × 10 70p 18 Pm × 10 80p  DIL QIL.  16 Pm × 10 £1.00 18 Pm × 10 £1.00 18 Pm × 10 £1.00 28 Pm × 4 £1.00  | 34/51<br>34/72<br>36/82<br>36/83<br>36/831<br>36/831<br>36/831<br>36/833<br>36/92179<br>36/83<br>36/92179<br>36/83<br>36/92179<br>36/83<br>36/92179<br>36/83<br>36/92179<br>36/83<br>36/92179<br>36/83<br>36/92179<br>36/83<br>36/92179<br>46/92279  | DE 3112-3112-3112-3112-3122-3122-3122-3122           | 138-98/94   £1.00  | REGULATED 0-3x - 0-4 5x - 0 MPON RYNESS, ERVICE Account e with or Add Posta                | POWER SUPPLY, Size 6°× 1160 Jamp  IENTS ESSEX SS3 s: No Credit der. age for Over  | 8AF. Cards. seas.                             |
| ### CVC20 to 45 PANELS Set  ###################################   | £6 EACH  L.O.P.T.  I.C. Holders DIL DB. 40 Pm × 4  | 34/51<br>34/72<br>36/82<br>36/83<br>36/831<br>36/831<br>36/831<br>36/833<br>36/92179<br>36/83<br>36/92179<br>36/83<br>36/92179<br>36/83<br>36/92179<br>36/83<br>36/92179<br>36/83<br>36/92179<br>36/83<br>36/92179<br>36/83<br>36/92179<br>46/92279  | DE 3112-3112-3112-3112-3122-3122-3122-3122           | 138-98/94   £1.00  | REGULATED 0-3x - 0-4 5x - 0 MPON RYNESS, ERVICE Account e with or Add Posta                | POWER SUPPLY, Size 6°× 1160 Jamp  IENTS ESSEX SS3 s: No Credit der. age for Over  | 8AF. Cards. seas.                             |
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# Service Bureau

Requests for advice in dealing with servicing problems must be accompanied by a £1.50 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.

#### GRUNDIG 2 × 4

The top half of the picture is streaky while the bottom half is only half as clear as it should be, with the colour flickering on and off. The sound is normal but becomes distorted when loud music starts suddenly. Sometimes there's wow, as if the capstan is not operating properly. Checks on the servo show that all the waveforms seem to be o.k. though the waveforms at pin 5 of the mixer chip IC1640 and for the head changeover adjustment are incorrect.

Tracking on this machine operates via the heads in a DTF system. We've experienced this combination of symptoms on more than one occasion and have each time found that the cause was failure of the video drum assembly.

#### SONY KV2704UB

In the standby mode the h.t. from the power supply oscillates between normal (135V) and approximately 80V at about 1Hz. With the power supply completely unloaded (all outputs disconnected) the h.t. drops to 80V and stays there. In both cases the 40V and 12V outputs are relatively unaffected. Regulation is poor, the picture breathing slightly with the sound, especially at high volume levels.

The most common culprits for this condition are C623 (33 $\mu$ F, 250V), C621 (1 $\mu$ F, 35V) and R612 (0.82 $\Omega$ , 2W). Check these along with zener diode D612 and if necessary potentiometer R614.

#### SHARP VC381

This machine won't play Scotch pre-recorded tapes from switch on when cold – the top of the picture tears and pulls to the left. Playback is normal when the machine has warmed up for about 45 minutes. Only Scotch brand cassettes have this effect.

We suggest you check the back-tension setting which may have to be set at one end of the specified 50-57g range to accommodate Scotch tapes.

#### REDIFFUSION Mk 4 CHASSIS

The trouble with this set is a regular matrix pattern of white dots covering the entire screen area. It's present on all channels and also with a VCR input. In all other respects the set operates normally.

The most likely cause of the dots is radiation from the power supply, which contains an oscillator – within 4IC1 – running at about 25kHz. First check that the dressing of the wires and cable looms in the set has not been disturbed, then suspect 4C27, 4C15, 4D16 and 4L2 in the power supply. If these are all in order it would be simplest

to check by fitting a complete substitute power supply module.

#### SONY SLC7

There's a problem on playback of either its own or prerecorded tapes. Wherever there's a vertical white-to-black transition a thick black outline appears. There are no smudges or streaking, the picture definition being very good. The tracking control has no effect on the fault. New heads, correctly set up, DOC adjustment, YC6 board alignment and preamp adjustment have all been tried without success. The playback envelope looks perfect and no voltage discrepancies have been found.

A judicious tweak of the noise canceller preset RV1 on the NC1 board is worth trying. Return it to its original position if this doesn't improve the overshoot effect. The other possibility is excessive edge enhancement (aperture correction). This is based on the 0·6μsec delay line DL3 which may be mismatched. Check whether C264 is open-circuit, DL3's earth connection, and the matching resistors R330, R331 and R96.

#### DECCA 100 CHASSIS

Colour lock has become rather weak and is critical to tune in with the channel tuning controls. A monochrome picture may be shown from cold, very slight adjustment of the tuning control being required to bring in the colour – but still a little touchy. Everything else is excellent.

We have often found that this problem is due to a faulty TDA3950 chrominance chip or a 4·43MHz crystal (Z200) that's drifted – replacement will provide a cure. First however ensure that the gating pulse waveform at test point TL201 is correct. If not, check the operation of the pulse shaper stage – Tr201 and associated components.

#### HITACHI VT8500

This machine will not work using the remote control handset – all other controls work satisfactorily. The remote control board has been removed and powered from the bench supply. With the remote control handset in position and operated a good signal is present at pin 21 of IC01A but there is no output at pins 2-8. All voltages are correct and h.f. oscillations are present at pins 1 and 28. A new chip has made no difference. I can't understand why the chip appears to be dead when there's a good input and all the voltages etc. are correct, but am uncertain what the transistor circuit associated with pin 26 does.

The two-transistor circuit connected to pin 26 of IC01A provides a reset pulse at switch on. As C17A charges, Q13A's collector should momentarily pulse high. Check this, because most other possibilities appear to have been covered. We've sometimes had puzzling faults on this board due to physical factors, i.e. hairline cracks in the print.

#### QUERY COUPON

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Available until 14th September 1988. One coupon, plus a £1.50 (inc. VAT) cheque or postal order, must accompany EACH PROBLEM sent in accordance with the notice printed above.

**TELEVISION SEPTEMBER 1988** 

#### SONY KV2000 Mk. II

When the set is switched on the sound is present but the picture takes almost half an hour to appear. It then appears slowly, from the bottom of the screen, stopping two thirds of the way up with the top third missing. The fault is not lack of height or foldover.

There is little doubt that the problem is in the blanking circuit. Check C818, D811, Q801 and Q802 in that order. Use of freezer and gentle heat from a hairdryer may assist in pinpointing the trouble-spot.



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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.

This summer seems to be the season of the oldies! Last month we had a Decca 100 chassis, this time it's an ITT CVC20 chassis. It's a fact of course that older designs are more prone to failure in warm weather – sets using valves were particularly vulnerable to a hot August. Surprisingly few of those in the TV service business today are familiar with the sets of a decade or more ago, or so it seems here – they've either forgotten about them or are relative newcomers.

The job with the CVC20 started with a check on the tube's emission, even though the specific complaint was of low width. Not much point in getting too involved if the tube is on the way out. Its emission was reasonable however, so the diagnosis – if you can call it that – began.

The width was certainly low: there was a black margin about 2.5cm wide on either side of the screen. What causes low width? A common cause is a reduced h.t. supply to the line output stage. It should have been 125V in this case. It wasn't, exactly, and setting up the preset control in the power supply had little effect. What causes low width when the supply voltage is about right? The line output transformer's tuning capacitors could be responsible. In this chassis the line output transformer has a split primary winding, so there are two tuning capacitors, C57/ 8. The Oracle was next asked whether 16nF capacitors were in stock. He finally came and had a look at the set. Finding that it was a CVC20, he gave the following advice. Pull out the EW modulator control board (panel CMH10): if the width then iumps out the cause of the problem is on the panel; if it doesn't, check around the EW driver transistor T17 on the main board.

A check revealed that the presets (width, trapezium and pincushion) on the CMH10 panel had no effect whatsoever on the picture, so the little panel was removed. When the set was switched on again the picture was still narrow. So the fault had to be on the main board. Two of T17's legs were freed from the board for testing.

Checks with the ohmmeter proved that it was o.k. With the Avo 8's black probe connected to its base, the readings, on the  $\Omega \times 100$  range, to the emitter and collector were each about  $1k\Omega$ . So the transistor was soldered in again and attention was turned to the associated components. R101 and C72 were both of the correct value and the driver transformer L33/4 looked o.k. – the continuity of the windings was checked and found to be correct. There seemed to be little point in checking the EW modulator diodes because they also provide the 24V supply and, indirectly, the 12V supply. These were obviously present in view of the good picture and sound. Measurement confirmed this. What next?

The Oracle was again consulted. "Transistor is o.k., so are the diodes and other bits." After a quick look at the circuit, Oracle suggested a check on the capacitors associated with the EW modulator diodes and, if they were o.k., to leave the set on one side for him to look at later. The capacitors were removed and tested but were all right.

So it came about that a little while later Oracle found himself inside the offending TV set with his prods and probes and methodical air. Expecting a nasty, obscure fault he was surprised to find that the cause of the trouble was quite simple – indeed it had cropped up many times before. The ensuing inquest revealed a major flaw in the reasoning and the methods of the previous man on the job. Where had he gone wrong and what was the cause of the fault? See next month.

#### ANSWER TO TEST CASE 308 – page 770 last month –

Our problem last month was an unusual one – a grossly overheating chip in the colour decoder section of a Decca 80/100 series chassis. The MC1327 device concerned provides chroma demodulation, RGB matrixing and PAL switching, and the amazing thing was that with an internal dissipation of what felt like several watts and with some of its pin voltages wildly incorrect it nevertheless provided the correct signal processing until it got really hot. It was also surprising that, as we subsequently discovered, neither of the MC1327 chips involved suffered permanent damage – indeed the original i.c. is now back in the set and working well.

As Fig. 1 last month showed, the MC1327 has an internal power supply regulator which provides several outputs for use within the chip – some of the feeds are taken via external components. One of these outputs appears at pin 5, where it's decoupled and used as a bias for the reference signal inputs at pins 12 and 13. Decoupling is carried out by the  $1\mu$ F tantalum capacitor C241 which, on removal for test with the ohmmeter, was found to be very leaky – it was ready to pass d.c. in either direction.

By thus pulling the potential at pin 5 towards earth the fault grossly increased the dissipation in the chip's internal regulator circuit, but the signal-handling functions were not affected until the substrate became very hot. Fusible resistor R246 didn't open – it's there mainly to guard against the effect of zener diode D202 going short-circuit.

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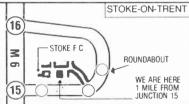
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| JAPANESE<br>TRANSISTORS<br>2SA-473 35p                               | 2SC-1845 20<br>2SC-1847 120<br>2SC-1865 120                             | p 25A/200V 165<br>p 25A/400V 185                          | p 4553 140 <sub>0</sub><br>p 4555 29 <sub>0</sub>               | 74HC175 38<br>74HC181 130   | p 74LS114 30p<br>p 74LS122 38p   | Z80BP10 480p 75182<br>Z80ACTC 250p 75183                                 | 720p<br>100p<br>100p    | SERVICE AIDS SERVISOL PRODUCTS  | ELECTROLYTIC CAPACITORS   |
| 2SA-483 <b>400p</b><br>2SA-490 <b>60p</b>                            | 2SC-1875 260<br>2SC-1881 210<br>2SC-1906 75                             | p 25A/600V 200<br>p 25A/800V 240<br>p 35A/100V 185        | p 4556 <b>36</b> µ<br>p 4557 <b>140</b> µ<br>p 4583 <b>60</b> 0 | 74HC182 60<br>74HC190 46<br>74HC191 60                                | 74LS123 38p<br>74LS124 85p<br>74LS125 32p                                      | Z80AS10 <b>660p</b> 75188<br>Z80AS10 1 <b>700p</b> 75189                 | 60p<br>60p<br>185p      | V. Head Cleaner 85p<br>Switch Cleaner 100p  | ANIAE EEAD  |
| 2SA-562 <b>57p</b><br>2SA-563 <b>45p</b><br>2SA-571 <b>500p</b>      | 2SC-1907 75<br>2SC-1909 250   | p 35A/200V <b>200</b><br>p 35A/400V <b>220</b>            | p 4584 30g<br>p 4585 40g  | 74HC192 <b>60</b><br>74HC193 <b>43</b>                                | p 74LS126 32p<br>p 74LS132 32p   | Z80ADRT <b>680p</b> 75322<br>74S188 <b>175p</b> 75325                    | 130p<br>340p<br>155p    | Silicone Grease 115p<br>Freeze It 105p  |   |
| 2SA 634 50p<br>2SA 636 50p<br>2SA 673 20p                            | 2SC-1923 <b>25</b><br>2SC-1941 <b>40</b>                                | p 35A/800V 260<br>p 1.5A/100V 40                          | p 40101 78p<br>p 40102 150p                                     | 74HC195 <b>47</b><br>74HC221 <b>100</b>                               | 74LS136 32p<br>74LS138 31p   | 74S189 210p 75365<br>74S201 240p 75450                                   | 145p<br>45p             | Foam Cleaner 105p<br>Anti-Static 105p   | 100 MF 30p 22 MF 30p<br>220 MF 35p 47 MF 35p  |
| 2SA-684 <b>60p</b><br>2SA-699 <b>100p</b><br>2SA-715 <b>90p</b>      | 2SC-1944 350<br>2SC-1945 350  | PLASTIC   | 40104 90p<br>40105 140p   | 74HC238 <b>65</b><br>74HC240 <b>48</b>                                | 74LS145 <b>70p</b><br>74LS147 <b>100p</b>                                      | 74S288 160p 75452<br>74S289 180p 75453                                   | 42p<br>42p<br>65p       | Aerokleane         90p           Aero Duster         115p           Flastic Seal         105p   | 470 MF 45p 100 MF 40p<br>1000 MF 60p 220 MF 50p<br>2200 MF 120p 470 MF 60p            |
| 2SA-720 <b>20p</b><br>2SA-733 <b>30p</b>                             | 2SC-1946 1500<br>2SC-1947 450<br>2SC-1957 70                            | TRIACS  | 40106 35p<br>40107 50p<br>40108 260p                            | 74HC241 47<br>74HC242 55<br>74HC243 60                                | 74LS148 80p<br>74LS151 30p<br>74LS153 36p                                      | 74S387 200p 75454<br>75107 80p 75480<br>75108 80p 75491                  | 65p<br>135p<br>60p      | T * * * * * * * * * * * * * * * * * * *   | 4700 MF 160p 1000 MF 100p   |
| 2SA-798 55p<br>2SA-844 30p<br>2SA-872 40p                            | 2SC-1969 160<br>2SC-1971 400<br>2SC-1972 600                            | P 8A/400V 68<br>P 12A/400V 85                             | P 40109 74p<br>P 40110 170p<br>P 40114 180m                     | 74HC244 44<br>74HC245 49  | 74LS154 85p<br>74LS155 36p   | 75109 110p 75492<br>75110 80p 8T26<br>75112 140p 8T28                    | 60p<br>95p<br>110p      | * UNIVERSAL TRIPLERS 500p *   | 10 VOLTS 2200 MF 160P<br>470 MF 40P<br>1000 MF 50P 63 VOLTS                           |
| 2SA-872A <b>50p</b><br>2SA-886 <b>90p</b><br>2SA-899 <b>60p</b>      | 2SC-1983 130<br>2SC-2001 60<br>2SC-2002 40                              | p 20A/400V 190<br>p 25A/400V 205                          | P 40117 180p<br>P 40147 240p<br>P 40160 55p                     | 74HC253 371<br>74HC257 411  | 74LS157 <b>28p</b><br>74LS158 <b>31p</b>                                       | 75113 105p 8T31<br>75114 130p 8T95<br>75115 130p 8T96                    | 330p<br>90p<br>110p     |   | 2200 MF 70p 1.0 MF 25p<br>2.2 MF 25p  |
| 2SA-907 <b>650p</b><br>2SA-909 <b>700p</b><br>2SA-933 <b>40p</b>     | 2SC-2002 25<br>2SC-2023 180<br>2SC-2026 60                              | P BA/400V 52<br>THYRISTORS                                | P 40161 55p<br>40162 55p  | 74HC259 <b>55</b><br>74HC273 <b>42</b>                                | 74LS161 44p<br>74LS162 44p   | 75121 <b>125p</b> 8T97   | 90p<br>110p             | SONY on/off SWITCHES 250p #   | 25 VOLTS 4.7 MF 25p<br>22 MF 25p 10 MF 30p  |
| 2SA-934 40p<br>2SA-935 40p<br>2SA-937 40p                            | 2SC-2028 <b>75</b><br>2SC-2029 <b>120</b>                               | p 0.8A/100V 28<br>p 0.8A/200V 29                          | p 40174 <b>48</b> p<br>p 40175 <b>60</b> p                      | 74HC280 65  | 74LS164 <b>40</b> p<br>74LS165 <b>56</b> p                                     | 75154 110p NEW VIDE<br>75158 140p HEADS<br>75159 200p JVC3HSS 2          |                         | ********  | 47 MF 35p 22 MF 35p<br>100 MF 35p 47 MF 40p<br>220 MF 40p 100 MF 50p                  |
| 2SA-940 70p<br>2SA-950 30p<br>2SA-952 50p                            | 2SC-2060 <b>60</b><br>2SC-2068 <b>90</b>                                | p 8A/300V <b>59</b><br>p 8A/400V <b>70</b>                | p 40182 <b>70</b> p<br>p 40192 <b>48</b> p                      | 74HC298 <b>52</b> <sub>1</sub><br>74HC299 <b>105</b> <sub>1</sub>     | 74LS168 68p<br>74LS169 60p   | 75160 400p Akai 2<br>75161 400p National 2                               | 2150p<br>2150p<br>2400p | OPTO ELECTRONICS  | 470 MF 45p 220 MF 60p<br>1000 MF 70p 470 MF 100p                                      |
| 2SA-953 60p<br>2SA-965 60p<br>2SA-966 70p                            | 2SC-2075 80<br>2SC-2078 95  | p 12A/400V 75<br>p 12A/600V 90                            | p 40194 <b>58p</b><br>p <b>40</b> 208 <b>240p</b>               | 74HC356 <b>45</b><br>74HC365 <b>34</b>                                | 74LS174 36p<br>74LS175 38p   | VIDEO RUBBER BEL   |                         | 2N-5777 <b>40p</b> 4N30 <b>90p</b><br>OCP-71 <b>100p</b> 4N31 <b>90p</b><br>ORP-12 <b>85p</b> 4N32 <b>100p</b>                              | 2200 MF 125p 1000 MF 160p<br>35 VOLTS   |
| 2SA-970 50p<br>2SA-979 85p<br>2SA-984 50p                            | 2SC-2086 <b>600</b><br>2SC-2098 <b>600</b><br>2SC-2166 <b>90</b>        | p 37<br>p 85  | 74 SERIES   | 74HC367 36 <sub>1</sub><br>74HC368 36 <sub>1</sub>                    | 74LS191 <b>48p</b><br>74LS192 <b>46p</b>                                       | VS-9300 7 belts/kit  | 180p<br>220p<br>200p    | ORP-60 100p 4N33 100p<br>ORP-61 100p 4N36 58p<br>4N37 58p   | 10 MF <b>25p</b><br>22 MF <b>25p</b> 1.0 MF <b>25p</b>                                |
| 2SA-992 <b>30p</b><br>2SA-1012 <b>130p</b><br>2SA-1015 <b>30p</b>    | 2SC-2228A 60<br>2SC-2229 25<br>2SC-2233 125                             | p BT119 100   | 7401 <b>16p</b> 7402 <b>18p</b>                                 | 74HC374 <b>50</b> r<br>74HC375 <b>60</b> r                            | 74LS194 47p<br>74LS195 50p   | VS-9500/9800 7 belts/kit   | 220p                    | OPTO 4N38 68p<br>Couplers LED DISPLAYS  | 47 MF   30p   2.2 MF   25p   100 MF   35p   4.7 MF   30p   220 MF   40p   10 MF   35p |
| 2SA-1102 190p<br>2SA-1103 200p                                       | 2SC-2235 601<br>2SC-2236 601<br>2SC-2238 701                            | p BT120 100<br>p OT121 120                                | 7404 35p<br>7405 10p  | 74HC377 55;<br>74HC386 20;<br>74HC390 55;                             | 74LS197 <b>48</b> p  | HR-3330 7 belts/kit<br>HR-3360/3660 7 belts/kit                          | 200p<br>190p            | 4N25 <b>50p</b> MAN.72 <b>115p</b><br>4N26 <b>50p</b> MAN.74 <b>115p</b>  | 470 MF 90p 22 MF 35p<br>1000 MF 110p 47 MF 40p  |
| 2SA-1104 <b>200p</b><br>2SA-1105 <b>250p</b><br>2SA-1106 <b>250p</b> | 2SC-2240 45<br>2SC-2259 80<br>2SC-2271 60                               | p TIC45 27<br>p TIC47 32                                  | 7406 <b>40</b> p<br>7407 <b>40</b> p<br>7408 <b>25</b> p        | 74HC393 50g<br>74HC423 70g  | 74LS240 <b>50p</b><br>74LS241 <b>46p</b>                                       | HR-7200 3 belts/kit<br>HR-7600 3 belts/kit                               | 195p<br>75p<br>145p     | 4N27 <b>50p</b> MAN.4640 <b>180p</b><br>4N28 <b>50p</b> MAN.8910 <b>230p</b><br>4N29 <b>90p</b> DL.747 <b>160p</b>                          | 2200 MF 160p  |
| 2SB-022 80p<br>2SB-324 55p<br>2SB-370 45p                            | 2SC-2275 50<br>2SC-2290 1800<br>2SC-2314 70                             | p 17089 <b>200</b><br>p 17127 <b>200</b>                  | 7409 20p<br>7413 35p<br>7414 45p                                | 74HC534 65¢<br>74HC540 73¢<br>74HC541 73¢                             | 74LS243 <b>55p</b><br>74LS244 <b>45p</b>                                       |  | 77p<br>160p             | PRINTERS  | SOLDERING IRON  |
| 2SB-546 70p<br>2SB-557 225p<br>2SB-561 50p                           | 2SC-2324 120<br>2SC-2329 480  | p   15/85R 230<br>p   SG613 850                           | 7416 40p<br>7417 32p  | 74HC563 73p<br>74HC564 73p  | 74LS247 <b>46p</b><br>74LS248 <b>48p</b>                                       | NV-777 4 belts/lct<br>NV-2000 5 belts/kit                                | 135p<br>130p<br>155p    | Epson FX840 £205<br>Nat Panascnic P1081 £145  | ANTEX XS25W 240V Soldering Iron<br>240Vac <b>540p</b>                                 |
| 2SB-566 130p<br>2SB 595 80p<br>2SB-598 60p                           | 2SC 2335 1201<br>2SC 2335 1201  | 4000B SERIES<br>CMOS IC's                                 | 7421 25p<br>7425 15p<br>7430 25p                                | 74HC574 <b>70</b> p<br>74HC583 <b>90</b> p                            | 74LS251 28p<br>74LS253 40p   | NV-3000 6 belts/kit<br>NV-7000 5 belts/kit<br>NV-7200 5 belts/kit        | 180p<br>100p<br>90p     | Nat Panasonic P1082 £160 Nat Panasonic P313 £240  | Spare Element for XS25W 240V 260p ANTEX C15W 240V Soldering Iron                      |
| 2SB-600 <b>500p</b><br>2SB-600 <b>500p</b><br>2SB-616 <b>190p</b>    | 2SC-2369 100<br>2SC-2371 45;<br>2SC-2373 210;                           | P 4000 13<br>P 4001 13<br>P 4003 13                       | 7437 <b>28</b> p<br>7438 <b>35</b> p                            | 74HC595 <b>85</b> p<br>74HC597 <b>85</b> p<br>74HC620 <b>110</b> p    | 74LS257 38p<br>74LS258 40p   | NV-8600 7 belts/kii<br>SONY  | 200p                    | Citizen 120D £140 Add £6 for postage for all printers   | 240Vcm 540p<br>Spare Element for C15W 240V 260p                                       |
| 2SB-621 85p<br>2SB-646A 90p<br>2SB-647 30p                           | 2SC-2407 110<br>2SC-2408 120<br>2SC-2470 65                             | P 4006 34<br>9 4007 13                                    | 7447 60p<br>7450 22p  |   | 74LS 260 38p<br>74LS 266 26p   | SL-T7ME/T7MER 6 belts/kit<br>SL-T9/P7/J9 7 belts/kit                     | 170p<br>210p<br>240p    | FLOPPY DISCS  |   |
| 2SB 649 40p<br>2SB-688 120p  | 2SC-2482 40;<br>2SC-2484 240;<br>2SC-2509 580;                          | 4009 20   | 7454 <b>25p</b><br>7470 <b>30p</b>                              | 74HC646 150p<br>74HC648 150p<br>74HC651 110p                          | 74LS279 <b>37p</b><br>74LS280 <b>100p</b>                                      | SANYO<br>VTC-5300 5 belts/kit  | 190p                    | 5 <sup>1</sup> / <sub>4</sub> inch DSDD (10 in box) Branded<br>Name £12.50<br>5 <sup>1</sup> / <sub>4</sub> inch DSDD (bulk pack) 25 £10.00 | DESOLDERING PUMP  |
| 2SB 705 <b>200</b> p<br>2SB-707 <b>200</b> p                         | 2SC-2545 55p<br>2SC-2547 65p<br>2SC-2550 70p                            | 4012 13<br>4013 19  | 7474 <b>40</b> p<br>7475 <b>25</b> p                            | 74HC652 110p<br>74HC670 90p<br>74HC688 150p                           | 74LS290 30p<br>74LS293 30p   | HITACHI  | 95p<br>240p             | 31/2 inch @SDD (10 in box) Branded<br>Name £21.00   | Desolder Pump 290p<br>Spare Nozzle 60p  |
| 2SB-716 30p<br>2SB-727 200p<br>2SB-754 80p                           | 2SC-2551 <b>70</b> g<br>2SC-2562 <b>90</b> g<br>2SC-2564 <b>245</b> g   | 4015 <b>32</b><br>4016 <b>18</b>                          | 7482 <b>70p</b><br>7485 <b>30p</b>                              | 74HC690 120p<br>74HC691 120p<br>74HC4002 25p                          | 74LS365 <b>30p</b><br>74LS366 <b>35p</b><br>74LS367 <b>33p</b>                 | VT-5000 7 belts/kit<br>VT-8000 3 belts/kit<br>VT 11 5 belts/kit          | 155p<br>110p<br>190p    | 3 inch CF2 Branded Name £2.40<br>3 inch CF2D Branded Name £3.00   |   |
| 2SB-755 310p<br>2SB-761 170p<br>2SB-764 60p                          | 2SC-2565 280µ<br>2SC-2570 60µ<br>2SC-2577 125µ                          | 4017<br>4018<br>30<br>4019<br>28                          | 7486 28p<br>7489 80p<br>7490 35p                                | 74HC4015 85p<br>74HC4016 75p<br>74HC4017 48p                          | 74LS368 <b>35p</b><br>74LS373 <b>50p</b>                                       | FISHER<br>VBS-7000 6 belts/kit   | 245p<br>120p            | JOY STICKS  | SOLDER MOP 65p  |
| 2SB-772 45p<br>2SB-775 160p<br>2SB-791 280p                          | 2SC-2578 220;<br>2SC-2579 200;<br>2SC-2580 240;                         | 4021 36<br>4022 36  | 7492 45p<br>7493 35p<br>7495 48p                                | 74HC4020 50p<br>74HC4022 40p<br>74HC4024 34p                          | 74LS375 52p<br>74LS390 46p<br>74LS393 41p                                      | TOSHIBA<br>V-5250/5280 5 belts/kit                                       | 230p<br>210p            | IBM Joy Sticks £16.00 Quick Short Two Joy Stick £6.00 Add £1 postage for Joy Stick  | 001 DED   |
| 2SB-792 70p<br>2SB-795 60p<br>2SB-825 135p                           | 2SC-2581 <b>290</b> 5<br>2SC-2608 <b>620</b> 5                          | 4024 <b>25</b><br>4025 <b>13</b>                          | 7497 80p<br>74107 30p<br>74111 52p                              | 74HC4028 40p<br>74HC4040 34p<br>74HC4049 50p                          | 74LS399 75p<br>74LS629 105p<br>74LS641 100p                                    | V-5475 6 belts/kit<br>V-7540 5 belts/kit                                 | 190p<br>190p            | TANTALUM BEAD   | <b>SOLDER</b><br>18 SWG 500g <b>580p</b>  |
| 2SB-861 160p<br>2SB-882 180p<br>2SB-884 120p                         | 2SC-2611 65p<br>2SC-2625 380p   | 4026 60<br>4027 18<br>4028 29                             | 74116 <b>85p</b><br>74119 <b>85p</b><br>74122 <b>40p</b>        | 74HC4050 <b>50p</b><br>74HC4051 <b>95</b> p                           | 74LS642 140p<br>74LS644 140p   | SHARP<br>VC-6300 5 belts/kit   | 150p                    | CAPACITORS  | 20 SWG 500g <b>650p</b>   |
| 2SB-886 225p<br>2SB-895 120p<br>2SB-950 180p                         | 2SC-2681 270p<br>2SC-2688 70p<br>2SC-2695 2100p                         | 4029 <b>34</b><br>4030 <b>17</b><br>4031 <b>90</b>        | 74123 20p<br>74125 40p<br>74126 45p                             | 74HC4053 95p<br>74HC4059 85p  | 74LS670 68p<br>74LS674 320p  | VC-7300 5 belts/kit<br>VC-8300 5 belts/kit<br>VC-9300 5 belts/kit        | 160p<br>175p<br>155p    | 15UF/3V   | SOLDERING IRON  |
| 2SB-951 190p<br>2SB-1009 110p<br>2SB-1037 110p                       | 2SC-2719 80p<br>2SC-2749 350p<br>2SC-2785 60p                           | 4032 <b>52</b><br>4033 <b>60</b><br>4034 <b>76</b>        | 74132 <b>42</b> p<br>74141 <b>55</b> p                          | 74HC4050 33p<br>74HC4066 33p<br>74HC4072 33p                          | IC'S   | CASSETTE MOTOR 6V 9VCW   | 290p<br>290p            | 22UF/10V 18p 2.2UF/25V 11p<br>33UF/10V 35p 3.3UF/25V 12p<br>47UF/10V 38p 6.8UF/25V 14p  | STAND   |
| 258-1037 180p<br>258-1091 100p<br>25C-97A 380p                       | 2SC-2810 360p<br>2SC-2837 360p<br>2SC-2922 610p                         | 4035 42<br>4036 180<br>4037 75                            | 74153 <b>45</b> p<br>74155 <b>45</b> p                          | 74HC4075 26p<br>74HC4078 32p<br>74HC4094 50p                          | 2114 <b>200</b> p  | 12VCCW<br>12VCW<br>13.2VCW   | 290p<br>290p<br>290p    | 100UF/10V 70p 10UF/25V 18p<br>2.2UF/16V 12p 15UF/25V 38p  | Soldering Stand 200p<br>Spare Sponge 40p  |
| 2SC-454 45p<br>2SC-458 15p<br>2SC-461 30p                            | 2SC-2979 32 0p<br>2SC-2988 280 p<br>2SC-3025 500 p                      | 4038 46<br>4039 180<br>4040 30                            | 74160 <b>50</b> p<br>74164 <b>50</b> p                          | 74HC4316 100p<br>74HC4351 110p<br>74HC4352 160p                       | 2732 280p<br>2732A 300p<br>2764 240p   |  | 290p                    | 3.3UF/16V 12p 1UF/35V 10p<br>4.7UF/16V 13p 1.5UF/35V 11p<br>6.8UF/16V 14p 2.2UF/35V 12p   |   |
| 2SC-495 60p<br>2SC-536 30p<br>2SC-681 340p                           | 2SC-3039 140p<br>2SC-3040 260p<br>2SC-3042 300p                         | 4041 36<br>4042 30<br>4043 36                             | 74173 <b>50p</b><br>74174 <b>70p</b>                            | 74HC4310 120p<br>74HC4511 85p<br>74HC4514 140p                        | 27C64 550p   | Stereo Head<br>Mono Mini Head  | 150p<br>230p            | 10UF/16V 14p 3.3UF/35V 13p<br>15UF/16V 26p 4.7UF/35V 16p<br>22UF/16V 34p 6.8UF/35V 17p  | CRYSTALS  |
| 2SC-710 50p<br>2SC-733 30p   | 2SC-3060 900p<br>2SC-3148 410p<br>2SC-3150 200p                         | 4044 36<br>4045 72  | 74175 65p<br>74176 45p<br>74180 50p                             | 74HC4515 130p<br>74HC4516 130p<br>74HC4518 70p                        | 41256-15 <b>450p</b><br>256DRAM <b>450p</b>                                    | VIDEO MOTORS<br>Sanyo  | p                       | 33UF/16V 42p 10UF/35V 12p   | FREQ. IN MHZ<br>1.0 260p 8.867 125p   |
| 2SC-790 125p<br>2SC-792 380p<br>2SC-828 25p<br>2SC-930 50p           | 2SC-3151 <b>230</b> p<br>2SC-3152 <b>250</b> p<br>2SC-3153 <b>350</b> p | 4046<br>4047<br>4048<br>27<br>4049                        | 74182 <b>45</b> p<br>74192 <b>40</b> p<br>74196 <b>40</b> p     | 74HC4520 <b>80p</b><br>74HC4538 <b>90p</b><br>74HC4543 <b>120p</b>    | 4116 <b>75p</b><br>4164 <b>150p</b><br>6116 <b>200p</b><br>6264-15 <b>300p</b> | Capstan Motor 4-527V-51000 24  | 290p<br>400p            | ELECTROLYTIC CAPACITORS   | 2.00 <b>200p</b> 10.0 <b>140p</b> 2.45760 <b>180p</b> 10.50 <b>200p</b>               |
| 2SC-943 160p<br>2SC-945 40p  | 2SC-3156 400p<br>2SC-3158 260p<br>2SC-3173 180p                         | 4050 <b>20</b><br>4051 <b>38</b><br>4062 <b>35</b>        | 74393 <b>70</b> p   | 74HC7266 <b>75p</b><br>74HC22106 <b>580p</b><br>74HC40104 <b>190p</b> | 6502 <b>300p</b>   | Sony Capstan Motor BHF-1100D 25 Sharp Reel Motor RM:OTB 1007 Gezz 17     | 500p                    | RADIAL LEAD  10 Volts 40 Volts  | 2.5 <b>200</b> p 11.0 <b>250</b> p<br>2.662 <b>200</b> p 12.0 <b>120</b> p            |
| 2SC-1050 300p<br>2SC-1060 99p  | 2SC-3178 340p<br>2SC-3181 240p<br>2SC-3210 400p                         | 4053 <b>35</b> 1<br>4054 <b>53</b> 1                      | HIGH SPEED<br>CMOS  | 74HC40105 250p<br>74LS SERIES   | 6503 570p<br>6520 170p   | Reel Motor RMOTM 1008 Gezz 17<br>Loading Motor RMOTM 1017 10             | 750n                    | 22 MF 15p 10 MF 15p<br>47 MF 15p 15 MF 15p<br>100 MF 18p 22 MF 15p  | 3.276 115p 14.0 125p<br>3.5795 95p 14.138 120p  |
| 2SC-1061 100p<br>2SC-1070 65p<br>2SC-1096 60p                        | 2SC-3212 510p<br>2SC-3264 510p<br>2SC-3277 280p                         | 4056 <b>52</b> ;  | 74HC03 14p  | LOW POWER<br>SCHOTTKY<br>T.T.L.                                       | 6530 1050p<br>6532 460p  | Capstan Motor PU-45979 22  | 200p<br>250p            | 220 MF 18p 47 MF 20p<br>470 MF 25p 100 MF 25p   | 4.0 110p 14.756 200p<br>4.194 130p 15.0 160p<br>4.43 95p 16.0 130p                    |
| 2SC-1106 180p<br>2SC-1114 415p<br>2SC-1115 400p                      | 2SC-3293 <b>85</b> p<br>2SC-3299 <b>120</b> p<br>2SC-3318 <b>500</b> p  | 4066 <b>20</b> g<br>4067 <b>120</b> g                     | 74HC10 20p  | 74LS00 14p<br>74LS01 14p<br>74LS02 14p                                | 6545 880p<br>6551 530p<br>6800 210p  | VIDEO PINCH ROLLERS National   | 250p                    | 1000 MF 35p 220 MF 30p<br>16 Volts 470 MF 35p<br>10 MF 15p 1000 MF 50p  | 4.608 <b>150p</b> 18.0 <b>130p</b><br>4.9152 <b>150p</b> 18.432 <b>130p</b>           |
| 2SC-1116 290p<br>2SC-1161 110p<br>2SC-1162 35p                       | 2SC-3355 90p<br>2SC-3358 80p<br>2SC-3402 50p                            | 4069 13g<br>4070 13g                                      | 74HC20 20p  | 74LS03 14p<br>74LS04 14p<br>74LS05 14p                                | 6802 220p<br>6803 800p<br>6808 500p  | NV-7000 4  | 475p                    | 22 MF 15p 2200 MF 190p 47 MF 15p 50 Volts   | 5.0 130p 19.969 130p<br>6.0 115p 20.0 160p<br>70 125p 24.0 250p                       |
| 2SC-1164 600p<br>2SC-1172 150p<br>2SC-1173 60p                       | 2SC-3416 80p<br>2SC-3417 90p<br>2SC-3422 110p                           | 4072 13g<br>4073 13g                                      | 74HC21 20p<br>74HC27 20p<br>74HC30 20p                          | 74LS08 14p<br>74LS09 15p<br>74LS10 14p                                | 6809 600p<br>6810 150p<br>6818 380p  | VTC-5500 4<br>Sony   | 475p<br>475p            | 220 MF 18p 2.2 MF 15p<br>470 MF 25p 4.7 MF 15p  | 8.0 <b>125p</b> 48.0 <b>160p</b>  |
| 2SC-1213 50p<br>2SC-1214 40p<br>2SC-1226 75p                         | 2SC-3422 110p<br>2SC-3467 70p<br>2SC-3468 70p<br>2SC-3503 90p           | 4076 42p  | 74HC51 20p  | 74LS11 14p<br>74LS12 14p<br>74LS13 22p                                | 6820 140p<br>6821 140p<br>6840 310p  | SL-C7 4  |                         | 2200 MF 60p 22 MF 25p<br>4700 MF 110p 62 Volume   |   |
| 2SC-1279 30p<br>2SC-1306 90p<br>2SC-1308K 350p                       | 2SC-3568 200p<br>2SC-3675 160p  | 4081 13r<br>4082 13r                                      | 74HC73 26p<br>74HC74 26p<br>74HC75 30p                          | 74LS15 15p<br>74LS20 15p<br>74LS21 15p                                | 6845 <b>620p</b><br>6850 <b>110p</b><br>8080A <b>400p</b>                      | HR-3300 5<br>HR-3330 5<br>HR 3360/3660 5                                 | 500p<br>500p            | 25 Volts  | * ENGINEERS SERVICE *   |
| 2SC-1317 <b>25p</b><br>2SC-1318 <b>25p</b><br>2SC-1327 <b>20p</b>    | 2SC-3685 400p<br>2SC-3789 75p<br>2SD-024 60p                            | 4085 <b>36</b> 5<br>4086 <b>30</b> 5<br>4089 <b>75</b> 5  | 74HC76 30p<br>74HC77 40p<br>74HC85 33p                          | 74LS22 15p<br>74LS24 38p<br>74LS26 15p                                | 8085A 300p<br>8155 360p<br>8156 360p   | HR-7200 5<br>HR-3300 5<br>Akai   | 500p<br>500p            | 47 MF 15p 2.2 MF 15p<br>100 MF 18p 4.7 MF 15p   | * SMALL ZIPPED * TOOL KIT *   |
| 2SC-1342 120p<br>2SC-1383 50p<br>2SC-1384 50p                        | 2SD-313 <b>70p</b><br>2SD-325 <b>60p</b><br>2SD-348 <b>460p</b>         | 4093 18p<br>4094 44p<br>4095 58p                          | 74HC86 29p<br>74HC93 50p<br>74HC107 31p                         | 74LS27 15p<br>74LS28 15p<br>74LS30 15p                                | 81LS95 120p<br>81LS96 130p<br>81LS98 130p                                      | VS-9700EG 3<br>Hitachi   | Joop                    | 470 MF 25p 22 MF 20p<br>1000 MF 50p 47 MF 25p   | £28.99 + VAT  |
| 2SC-1398 <b>80p</b><br>2SC-1413 <b>265p</b><br>2SC-1419 <b>150p</b>  | 2SD-371 240p<br>2SD-401 130p<br>2SD-438 100p                            | 4098 <b>50</b> p<br>4099 <b>42</b> p<br>4501 <b>27</b> e  | 74HC109 31p<br>74HC112 31p<br>74HC113 31p                       | 74LS32 17p<br>74LS33 17p<br>74LS31 16p                                | 8224 <b>270</b> p<br>8226 <b>270</b> p<br>8228 <b>270</b> p                    | Sharp<br>VC-6300/6500<br>IDLERS & PULLEYS                                |                         | 2200 MF 70p 100 MF 30p<br>35 Volts 220 MF 35p   | CONTAINING:   |
| 2SC-1444 360p<br>2SC-1454 320p<br>2SC-1472 40p                       | 2SD-600 120p<br>2SD-613 70p<br>2SD-718 100p                             | 4502 <b>36</b> p<br>4503 <b>30</b> p                      | 74HC123 43p<br>74HC125 35p<br>74HC126 36p                       | 74LS38 17p<br>74LS40 16p<br>74LS42 28p                                | 8243 250p<br>8250 850p<br>8087 11000p  | REPLACEMENTS<br>Sanyo  |                         | 22 MF 15p 1000 MF 100p 47 MF 15p 100 Volts  | * MULTI TESTER, *   |
| 2SC-1505 <b>80p</b><br>2SC-1507 <b>140p</b><br>2SC-1509 <b>80p</b>   | 2SD-1277 190p<br>2SD-1398 250p<br>2SD-1453 180p                         | 4505 <b>180</b> p<br>4506 <b>58</b> p<br>4507 <b>30</b> p | 74HC131 38p<br>74HC132 37p<br>74HC133 35p                       | 74LS47 56p<br>74LS48 52p<br>74LS51 15p                                | 8251 <b>320p</b><br>8253 <b>320p</b><br>8255 <b>310p</b>                       | Reel, Pulley 143-0-662T-01201 5  | 450p                    | 100 MF 20p 0.47 MF 15p<br>220 MF 25p 1.0 MF 15p<br>470 MF 30p 2.2 MF 15p  | * TWEEZER * * FIVE DIFFERENT TYPES *  |
| 2SC-1505 80p<br>2SC-1514 85p<br>2SC-1515 60p<br>2SC-1520 120p        | 2SD-1609 110p<br>BRIDGE<br>RECTIFIERS                                   | 4508 67p<br>4510 32p<br>4511 30p                          |   | 74LS54 15p<br>74LS55 17p<br>74LS73 26p                                | 8256 1200p<br>8257 350p<br>8259 360p   | Idler 143-256T-03200 4<br>Sony<br>Rew Pulley A-6706-348-B 4              | 450p                    | 1000 MF 50p 4.7 MF 15p<br>2200 MF 100p 10 MF 15p  | * OF TINE TOOLS *   |
| 2SC-1573 <b>95p</b><br>2SC-1586 <b>540p</b>                          | 1A/50V 16p<br>1A/100V 18p   | 4512 <b>38</b> p<br>4513 80p                              | 74HC147 <b>45p</b><br>74HC148 <b>40p</b>                        | 74LS74 20p<br>74LS75 26p  | 8259 3400p<br>8271 3400p<br>8272 1200p<br>8279 450p                            | Rew Pulley A-6706-391-A/B 3<br>Sharp<br>Idler Assembley NIDI 0005 Gezz 3 | 300g                    | PLEASE PHONE US FOR TYPE NOT I  | E GIVEN FOR LARGE QUANTITIES  |
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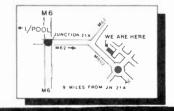
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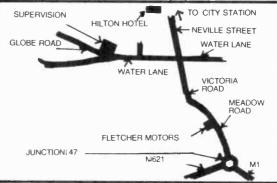
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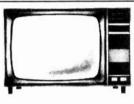
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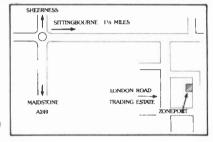
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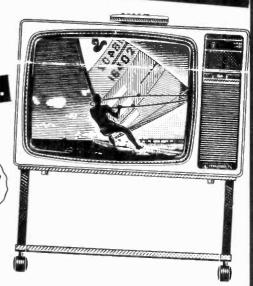
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| Panasonic 3HSS(N)   |   | N'                         |
| NV2000, NV2010, NV7000,<br>NV333, NV8600, NV8610.                     |   | N,                         |
| 3HSS-UI(N)<br>Fits model numbers: NV370 8<br>VR6460                   | <b>£29.90</b><br>3. Philips                       | N'<br>AJ                   |
| 3HSS(4N)  | . £46.50  | <b>F</b> (3)               |
| 3HSS(4NB)   | £54.60  | 3\<br>3\                   |
| 3HS5(V)   | <b>£22.95</b><br>6, 3V22,<br>38, 3V39,<br>HR7200, | 3\<br>V()<br>V()<br>V()    |
| Sharp   | £54.60  | V                          |
| 3HSS(SP)  | <b>£29.90</b><br>VC9300,<br>, VC383,              | S                          |
| Toshiba<br>PS3B(T)<br>Fits model numbers: V9600, V31B,                | £31.95<br>V33B                                    | S                          |
| Hitachi 3HSS(H)   | £26.50  | SL<br>SL<br>SL             |
| Fits model numbers: SLC20, SLC30                                      | . £34.50  | 76<br>V9<br>V8<br>V3<br>V5 |
| SLF1.<br>PS5B(3S)<br>Fits model numbers. SLC9, SLT5<br>SLF60.         | . £44.25<br>0, SLC8,                              | HI VI                      |
| Ametrad/Saicho  |   | V                          |

| All our replacement heads are brand new precision Japanese heads not refurbished. | Panasonic                                | 044.00           |
|---|--|------------------|
| Panasonic   | NV2000, NV2010<br>NV7000, NV7200         |                  |
| 3HSS(N)   | NV333, NV370                             | €44.00           |
| Fits model numbers NV2000, NV2010, NV7000, NV7200,                                | NV366<br>NV688, NV777, NV788             | £64.50           |
| NV333, NV8600, NV8610.<br>3HSS-UI(N) £29.90                                       | NV730                                    | £64.50<br>£67.50 |
| Fits model numbers: NV370 & Philips<br>VR6460                                     | All others available P.O.A.              | 201.00           |
| 3HSS(4N) £46.50   | <b>Ferguson</b><br>3V00, 3V16, 3V22      | 050.00           |
| Fits model number. NV366 3HSS(4NB)  | 3V29, 3V30                               | £59.90<br>£59.90 |
|   | 3V32                                     | £66.95           |
| Ferguson San San San San San San San San San Sa                                   | 3V35, 3V36, 3V38, 3V39                   | £59.90           |
| 3HSS(V)   | Sharp                                    |                  |
| 3V29, 3V30, 3V31, 3V35, 3V36, 3V38, 3V39, HR3300, HR3330, HR3360, HR7200.         | VC7300, VC7700, VC7750<br>VC8300         | 269.90           |
| UD7200 UDD120   | VC9300, VC9500, VC9700                   |                  |
| 3HSS4VB   | VC381, VC383, VC386                      | £62.00           |
| Charm   | VC482                                    | £62.00           |
| 3HSS(SP) £29.90   | All others available P.O.A.              |                  |
| Fits model numbers: VC9100, VC9300, VC9500, VC9700, VC381, VC8381, VC383.         | <b>Sanyo</b><br>VTC5000, VTC5150         | C30 00           |
| VC388, VC482.   | VTC5300, VTC5400                         |                  |
| Toshiba   | VTC9300                                  |                  |
| <b>Toshiba</b> PS3B(T)  | Sony                                     |                  |
| Hitachi   | SLC5, SLC6, SLC7                         |                  |
| 3HSS(H)   | SLC20, SLC30                             | £49.50<br>£54.50 |
| Fits model numbers, VT8000, VT9300 etc.   | SLC9                                     |                  |
| <b>Sony</b> PS3B(S) £24.95 Fits model numbers: SLC5, SLC6 SLC7,                   | Toshiba                                  |                  |
| Fits model numbers: SLC5, SLC6 SLC7,  | V9600                                    |                  |
| SL3000 also various NEC models<br>P84B(2S)  | V8600<br>V31, V33                        |                  |
| Fits model numbers: SLC20, SLC30, SLC40, SLF1.                                    | V55, V56                                 |                  |
| PS5B(3S) £44.25   | Hitachi                                  |                  |
| Fits model numbers. SLC9, SLT50, SLC8, SLF60.                                     | VT5000, VT5500                           |                  |
|   | VT6500, VT8000, VT8300<br>VT8500, VT8700 | £49.50           |
| Amstrad/Saisho<br>3HSS(R)   | VT9300, VT9500, VT9700                   |                  |
| Fits model numbers VCR7000 and all mod-<br>els using Orion chassis.               | VT11E, VT14E                             | £45.50           |
| els using Orion chassis.  3HSS(FI)  | VT17E, VT19E<br>VT33E                    |                  |
| VCR9000 etc.  |  | 149.50           |
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| 3HSS(SF)  | VR6462                                   | £44.50           |
| V1000.  | Please call if your model is not listed  |                  |
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| NV7000. NV7200                   | €6.50 |
| NV333, NV366                     | €6.50 |
| NV370, NV830. NV850              | £2.80 |
| NV688                            | £6.50 |
| NV777, NV788                     | £4.70 |
| NV8600, NV8610                   | £6.50 |
| NV730                            | £1.90 |
| NV230, NV430, NV870              | £2.80 |
| NV870, NV810                     | £2.80 |
| Ferauson                         | 12 00 |
| 3V00, 3V16, 3V22                 | 00.50 |
|                                  | €6.50 |
| 3V23                             | £3.90 |
| 3V29, 3V30                       | £4 90 |
| 3V35, 3V36, 3V38, 3V39           | £2 90 |
| Sanyo                            |       |
| VTC5000, VTC5150                 | £1.99 |
| VTC5300, VTC5400                 | €4 50 |
| VTC9300                          | €6.50 |
| Sony                             |       |
| SLC5, SLC7                       | £6.50 |
| SLC6                             | £7.50 |
| SL8000, SL6080                   | £6.50 |
| Sharp                            |       |
| VC7300, VC7700, VC7750           | £6.50 |
| VC8300<br>VC9100, VC9300, VC9500 | £6.50 |
| VC9100, VC9300, VC9500           | £6.50 |
| VC381, VC383, VC386              | £6.50 |
| Hitachi                          |       |
| VT5000, VT5500                   | €6.50 |
| VT8000. VT8300. VT8500           | £2,90 |
| VT9300, VT9500, VT9700           | £3.30 |
| VT11E, VT14E, VT17E, VT19        | €6.50 |
| VT33E                            | €6.50 |
| Akai                             |       |
| VS9700                           | €6.50 |
| VS2, VS3, VS4, VS5               | £4.90 |
| VS9300, VS9500, VS9700           | ε6.50 |
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| VT5000, VT5500<br>VT8000, VT8300, VT8500                       | £5.95                   |
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| NV777, NV788 (Genuine)                                 | £3.45 |
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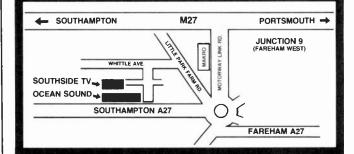
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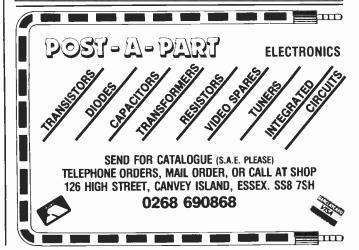
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| ANSAN   C.S.   ANZ-18  |                   |        | AN7178<br>AN7213 |                |          |                |                  |                | LA7910           |        | S1K2125<br>S1K2129 |                | TA7272F            | £2.95          | UPC1278H          | £2.75 |   | £3.35    |
| AAS66P   1.70   AA72224   3.5 0   HA1377   2.2 0   LA2100   C2.95   LB1409   C2.95   STR2240   C9.50   LA2260   C9.50   C9.50   LA2260   C9.50   C9.50   LA2260   C9.50   LA22   |                   |        | AN7218           | £1.75          |          | £2.50          |                  |                | LB1405           | €2.20  | STK2230            |                | TA7274P            | £2.95          | UPC1364C          |       |   | £3.75    |
| ANJOY D. 12.00 ANJOYS C. 12.00 | AN366P            | £1.70  | AN7222N          | €3.50          |          | £2.20          |                  |                | LB1409           | €2.95  | STK2240            |                | TA7280P            | £3.50          | UPC1365C          |       |   | £1.85    |
| AM510  P. 18.0   AM7273   C. 29   M-1389   P. 2.20   LA3210   C. 29   LA3210   C. 20   LA   | AN374P<br>AN377   |        |                  |                | HA1384   |                | LA2101           |                | LC4066B          |        | STK2250            | £9.50          | TA7282AP           | 12.95<br>C2.95 | UPC1384C          | £3.50 | HITACHI VT9000 Play Idler                   | £3.75    |
| ANSOLO PLATE AL ANCION CAPE AL ANCIO |                   | 21.80  | AN7256           | £3.50          |          |                |                  |                | LC7131           |        | STK3042            |                | TA7283AP           | £2.95          | UPC1391H          | £1.50 |   | £4.25    |
| ANS-265 S. 20 AN7410 C. 20.0 HA19396 C. 2.95 (A3300 C. 16.5 (LC7)37 C. 43.50 (M37470 C. 20.0 M37410 C. 20.0 M37410 C. 20.0 M37410 C. 2.95 (HA19396 C. 2.75 (M3310 C. 2.75 ( |                   |        |                  | £3.95          |          |                |                  |                | LC7132           |        | STK3044            | £5.95          | TA7288P            | £2.95          | UPC1394C          |       | SHARP Play Idler                            | £2.95    |
| ANS-10   |                   |        | AN7310<br>AN7311 |                |          |                |                  |                | C7136            |        |                    |                | TA7317P            | 52 75          | UPC45580          |       | SANYO Canatan Motor                         |          |
| ANS-110 13.50 ANT-420 12.25 HA338 12.50 HA338 12.51 HA | AN5265            | €3.20  | AN7410           | £3.00          | HA1396   | £3.75          | LA3301           | £1.30          | LC7800           | €3.95  | STK4060            | €6.50          | TA7328P            | €2.20          | BC639             | £0.22 | SANYO Capsian Motor                         |          |
| AM5510 C2.75 BA311 C0.80 HA1457W E2.75 LA361 C1.20 M5100L E3.95 STK4151I C7.50 TA7607AP E2.95 BFF90 C5.20 M5513 C1.80 M5100L E3.95 STK4151I C7.50 TA7607AP E2.95 BFP90 C5.20 M5513 C1.80 M5100L E3.95 STK4151I C7.50 TA7608P E2.95 BFP90 C5.20 M5513 C1.80 M5100L E3.95 STK4151I C7.50 TA7608P E2.95 BFP90 C5.20 M5513 C1.80 M5100L E3.95 STK4151I C7.50 TA7608P E2.95 BFP90 C5.20 M5513 C1.80 M5100L E3.95 STK4151I C7.50 TA7608P E2.95 BFP90 C5.20 M5513 C1.80 M5100L E3.95 STK4151I C7.50 TA7608P E2.95 BFP90 C5.20 M5513 C1.80 M5100L E3.95 STK4151I C7.50 TA7608P E2.95 BFP90 C5.25 M500D C5.85 M |                   |        |                  | £2.95          |          |                |                  |                | M5134P           |        | STK4131II          |                | TA7343AP           |                | BC640<br>BERROO   |       | SANYO Reel Drive Pulley                     | £7.25    |
| AMS512 C2 55 BA313 C2.80 HA11219 C3.25 LA030P C2.00 M51513 C1.00 M51516L C2.75 LA030P C2.80 M51514 C2.80 LA030P C2.80 LA03 |                   | £2.95  | BA301            |                |          | \$2.75         |                  |                | M51102L          |        | STK4151II          |                | TA7607AP           | £2.95          | BFR91             |       | SANYO Pinch Roller 5000/5300                | 25.95    |
| AMS620X 23. 50 BA318 C 1.50 HA11225 C 2.5 LA031P C 1.50 MS15158 C 2.50 STK4893 C 2.50 STK4894 C  |                   |        |                  |                |          |                |                  |                |                  |        |                    |                |                    |                |                   |       | SANYO Pinch Roller 9300                     | 64.95    |
| AM5701 C 1.80 BA328 C 2.50 HA11223 W 2.80 LA4020 C 1.50 M515168L 22.90 STK4893 C 2.50 HA1225 C 1.60 M5272 C 1.60 BA328 C 2.50 HA11226 C 4.50 LA4100 C 1.20 M515168L 22.90 STK4893 C 2.50 HA1225 C 2.00 HA11225 C 2.00 LA4100 C 1.20 M51516L C 2.00 STK4893 C 2.50 HA1225 C 2.00 HA12 |                   |        |                  |                |          |                |                  |                |                  |        |                    |                |                    | 52.70          |                   |       | SONY Capstan Motor 1100                     | €28.75   |
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| MAST320   C1.85   BA335   C3.60   HA1125   C2.30   LA4102   C1.40   M51518   C2.20   STK\$211   E5.75   T091068P   C4.96   BU3506   C1.80   BU500   C1.80   BU500   C1.80   BU500   C1.80   C  |                   |        |                  |                |          |                |                  |                |                  |        |                    |                |                    | £1.75          | BU208A            |       | ENQUIRIES OTHER ITEMS                       |          |
| AM5732 C1.85 BA340 C2.50 HA1125 C2.75 LA4110 C1.75 M51627 C1.50 STK525 C3.75 T062105 C3.50 BU508 C1.80 CASSETTE MOTORS  AM5753 C1.95 BA402 C2.75 HA11401 C2.80 LA412 C1.75 M618772 C1.50 STK525 C3.75 T0A1010A 22.50 BU508A C1.80 CASSETTE MOTORS  AM5753 C1.95 BA402 C2.30 BA403 C1.95 HA11423 E4.75 LA4120 C2.95 MB2712 C1.50 STK525 C5.75 T0A1010A 22.50 BU508A C1.80 CASSETTE MOTORS  AM5750 C2.30 BA403 C1.95 HA11423 E4.75 LA4120 C2.95 MB2712 C1.50 STK525 C5.75 T0A1010A 22.50 BU508A C1.80 CASSETTE MOTORS  AM5750 C2.30 BA403 C1.95 HA11470 C3.50 LA4125 C2.20 MB2713 C2.95 STK525 C5.75 T0A1010A 22.50 BU508A C1.80 CASSETTE MOTORS  AM5750 C2.30 BA403 C1.95 HA11470 C3.50 LA4126 C2.60 MB2713 C2.95 STK525 C5.75 T0A1170 C2.50 C5.75 C5.7 |                   | £1.85  | BA335            |                |          |                | LA4102           |                | M51518L          |        | STK5211            | £6.75          | TC91068P           | £4.95          | BU326A            |       | LIMIVEDO AL TRIDICOS                        | CE EN    |
| AM6250 C 2.30 BA403 C 1.95 HA11423 E 3.95 LA125 C 2.20 MB2713 C 1.60 STK5425 E 5.90 E  | AN5732            | £1.85  |                  | £2.50          |          | £2.75          |                  | £1.75          | M51521L          |        |                    |                | TD62105P           | £3.50          | BU500             |       | OTHER TRIFLERS                              | 10,00    |
| ANG-250   C-2-30   RA403   C-1.96   HA11440   C-2-3.95   LA4125   C-2-20   MB2/714   C-2-5   C-2-20    |                   |        |                  |                |          |                |                  |                |                  |        |                    |                | TDA1010A           |                |                   |       | CASSETTE MOTORS                             |          |
| AN632P G. 17.5 RA514 C. 1.96 HA11701 S. 3.50 LA4126 E. 2.60 MB3714 E. 2.95 STK5451 65.0 T0A1170N C. 15.0 ZSA1106 E. 2.50 AL 2.50 STK5476 AL 2.95 STK5451 C. 1.96 HA11704 E. 2.95 STK5451 C. 1.96 STK5451 C. 1. | AN6250            | £2.30  | BA403            | £1.95          | HA11440  | £3.95          | LA4125           | €2 20          | MB3713           | £1.60  | STK5421            | £6_50          | TDA1074A           | £2.75          | 2N3773            | £1.50 | 6-9-12-13.2 Volts C.W.                      | £3.45    |
| ANG328   Ci 2,95   BA516   Ci 90   HA11704   F5,20   LA4140   Ci 90   MB2730   Ci 95   STK5726   Ci 95   STK5726   Ci 95   Ci 95   STK5726   Ci 95   STK57   | AN6326N           |        |                  |                |          |                |                  | £2.60          | MB3714           |        |                    |                |                    | £1.20          | 25A733<br>25A1104 |       | 12-13 2 Volts C C W                         | £3,45    |
| AN6330 C 2.9 8 BAS21 F1.80 HA11705 F6.59 LA145 F1.70 MB1731 E3.50 STK5720 F6.80 TDA1515 E4.50 Z85836 E9.51 MD10 E1.50 AUD Rev. £2.75 AN6341N C 4.00 BAS26 C 2.75 HA11710 F3.75 LA170 C 3.75 | AN6328            | £4.20  | BA516            | £1.90          | HA11704  | €5.20          | LA4140           | 00.03          | MB3730           | £2.50  | STK5476            | €6.75          | TDA1170S           | £1.50          | 2SA1106           | £2.75 | CASSETTE HEADS                              |          |
| ANG341N P. 10 BAS56  | AN6330            | \$2.95 | BA521            | £1.80          | HA11705  | €6.95          | LA4145           | £1.70          | MB3731           | €3.50  |                    |                |                    | £4 50          | 2SB536            | £0.95 |   | C2 75    |
| ANG342N C 250 BA527 C 1.56 HA11711 C 9.50 LA4178 C 250 MBB719 C 1.86 S TKY308 C 9.59 TDA2002 C 9.80 C 25C1364 C 1.50 BA536 C 2.50 HA11716 C 1.57 S TK014 C 1.58 S TK014 C 1.58 S TK028 C 1.50 TDA2003 C 9.80 C 25C1364 C 1.50 BA536 C 2.50 HA11716 C 1.57 S TK014 C 1.58 S TK014 C 1 | AN6340<br>AN6341N | £7.85  |                  |                |          |                |                  | £2.40<br>£3.50 |                  |        |                    |                |                    | £4.50          | 250546A<br>25C461 |       |   |          |
| AN6344 C 4, 75 B A532 C 1.60 HA11713 F6, 50 LA482 C 2.20 STK011 C 33.95 STK7404 F6, 95 TDA2003 C 19.00 ZSC1992 C 29.95 Enquires invited for any Japanese IC 8.45 we have imported AN6350 K 13.85 BA546 C 2.20 HA11716 K 15, 95 LA483 C 29.5 STK014 T 25.5 STK0250 C 10.75 TDA2003 C 19.00 ZSC1990 ZSC1990 ZSC1990 C 17.75 TOA004 C 12.20 ZSC2166 C 1.00 TEMS DESPATCHED WITHIN 49 HOURS C 17.75 LA492 C 17.75 STK045 C 15.00 STK016 C 15.00 T 17.75 TDA2004 C 17.75 STK045 C 15.00 T 17.75 TDA2005 C 17.75 TDA | AN6342N           | €2.50  | BA527            | £1.75          | HA11711  | 29.50          | LA4178           | £2.50          | MB8719           | €3.85  | STK7308            | 25.95          | TDA19C8A           | £1.75          | 2SC1364           | €0.50 |   |          |
| ANGSSON C3.85 BAS46 C2.20 HA11716 C4.75 LA492 C1.95 STW015 E5.20 STW025 E5.20 STR8250 C10.75 TOA2004 C2.20 2SC2166 C1.00 ITEMS DESPATCHED WITHIN 48 HOURS ANGSON C4.50 BAS12 C1.80 HA11717 E4.75 LA420 C1.50 STW016 E5.20 STR830 C5.80 TOA2005 C2.75 SC2580 C2.75 SC2580 C2.75 ANGSON C5.50 STR840 C5.80 TOA2005 C2.75 SC2580 C2.75 SC2580 C2.75 ANGSON C5.50 STR840 C5.80 TOA2005 C2.75 SC2580 C2.75 ANGSON C5.50 STR840 C5.80 TOA2005 C2.75 SC2580 C2.75 Please add 60p post and packing and phoniment Callers by appointment Callers by appointment Callers by appointment C5.50 SC2516 C3.50 SC2516 C3.5 | AN6344            | £4.75  | BA532            | 21.60          |          | 26.50          | LA4182           | £2.20          | STK011           | \$3.95 |                    |                |                    | 08.02          | 2SC1942           | £2.95 |   | ported   |
| AN6367N  |                   |        |                  |                |          |                | LA4183<br>LA4192 | £2.95          | STK015           |        | STK82501           | £10.75         | TDA2003            | £2.20          | 2SC2166           | £1.75 |   |          |
| ANGSIG 15.50 BAGSIA 15.75 HA11727 19.50 LA4230 12.75 STR025 17.50 STR041 15.80 TDA203 11.50 S2C3156 (3.50 Gallers by appointment 1.00 Appointm | AN6357N           | £4.95  | BA547            | £2.50          | HA11717  | €5.75          | LA4201           | £1.60          | STK016           | 26.25  | STR380             | \$5.80         | TDA2005            | €2,75          | 2SC2580           | £2.75 |   | to total |
| ANG363 C8 50 BA656 C4 50 HA11727 C9 50 LA4420 C1.75 STK043 C10.50 STR451 C5.80 T0A2030 C1.50 ZSD401A C1.50 Opening times 10am-5pm, Mon-Fn, 9-12 Sats  AN6371 C4 25 BA643 C4 50 HA11745 C9 00 LA4422 C1.75 STK077 C9.50 STR2012 C6.75 T0A2170 C2.75 ZSD1398 C2.50   |                   |        |                  | £1.80          | HA11718  |                |                  |                |                  |        |                    |                |                    | £1.50          | 2502581           |       |   | io total |
| ANG371 \$4,25 BA843 \$4,50 HA11745 \$9,00 LA4422 \$1,75 STK077 \$6,50 STR2012 \$6,75 TDA2170 \$2,75 2SD1398 \$2,50 \$  |                   |        | BA656            |                | HA11727  | £9.20<br>£9.50 | LA4420           | £1.75          | STK043           | £10.50 | STR451             | £5.80          | TDA2020            | £1.50          | 2SD401A           | £1.50 |   |          |
| AND S87 ES. 95 BAISTUP ET. 75 MAIT 1/4 E9.50 LA44SU ET. 50 STKU/8 ES. 75 STHAUSU ED. 76 THAUSU ET. 75 STHAUSU ET. 75 THAUS ET. 75 MAIT 1/4 E9.50 LA44SU ET. 50 STHAUSU ED. 75 STHAUSU ET. 75 THAUS ET. 75 MAIT 1/4 E9.50 LA44SU ET. 50 STHAUS ET. 75 STHAUS ET. 75 MAIT 1/4 E9.50 LA44SU ET. 75 STHAUS ET. 75 STHAUS ET. 75 MAIT 1/4 E9.50 LA44SU ET. 75 STHAUS ET. 75 STHAUS ET. 75 MAIT 1/4 E9.50 LA44SU ET. 75 STHAUS ET. 75 STHAUS ET. 75 MAIT 1/4 E9.50 LA44SU ET. 75 STHAUS ET. 75 STHAU | AN6371            | £4.25  | BA843            | £4.50          | HA11745  | 00.03          | LA4422           | £1.75          | STK077           | €6.50  | STR2012            | £6.75          | TDA2170            | €2.75          | 2SD1398-          | €2.50 | 1804 400000 40000000                        |          |
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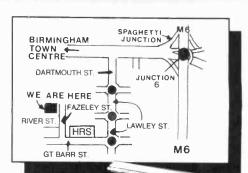
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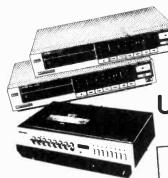
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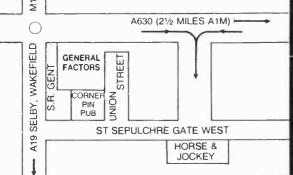
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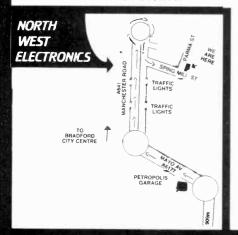
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| GEC IF tuner panel                                     | R 2009<br>R 2010b                             | £1  | ZTX 550 10p<br>MJ 2253 60p                                | E5.00<br>ITT CVC45 8 way resistor   | 6 Push Button Unit for GE<br>2100 Series        | Model 3000  |
| PC786B £12.50  Rank IF 742 £3                          | R 2029<br>R 2210<br>R 2257                    | 50p<br>60p<br>60p<br>50p                                    | MJF 3040 60p<br>MJE 2209 10p<br>SP 8385 50n               | unit for v/cap £3  CVC40 8 button unit with   | Replacement for Tou<br>Button Unit              | 2h   Pocket Personal D.M.M.   Volts range A4', DC 200M/V to   400V, Res. 2000Km   £20 |
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| Tuner IF Cans ITT                                      | R 2443=BD124<br>R 2540<br>R 2737              | 30p<br>£2<br>40p  | 20v/2.25A; 20v/1.5A;<br>17/.5A; 19/.5A; 28/.05A £3        | by R. Bunny £5.95 No VAT  | - £1.50   | Philips Solar Scientific<br>SBC1730 Calculator £t2                                    |
| CMR200 £10   | R 2738=TIP41<br>R 2775=TIP41c<br>R 3129=TIP47 | 30p<br>40p<br>40p   | OLD TYPE TEX. LC.<br>TX004F £3,50                         | Electronics Hobbyists<br>Handbook £4.95 No VAT  | Electronic Buzzer<br>6 volt, 12 volt <b>40p</b> | 15v-0-15v 1 Amp<br>Fransformers £1  |
| ITT SEL HF Modul 2<br>UK IF Tuner £8                   | R 4050<br>S 2008b                             | £1.00<br>80p<br>£1  | TX005GN £3,00<br>TX904 £3,00                              | Hills £4,50 NLCD 5 Hours Battery Charger with battery test £6                           | 15V, 015V, 1A<br>Print Type Trans               | E1 RGP30K 10p<br>RGP30G 8p  |
| 4 types of front panels<br>Fidelity 2000/3000          | 2SD898B<br>2SC1942<br>Hitachi sets etc.       | £I  | X908 £4.00<br>MM2102AN £2.00                              | Multi Core  | 1   | RGP10B 5p<br>RGP15G 6p<br>T6024WGI 10p  |
| types £5   | STR441<br>  STR454<br>  STR6020               | £2.50<br>£2<br>£2<br>£1                                     | Voltage Regulators<br>+5V/UA78PO5SC 30p                   | 60–40 Soldar 500G 20 SWG<br>15 Watt Stereo Amp Sanyo !                                  | 23  | GP10 Sp   |
| CVC20, CVC32 1.F.<br>CVC40 Cans £5                     | S 2000AF line o.p.<br>2SC940<br>BU 105/04     | £1  | -8V/79M08c 30p<br>+6V/78M06c 30p                          | PHILIPS<br>25 Watt Solder Iron  |   | THORN RGP80G 30p  |
| 20AX Line lin coil 50p                                 | BU 108<br>BU 124                              | 80p<br>£1<br>50p  | +10v/78LA10 20p<br>LM 337 30p                             | 10 mixed tube bars  | Various Tools and Accesso                       | £4,00   |
| GEC switch mode<br>trans 20AX<br>ITT mains CVC9 to     | BU 126<br>BU 180a<br>BU 204                   | 80p<br>65p<br>60p   | LM 342/18 30p<br>LM 340T 5.0 50p<br>+12V/LM 340T12 50p    | 5000 Diodes-Resistors<br>T/V V/Aerial 300Ω or 75Ω<br>* D/P push mains switch            |   | £3 pack<br>£1.50<br>20p each  |
| CVC33 print type 60p                                   | BU 205<br>BU 206<br>BU 207                    | 75p<br>£1<br>£1   | +18V/MC78M18 20p<br>+24V/78M24 30p                        | Mains lead & two pin socket<br>T/V loop aerial  | for radio cassette                              | 35p  <br>75p  |
| remote switch 50p                                      | BU 208<br>BU 208A                             | 80p<br>75p<br>90p   | MC 7724cp 40p<br>MC 7824 40p                              | Radio Telescopic Aerial<br>Philips Neon Lamps for TV                                    | sets  | £1.00<br>5p   |
| NEW<br>2110 GEC Sound O/P                              | BU 208D<br>BU 222<br>BU 326                   | £1  | TIS 90<br>TIS 92 20p                                      | Freeze Philips Foam Cleaner Philips Contact Cleaner Philips                             |   | £1.20<br>£1.20<br>£1.20   |
| Panel £1   | BU 407<br>BU 426A<br>BU 426V                  | 60p<br>45p<br>60p   | TIS 93 20p<br>U 19885 40p                                 | Cans of Anti Static, Degrease<br>Lorlin Full Remote Relay Sw                            | ritch fit most T/V sets, main                   | All at £1.40  <br>is 4 tag, 2 tag 12 volt   |
| 2110 GEC L.O.P.T.<br>Panel £6                          | BU 500<br>BU 500D<br>BU 508A                  | £1.1d<br>£1   | U 3832 15p<br>U 3845 15p                                  | Mains timer, 13 amp — up t<br>Screen locking agent, large of<br>Red E.H.T, LAED and And | o 2 hours: easy to use, pluj<br>in<br>ido Con   | s into socket £3,00<br>£1.50<br>£1.00   |
| 2110 GEC Power<br>Panel £5                             | BU 508V<br>BU 705                             | 90p<br>£1<br>£1   | MR 508 10p<br>MR 501 10p                                  | Weller solder iron 25 watt<br>Hitachi Silver Oxide Battery                              | •   | £4.00   |
| Line o/p frame panels<br>GEC 20AX £10.00               | BU 807<br>  BU 824<br>  BUT 11                | £1<br>50p<br>50p<br>£1                                      | MR 502 10p<br>BCW 71R 30p                                 | 100 Coax Plugs<br>De-solder pump + 2 nozzels  | Philips   | £12.00<br>£4.00   |
| ITT CVC40 Push<br>Button Unit & Mains                  | BUT13 600V-28A<br>  BUW 11<br>  BUW 84        | 50p   | BYF 1202 10p<br>BYF 1204 10p<br>BYF 3126 40p              | Flat Red LED and Green<br>500gm 60/40 solder reel<br>Solder 1 kilo reel                 |   | 5p<br>£6  <br>£5.50   |
| Switch £12   | BYW 20-08-9<br>BYW 95<br>BUX39 25A-150V       | 60p<br>£1<br>10p<br>£1                                      | BYF 3214 40p<br>BYX 10 10p                                | Dual v/u meter -20 = +10db<br>K30 thermistor 232266298009                               |   | £1<br>75p   |
| Pve Teletext Adaptor Model 7056 with Hand Set £90      | BUX84<br>BUX85                                | 50p<br>50p  | BYX 36/600 35p<br>BYX 38/300 25p                          | De-solder Pump<br>Portasol Flameless Gas Solde<br>Green & Red, LED pack mit             |   | £2,50<br>£16.00<br>100 for £1,00  |
| 6 Push Button and IF &                                 | TIC 106a<br>TIC 116m<br>TIC 116n/Y 1003       | 30p<br>30p<br>30p   | BYX49/600R 75p<br>BYX 55/350 10p<br>BYX 55/600 (Bead) 10p | Miniature Linesman Pfiers   | HILLS   | ature Pliers £2,20  |
| Tuner U342 with Preset 5"×6½" UHF £6                   | TIC 126N<br>TIC 225S<br>TIC 226E              | 30p<br>30p<br>30p   | BYX 71/350 20p<br>BYX 71/600 50p                          | Miniature Side Cutters  KT3 PANELS  | £2.20 Miniature                                 | End Cutters £2.20   |
| BA 301 £1<br>TA 4127 £1                                | TIC 226m<br>TIC 236m<br>TAG 226/600           | 30p<br>30p<br>30p   | BYX 72/300 20p<br>BYX 36/600 50p<br>BYV 95B 10p           | Sound Output RGB Output<br>Panel, I.F. Panel and Line O                                 | SC RE 190                                       | s £2.00<br>V Res. £1.50<br>20 for £1  |
| HD 3884 2A23 £3<br>TA 4184 £1<br>TA 2125 £1            | TICV 106D<br>(TI02 case 2A/400V)              | 10p   | BYV 95B   10p<br>  BVY 95C   12p<br>  BYV 96D   10p       | PYE 6 Key Switch & Panel  | £7.00 each 10 × 20<br>BF 470                    | Turn 100k pots, Rank £2 20 for £2   |
| TA 4190 £1<br>TA 4138 £1<br>TA 4196 £1                 | TIP 29<br>TIP 30<br>TIP 30A                   | 25p<br>25p<br>25p<br>25p<br>25p<br>25p<br>25p<br>50p<br>70p | BYZ 106 10p<br>BPW 41 15p                                 | G11 Front Panel   | some wi   | UHF Aerial Isolating Sockets,<br>th long leads. Fit ITT, GEC,                         |
| TA 4174 £1<br>TA 4139 £1<br>TA 4198 £1                 | TIP 30B<br>TIP 30C<br>TIP 31                  | 25p<br>25p<br>25p   | BYW 56 2A/1000x G11 8p<br>BYW 29/50 15p                   | SONY 1400KV Chroma Pane<br>SONY 1400KV Touch button                                     | el £6   Philips.                                | Pye £1.00   |
| TA 4167 £1 TA 4199 £1                                  | TIP 32<br>TIP 33B<br>TIP 33C                  | 25p<br>50p  | BZU 15/24 54p<br>BZY 93c75 50p<br>BZV 15/18 30p           | GEC Decoder Panel PC772A<br>PC446A  | E RE TONN 1.                                    | Mixed Packs Power Trans RCA 16182 NPN ment for BD124 and Mounting                     |
| BA 546 £1<br>BA 328 £1<br>TA 4176 £1                   | TIP 34A<br>TIP 34B<br>TIP 34C                 | 50n   | BZV 15/30 30p<br>BZW 70c6v2 10p                           | 12 Volt Mains Trans 500M/A  | £1.00 Kits<br>25 Pane                           | Mount Bulbs & Neons £1.50   |
| TA 4145 £1 TA 4191 £1 HA 11710 £1                      | TIP 35B<br>TIP 35C                            | 60p<br>70p<br>50p<br>70p<br>80p                             | BZX 79.3v 10p<br>Bush thyristor RCA 76122 £1              | Double 1.5 Digital Display.<br>High brightness  | 20p 10A<br>25 LED<br>20I/C H                    | red/yellow/green £1.50   £1.50   £1.50   £1.20  |
| TA 4188 £1<br>TA 4197 £1                               | TIP 35D<br>TIP 36<br>TIP 36C                  | 50p<br>70p  | Transformer 240v/20v-500Ma75p<br>Chassis type Transformer | Quantity Reduction  | 20 Large<br>20 Smal                             | LED Red £1.00<br>LED Red £1.00  |
| TA 4197 £1<br>TA 4183 £1                               | TIP 41<br>TIP 41B<br>TIP 41D                  | 15p<br>40p  | 240v/12 Volts 500m/a 75p<br>CVC 20 tube base £2           | BY204/4<br>BY206  | 25 for £1.00   Dayl & D                         | from LED on Panel   Ip each   |
| TA 4195 £1<br>TA 4175 £1<br>TA 4177 £1                 | TIP 42<br>TIP 42/BRC 6109                     | 70p<br>10p<br>10p<br>40p<br>30p<br>30p                      | Tube Base Rank & G11 £1.20 Infra red led                  | KT3 touch button black<br>G11 touch button red<br>K30 full remote Dawer Ass v           | 6 for £1 Mixed 1                                | 0 Transistor B.F. and B.C. and  |
| TA 4192 £1<br>TA 4146 £1<br>TA 7265 £3                 | TIP 48<br>TIP 49<br>TIP 57                    | 40р<br>30р<br>30р   | LD57CA 15p<br>15K-20 turn pots 20p                        | I.C.<br>K30 VHF. UHF Dawer Ass  | £7.00 PET                                       | £1.50 100) for £10.00 4 Amp Vidco Battery Pack 10 of                                  |
| TA 7699P £3  | TIP 110<br>TIP 100<br>TIP 102                 | 20p<br>30p<br>30p<br>50p<br>50p                             | Thorn 3500 2A cut out 50p BBH/SAFETY                      | BU126   | 10 for £6.00<br>10 for £8.00                    | Cells £8.50   |
| The Service Engineers Guide to Teletex £2              | TIP 115<br>TIP 117<br>TIP 125                 | 50p<br>50p<br>35p   | MAINS ISOLATING<br>TRANSFORMER                            | BU105<br>BF458  | 10 for £6.00 10 glass<br>10 for £1.00 10 press  | reed switch £1 to make switch 70p £1,50   |
| 4 Types Fedility front panels with i.e. & pats £2 each | TIP 126<br>TIP 127<br>TIP 130                 | 35p<br>40p<br>40p<br>30p                                    | 250V-250V/A £10   |   | 40 for £1.00 With For                           | cus Pin, 10 Tube Bases,<br>£2.00  |
| BB 103 10p   | TIP 131<br>TIP 136                            | 30p<br>6p<br>30p  | BRIDGES<br>KBL 005 30p                                    | Mixed Mounting Kit for Pow<br>Transistors   | er 50p Bandolio                                 | odes, Condensers, Resistors on  |
| BB 105A×12 £1<br>BB 105B×12 £1<br>BB 105G×12 £1        | TIP 140<br>TIP 142<br>TIP 640                 | 50p<br>80p<br>50p   | KBL 02 30p<br>KBP 04 30p<br>W02 15p                       | 300 Condensers<br>300 Resistors<br>150 Electrolytics                                    | £1.50 Chassis                                   |   |
| BB 121a 10p<br>47 10p each                             | TIP 2955<br>TIP L761A-1000V/4Amp<br>T-6032    | 50p<br>80p<br>50p<br>35p<br>75p<br>30p                      | W02   15p<br>  W004   15p<br>  W005   20p                 | 15 Bulbs Philips<br>GEC-Hitaehi Thick Film Fran   | 40p   | ed Diodes £2  |
| DG3P EQV-BY228 10                                      | T 6036<br>T 6040                              | 40p<br>40p  | 800V Bridges 2½ Amp 30p                                   | CENID7 C  | Missal V  | M/A Fuse £1<br>//Cap Pots TTT-GEC-Hitachi-  |
| for £1 2 amp bridge rec. wire                          | T 6047<br>T 6049<br>T 6051                    | 40p<br>40p<br>40p   | MAINS<br>MICRO SWITCH                                     | SENUZ CONTO ORDER SEE BA  | MPONENTS Philips !                              | te, 20 for £1 ins Switch with Remont  |
| end 15p  | T 6052  | 40p   | GEC & Double etc. £1                                      | OLL BA  | CMCII.  |   |

| QEND7  | COMPONENTS<br>E BACK PAGE   | Rank T20 Z136 Panel<br>NEW GEC 20AX Power Supply Switch M  | 16de £12   | .00 220 MFD Sprague 385V 50<br>350V 300M + 300M £1.0  |
|--|---|--|--|---|
| SLINDZ   | COMPONENTS  | NEW GEC 20AX Power Supply Switch M<br>Field + Jungle panel for GEC 313.73135<br>GEC 2110 line panel with transformer | f1<br>£7   | .50 400V 400M 60<br>.00 350V 400M 60  |
| TO ORDER SE  | E BACK PAGE   | GEC 2110 tuner unit + IF Panel<br>Pve/Chelsea Line op panel  | £#2<br>£#2   | .00 Thorn 3500<br>.00 175/100/100/350v £1.0   |
| Matsushita PY34220 Tuner £7 C. Cam Decoder with TDA3591 £5             | K35 Decoder 28,00   K35 Sound OP  | Pyc 205 T/unit<br>Pyc 713 IF parel and tuner   | 1.3  | .90 KT.3/200/25/25/385v £1.0<br>KT3-K30 220+40+40 75<br>.00 200+200+75+25M 325V £1.0  |
| Toshiba VHF/UHF FG522F £6  | Thick Film Daughter KT3 3122-127-43891  | Pye 713 Chroma   | 013  | UUU   300+300+150+100+50M1-D  |
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| 9000 Cyclops panel <b>£1.50</b>  | Plug In   | Pye 731 IF panel + tuner<br>GFC portable chassis + LOPTI 2114 New  |  | 500   150/200/200/3005 70<br>500   300/100/100/16/275v £1.5   |
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| 4000 Power supply £3<br>1000 Mains lead, switch                        | Fidelity Tube Base with transitor & focus   | NEW G9 Frame Panel<br>NEW G11 IF Panel   |  | .00 200/200/75/25M 375V £1.00   |
| T605 1√NPN T066 80√6A 10p<br>9000 Sound output panel £1                | pot £1.50   |  |  |   |
| 3500 Focus unit £1.50<br>3500 Mains Trans £4                           | Bush Tube Base on panel £1.00   | G8 Tuner Unit + Panel £4.00<br>G8 IF & Chroma £6.00  |  | .00   150/150/100/100/320v   £2.0<br>100/350 + 300/200/100/16/275v   £2.0<br>.00   225+25/380 GT:C   70   |
| 3500 cut outs 10 for £4<br>3500 IF panel £2                            | TX10 Tube Base on Panel £3.00   | G8 Chroma £3.00  |  | .00   200/100/100/350v €E.S   |
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| 3500 Line panel  | Line Transformers Line O.P. Trans. Mono T.X. 12"-14"  | Complete CVC 825 Chassis (both panels) £40.00  |  | FTT 8 and 6 Push Button £1.00   |
| IC board with set of SN74LS €1   | Philips 27482 £10   | AFC V/Cap Resistor Unit UHF with IC<br>SAS660 SAS670 £3.00   |  | 30p   Pye 725 LOPEs   £6.00<br>Pye 731 LOPEs   £6.00<br>10p   Thorn 8500-8800 LOPEs   £5.00   |
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| Beam limiter panel £1.50<br>3500 Power panel with Y969 £1              | Thoru 1690 LOP1   \$7.50   2 J/Pots 3,500 Lotf each type   \$3.00   | \$1.437F £3.00<br>Z909B RANK IF Panels   | 47(0)/100  | CMC 303 front panel £5.00<br>Top CMC 302 Panel with TC mains switch   |
| 3 Way regulated adaptor 240V 6V/<br>7.5/9V/300mA £3.50                 | G8 Trans Philips £7.00  | Export 5.5MHz 2 T.C.'s<br>TBA1205B TCA2705Q £2.50  | 300 300/300V   8   | 80p etc \$ £5.0   |
| Rank/Toshiba preh unit 0354 £9.50<br>4 Push button unit preh £1.00     | G11 Split Diode   | K35 II- £6.00<br>Z743 RANK IF Panel  | 1/250 Pulse  | 50p CMD 800 Decoder £8.00<br>5p GH £1.5   |
| 6 Push button VHF/UHF for  | Thorn B/W AD5308F + Stik +<br>Lead £1.50  | Export 5.5MHz 3 LC.'s  | I NO LOUIV   | 1 I C Receiver Panet  |
| v/cap. GEC-Decca type £7.00 7 Push button for CVC5 ITT £8.00           | G1 C 2040 £3,00<br>GEC 2110 £7,00<br>F1,00 £1,50  | TBA750+SC9504P+<br>SC9503P £1.50   | 3n3/250 A.C 1<br>33/250V 1                               | 10p 3 I.C. Power Supply G11 Full Remote<br>20p Receiver Panel £3.00   |
| KT3 12 Push button unit  | Mullard A I 2036 £1.50<br>Pye 169 Line Tuns £3.00   | Pye G11 Front panel with transducer,<br>pots, tuner pots, 6 pb switch+lead £5,00                                     | 39/250V<br>4n7/250 tested 5KV                            | 15p PHILIPS SBC 469 Stereo Microphone<br>£23.00   |
| 6 Push button Unit Thorn £1.00<br>6 Push button GRC £6.00              | Pve mono £3.00<br>Rank mono 1704A £3.50   | Pye 6 button switch portable £1.00<br>GEC V/cap VHF/UHF tuner and IF+  | 22/250<br>47/250   |   |
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| Rank Z718 4 P/B/Unit MFCH £4<br>7 Button Unit GFC with Lamps £7        | Rank F O P T Z970   | 2110 GEC Power Panel £8.00   | GEC600/250 6   | 60p HT 100 Multimeter £6.75   |
| 697 Push Button Unit £6.00<br>Z916B panel £5.00                        | A 12080/15 £5,00 CV C30 11T £5,00   | CVC 20 Front panel with sliders + mains input panel £4   | 300+300 MED 350v £1                                      | .00 HT500 Multimeter £9.00<br>FU700 £15.00  |
| T513AP panel £5,00   | CVC32 Line 'Fran £7.00<br>CVC800 Line Trans £6.00   | CVC 40 PUSH BUTTON ASSY with sliders; complete with lamp assy + pots   | 32/300   | 10p   HD1000 Digital  |
| Mains Droppers Pyc 731 3+56+27R 50p                                    | CVC46 Slip/Diode £12.00<br>CVC 45 £5.00   | 8 button units £9.00<br>CVC9 slider pots panel 50p   | 4/350<br>8/350   | 5p   11D5000 Digital   £25.00<br>8p   11D6:00 Digital   £32.00  |
| Thorn 50/17/1K5 £1.00<br>120/20/20/48/117 £1.00                        | GEC Portable G1OT2041 £3.00<br>GEC Portable G1OT2046 £3.00  | Universal Focus, Fits Pye, Thorn and<br>Decca Units.   | 4.7M/35(k 1<br>33/350 2                                  | 11D8000 Digital £37.00<br>11D9500 Digital with capacity Temp  |
| 270/10/6 for Thorn 4000 50p<br>18/320/7(V39 £1.10                      | EHT Spin Diode Leads ITT  | T147 Rank tube base on panel £1.00   | 22(k350)<br>3(x)/350                                     | Mon Infra Red   |
| Thorn 50-40R-1K5 50p<br>Ae Socket & Lead                               | 1.OPT Rank Z763 £5.00 £10.00 £10.00   | Z718 Focus Unit £1.50<br>T20 Focus Unit £1.00  | 400/350<br>22/375  | 50p Hanset Tester<br>Works at 24 leet - Sound repeater.   |
| GEC, ITT, Philips, Pyc 25p   |   | Large Type 75p<br>Decca Small 75p  | 220/385 (PPF)  | 75p   Fits in top pocket  |
| 7×3½Thorn £1<br>Thorn 1600-1700 £1.50                                  | Universal Tripler<br>with small locus pot. Green type = £7.00   | KT3 Focus Unit 75p<br>K30 Focus Pot 75p  | 0.1/400  | 15p Handset Tester with LED £4.50   |
| Rank Toshiba Tube Bases 30p<br>Speakers                                |   | K30 Tube base on panel £1.00   | .56K/400v 2  | 5p   Repaired Handsets<br>  20p   Philips K4-K35, RC5350-RC5300,  |
| 6×4 G11 25 ohm £1,00<br>5 <sup>1</sup> 2×2 <sup>1</sup> 2 3 ohm £1,00  | Black Friplers £6,00  | TX10 Focus Units £8,50<br>CVC 32 Focus Unit 75p  | .22/400  | Particle   Particle |
| 5×3 80 ohm 70p<br>5×3 50 ohm 50p                                       | S.I.C. Universal Empler £6.00<br>11-134 £2.50   | Feddity Focus Unit 14R=14S 30p<br>3500 Thorn Focus Unit £1.00  | Q/1001 I   | RC4001 Full Remote KT3 K30 Teletext<br>Handsets exchanged £15.00  |
| 5×3 35 ohm 70p<br>4×4 8 ohm 15 watt £1                                 | 11 1GA  | ITL Small for use with Split<br>Z718 Bush Focus £2.00  | 4178/4181  | 10p NEW Type RC4001 9 buttons not 12<br>20p £6.00   |
| 6×4   15 ohm £1.00   | Rank 1251.1 Triplet £2.00   Rank 171 CP A823 £3.50  | Diode 50p  | 220/450 4  | GFC Full Remote Infra-red, 1983 models  |
| 6×4 speaker 16 ohm<br>7×3 70 ohm £1.00<br>8×5 8 ohm 15 watt £2         | TU 25 30K Rank £3.00<br>11 11.Z Rank £3.00  | Remo TVLSSP 50p<br>1600 Thorn EHT Rec and Lead 50p   | 0.1/600  | 15p   |
| 8×5 8 ohm £F<br>5×3 8 ohm 70p  | G9 Philips £4.00<br>G1 C 2110 £4.00   | TV14 50p<br>TV20 £1.00   | 0 1/450 A/C wire end 2                                   | 20m Traventina  |
| 7×3 16 ohm £1.00<br>5" dia 16 ohm £1.00                                | 3500 Thorn £3.00<br>8500 Thorn £4.00  | TV45 50p<br>Thorn 14/1500 rec stick 5p   | .047/600   | 105H164<br>  10p  |
| 5" dia 8 ohm £1.50   | 9000 [horn £7.00   9500 [horn £4,50   | TX10 8 Button Unit £10.00  | 0.01/1000 1  | 10p THORN   |
| 6 <sup>1</sup> 2" dia 4 ohm £1.50<br>6 <sup>1</sup> 2" dia 3 ohm £1.50 | 9900 [horn £4,00<br>2040 GEC £3.50  | TX10/TX100 16 Button £10.00 G11 drawer ASS 3 pots Mains switch   | 47/1(KNN 6   | Op   VCR Front Display Panel   \$7,00   |
| 2 <sup>3</sup> 4" dia 8 ohm 75p<br>3" dia 8 ohm 75p                    | GFC TVM25 Tripler £2.00 Universal Tripler £5.00   | and lead £2.00   | .4//2.017 / 1  | Ilandset £15.00   |
| 4 <sup>1</sup> 2" sq 15 ohm 75p<br>K13 speaker K30 75p                 | G8 Tripler £5.00 CVC20-32 £5.00   | K30 Drawer Ass with pots cable forme €1.00   | 0.0047/1500 1  | 100   Crist Offrasonic 8C11 Full Remote £10.00  |
| 3" din 15 ohm 60p<br>1690 5×3 12 ohm €1                                | Decca 80 100 £4.50 Grundig TVK 52 £2.50   | TX10 Drawer with 8 way pots, ass. £2.50  | .0105/1500 E   | On   G11 Ultrasome Teletext Handset £20.00  |
| K45 Philip 15 ohm 75p<br>K30 15 watt £1                                | 117 BO Pve 73) £3,00<br>117 HY £4,00  | TX10 Ex port with band switch (drawer) £2.50   | 2n0/1500   | S C.11, Ultrasonic GFC Full Remote   C201411/C221911   £15 00   New Replacement for G11 Ultrasonic  |
| KT3-K30<br>OL-425  | D22 for Pye 18" colour portable £4.00   | Line O/P panel GEC 2217/2218/2213/   | 2n2/1500 [<br>01/1600 ]                                  | [2P] Full Remote £12.06<br>[5P] Thorn 4000 usert with 7 buttons £5.06   |
| OF-550 F.W. 10n  | BG 100/41 £3.25<br>FRO Tripler print type with foacs PO7  | 2214/2226/2227/2228 £10 PHILIPS BATTERIES  | G11.8200/2KV 1<br>0.1/2KV 2                              | 20mg   Decea RC 12  |
| OI-513 correction 10p<br>OI-557 50p<br>DIODES                          | BG2087 £5   | (Small Types) HAND SETS<br>SR41 25p  | 0.0015/2KV   | 10p   Dynamon-Part Terriore C T V 52, 65, 64  |
| BY 126 10p   | 1/text ultrasonic rec'r panel   £14.00   12-14V   20 for £5.00   200 for £25.00   GFC 8 touch unit assy complete with all | SR43 25p   | 6n2/2KV 1<br>2ntV2KV 1                                   | 15p Hanchi intra red bander 538.00  |
| BY 127 10p<br>BY 133 10p<br>BY 134 10p                                 | CFC s fouch unit assy complete with an<br>  LC s + pots   | SR44 25p<br>SR54 25p   | 2n2/2KV i<br>470pf 4KV 1                                 | 5p   7228/7324, K12 26C 797/(ST 66K   |
| BY 154 50p<br>BY 176 25p   | G11 F W cods   £1.00   G11 Fransient Suppressors 245V   20p   | 1 R43<br>1 R44<br>25p  | 7500pf/2KV 1   | [0p] G11, Full remote top button assy. £12.00   |
| BY 179 40p   | G11 Scar Corls £5.00   G11 100K tuner pors 12 for £1  | LR54 25p<br>CR2032 25p   | 4n7/2KV L  | Op   G11. Full remote repair service (exchange unit)   £18.00   G11. Full remote new ultrasome   £32.00   GEC intra red full remote 8 channel   |
| BY 184 25p<br>BY 187 10p<br>BY 190 40p                                 | KF3 II panel £6 00  <br>KT3 Inne OSC transformer £1   | 10 500PF 2KV 20p<br>22/1000 20p  | 7n1/1500V 1  | 0n / / C S A A (250) E (4 00  |
| BY 196 30p   | K F3/K30 infra-red receiver   | 1/250AC 20p  | 9n1/2000V 1  | 60 CP2605   £6,00<br>  5n   Philips infra red full remote 12 channel  |
| BY 204/4 8p  | K30 drawer unit with IC's   | IMFD-250AC 25p   | 80.228.V<br>0.0082/2500<br>150/3500                      | 5p   Finish initial red (iii) Temore 12 Channel   15p   1or (ii) CP2605   £12.00   K35  |
| BY 206 8p<br>BY 208/800 8p   | K30 drawer unit with IC's   | TAA7750 <b>£1.00</b><br>HA41[485 <b>£1.00</b>  | 150/3500<br>1800/4KV                                     | 5p   107 00 CP2605   £12.00   |
| BY 210/400 5p<br>BY 210/800 10p  | KT3 Al: Sockets 50p   | UPC1373 50p<br>M50143 €1.00  | 170/8KV  | (0p) GEC infra-red 2236-2026  |
| BY 223 60p<br>BY 224/600, 4 8A/6008 bridge 50p                         | KT3 receiver panel £8<br>KT3 line driver transformer 50p  | M491BB1 <b>£1.00</b> M58657P <b>25p</b>  | 180/8KV 1<br>210/8KV 1                                   | 0p GEC pash pad handset button blobs 10p  |
| BY 226 15p<br>BY 227 15p   | Pye, K30, GEC, etc. Pre-mains stand-by switch   | M50441/550 3p  | 1000/10KV 1  | 0p Pye & Philips handset KT3-K30 chassis.<br>No RC5150-RC5176-RC5171-RC5177.  |
| BY 228 1500s 20p<br>Hat BY 229 black 15p                               | Decca 80/100 H: panel £5<br>NPN PNP 80V 6 Amp TO66 O.P  | M58658P £1.00  <br>Delay Line TDK Small 10p  | Tube Thermpath 167 £1.<br>Rank Secam Decoder Panel UHF & | OR   Special Price #13.00   |
| BY 299 Red 20p<br>BY 229/400 30p                                       | Trans pair 25p 5 button touch tuner BBC1/2 FFV1/2   | ·  | VHF T115A £13. 10 off .91 CAP G11 £2.                    | .00 FF CVC 32 handset repaired £15.00   |
| BY 299/60p Tag 30p<br>BY 237 5p  | video with ic SAS 560T/570T £7.00 Control panel 5 sliders + mains lead £1.50  |  |  | 0p   TX10 Hand Set Text £19.00  |
| BY 254 10p<br>BY 255 30p   | G11 8 touch button unit replaces old 6 PBU £24  | CVC 20-25-30 Mains Switches  | 6  | TX9 with Text £19.00 1X9 & TX10 button print £2.00  |
| BY 298 10p<br>BY 299 10p   | Fube base + base unit for 820 Euro<br>chassis £4,00   | Infra Red and Ultrasonic G11 Teletext De<br>RANK & FIT Mains Remote On-Off Swite                                     | coder Panel £  | 230   1171  |
| BY 406 8p<br>BY 527 20p  | GFC Line O/P Trans & Rec Stick for<br>Portable £3.00  | RANK & ITT Remote Switch 2800 ohm  | £1.  | 50 PHILIPS  |
| BY 407a 10p<br>BY 527 10p  | CVC 20/25/30/35/40 decoder panel  | G11 Mains Switch<br>4 amp Mains Switch   | 2  | 5p KT3 – K45  |
| BY 602 Hbp<br>F 247 10p  | (untested) £5   CV C 40/45 H- panel £5  | GEC Mains Switch 4 amp<br>KT3 Mainswitch   |  | 00 RC5353 ers or Philips Handsets   |
| GP20G 5p<br>GRP80G (TX10) 60p  | 40K   fransducer   50p  <br>  PHILIPS NESTAN   £1.20  | G8 Mains Switch G11 Prefi Red LED P/Button for C.H. Ch   | ange 2   | (5) RC5300 £12.00<br>(0) Philips RC5 £15.00   |
| XK 3102 50p<br>BYV 28/200 20p  | LM337M Reg 30p<br>20 GFC Black Spark Gaps £1.00   | RANK TOSHIBA Transductors TPC-201 Mains Switch TTT Long Type Print   | . 5  | 0p TEXT-TYPE<br>5p Replace Hand Set for   |
| Bridge TX10 800/3 amps 30p<br>KBPC35-02 Bridge £1.50                   | K13 Front Panel Control Assv £2.50  | Mains Switch Philip Long Type TAG<br>Mains Switch GEC Long Type TAG  | 7  | 5p Philips KT3-K30, K4 etc £12.30   |
| Bridge Rec D35B10 40p International Rectifier EHI Diodes G7            | BTW 30/50 50p   | 2000 Chassis Fidelity Mains Switch (4 TAC<br>250V/4A White Lorlin Mains Switch                                       | i) 6   | 0p 9000 - 9600 - TX9 TX10 TX100   |
| 6A/600V Stud Diodes 20p  | BTW 92/800R £3  | KT3-K30-K35 Full Remote Mains Switch (<br>Feletext Adaptor Kit TY-500 Panasonic                                      | 6 TAG)   | PHILIPS   |
| 6A/1000V Stud Diodes 20p   | 25A473 PNP C/P H0p  | reserve excaptor for a 1-2500 ranasofile   | i  | RCS171 £12.00   |

| Tuner Units Thorn TX Tuner VICap ear to EL C1043 240 Volts Aeraal Amps VHF-UHF 3 Valy VIHF-UHF with Data Tuner MECT EL 240 Family with Data Masfet Thorn TX Tuner VICap UHF VIHE 2 Thorn TX To Export VCap UHF. VIHE 2 Thorn TX To Export VCap UHF. VIHE 2 TARRO Family with Data Masfet Thorn TX To Export VCap UHF. VIHE 2 TX Cap Rank VHF ZTATVUnit NEW GX Tuner VCap TX Cap Rank VHF ZTATVUnit NEW GX Tuner VCap ELC 2000 on Panel ELC 2000 on ELC 100 NEW ELC 2000 on ELC 2000 ELC 2000 on ELC | SENDZ COMPONENTS   63 Bishopsteignton,   Shoeburyness, ESSEX SS3 8AF   SAME DAY SERVICE   All items subject to availability. Technical Information by telephone only. No Accounts: No Credit Cards   Postal Order/Cheque with order   Add 15% VAT, then £1 Postage   Add Postage for overseas   Callers: To shop at 212 London Rd.,   Southend. Tel. 0702-332992   Open 9-1/2.30-6.0/MT+ school orders accepted on official headings add 10% handling charge.   BD807   20p   D4714A   E2   BD807   20p   BB808   20p | Thorn MABSHOB-C MABSHOP-C MASHOP-C MASHOP | THA673             | TDA2503   £3,60     TDA2506   £1,50     TDA2506   £1,50     TDA2506   £1,50     TDA2506   £1,50     TDA2501   £1,00     TDA2611   £1,00     TDA2611   £1,00     TDA2611   £1,00     TDA2661   £1,00     TDA3661   £2,00     TDA3661   £2,00     TDA3661   £3,00     TDA3 |
|--|---|--|--------------------|--|
| BI758   30p   2SC2229     BFT34   15p   2SC3795     BFT34   15p   2SC3795     BFT34   15p   2SC3795     BFT34   15p   2SC3795     BFW11   20p   2SD   180   TO     BFX91   25p   2SD   180   TO     BFX92   20p   2SD   2SD   160     BFY52   25p   2SD   160     BRX43   15p   2SD   2SD   2SD     BRX43   15p   2SD   2SD   2SD   160     BRX43   15p   2SD   2SD   160     BSX95   10p   2SD   1415     BSX95   10p   2SD   1415     BSX10   17p   BSX   3DA     BSX10   17p   BC   107     BSX10   10p   BC   15     BSX10   10p   BC      | 15p   | SASSOJ ELOD SASSOJ ELOD SASSOJ ELOD SASSOJ TELOD SLAVO TELOD TATALIZA TATALI | SN76552   Superior | ACIOS  |