

DECEMBER 1991

£1.80

TELEVISION

SERVICING·PROJECTS·VIDEO·DEVELOPMENTS



Servicing the Finlux 1000 Chassis
Build this Satellite TV Receiver
DX-TV•CD Player Casebook
Servicing the Fisher FVH-P520 VCR
The History of BBC Stereo TV
TV Fault Finding•VCR Clinic



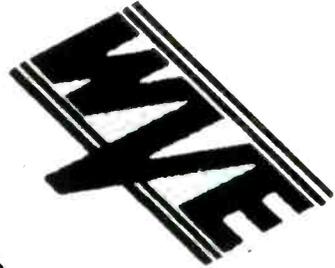
if it's in a

PHILIPSON
ROTHSCHILD
GRUNDIG
MATSUI

SHARP
DAIICHI

SANSUI
NIKKA

to name but a few - disgustingly large amounts of parts are in stock



If its a semi
[no matter what]
its even worse!
98% of the time
has got it - phone us now

Willow Vale

READING
0734

- 876444

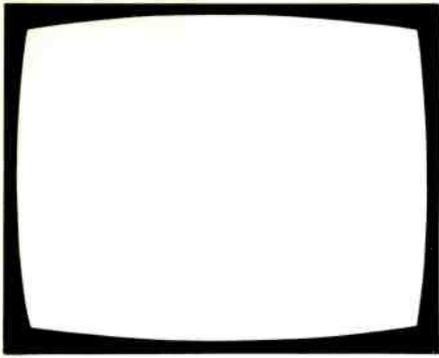
and you don't have to use part numbers!

If you are looking for frustration
- don't call us -
WE DO NOT
STOCK
IT!

Manchester 061-682 1415 Nottingham 0602-870789

Willow Vale Electronics
the spares distributor
who says

YES



TELEVISION

December
1991

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Issue 494

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QUERIES

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OUR NEXT ISSUE DATED JANUARY WILL
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| AA32 | 9p | BD332 | 40p | BT779 | 140p | TI117 | 50p | OA47 | 10p | PCF801 | 110p | AN7145 | 195p | ICL7106 | 650p | LM3909 | 80p | STK436 | 490p | STK7226 | 800p | TA7310 | 100p |
| AC107 | 40p | BD362 | 40p | BU10A | 110p | TI121 | 37p | OA90 | 80p | PCF802 | 110p | AN7148 | 210p | ICM1711 | 90p | LM3911 | 160p | STK437 | 800p | STK7308 | 410p | TA7312 | 120p |
| AC126 | 30p | BD370 | 60p | BU10B | 80p | TI122 | 47p | OA200 | 10p | PCH200 | 100p | AN7156 | 240p | ICM7555 | 60p | LM3915 | 160p | STK441 | 600p | STK7309 | 500p | TA7313 | 110p |
| AC127 | 30p | BD371 | 60p | BU10C | 100p | TI125 | 57p | OA202 | 10p | PC181 | 65p | AN7168 | 280p | ICM7556 | 60p | LM3918 | 270p | STK443 | 740p | STK7348 | 410p | TA7315 | 240p |
| AC128 | 35p | BD410 | 50p | BU110 | 110p | TI126 | 49p | IN 911 | 2p | PC182 | 80p | AN7178 | 270p | CA201 | 100p | M50115P | 320p | STK457 | 600p | STK7356 | 600p | TA7317 | 200p |
| AC128K | 40p | BD433 | 50p | BU111 | 140p | TI127 | 49p | IN 912 | 2p | PC183 | 80p | AN7180 | 270p | CA202 | 100p | M50117P | 320p | STK460 | 600p | STK7357 | 600p | TA7320 | 200p |
| AC141K | 45p | BD434 | 30p | BU112 | 60p | TI130 | 30p | IN 4002 | 3p | PC185 | 80p | AN7254 | 180p | CA210 | 150p | M50119P | 600p | STK461 | 620p | STK7404 | 400p | TA7324 | 200p |
| AC142K | 45p | BD435 | 31p | BU124 | 60p | TI131 | 30p | IN 4003 | 3p | PC186 | 80p | AN7256 | 280p | CA2130 | 150p | M50119P | 620p | STK462 | 600p | STK7406 | 600p | TA7325 | 200p |
| AC176 | 22p | BD436 | 30p | BU126 | 65p | TI132 | 30p | IN 4004 | 3p | PC187 | 80p | AN7257 | 280p | CA2139 | 150p | M50130P | 600p | STK463 | 600p | STK7408 | 800p | TA7336 | 200p |
| AC167K | 25p | BD437 | 30p | BU118 | 180p | TI140 | 100p | IN 4200 | 3p | PC188 | 80p | AN7258 | 280p | CA2200 | 150p | M50130P | 600p | STK464 | 600p | STK7409 | 800p | TA7337 | 200p |
| AC187K | 25p | BD438 | 36p | BU184 | 100p | TI142 | 90p | IN 4006 | 3p | PC189 | 80p | AN7260 | 280p | CA2210 | 150p | M50130P | 600p | STK465 | 600p | STK7410 | 800p | TA7338 | 200p |
| AC187K | 40p | BD439 | 36p | BU204 | 75p | TI145 | 65p | IN 4107 | 4p | PL82 | 60p | AY3-1015 | 290p | CA2212 | 150p | M50130P | 600p | STK466 | 600p | STK7554 | 1000p | TA7343 | 200p |
| AC188K | 25p | BD440 | 40p | BU205 | 70p | TI146 | 90p | IN 4108 | 4p | PL83 | 60p | AY3-1270 | 290p | CA2213 | 130p | M51181 | 300p | STK467 | 600p | STK7561 | 700p | TA7357 | 400p |
| AC188K | 40p | BD441 | 40p | BU206 | 70p | TI147 | 100p | IN 4109 | 4p | PL84 | 80p | AY3-1350 | 450p | CA2214 | 130p | M51181 | 300p | STK468 | 600p | STK7562 | 700p | TA7358 | 400p |
| ACV18 | 48p | BD533 | 30p | BU208 | 70p | TI150 | 90p | IN 5401 | 8p | PL95 | 180p | AY3-1350 | 450p | CA2261 | 100p | M51355P | 300p | STK748 | 610p | STK8205 | 800p | TA7601 | 400p |
| ACV19 | 48p | BD534 | 38p | BU209A | 70p | TI151 | 90p | IN 5402 | 8p | PL500 | 110p | AY3-1350 | 450p | CA2262 | 100p | M51355P | 300p | STK749 | 610p | STK8250 | 800p | TA7607 | 270p |
| AF159 | 60p | BD535 | 38p | BU209B | 70p | TI152 | 90p | IN 5403 | 8p | PL501 | 120p | AY3-8910 | 360p | CA2264 | 100p | M51355P | 300p | STK750 | 610p | STK8250 | 800p | TA7608 | 270p |
| AF125 | 50p | BD536 | 38p | BU209C | 70p | TI153 | 90p | IN 5404 | 8p | PL502 | 120p | AY3-8910 | 360p | CA2264 | 100p | M51355P | 300p | STK751 | 610p | STK8250 | 800p | TA7609 | 270p |
| AF127 | 50p | BD537 | 38p | BU209D | 70p | TI154 | 90p | IN 5405 | 11p | PL519 | 430p | BA301 | 65p | CA2264 | 100p | M51355P | 300p | STK752 | 610p | STK8250 | 800p | TA7610 | 270p |
| AF139 | 30p | BD538 | 38p | BU225 | 190p | TI544 | 40p | IN 5406 | 12p | PY81 | 100p | BA311 | 80p | CA2264 | 100p | M51355P | 300p | STK753 | 610p | STK8250 | 800p | TA7611 | 270p |
| AF239 | 30p | BD543 | 50p | BU228 | 190p | TI545 | 40p | IN 5407 | 12p | PY88 | 100p | BA311 | 80p | CA2264 | 100p | M51355P | 300p | STK754 | 610p | STK8250 | 800p | TA7612 | 270p |
| BA145 | 10p | BD647 | 60p | BU235 | 55p | TI591 | 18p | RG151 | 15p | LED's | 5p | BA401 | 60p | CA2264 | 100p | M51724 | 300p | STK755 | 610p | STK8250 | 800p | TA7613 | 270p |
| BA148 | 10p | BD649 | 60p | BU236 | 75p | TI593 | 20p | RG151 | 15p | LED's | 5p | BA402 | 60p | CA2264 | 100p | M51724 | 300p | STK756 | 610p | STK8250 | 800p | TA7614 | 270p |
| BA149 | 10p | BD650 | 60p | BU237 | 75p | TI593 | 20p | RG151 | 15p | LED's | 5p | BA403 | 60p | CA2264 | 100p | M51724 | 300p | STK757 | 610p | STK8250 | 800p | TA7615 | 270p |
| BA157 | 12p | BD651 | 60p | BU238 | 75p | TI593 | 20p | RG151 | 15p | LED's | 5p | BA404 | 60p | CA2264 | 100p | M51724 | 300p | STK758 | 610p | STK8250 | 800p | TA7616 | 270p |
| BB058 | 12p | BD652 | 60p | BU239 | 75p | TI593 | 20p | RG151 | 15p | LED's | 5p | BA405 | 60p | CA2264 | 100p | M51724 | 300p | STK759 | 610p | STK8250 | 800p | TA7617 | 270p |
| BB205 | 24p | BD653 | 60p | BU240 | 75p | TI593 | 20p | RG151 | 15p | LED's | 5p | BA406 | 60p | CA2264 | 100p | M51724 | 300p | STK760 | 610p | STK8250 | 800p | TA7618 | 270p |
| BC107 | 8p | BD679 | 40p | BU406 | 80p | VN66A | 110p | SR2M | 60p | I.C. SOCKETS | 5p | BA501 | 150p | CA2264 | 100p | M54533P | 200p | STK761 | 610p | STK8250 | 800p | TA7619 | 270p |
| BC108 | 8p | BD679 | 40p | BU406 | 80p | VN66A | 110p | SR2M | 60p | I.C. SOCKETS | 5p | BA502 | 150p | CA2264 | 100p | M54533P | 200p | STK762 | 610p | STK8250 | 800p | TA7620 | 270p |
| BC109 | 8p | BD681 | 45p | BU409 | 95p | ZTK107 | 11p | 8PIN | 5p | RECTANG. LED's | 5p | BA503 | 150p | CA2264 | 100p | M54533P | 200p | STK763 | 610p | STK8250 | 800p | TA7621 | 270p |
| BC109C | 10p | BD682 | 45p | BU426A | 70p | ZTK108 | 11p | 14PIN | 6p | RECTANG. LED's | 5p | BA504 | 150p | CA2264 | 100p | M54533P | 200p | STK764 | 610p | STK8250 | 800p | TA7622 | 270p |
| BC110 | 11p | BD705 | 80p | BU500 | 100p | ZTK109 | 12p | 18PIN | 10p | RECTANG. LED's | 5p | BA505 | 150p | CA2264 | 100p | M54533P | 200p | STK765 | 610p | STK8250 | 800p | TA7623 | 270p |
| BC140 | 20p | BD709 | 80p | BU508AF | 95p | ZTK300 | 16p | 20PIN | 12p | RECTANG. LED's | 5p | BA506 | 150p | CA2264 | 100p | M54533P | 200p | STK766 | 610p | STK8250 | 800p | TA7624 | 270p |
| BC142 | 20p | BD711 | 80p | BU508D | 115p | ZTK302 | 16p | 22PIN | 13p | RECTANG. LED's | 5p | BA507 | 150p | CA2264 | 100p | M54533P | 200p | STK767 | 610p | STK8250 | 800p | TA7625 | 270p |
| BC143 | 20p | BD736 | 80p | BU508DF | 115p | ZTK303 | 16p | 24PIN | 14p | RECTANG. LED's | 5p | BA508 | 150p | CA2264 | 100p | M54533P | 200p | STK768 | 610p | STK8250 | 800p | TA7626 | 270p |
| BC148 | 8p | BD828 | 50p | BU546 | 100p | ZTK304 | 17p | 28PIN | 16p | RECTANG. LED's | 5p | BA509 | 150p | CA2264 | 100p | M54533P | 200p | STK769 | 610p | STK8250 | 800p | TA7627 | 270p |
| BC149 | 8p | BD897 | 50p | BU546 | 100p | ZTK320 | 29p | 40PIN | 18p | RECTANG. LED's | 5p | BA510 | 150p | CA2264 | 100p | M54533P | 200p | STK770 | 610p | STK8250 | 800p | TA7628 | 270p |
| BC157 | 8p | BD898 | 50p | BU608 | 150p | ZTK500 | 13p | 40PIN | 18p | ZENERS | 5p | BA511 | 150p | CA2264 | 100p | M54533P | 200p | STK771 | 610p | STK8250 | 800p | TA7629 | 270p |
| BC158 | 8p | BD905 | 50p | BU608 | 150p | ZTK500 | 13p | 40PIN | 18p | ZENERS | 5p | BA512 | 150p | CA2264 | 100p | M54533P | 200p | STK772 | 610p | STK8250 | 800p | TA7630 | 270p |
| BC160 | 30p | BD977 | 50p | BU636 | 150p | ZTK502 | 13p | 40PIN | 18p | ZENERS | 5p | BA513 | 150p | CA2264 | 100p | M54533P | 200p | STK773 | 610p | STK8250 | 800p | TA7631 | 270p |
| BC171 | 10p | BDX32 | 100p | BU801 | 80p | ZTK503 | 13p | 40PIN | 18p | ZENERS | 5p | BA514 | 150p | CA2264 | 100p | M54533P | 200p | STK774 | 610p | STK8250 | 800p | TA7632 | 270p |
| BC172 | 10p | BDX33 | 100p | BU806 | 75p | ZTK504 | 26p | 40PIN | 18p | ZENERS | 5p | BA515 | 150p | CA2264 | 100p | M54533P | 200p | STK775 | 610p | STK8250 | 800p | TA7633 | 270p |
| BC177 | 14p | BDW23 | 55p | BU902 | 130p | ZTK550 | 24p | 40PIN | 18p | ZENERS | 5p | BA516 | 150p | CA2264 | 100p | M54533P | 200p | STK776 | 610p | STK8250 | 800p | TA7634 | 270p |
| BC178 | 14p | BDW24 | 55p | BU903 | 130p | ZTK550 | 24p | 40PIN | 18p | ZENERS | 5p | BA517 | 150p | CA2264 | 100p | M54533P | 200p | STK777 | 610p | STK8250 | 800p | TA7635 | 270p |
| BC182 | 7p | BDW93 | 80p | BU920 | 130p | ZTK550 | 24p | 40PIN | 18p | ZENERS | 5p | BA518 | 150p | CA2264 | 100p | M54533P | 200p | STK778 | 610p | STK8250 | 800p | TA7636 | 270p |
| BC182L | 40p | BDY21 | 100p | BU922 | 130p | ZTK550 | 24p | 40PIN | 18p | ZENERS | 5p | BA519 | 150p | CA2264 | 100p | M54533P | 200p | STK779 | 610p | STK8250 | 800p | TA7637 | 270p |
| BC183 | 7p | BDY92 | 100p | BU922 | 130p | ZTK550 | 24p | 40PIN | 18p | ZENERS | 5p | BA520 | 150p | CA2264 | 100p | M54533P | 200p | STK780 | 610p | STK8250 | 800p | TA7638 | 270p |
| BC183L | 7p | BF137 | 30p | BU930 | 130p | ZTK508 | 22p | 40PIN | 18p | ZENERS | 5p | BA521 | 150p | CA2264 | 100p | M54533P | 200p | STK781 | 610p | STK8250 | 800p | TA7639 | 270p |
| BC184 | 7p | BF154 | 25p | BU111AF | 70p | ZTK508 | 22p | 40PIN | 18p | ZENERS | 5p | BA522 | 150p | CA2264 | 100p | M54533P | 200p | STK782 | 610p | STK8250 | 800p | TA7640 | 270p |
| BC184L | 7p | BF167 | 30p | BU113 | 70p | ZTK508 | 22p | 40PIN | 18p | ZENERS | 5p | BA523 | 150p | CA2264 | 100p | M54533P | 200p | STK783 | 610p | STK8250 | 800p | TA7641 | 270p |
| BC212 | 7p | BF173 | 40p | BU156A | 150p | ZTK508 | 22p | 40PIN | 18p | ZENERS | 5p | BA524 | 150p | CA2264 | 100p | M54533P | 200p | STK784 | 610p | STK8250 | 800p | TA7642 | 270p |
| BC212L | 7p | BF178 | 30p | BUX80 | 180p | ZTK508 | 22p | 40PIN | 18p | ZENERS | 5p | BA525 | 150p | CA2264 | 100p | M54533P | 200p | STK785 | 610p | STK8250 | 800p | TA7643 | 270p |
| BC213 | 7p | BF180 | 16p | BUX82 | 180p | ZTK508 | 22p | 40PIN | 18p | ZENERS | 5p | BA526 | 150p | CA2264 | 100p | M54533P | 200p | STK786 | 610p | STK8250 | 800p | TA7644 | 270p |
| BC213L | 7p | BF181 | 16p | BUX82 | 180p | ZTK508 | 22p | 40PIN | 18p | ZENERS | 5p | BA527 | 150p | CA2264 | 100p | M54533P | 200p | STK787 | 610p | STK8250 | 800p | TA7645 | 270p |
| BC214 | 7p | BF183 | 20p | BUX85 | 200p | ZTK508 | 22p | 40PIN | 18p | ZENERS | 5p | BA528 | 150p | CA2264 | 100p | M54533P | 200p | STK788 | 610p | STK8250 | 800p | TA7646 | 270p |
| BC | | | | | | | | | | | | | | | | | | | | | | | |

| IDLERS & PULLEYS REPLACEMENTS | | | IDLERS & PULLEYS REPLACEMENTS — Cont. | | | VIDEO MOTORS | | |
|---|----------------------------------|--------|--|-------------------|----------------------|---|------------------------|--------|
| AMSTRAD | Reference | | NATIONAL | | | AMSTRAD | | |
| VCR7000 | 150280 | £1.50 | NV322, NV600, NV688, NV777, NV788 | IDLER UNIT | VXP0463 | VCR 7000 | REEL MOTOR | £17.00 |
| AKAI | | | NV333 | IDLER ARM | VXL0997 | FERGUSON & JVC | | |
| VS1-2, VS4-5, VS15 | FF-REW IDLER M1327773 | £4.50 | NV333, NV366 | IDLER UNIT | VXP0401 | PU 45979, 3V16, 3V22, HR3300, HR3660 | CAPSTAN MOTOR | £21.00 |
| VS1-2, VS4-5, VS15 | T-UP IDLER BV327815 | £6.00 | NV333, NV366 | PLAY IDLER | VXP0433 | PU 55371V, 3V35, 3V36, 3V38, 3V39 | CAPSTAN MOTOR | £19.50 |
| V9700 | IDLER BV321979 | £6.00 | NV333, NV3000 | ACTION GEAR | VDG0016 | 8943, 8944, HRD110, HRD120, HRD121, HRD225 | | |
| VS125, 126, 155, VS165, 240, 244, VS245, 247, 248, VS250, 512, 515, 516 | IDLER ASSY MZ366960J2 | £11.00 | NV333, NV2000, NV3000 | LOADING GEAR | VXP0325 | PU 46414, 8904, 8922, HR3300, HR3320, HR3330, HR3360, HR3600, HR3660 | | £19.50 |
| FERGUSON | | | NV333 | INTERMEDIATE GEAR | VXG0017 | PU 51381V, 3V39, 3V30, 8930, HR7200, HR7300 | REEL MOTOR | £26.50 |
| 3V16-22 | T-UP IDLER PU47752 | £4.50 | NV366 | IDLER ARM | VXL0997 | PU 58635V, 3V58, 3V59, 3V64, 3V65, 8950, 8951, FV10B, FV11R, FV12L, FV13H, FV20B, FV21R, FV22L, HRD170, HRD180, HRD230, HRD370, HR0430 | DRUM MOTOR | £19.50 |
| 3V16-22 | T-UP IDLER PU49280 | £6.30 | NV370, NV430, NV730, NV830, NV850, NV870, NVG7, NVG10, NVG12, NVG18 | IDLER ARM | VXP0521 | PU 58636W, 3V58, 3V59, 3V64, 3V65, 8950, 8951, FV10B, FV11R, FV12L, FV13H, FV14T, FV20B, FV21R, FV22L, HRD170, HRD180, HRD230, HRD370, HRD430, HRD530 | REEL MOTOR | £18.00 |
| 3V23, 3V29-30, 3V31-32, 3V35 | REEL IDLER PU48967 | £3.00 | NV730 | CAM GEAR | VDG0200 | 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8945, 8947, 8948, HRD140, HRD150, HRD455, HRD565, HRD725, HRD755, HRP50, R73AF | LOADING MOTOR | £8.00 |
| 3V23 | ROLLER ASSY PU49042A | £4.00 | NV2000, NV3000 | IDLER UNIT | VXP0581 | | | |
| 3V29-30, 3V31-32, 3V35-36, 3V38-39, 3V49 | T-UP IDLER 51402 | £1.45 | NV2000, NV3000 | IDLER UNIT | VXP0331 | | | |
| 3V29-30, 3V31-32, 3V35-36, 3V38-39, 3V49 | T-UP CLUTCH PU51380 | £2.60 | NV2000, NV3000 | IDLER UNIT | VXP0329 | | | |
| 3V35-36, 3V38-39, 3V49 | REEL IDLER PU55374 | £2.85 | NV2000, NV3000 | CAM GEAR | VDG0069 | | | |
| 3V35-36, 3V38-39, 3V49 | T-UP CLUTCH PU55373 | £2.25 | NV2000, NV3000 | ACTION GEAR | VDG0016 | | | |
| 3V38-59, 3V64-65, FV10-11, FV12-13, FV14 | IDLER ARM PU58645 | £2.50 | NV7000, 7200, 7800 | IDLER UNIT | VXP0344 | | | |
| 3V42 | CLUTCH ASSY PU55822 | £13.50 | NV7000, 7200, 7800 | CLUTCH | VXP0343 | | | |
| 3V44 | CLUTCH ASSY PU57658 | £11.50 | NV8400, NV8600, NV8610, NV8620 | CLUTCH | VXP0243 | | | |
| 3V42, 43, 48, 53, 56 | T-UP CLUTCH PU56043-1-4 | £2.80 | NV8600 | IDLER | VXP0488 | | | |
| 3V42, 43, 48, 53, 56 | SUPPORT CLUTCH PU56044-1-5 | £2.80 | NVG21-25, NVG40-45 | PULLEY UNIT | VXP0767 | | | |
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| FVHP520, FVHP530 | FF-REW PULLEY HI638531 | £1.00 | VH200-201 | IDLER | 850A200004 | 288P02801, HS300, 301, 302, 310 | MOTOR REEL SPOOLING | £33.50 |
| FVHP615 | COMP. IDLER ASSY F11430420400300 | £3.30 | VH555-700, VH844-900, VH1000-1500, VH1800, VP200, VH530 | | | 288P02806, HS303, 304, 320, 330, 700 | MOTOR REEL SPOOLING | £31.50 |
| FVHP615 | GEAR IDLER ASSY F11430410400900 | £6.50 | VH535-630, VH635-640, VH893-1440, VH2500-2600, VH2700-4010, VH5010 | IDLER | 850A200005 | 288P03401, HS303, 700 | MOTOR REEL TAKE-UP GEN | £21.00 |
| FVHP840 | REEL T-UP ASSY F11430410400900 | £6.50 | | | | NATIONAL | | |
| FVHP905, 906, 908, FVHP910, 916 | GEAR IDLER ASSY F11430490402400 | £6.20 | | | | MYN 135V5L, NV332, NV333, NV340, NV366 | REEL MOTOR | £13.50 |
| FVHP975, 990, 999, FVHP5000, 5100 | IDLER F11430420400700 | £5.20 | | | | VEM0212, NV730NV770 | MOTOR REEL GEN | £30.00 |
| GOLDSTAR | | | PHILIPS | | | SANYO | | |
| | IDLER 435038A | £2.50 | DV464, VR6462, VR6463, VR6660, VR6860, VR6460, VR6520, 6920, DB532, VR6542, VR6843 | IDLER | 52220334 | 4-529V-10800 (RM11), VTC5000, VTC5150 | REEL MOTOR | £6.30 |
| HITACHI | | | | IDLER ARM | 40340162 | | | |
| | FF-REW IDLER 6886971 | £1.50 | | REEL IDLER | £7.50 | SHARP | | |
| VT11-33, VT63-64, VT14, 17, 19, 38, 57, VT86, 88 | PLAY IDLER V-6861482 | £3.20 | SANYO | | | RMOTV 1008GEZZ, VC200, VC381, VC384, VC385, VC386, VC483, VC3300, VC8381, VC9100, VC9300, VC9500, VC9700 | REEL MOTOR | £13.50 |
| VT120-220 | CLUTCH ASSY 6879515 | £7.50 | VHR110, VHR1300, VHR1500 | IDLER | 1430662T14730 | RMOTV 1007GEZZ, VC387, VC483, VC486, VC585 | REEL MOTOR | £16.50 |
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| ITT | | | VC300, VC387, VC481, VC482, VC483, VC496, VC571, VC585 | IDLER | NIDL0006GEZZ | SONY FLYBACK TRANSFORMERS | | |
| VR3905, VR3906 | T-UP IDLER PU51402 | £1.45 | VC780-781, VC785-787, VC793-VC772 | REEL IDLER | NPLTV0111GEZZ | Part No. Models Price | | |
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| VR3913, VR3943 | REEL IDLER PU48967 | £3.00 | VR1100, VR1200, VR1200HQ, VR1600, VR2500, VR3300, VR3500, VR3600 | CLUTCH | 850A200000 | 1-439-256-11 KV-2704EC, 2704UB, 2704ET, 2704E(A), 2704E | £40.00 | |
| JVC | | | SAMSUNG | | | 1-439-286-21 KV-2215UB, 2217UB, 2215E1, 2215FE, 2212EX, 2215ET | £30.50 | |
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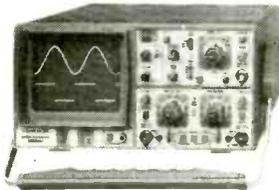
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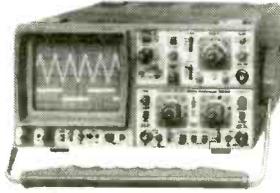
- SPECIFICATION**
- * 2 Channels
 - * Bandwidth: DC - 20MHz
 - * Sens: Ch.1, Ch.2, 1mV/cm
 - * Timebase: 0.1s - 20ns/cm
 - * Triggering: DC - 40MHz
 - * Active TV - Sync - Separator
 - * Variable hold-off
 - * Trigger LED indicator
 - * Calibrator: 1KHz Square wave
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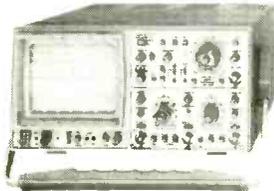
- * 2 Channels
- * Bandwidth: DC - 60 MHz
- * Sens: Ch.1, Ch.2, 1mV/cm
- * Timebase : 2.5s - 5ns/cm
- * Triggering: DC - 80MHz
- * Active TV - Sync - Separator
- * After delay trigger
- * Sweep delay
- * Delay line
- * Trigger LED indicator
- * Calibrator: 1KHz & 1MHz Sq. Wave
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HM1005 100MHz UNIVERSAL 3 CHANNELS - UP TO 6 TRACES

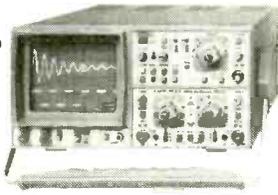


- SPECIFICATION**
- * 3 Channels
 - * Bandwidth: DC - 100MHz
 - * Sens: Ch.1, Ch.2, Ch.3, 1mV/cm
 - * Timebase A: 2.5s - 5ns/cm
 - * Timebase B: 0.2s - 5ns/cm
 - * Triggering DC - 130MHz
 - * After delay trigger
 - * Delay line
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HM205-3 20MHz DIGITAL STORAGE

- SPECIFICATION**
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 - * Analogue real time (Same as 203-7)
 - * Bandwidth: DC - 20MHz
 - * Sens: Ch.1, Ch.2, 1mV/cm
 - * Timebase Digital: 5s-1µs/cm
 - * Triggering DC - 40MHz
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 - * Max sampling rate: 2 x 20MHz
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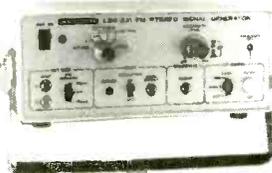
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TC402-C VHF & UHF

- FEATURES**
- * Three bands:
Low VHF: 45-110MHz
High VHF: 110-300MHz
UHF : 470-862MHz
 - * Digital display for direct frequency readout.
 - * Built-in monitor loudspeaker AM/FM.
 - * Signal measurement from 20µV to 100mV.
 - * Powered by eight 1.5 AA batteries.
 - * Fully portable with sturdy carrying case.



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TC90 VHF-UHF- SAT.



- FEATURES**
- * Five bands:
Low VHF : 45-110MHz
High VHF : 110-300MHz
Hyper VHF : 300-470MHz
VHF : 470-862MHz
Satellite : 950-1750MHz.
 - * Digital display for direct frequency readout.
 - * Signal measurement VHF/UHF 20µV to 3V.
 - * Signal measurement satellite -70dBm to -100dBm.
 - * Audible indication of satellite signal level.
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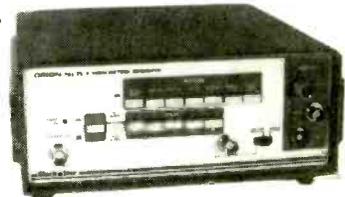
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| 4.7uf at 400v | 35 | MS5401/84RS | 12.95 | TDA2578A | 3.95 | Hitachi CPT1446 | 22.95 | BF460 | 70 |
| 10uf at 250v | 35 | MC13002P | 4.95 | TDA2578A | 2.95 | ITT Compact 80 | 19.95 | BF757 | 95 |
| 10uf at 400v | 75 | SA1293-02 | 6.95 | TDA2579 | 3.75 | ITT CVC25/3032 | 9.95 | BR103 | 75 |
| 22uf at 250v | 40 | SA5000A | 4.95 | TDA2581 | 2.95 | ITT CVC800/12/3 | 23.95 | BT151/800 | 1.35 |
| 33uf at 250v | 55 | SA5501Z | 4.95 | TDA2582 | 2.95 | ITT CVC830 | 19.95 | BU126 | 1.95 |
| 47uf at 250v | 65 | SL1430 | 1.95 | TDA2591/3 | 2.95 | ITT CVC1100 | 19.95 | BU208A | 1.45 |
| 100uf at 250v | 1.25 | SL1432 | 1.95 | TDA2594 | 2.95 | ITT CVC1150 | 21.50 | BU208D | 1.95 |
| (All the above are pcb mounting) | | STK5325 | 7.95 | TDA2600 | 6.50 | ITT CVC1200/1 | 19.95 | BU326A | 1.95 |
| DIODES | | STK5331 | 6.95 | TDA2653AQ | 3.95 | ITT CVC1204 | 14.75 | BU426A | 1.45 |
| TYPE | PRICE | STK5332 | 6.95 | TDA3330 | 3.95 | ITT CVC1215 | 19.95 | BU500 | 2.00 |
| R2M | 95 | STK5333 | 6.95 | TDA3560 | 4.95 | ITT Monoprint 110D | 22.50 | BU508A | 1.95 |
| BY133 | 15 | STK5335 | 6.95 | TDA3561A | 4.95 | ITT Monoprint B | 22.50 | BU508AF | 1.95 |
| BY227 | 20 | STK5421 | 7.95 | TDA3562A | 5.50 | Matsui C1410/1420 | 26.95 | BU508D | 1.95 |
| BY229 800 | 95 | STK5422 | 6.95 | TDA3562A (TFK) | 6.75 | Matsui C1480A | 26.95 | BU508DF | 2.50 |
| BY299 800 | 35 | STK5471 | 8.75 | TDA3565 | 4.95 | Philips C4 | 23.50 | BU508V | 2.75 |
| 1N4007 | 20 | STK5481 | 8.95 | TDA3571BQ | 7.95 | Philips CP90 | 22.95 | BU705 | 2.95 |
| 1N5408 | 20 | STK5482 | 8.95 | TDA3576B | 7.50 | Philips CTX 14'20" | 21.50 | BU807 | 1.75 |
| BZ6X1C (1.3 Watt) | | STK7308 | 7.95 | TDA3651 | 2.75 | Philips K30 | 23.75 | BU826A | 2.95 |
| 5v6, 6v8, 7v5, 9v1, 12v | | STK7348 | 7.95 | TDA3651AQ | 4.75 | Philips K35 | 22.95 | BU907 | 2.95 |
| 15v, 24v, 33v, 68v, 120v | | STR411 | 6.75 | TDA3652 Genuine | 9.95 | Philips K40 | 23.75 | BU908 | 2.95 |
| 130v (5 per Value) | 1.00 | STR4090 | 8.95 | TDA3653 | 3.95 | Philips 2A | 23.50 | BUT11AF | 2.75 |
| E.H.T. TRAYS | | STR4211 | 4.50 | TDA3653A | 4.95 | Saicho CT141X | 26.95 | BUT12A | 2.95 |
| Continental 30AX Focus | 8.95 | STR5412 | 4.95 | TDA3654A | 3.95 | Sharp C1410 | 24.95 | BUX84 | 80 |
| DECCA 120/130 | 7.95 | STR5020 | 8.95 | TDA4500 | 5.95 | TX9/10 Standard | 1.00 | BUX84 | 80 |
| GRUNDIG CUC2410 14" | 19.75 | STR5103A | 6.50 | TDA4501H | 5.95 | TX9/10 Remote | 1.75 | R4050 | 2.95 |
| GRUNDIG CUC2410 | 19.75 | STR5401 | 9.95 | TDA4505E | 6.95 | TX30/100 Standard | 1.50 | T9053V | 3.50 |
| 18" 26" | 19.95 | STR56041 | 6.95 | TDA4600/2D | 3.95 | TX30/100 Remote | 1.75 | T9054V | 3.50 |
| ITT CVC20/30 | 6.95 | STR56041 | 6.95 | TDA4601 | 3.95 | Fidelity CTV140 | 1.50 | T9064V | 1.95 |
| PHILIPS KT3 | 7.95 | STR6020 (KIT) | 5.95 | TDA4601D | 4.75 | Fidelity CTV14R | 2.95 | TIP29C (TO168V) | 75 |
| RBM T20/22A | 7.95 | TA7272P | 2.95 | TDA8180 (Genuine) | 8.50 | Fidelity CTV14S | 2.95 | TIP41C | 50 |
| THORN 9000 | 8.00 | TBA120U | 1.95 | TDA9503 | 3.75 | Grundig CUC731 | 3.50 | TIP42C | 50 |
| UNIVERSAL | 5.95 | TDA1035T | 2.95 | TEA1014A | 3.95 | Philips G11 Standard | 1.35 | TIP112H (TO167V) | 75 |
| FUSES | | TDA1037 | 2.75 | TEA1039 | 2.95 | Philips G11 Remote | 1.75 | TPL791A | 1.95 |
| 20mm A/S: (Pkts of 10) | | TDA1044 | 2.95 | TEA2018A | 2.95 | Philips KT3 Remote | 1.75 | 2SC1942 | 2.95 |
| 250MA, 315MA, 500MA, | | TDA1170S | 1.95 | UPC1365C | 3.95 | Philips KT4/CTX Remote | 1.75 | 2SC3156 | 2.95 |
| 630MA, 800MA, 1A, 1.6A, | | TDA1510 | 3.80 | UPC1378H | 3.95 | RBM T20A 3K3 Volume | 3.95 | 2SD725 | 4.95 |
| 2A, 2.5A, 3.15A 4A, 5A, | | TDA1512 | 3.50 | UPC1394C | 3.95 | Sony Universal | 3.75 | 2SD1398 | 2.50 |
| 6.3A, 8A | 1.20 | TDA1515 | 4.50 | UPC1420CA | 8.50 | Sony KV1612 Remote | 3.95 | 2SD1453 | 2.95 |
| 20mm Q/B: (Pkts of 10) | | | | | | Sony KV2022 Remote | 2.95 | Sony CS/67 | 14.95 |
| 500MA, 630MA, 800MA, 1A, | | | | | | Thorn Universal | 1.00 | Toshiba V73 83B | 21.50 |
| 1.6A, 2A, 2.5A, 3.15A | 60 | | | | | | | Toshiba V93B | 23.95 |

ALBA VIDEO SPARES

| | |
|-------------------|-------|
| VCR4000 | |
| Belt Kit | 1.95 |
| Capacitor Back-up | 2.50 |
| Pinch Roller | 3.95 |
| Reel Idler | 3.95 |
| Reel Pulley | 3.95 |
| Video Head | 21.50 |

VCR5000

| | |
|--------------|-------|
| Belt Kit | 1.95 |
| Pinch Roller | 3.95 |
| Reel Idler | 3.95 |
| Reel Pulley | 1.95 |
| Video Head | 21.50 |

AMSTRAD VIDEO SPARES

| | |
|--------------------|-------|
| VCR4500/4600 | |
| Belt Kit VCR4500 | 1.95 |
| Belt Kit VCR4600 | 1.95 |
| Modification Kit | 6.95 |
| Video Head VCR4500 | 18.75 |
| Video Head VCR4600 | 18.75 |

FERGUSON VIDEO SPARES

| | |
|------------------------|------|
| 3V00/22 | |
| Belt Kit | 2.50 |
| Pinch Roller | 3.95 |
| Reel Idler | 3.95 |
| Take-Up Clutch (Large) | 5.95 |
| Take-Up Clutch (Small) | 5.95 |
| Video Head | 9.50 |

3V29/30

| | |
|-------------------|-------|
| Repair Kit | 12.95 |
| Belt Kit | 1.80 |
| Capstan Motor | 32.50 |
| Cassette Lamp | 80 |
| Loading Belts (5) | 1.95 |
| Pinch Roller | 3.95 |
| Reel Idler | 2.95 |
| Take-Up Clutch | 2.95 |
| Take-Up Idler | 1.85 |
| Tension Band | 2.45 |
| Video Head | 9.50 |

3V35/39

| | |
|-------------------|-------|
| Repair Kit | 12.95 |
| Belt Kit | 1.95 |
| Capstan Motor | 22.95 |
| Cassette Housing | 25.95 |
| Cassette LED | 1.95 |
| Loading Belts (5) | 1.95 |
| Mains Transformer | 23.95 |
| Pinch Roller | 3.95 |
| Reel Idler | 2.95 |
| Remote Control | 14.95 |
| Take-Up Idler | 1.85 |
| Take-Up Clutch | 2.95 |
| Tension Band | 2.45 |
| Video Head | 9.50 |

FERGUSON VIDEO SPARES

| | |
|------------------|-------|
| 3V44/45 | |
| Repair Kit | 14.95 |
| Belt Kit | 1.50 |
| Cassette Housing | 25.95 |
| Clutch Assembly | 12.95 |
| Pinch Roller | 3.95 |
| Remote Control | 15.95 |
| Video Head | 19.50 |

3V65/FV11

| | |
|------------------|-------|
| Repair Kit | 11.95 |
| Belt Kit | 1.75 |
| Capstan Motor | 27.50 |
| Cassette Housing | 29.95 |
| Pinch Roller | 3.95 |
| Reel Idler | 2.75 |
| Reel Motor | 15.95 |
| Video Head | 23.50 |

FISHER VIDEO SPARES

| | |
|-----------------|-------|
| FV1615/720 | |
| Belt Kit | 1.95 |
| Clutch Assembly | 5.95 |
| Pinch Roller | 4.50 |
| Reel Idler | 5.95 |
| Video Head | 17.50 |

FVH905/910

| | |
|-----------------|-------|
| Belt Kit | 1.95 |
| Clutch Assembly | 19.95 |
| Reel Idler | 5.95 |
| Video Head | 17.50 |

VT8000/8700E

| | |
|---------------|-------|
| Belt Kit | 1.95 |
| FF/REW Idler | 2.95 |
| FF/REW Pulley | 95 |
| Play Idler | 3.95 |
| Video Head | 17.50 |

HITACHI VIDEO SPARES

| | |
|---------------------|-------|
| VT63/64E | |
| Belt Kit | 1.95 |
| Capstan Motor | 27.50 |
| Clutch Assembly | 7.95 |
| FF/REW Idler | 2.50 |
| Pinch Roller | 3.95 |
| Repair Kit | 17.95 |
| Video Head VT63/64E | 22.50 |
| Video Head VT65E | 34.95 |

VT120/130E

| | |
|-------------------|-------|
| Belt Kit | 1.95 |
| Clutch Assembly | 7.95 |
| FF/REW Idler | 3.75 |
| Pinch Roller | 3.95 |
| Repair Kit | 18.50 |
| Video Head VT120E | 24.95 |
| Video Head VT130E | 29.95 |

PANASONIC VIDEO SPARES

| | |
|----------------------|-------|
| NV230/430 | |
| Repair Kit (Genuine) | 12.95 |
| Belt Kit | 1.95 |
| Mode Switch | 3.95 |
| Pinch Roller | 3.95 |
| Reel Idler (Genuine) | 2.95 |
| Tension Band | 2.45 |
| Video Head NV333 | 9.50 |
| Video Head NV366 | 24.95 |

NV333/366

| | |
|----------------------|-------|
| Repair Kit (Genuine) | 13.75 |
| Belt Kit | 1.95 |
| Pinch Roller | 3.95 |
| Reel Idler (Genuine) | 1.25 |
| Reel Motor | 17.95 |
| Reel Idler | 2.45 |
| Video Head NV333 | 9.50 |
| Video Head NV366 | 24.95 |

NV370

| | |
|----------------------|-------|
| Repair Kit (Genuine) | 12.95 |
| Belt Kit | 1.95 |
| Mode Switch | 3.95 |
| Pinch Roller | 3.95 |
| Reel Idler (Genuine) | 2.95 |
| Tension Band | 2.45 |
| Video Head | 12.50 |

PANASONIC VIDEO SPARES

| | |
|----------------------|-------|
| NV777 | |
| Repair Kit (Genuine) | 12.95 |
| Belt Kit | 1.95 |
| Pinch Roller | 3.95 |
| Reel Idler (Genuine) | 3.95 |
| Video Head | 23.95 |

NV2000/2010

| | |
|----------------------|-------|
| Repair Kit (Genuine) | 21.50 |
| Belt Kit | 1.95 |
| Pinch Roller | 3.95 |
| Play Idler (Genuine) | 1.25 |
| Reel Idler (Genuine) | 1.25 |
| Video Head | 9.50 |

NV7000/7200

| | |
|-----------------------|-------|
| Repair Kit (Genuine) | 17.50 |
| Belt Kit | 1.95 |
| Pinch Roller | 3.95 |
| Play Clutch (Genuine) | 4.95 |
| Reel Idler (Genuine) | 1.25 |
| Video Head | 9.50 |

PHILIPS VIDEO SPARES

| | |
|-----------------------|-------|
| NV6710/12 | |
| Repair Kit (Genuine) | 12.95 |
| Belt Kit | 1.95 |
| Mode Switch | 3.95 |
| Pinch Roller | 3.95 |
| Reel Idler (Genuine) | 2.95 |
| Video Head (NVG7/9) | 19.50 |
| Video Head (NVG10/12) | 19.95 |

VR6460/6520

| | |
|--------------|-------|
| Repair Kit | 12.95 |
| Belt Kit | 1.95 |
| Pinch Roller | 3.95 |
| Reel Idler | 2.95 |
| Video Head | 12.50 |

SANYO VIDEO REPAIRS

| | |
|-----------------------|-------|
| VTC5000 | |
| Belt Kit | 1.00 |
| Reel Motor (Genuine) | 7.95 |
| Reel Pulley (Genuine) | 5.95 |
| Video Head | 27.50 |

SHARP VIDEO SPARES

| | |
|----------------------|-------|
| VC9300/381 | |
| Belt Kit | 2.50 |
| Pinch Roller | 3.95 |
| Reel Idler (Genuine) | 3.95 |
| Reel Motor (Genuine) | 12.95 |
| Video Head | 17.50 |

VC481/482

| | |
|----------------------|-------|
| Belt Kit | 2.50 |
| Pinch Roller | 3.95 |
| Reel Idler (Genuine) | 3.95 |
| Reel Motor (Genuine) | 14.95 |
| Video Head | 17.50 |

VC51/582

| | |
|----------------------|-------|
| Belt Kit | 2.50 |
| Pinch Roller | 3.95 |
| Reel Idler (Genuine) | 3.95 |
| Reel Motor (Genuine) | 18.95 |
| Video Head | 17.50 |

SONY VIDEO SPARES

| | |
|-----------------|-------|
| CS/67 | |
| Belt Kit C5/7 | 2.50 |
| Belt Kit C6 | 1.95 |
| Pinch Roller | 3.95 |
| Rowind Kit C5/7 | 4.95 |
| Rowind Kit C6 | 3.95 |
| Video Head | 14.95 |

VIDEO BELT KITS

| | |
|------------------|------|
| Akai VS13/5 | 1.95 |
| Mitsubishi HS302 | 1.95 |
| Sanyo 1100 | 1.95 |
| Sharp 7300 | 2.50 |
| Sharp 8300 | 2.50 |

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| AAA Batteries (Pkt 4) | |

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- (d) FERGUSON T785 FASTEXT

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| 901227..... | £10.44 | TRY |
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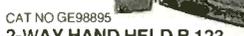
ORDER CODE: CAR/CPA100
12 x 60W CLASS "A" AMPLIFIER
B005LA (CPA 100)

Class "A" stereo in-car amplifier capable of delivering 2x 60W stereo or 120W mono in bridge mode. Inputs are low level phono, with left and right level controls. Full thermal and overload protection.

Output power: 2x60W stereo 0.1% THD
120W mono 0.1% THD

Signal to noise ratio: 20-20000Hz
Frequency response: 20-20000Hz
Input sensitivity: 100mV-3V adjustable
Input impedance: Low level input 20kΩ
Output impedance: 4Ω
Power: 14.4V dc 15A
Dims: 240x120x50mm

£39.99



2-WAY HAND HELD Crystal Control Transceivers. Built-in Telescopic Aerial, call button, transmitter receive key, on air indicator. Each unit requires PP3 battery for operation (not supplied).

Operating Frequency: 43MHz
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Frequency Tolerance: ± 0.005%
Range 1-2Kilo, open field (Depends on conditions)
Oscillation: Crystal Control
Power Pack: 9V DC (PP3 battery, 1 pair in box)

£26.50



ORDER CODE: CAR/CPA504
4 x 120W CLASS "A" AMPLIFIER
B005N (CPA 504)

High power 4-channel Class "A" amplifier, capable of delivering 4 x 120W or 2 x 240W in bridge mode. Inputs are direct from the speaker outputs of the car radio cassette, or low level phono inputs with left and right level controls. Full thermal overload protection.

Output power: 4x120W or 2x240W (bridged)
Frequency response: 10-50000Hz
Signal to noise ratio: 90dB
Input sensitivity: 100mV-3V adjustable
Input impedance: High level input 100Ω
Low level input 20kΩ
Power: 14.4V dc 60A
Dims: 400x240x50mm

£119



ORDER CODE: CAR/CPA200
2 x 200W CLASS "A" AMPLIFIER
B005M CPA 200

High power Class A amplifier capable of delivering 2 x 200W stereo or 400W mono in bridge mode. Inputs are direct from the speaker outputs of the car radio/cassette or low level phono inputs, with left and right level controls. Full thermal and overload protection.

Output power: 2-200W stereo 0.08% THD
400W mono 0.2% THD

Signal to noise ratio: 90dB
Frequency response: 10-50000Hz
Input sensitivity: 100mV-3V adjustable
Input impedance: High level input 100Ω
Low level input 20kΩ

Output impedance: 4Ω
Damping factor: 180 into 4Ω
Power: 14.4V dc 43A
Dims: 240x130x50mm

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FISHER 654R (DLER 143-0-4904-00900) 5.50

FERGUSON TAKE UP IDLER PUS1402A 1.95

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E8C25 1.50
E8C26 5.90
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E8C28 0.80
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E8C30 2.20
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CW = Clockwise CCW = Anti clockwise

TWIN FLOUORESCENT LAMP — 12V

A very attractive twin tube lamp holder with two 12V BW fluorescent tubes. White plastic case with clear plastic ribbed diffuser and ON/OFF switch. Supplied with 90cms of twin flex for connection to 12V battery (Red stripe to positive). Ideal for caravans, boats vans etc.

Overall dimensions: 370 x 65 x 41mm
ORDER CODE: Opto/TLF12

Price 1+ 10+ 50+
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Identical to above, but single tube.

12V dc 8 Watts Dims: 360 x 52 x 37mm
ORDER CODE: Opto/SL £5.50

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Replacement tube for above Twin and Single fluorescent lamps. Fits most 12V fluorescent lamps. Tube length: approx 300mm (inc pins)

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Dims: 160 x 88 x 110mm

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A hand-held broadband radio receiver with a range covering CB, FM, radio, TV, Air and PB bands. Built-in telescopic aerial. Squelch, volume and tuning controls and band selector switch.

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Power 6V dc
(4 x AA batteries, not included)
Dims 93 x 198 x 50
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COMPONENT SPEAKER SYSTEM B020 (TC6500)

2 x 3-way component speaker system comprising: two 6.5 woofers, two 4 mid-range, two 2.25 tweeters and all leads, filters and fixing screws.

Finished in black with black mesh grilles.

Maximum power 60W/8ohm
Frequency response 60-20000Hz

Speaker sizes 6.5 woofer, 4 mid-range, 2.25 tweeter

Impedance 4Ω

RESISTOR KITS — each value individually packed

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1/2W pack Popular — 2R2 to 10M 1000 pieces 10.75

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PRE-SET POT'S Vert 120 pieces £7.75

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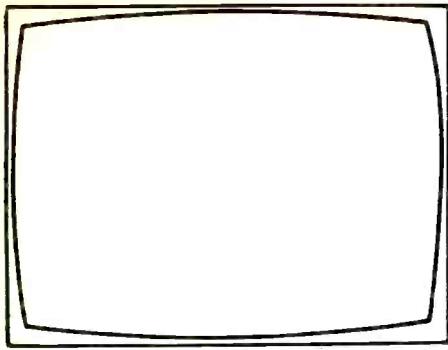
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TELEVISION

The Franchising Procedure

There is probably no way of awarding the ITV franchises that will satisfy everyone. We have now seen the latest system in operation for the first time. It evolved out of the old IBA system, which even the IBA felt was unsatisfactory, as a sort of compromise. Originally the idea was simply to hold an auction with minimal qualifications. Then, following considerable criticism within the industry, additional qualifying conditions were imposed. These relate both to the business side – whether the applicant is likely to be able to make a go of it over the ten-year period of the franchise – and to the quality of the programming proposed by the applicant. The result of the qualifying conditions has been curious indeed. Many have been left with the feeling that the new system is no more the right approach than the previous one. The Prime Minister himself has said “I don’t think it has been an optimum success”.

Four of the present holders have lost their licences to broadcast despite two of them (TVS and TWS) putting in the highest bids for their regions. Of the sixteen franchises, just half went to the highest bidder – and of these three were uncontested. The odd results produced by the procedure are highlighted by the extreme bids, with Central Television holding its major franchise despite bidding just £2,000 while TVS was unsuccessful despite making the highest of all bids at £59.758m. The ITC felt that TVS couldn’t possibly succeed with its commitments given the costs it proposed to take on. TVS had reckoned that advertising revenue would rise sufficiently to see it through. Maybe it would have done, though the projections looked rather optimistic. Yorkshire Television is regarded as being probably the biggest loser amongst the successful bidders. Under the present rules it would probably have paid some £16.8m in 1993: instead, it is likely to pay £48.6m. Granada and LWT were successful despite bidding roughly a quarter of the sum their competitors had offered. In all, the ITC expects the Treasury to benefit by an extra £40m a year under the new system. That doesn’t seem a huge sum and, if the main aim was originally to maximise the return from in effect selling the right to use public property, one has to ask whether it justifies such a major change to a system that worked reasonably well.

The problems that the new system will bring do not relate simply to the amount bid. Some companies that have succeeded with low bids will be awash with cash. Others that have succeeded with high bids, some grossly too high in the opinion of industry watchers, will find it difficult to survive while meeting their obligations. This could give rise to very varied programming quality from region to region. One major change envisaged by some companies, including Carlton Television (London weekday) and Meridian (south and south east), is to act as “publishers” in the manner of Channel 4, commissioning most of their material and thus avoiding the need to maintain extensive and expensive programme making facilities. It has worked for Channel 4, so why not for Channel 3 as we shall now have to call it? The point to bear in mind here is that things don’t always work out in the way intended. An example is the changes that the government is bringing about in the brewing industry.

If you recall, the tied house was seen as detrimental to consumer choice. So the major brewers have been ordered to sell a large part of their tied house estates. The idea seems to have been that lots of entrepreneurs would buy pubs and then obtain their supplies from various different sources, giving the punter a greatly increased choice. But it now looks – even before the tied pubs have been disposed of – that the consequence will be to split the industry into separate brewing and retailing sides. The way things are going, each of these will be dominated by a handful of even larger enterprises than we started off with: a few mammoth brewers, and a few equally large caterers running pub/restaurant/hotel empires. So much for increased choice at the bar. In other words, the changes could well have the opposite effect to that intended.

If a similar situation arises in television, with mergers and takeovers resulting in a small number of broadcasters on the one hand and a few giant programme makers on the other, will the viewer have benefitted or not? For the present the only answer is that we shall have to wait and see. What is perturbing is that the government’s desire for change led to the new arrangements being pushed through with far too little consideration being given to the possible outcome. The government apparently thought that there were large numbers of prospective independent programme makers brimming with new ideas but thwarted by the power of a broadcasting establishment. This always seemed to be rather pie in the sky. There was no very good reason to believe that bright ideas would be unable to find a place in the broadcasting schedules.

We shall have to let the new arrangements settle down and then assess the consequences. It might well be that the changes will have negligible effect as far as the viewer is concerned. But whether the idea of awarding a new set of franchises every few years is a good one or not is something that does need to be considered, particularly in view of the odd results of the recent auction. It would surely be better to let established broadcasters get on with it, but to do so under the control of a powerful authority that would monitor performance and have, as a last resort, the power to cancel a licence and call for fresh offers.

PRICE INCREASE AND PUBLISHING DATE

The cover price of *Television* will be £1.95 from our next issue dated January. We regret the need for this increase, which has been made to cover increased costs.

Our apologies for giving the wrong publication date for the present issue last month. This was due to a decision taken after we went to press.

EDITOR

John A. Reddihough

EDITORIAL ASSISTANT

Tessa Winford

Please note that the telephone numbers below are for contact with the advertisement departments only. Editorial enquiries should be sent to the editor at the address given on page 81 or faxed to 081-661 8956.

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COVER PHOTO

This month’s cover photograph shows the Finlux 1000 series TV chassis. See servicing article on pages 122-4.



Teletopics

FERGUSON MANUFACTURING ENDS

Market conditions are blamed for Thomson Consumer Electronics' decision to close the Ferguson Gosport TV factory, which has been operating at a loss since 1984. The factory was first established by Ultra in 1956 and has been extended on several occasions. In recent times it has concentrated on the manufacture of smaller-screen TV sets and satellite/pay TV decoders – it's Thomson's main centre for decoder production. TV set sales in the UK have been poor this year while the growth of satellite TV sales has not been up to expectations. Gosport's output has thus been in markets where the competition has been severe. The Ferguson brand is to be retained, but all production will be in overseas plants. Closure will be early next year, with a loss of over 700 jobs. Total employment in manufacturing and R and D work was 4,600 when Ferguson was sold to Thomson by Thorn EMI in 1987. All that will be left will be R and D, sales and servicing operations at Enfield, employing around 300 people.

SONY/PHILIPS AUDIO DEAL

Sony and Philips have agreed to support each others' digital compact cassette (DCC) and Mini Disc systems. Sony will produce prerecorded DCCs and players while Philips has agreed to pool its patents relating to Mini CD technology and jointly license this to other manufacturers. The DCC system is due to be launched next spring.

MARKETING PLANS

The VCR Plus system for easy VCR programming, described in our October issue (page 862), is to be launched on the 6th of December. It will be known as Video Plus +. Publications committed to publishing the Video PlusCode numbers include the Mirror, Record, Sun, Today, Times, Sporting Life, TV Times, What's On TV, Sunday Mail, Sunday Mirror, The People, The Sunday Times and the News of the World. The suggested retail price of the Video Plus + handset is £59.99 including VAT.

Kodak plans to launch two Photo CD players next June/July. The Philips manufactured players will sell for around £300-£400 depending on the features incorporated. The system, which enables up to a hundred 35mm film shots to be stored on a compact disc, was described in our October issue (pages 873-5). Philips also plans to introduce Photo CD players next summer. Fuji has announced its support for the system and will be providing lab services for the transfer of silver-halide and memory-card images to Photo CD from next autumn.

The BBC's Select subscription TV system is to start early next summer, using BBC-1 and BBC-2 transmitters to broadcast scrambled programmes during the night hours. The idea is that these will be decoded and recorded for subsequent viewing. Videocrypt scrambling, as used by BSkyB, is to be used. This involves cutting successive lines at different places and reversing the two parts of each line while on the sound side the l.f. part of the signal is converted to h.f. and vice versa. A smartcard will be used to enable the decoder, operating in conjunction with

teletext codes – Selector is the name chosen for the decoder. As with the Video Plus + programmers, the Selector controls the VCR with which it operates via an IR remote control system. Since at least two hundred different IR codes are in use, the VCR and Selector will have to be matched. This will be done by the installation engineer. The BBC points out that it is not aiming to compete with BSkyB: the service will be for specialist programmes rather than mass entertainment.

SONY'S DATA DISCMAN

Sony launched the Data Discman in Japan in the summer of 1990. Described as "the electronic book of the future" it's a pocket-sized portable CD-ROM reader with a 10-line, 30 characters-per-line display and a miniature typewriter keyboard. The Data Discman Model DD1EX is due to be launched in the UK next April, at a price of around £350. The Data Discman gives access to 200Mb of data stored on an 8cm CD, using the new EB (electronic book) format. In Japan some 400 electronic books are available from 30 publishers. For comparison, the disc's storage capacity is equivalent to nearly 300 720K floppy discs. To give easy access to the stored information the Data Discman has six search routines: word search, end-of-word search, term search, menu search, combined search and graphic search. The Data Discman weighs 1lb 8oz with battery and measures 1.66 × 4.25 × 6.25in.

TV LICENCE FEE

From next April the colour TV licence fee will rise to £80 while the monochrome licence fee will be increased to £26.50. The increase is 4.1 per cent based on September's inflation rate.

BUSINESS NEWS

Components/accessories distributor HRS Electronics went into liquidation and was shortly afterwards bought out during early October. The liquidation occurred on October 4th: on the 11th the Ring Group of Companies Ltd. announced that it had completed purchase of the business and assets of HRS Electronics PLC. As a part of the Ring Group the company will continue to trade as HRS Electronics, with national representation and distribution, and will operate from the same address in Birmingham. The company intends to continue its policy of next day delivery of telephone orders placed before 5.30 p.m. The Ring Group of companies is based in Leeds. Its activities include the distribution of consumer and automotive lighting equipment. The company plans to invest £1.5m in HRS and will expand the Planet range.

Leda Ltd., supplier of spares for NEI products, has moved to Unit 7, Croft Court, Sandall Carr Road, Kirk Sandall, Doncaster DN3 1QR. Telephone and fax numbers remain the same.

Cathay Electronics Ltd. has been bought by Nikkai Imports Ltd. of Leeds. It will continue to operate from Abingdon, Oxon but is expected to relocate by the end of the year, probably to Leeds. Nikkai intends to maintain the Cathay brand name and expand its TV/video range. Earlier this year Nikkai bought Dansai.

Toshiba and C.Itoh have taken a 12.5 per cent stake in a new joint venture company with Time Warner. The new subsidiary, Time Warner Entertainment, will include Time Warner's film and cable TV interests.

According to the latest *Financial Times* satellite monitor

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some 65,000 dishes were installed in September, taking the total to around 1.8m. Comet and BSkyB have reached an out-of-court settlement over Comet's breach-of-contract claim: it was left with substantial stocks of BSB receiving equipment when BSB and Sky Television merged late last year.

TV TECHNOLOGY

To support its work on the development of enhanced PAL systems the BBC is to receive partial funding from the Department of Trade and Industry. The work is being done as a contribution to the PAL-Plus group's participation in the Eureka Project 637. Other members of the PAL-Plus group include ITV broadcasters, ZDF, ORF, SRG, IRT, Thomson Consumer Products, Nokia, Philips and Grundig. The aim is to enhance the quality of terrestrial PAL transmissions, so that suitable receivers will be able to offer 16:9 aspect ratio displays with reduced cross colour and luminance and better resolution while maintaining system compatibility for existing receivers. BBC engineers have considerable experience with compatible PAL enhancements. The work on enhanced PAL will complement the work being carried out on HD-TV under Eureka Project 95, to which the BBC is committed. While enhanced PAL will not equal the quality offered by HD-TV, the BBC feels that significant enhancements can be provided for those wishing to buy receivers designed to take advantage of them.

NHK in Japan has demonstrated a 3-D TV system that doesn't require the viewer to wear special glasses. It uses a special lenticular screen in conjunction with a high-quality liquid-crystal colour video projector which uses three groups (RGB) of 1,474,560 pixels to give the impression of depth. The camera's outputs are multiplexed pixel by pixel to form a vertical stripe image. This is then projected on to the special screen from the rear. The demonstration used a 50in. screen. Viewers had to be carefully placed and a considerable amount of space was required. The spacing between the projector and the lenticular diffusion screen was 3m, and viewers had to be at least 5m in front of the screen. One disadvantage is that movement of the viewer's head can result in loss of the picture, with the vertical stripe image changing to black stripes. NHK has released only very general details of the system, which is regarded as experimental. Dr. Harumo Isono of NHK's Visual Science Research Division added that "it will be a long time in the future before we sell 3D-TV in Japan".

Canon has demonstrated in Japan a new form of liquid-crystal display using ferroelectric LCD technology. The technology presents considerable manufacturing problems and will probably be used for computer displays initially. It's based on ferroelectric crystals which do not require a constant electric field to retain an image. One advantage is a greatly improved response time – some 50nsec compared with up to 200msec with conventional LCD technology.

VIDEO NEWS

JVC is about to launch in Japan an S-VHS VCR with PCM digital audio. Model HR-Z1 uses a depth multiplex h.f. bias recording system: f.m. stereo sound, PCM digital audio and video signals are recorded on the tape as a triple layer. The digital audio system has a frequency response of 20-20,000Hz with a dynamic range of over 90dB. It uses orthogonal quadrature phase-shift keying (O-QPSK) and Reed Solomon error correction coding, the carrier frequency being 3kHz. Either two or four channel sound

can be accommodated by the system. The sampling frequency is 48kHz/16 bits linear and the quantisation 32kHz/12 bits non-linear. The HR-Z1 also has a built-in satellite tuner, a 16:9 widescreen broadcast detection system and improved video heads and signal processing systems. The price in Japan will be the equivalent of around £1,400. No details of a UK launch have been released.

The newly introduced Philips VR813 VCR can record and playback 4:3 and 16:9 aspect ratio transmissions: it includes an automatic sensing circuit to detect the type of signal. Other features include a one month/eight event timer, teletext and Nicam decoders, long-play, VISS and numerous trick-play features. Suggested retail price is £800. Also new from Philips is the LC40450 pocket TV which has a 4in. LC display, a built-in a.m./f.m. stereo radio and is capable of PAL/SECAM reception. Suggested price is £500.

Several VCRs featuring PDC (programme delivery control), a teletext controlled timer programming system about to be introduced on Channel 4, have been introduced. They include the Ferguson FV54LX at £400, the Philips 31DV3 and VR713 at £350 and £550 respectively and the Grundig VS960 at £700 (a cheaper model, the VS920, is to follow shortly). The Philips VR713 incorporates Nicam hi-fi while the Grundig VS960 has both Nicam hi-fi and fastext. Also new from Grundig are three TV sets that use the new five series chassis. Model numbers, screen sizes and prices are P37-540/34cm/£250, T51-540/49cm/£358 and T55-540/51cm/£388.

Ferguson and Akai have both introduced ultra-compact VHS-C camcorders. The Ferguson FC37 at around £600 has numerous features including VHS compatibility, long-play recording, a full auto recording mode, sensitivity down to 3 lux, a power zoom with auto macro facility, shutter speeds from 1/50th to 1/4,000th of a second, digital tracking, HQ picture enhancement, a built-in directional microphone, an electronic viewfinder which also gives comprehensive indications, editing facilities and a trigger-linked preset fader. Akai's models are the PVSC20 at £650 and the PVSC40 at £750. The PVSC40 includes Akai's Intelligent HQ system, a picture-optimising auto tape-tuning arrangement which, used with an S-VHS tape, is said to give recording quality approaching that obtained with an S-VHS machine.

The newly-released Ferguson FV57H at £480 incorporates Nicam hi-fi sound. Aiwa's new VCR, Model HV-F125, comes with a remote control handset with a jog/shuttle dial.

Nokia has launched an integrated satellite receiver and decoder, Model SAT1500, at £330. Features include an automatic Videocrypt decoder, stereo sound, three Scart connectors, a VCR timer, remote control and a 90-channel memory.

The video rental boom seems to have tapered off. According to a report, Cultural Trends 10, from the Policy Studies Institute video cassette rentals reached some 396 million in 1989 then fell back to 374 million in 1990. Growth in satellite TV movie viewing is put forward as a possible explanation for the decline.

EXHIBITIONS AND CATALOGUES

Cable and Satellite 92, the European broadcasting and communications show, is to be held at Olympia, London on 13-15th April 1992. The CD-ROM Europe 92 conference and exhibition is to be held at the Metropole Hotel, Brighton on 31st March-2nd April 1992.

specific household is caused only after the installation of equipment (e.g. a new aerial) to receive Channel 5 in that household". Presumably the idea is that whoever carries out a Channel 5 installation should be able to deal with any interference problems. But it does look as though this could lead to misunderstandings to say the least. Also, since this qualification was taken into account in predicting the extent and cost of retuning VCRs (not other equipment apparently), if viewers cotton on to this and delay installing Channel 5 equipment until any interference problems have been dealt with the eventual cost to the Channel 5 licencee could be far higher than he might have bargained for.

The ITC's study found that in most parts of the UK where Channel 5 is to be introduced there will be between two and five suitable channels within the tuning range of a VCR's modulator for retuning purposes. The main exception is an area of West London, extending out to Slough, where there may be difficulties in finding suitable channels for retuning due to problems with Heathrow

airport radar. The report estimates that around 50,000 VCRs in this area might not be able to be retuned satisfactorily.

The report suggests three alternatives where retuning is not practical. First, a video interface could be used to connect equipment. The problem with this is that so many existing TV sets don't have video input facilities. Secondly a wide-range (covering at least channels 28-42) modulator could be connected to the VCR's video output. Finally, a notch filter could be added in series with the TV set's aerial input to attenuate interference from an adjacent service area, thus freeing some spectrum space for use by the VCR's u.h.f. output. Because interference from an adjacent area would generally be at a low level, the rejection would not need to be very great, making the filter relatively cheap and easy to produce.

Some other possible problems are highlighted in a couple of letters we have received from readers. One of these arrived too late for inclusion this month and will therefore be published in our next issue.

More on the Panasonic G Deck

M.P. Prakash R. Lewis

In the May-June issues Nick Beer wrote about servicing VCRs fitted with the Panasonic G deck. One point he didn't mention was the voracious appetite of Panasonic models for the chopper chip Q1001. We've handled hundreds of these machines over the last couple of years. Commonly we start by finding that the mains fuse has blown, then we find that Q1001 has gone short-circuit. In some cases the 0.39 Ω , 2W resistor between pins 4 and 5 of Q1001 will have been damaged or the 2.2 Ω , 2W surge limiting resistor in series with the bridge rectifier, on the earthy side, may have taken the plunge. While at it, check the zener diodes present with some circuits on the primary side of the chopper transformer for shorts or leakage. The cause of failure to start when a new chopper chip has been fitted, or a short-lived chopper, invariably has its roots here.

Some models such as the G9-12, G15, G30 and NV280 have a similar power supply. In the event of Q1101's failure, replace D1120 as well. Ensure that Q1101 is fitted with a smear of heatsink compound and the plastic part (VG00922) which meshes Q1101's heatsink to the isolated metal shield body - the heatsink is at mains potential as the chopper transistor's collector (pin 3) is connected to the metal tab. The grey-coloured plastic is between the heatsink and body. If the power supply works intermittently take a closer look at the subassembly (VJB01211) where D1117, D1104 and R1105 can become leaky or open-circuit.

On the secondary side, the axial electrolytics tend to lose capacitance. This results in obscure symptoms.

Failure of the luminance module, part no. VEFH03D, is common with some of these machines. The symptom varies from no playback with E-E normal to playback with streaking lines.

Mechanical Faults

The deck itself causes few problems. The subloading arm tends to break at the bottom however if the timing goes haywire. Incidentally, this arm pivots the tape into contact with the audio/control head in the semi-loaded

position in order to read the off-tape control pulses for the real-time counter. If the machine often mistimes or changes mode with an accompanying noise that sets your teeth on edge, a new set of teeth/gears is probably required. When the sub-cam gear or ring gear wears mode-switch alignment will be required daily: the cure is to change them even if they don't look worn.

For routine service this deck, unlike the previous D1, doesn't require removal of the cassette compartment to gain access. You simply remove the two small, gold-coloured screws that hold the top of the compartment and lift out the metal lid. To set the timing, remove the two red-coloured screws at the right-hand side of the compartment and lift this side. Saves time and further complications.

A National G12

A National G12 had us baffled for some time. The symptom was a medium-level hum on playback and record. If the input was shorted out in the record mode the hum vanished, only to reappear as soon as the input was restored. We changed IC403, then the associated transistors and electrolytics, all to no avail. One item we suspected was the audio/control head, but this was cleared by substitution. Eventually we cleared the trouble by adding a 7812 regulator in the supply to the audio module. Scope checks carried out earlier in the fault-finding process showed that the ripple was normal compared with a working machine. Now there's no trace of any hum at all.

Sharp VC9300

Talking of audio problems, we had considerable difficulty with a Sharp VC9300. The symptom was intermittent crackling. When the scope's probe was connected however the machine worked impeccably. The switching chip and all the electrolytics were checked by substitution to no effect. We eventually found that Q607 and Q608 were responsible, though they gave correct displays when checked with a component tester.

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TV Fault Finding

Reports from Philip Blundell, AMIEE, E.M. Beddow, Brian Storm, Ed Rowland, Steve Cannon, Michael Dranfield, Ian Bowden, D.W. Sergeant, Alan Smith and H. MacMullen

Philips 2B Chassis

This set was dead: the 140V supply was low at 122V and there was no channel display. I made the usual checks in the line output stage but as everything here seemed to be o.k. I checked the other supplies for shorts. This showed that the 20V and -20V supplies each read 10Ω to chassis. The TDA1521 audio output chip was short-circuit. **P.B.**

Philips K40 Chassis

Field flyback lines could be seen for a second or so when the channel was changed. They then disappeared. A scope check at pin 8 of the TDA3561 colour decoder chip showed that the field section of the blanking signal was missing. It was present at pin 11 of the TDA3650 field output chip. The cause of the fault was a crack in the print from R3109 to plug L53.

If you have to replace C2170 because of an EW correction problem it must be a bipolar type. Fitting a normal electrolytic capacitor will reward you with excessive width and bowed verticals. **P.B.**

Fidelity CTV140

This set appeared to be dead but a check on the 114V line showed that it was very much alive, with some 130V at the collector of the line output transistor. There was no voltage at the collector of the driver transistor however. This is fed from a 25V rail, and we soon found that the 0.68Ω safety resistor in series with the rectifier was open-circuit. A meter check from the rectifier to chassis gave a reading of only a few ohms: a check on the driver transistor then showed that it was short-circuit. When this was replaced we were rewarded with a nice picture which after a few seconds very slowly drifted off tune. Several things were replaced before we discovered that the isolation diode connected to the slider of no. 5 tuning preset was leaky. Replacing this gave stable tuning. **E.M.B.**

Mitsubishi CT2227BM

We service a lot of these sets and have found them to be very reliable. A dead set call usually means that there are dry-joints at the line driver transformer or that the safety resistor in series with the remote control supply rectifier has failed. Only the correct type should be used. No sound is often due to R371 being open-circuit. This resistor is in the feed to the sound supply bridge rectifier. I've found no cause for these resistors to fail. **E.M.B.**

Amstrad TVR2

One of these models took half an hour to come on. C1517 was low in value. **E.M.B.**

Grundig CVC2410 Chassis

The complaint was of no results. When we called we found that the on/off switch was sticky. Next day we were back again because of the same complaint. This time we discovered that the set would come on if the switch was operated twice. We were puzzling over this when there was an almighty crack and sparks came from the side of the

tripler. Back in the workshop we fitted a new tripler but there was still a power supply fault. This was eventually cured by fitting a new TDA4600 chopper control chip. **E.M.B.**

Panasonic TX21V1 (Alpha 3 Chassis)

Although this set powered up there was a distinct lack of any microcomputer chip activity, with no display on the front panel, no control response, no sound and only a dark, blank raster. Checks around IC1203 and IC171 revealed no obvious problems however. In such cases it's often a good idea to disconnect the serial data and clock lines to the text panel, where other micro chips connected directly to IC1203 and IC171 usually lurk. With these disconnected the set sprang to life, producing sound and a perfect picture. When the text micros were isolated one by one the MAB8461PW13S chip IC3507 proved to be the cause of the problem. Replacing it restored normal operation on all functions. **B.S.**

Panasonic TX24T1 (Alpha 2 Chassis)

The complaint was of tuning problems after three and a half hours. On test we found that later in the morning BBC-1 started to jump on and off tune then disappeared altogether. Checks around IC171 (SAB3035) and the tuner showed that while the power supplies were steady the a.f.c. voltage at pins 11 and 12 of IC171 fluctuated wildly. This chip and the tuner are normally the first items to be suspected, in my experience unfairly, so I proceeded as follows. In normal operation the a.f.c. voltage is about 6V on tune and 8V off tune. In the fault condition the voltage varied between 2-4V, but why? When I supplied a stabilised 6V, BBC-1 locked on tune. So there was nothing wrong with the tuner or i.f. stages. Suspicion turned back to IC171 and the components linked to pins 11 and 12. D174 and C187 proved to be innocent but when R171 was checked with an analogue meter I obtained a variation like that with an audio VU meter, varying most impressively between 50 and 100kΩ. A new 10kΩ resistor cured the problem. **B.S.**

ITT C3425

Loss of sound responded to a sharp tap on the side of the cabinet. The cause turned out to be an intermittently open-circuit loudspeaker. The set is owned by an elderly lady who normally has the volume turned right up. Enough, said. **E.R.**

Toshiba 2805DBT

We've had a couple of these Dolby Surround Sound sets in with niggly faults like cracks in the print or dry-joints. This one had a genuine field fault. There was partial lower field scan and no upper field scan. A field output stage fault was naturally suspected and, as a start, the field output chip IC303 was replaced. In nine cases out of ten with any model this would have cured the fault. This set was the other one out of ten. Now with these sets the microcomputer chip controls almost everything, including

the field processing: the height and other variables can be adjusted via the handset after entering the service mode. Unfortunately we couldn't enter the service mode as it uses the on-screen display and this, of course, couldn't be seen. So much for technology!

We used the trusty, age-old, bog standard analogue scope to make checks on the ramp generator/EW correction chip IC371. This chip is also the slave on the I2C bus from the microcomputer. The drive waveform to the field output chip, at pin 8, was decidedly dodgy. This gave rise to a chicken-and-egg situation: the fault could be due to the ramp generator processing or the output stage could have been providing incorrect feedback. On the toss of a coin we decided to replace IC371. Luckily, this restored full field scan. **S.C.**

Panasonic TX2200 (U4 Chassis)

This set was dead with a zinging noise coming from the power supply. In previous cases we've found that the cause has been a short in the line output transformer, but with this one a noise could be heard coming from the speaker. A quick check on the 121V h.t. rail showed that it was o.k. – with a shorted line output transformer the voltage falls to 30V or so. The noise from the speaker suggested that the cause of the trouble was not the line output stage. What was actually happening was that the power supply was running with little or no load. There was no drive at the base of the line output transistor, and when we traced back to the line driver transistor Q501 we found that its collector supply was missing. R513 (1k Ω) was open-circuit. **M.Dr.**

Hinari TVA1 Sunrise

If you banged the side of the cabinet this set would go into standby. After a lot of tapping we decided that the cause of the fault lay in the front-mounted control PCB. It didn't look as if it was going to be easy to get this out. I tried looking for dry-joints with the panel in place but had no luck. Then came a chance discovery. By moving the wires to the on/off switch, standby could be brought into operation. After removing the on/off switch – two screws behind the plastic cover – I found that the remote contacts were very poorly soldered. Resoldering cured the fault. Has anyone managed to get the front PCB out?! **M.Dr.**

Salora G Chassis (Ipsalo 1)

The reported fault was no go. When the set was switched on a ticking every five seconds or so could be heard coming from the Ipsalo transformer. The drive to the protection thyristor THB2 was turning it on then immediately off again, which suggested that some sort of overload was present. Cold checks were made on the secondary supplies from the Ipsalo transformer but no shorts could be found. When the tripler's input lead was disconnected the set started up, but with a new tripler fitted the results were the same as before. Whilst making more checks around the Ipsalo circuit the set started up and didn't fault for five days! Checks on the Ipsalo control chip and its supplies were then carried out. Only two things seemed to be wrong. The 50Hz waveform fed from the a.c. side of the standby/start supply bridge rectifier via DB38 to pin 27 of the hybrid Ipsalo control chip was slightly low in amplitude – 1V peak-to-peak instead of 1.2V peak-to-peak. And the 32V standby supply that feeds the remote control panel and is regulated down to form the start-up supply was low at 24V. Whilst we were measuring this point the voltage

increased to 28V and the set started up as normal. It was quickly switched off, then tried again. It failed to start. A quick squirt of freezer on the standby/start bridge rectifier diodes brought the voltage up and the set started. One of the diodes, DB43, was faulty, though it measured correctly both in circuit and when removed. **I.B.**

Hitachi NP84CQ Mk II Chassis etc

The symptom with an Hitachi CPT1474R that came in recently was field roll as the set warmed up. Expecting to find an NP82CQ chassis, I was a little surprised to find an NP84CQ Mk. II when I removed the back. Noting the fault report on the CPT1476R in the February issue, I promptly changed C609 only to find that the rate of drift had increased. In these sets the field oscillator is set up by inhibiting the sync input – you earth pin 28 of IC201 – then connecting a 3.9M Ω resistor across R614. With this done the oscillator drifted continuously. When I put a finger on C609 I twigged what was happening: the ceramic capacitor I had fitted had an enormous temperature coefficient. On replacing it with a polycarbonate capacitor the oscillator was rock steady.

It seems that Hitachi also didn't know that high-K ceramic capacitors drift. So with any set that uses a TDA4503 chip it's worth replacing the 0.22 μ F capacitor. It would appear that under normal conditions there's just enough lock range in the chip to accommodate capacitor drift, but with only a small change in the field oscillator control lock can be lost. **D.W.S.**

Matsui 1810

The complaint with this set was "picture jittering after a period of time". Sure enough the fault occurred after about half an hour. We found that the culprit was C438 (0.022 μ F). **A.S.**

Philips CF1 Chassis

This set was dead. We found that the 1.5nF protection capacitor C2310 across the BYD33M 190V rectifier D6310 was short-circuit. When this happens the chopper power supply shuts down. To check voltages in this chassis you have to remove the two tin covers. Be sure to link the solder points where the covers are fitted, otherwise you can have the situation where the BUT11F chopper transistor has no emitter earth connection. Beware – the covers are not at earth potential. **H.MacM.**

Ferguson TX9 Chassis

This set, one of the later type with the chopper power supply, wouldn't start. The chopper circuit was working but there was no line output stage operation and the 18V supply from the chopper transformer was missing. This was all due to L103 on the a.c. side of the 18V rectifier D70 being dry-jointed. I didn't expect this as these chokes are wound with Lumex wire that needs no flux, heat only being required to solder.

Another TX9 suffered from no colour. It took a time to find that the matrix balance potentiometer RV67 was open-circuit at its earthy end.

What appeared to be a TX9 suffered from tuning drift. After some time the colour would drop out and the audio level would fall. The 15k Ω wirewound resistor that feeds the 34V regulator was slowly going high in value. A replacement restored normal operation. **H.MacM.**

Satellite TV Receiver Project

Part 1

C.W. Murray

Some two years ago I set about designing my own satellite TV receiver. This led to the Mk. 1 design: it employed an Amstrad i.f. block to which audio and video processing circuitry and a power supply were added. The Mk. 2 design described in this article is a development from the original one. While the video section remains as before the sound section has been considerably simplified and improvements have been made to the a.f.c. and power supply circuitry. Because of possible problems in obtaining the Amstrad i.f. block this design employs an Astec unit which has improved performance.

The receiver is intended to be used in exploring and monitoring satellite TV and so doesn't have hi-fi stereo sound or a video output to feed a VCR etc. The video amplifier simply drives the on-board modulator. Fig. 1 shows the receiver circuitry.

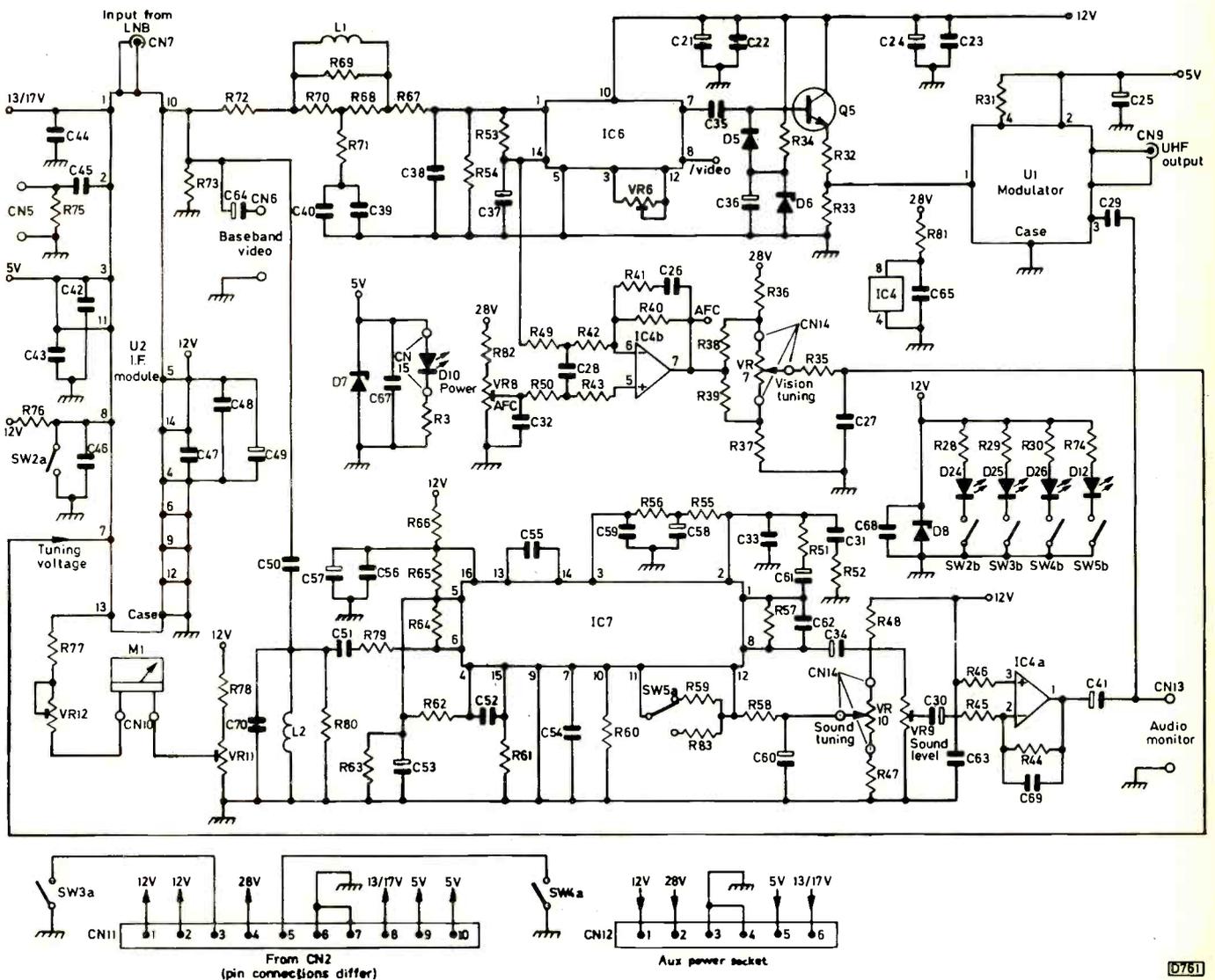
Audio Section

The sound section is based on the Xicor XR215N phase-locked loop chip. It's used in a circuit developed from

Denis Mott's audio stage in his satellite-band scanner – see the November 1990 issue of *Television*. Improvements here include the addition of a bandpass filter at the input and audio bandwidth selection – the narrow-band setting is useful when receiving marginal signals, as it helps to reduce the noise level. Coupling capacitor C41 is optional, being fitted only when the audio monitor facility is used. It's important to remember to cut the track under C41 when it's fitted. The amplifier connected to the monitor point should not load the receiver's audio amplifier, especially when turned off, otherwise the modulator's audio input may become distorted.

Video Section

The video section employs an NE592 chip. While this is not the best choice it has the advantage of low cost and in practice works well. It's important to note that the UA733 or TL027 cannot be directly substituted for the NE592. The video amplifier's output is a.c. coupled by C35 to a d.c. clamp network which also provides bias for the



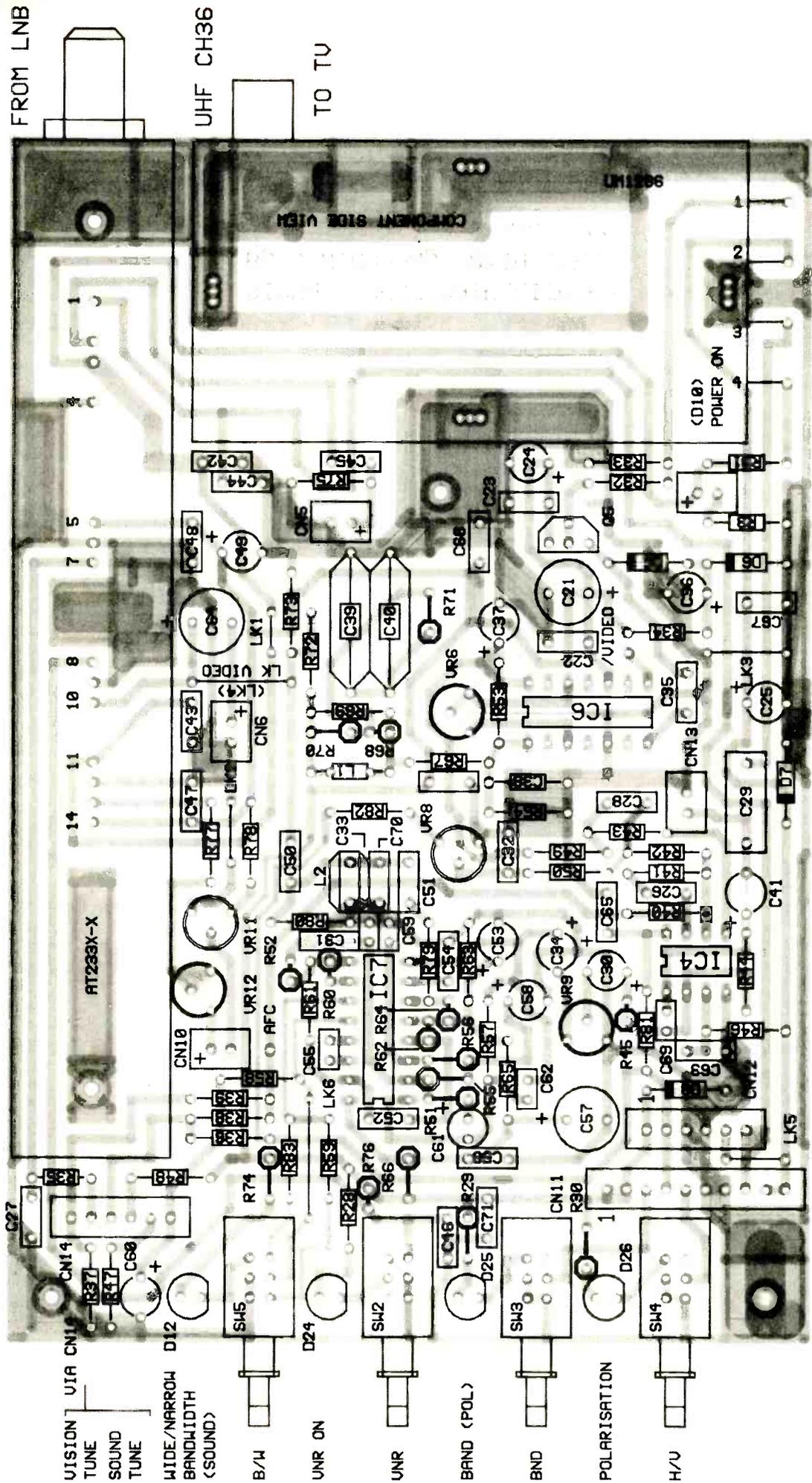


Fig. 2: Component layout on the receiver PCB.

Component details

| Component | Type | Farnell part no. | R70 | 68 | SFR2568R |
|-----------|----------|------------------|-----|---------------|-----------|
| R1 | 1Ω | SFR251R | R71 | 18 | SFR2518R |
| R2 | 2.2Ω | DCR252R2 | R72 | 15 | SFR2515R |
| R3 | 270Ω | SFR25270R | R73 | 150 | SFR25150R |
| R4 | 560Ω | SFR25560R | R74 | 680 | SFR25680R |
| R5 | 10Ω | SFR2510R | R75 | 1M | SFR251M |
| R6 | 100Ω | SFR25100R | R76 | 4.7k | SFR254K7 |
| R7 | 100Ω | SFR25100R | R77 | 56k | SFR2556K |
| R8 | 5.6k | SFR255K6 | R78 | 1.8k | SFR251K8 |
| R9 | 2.7Ω, 7W | 104-247 | R79 | 470 | SFR25470R |
| R10 | 1Ω | SFR251R | R80 | 560 | SFR25560R |
| R11 | 12k | SFR2512K | R81 | 10 | SFR2510R |
| R12 | 1k | SFR251K | R82 | 18k | SFR2518K |
| R13 | 3.3k | SFR253K3 | R83 | 3.3k | SFR253K3 |
| R14 | 1k | SFR251K | | | |
| R15 | 39Ω | SFR2539R | | | |
| R16 | 100Ω | SFR25100R | | | |
| R17 | 1.2k | SFR251K2 | C1 | 470μF, 35V | 148-860 |
| R18 | 3.3k | SFR253K3 | C2 | 470μF, 35V | 148-860 |
| R19 | 1.8k | SFR251K8 | C3 | 4,700μF, 35V | 105-038 |
| R20 | 1k | SFR251K | C4 | 4,700μF, 35V | 105-038 |
| R21 | 56Ω | SFR2556R | C5 | 1,000μF, 25V | 148-852 |
| R22 | 560Ω | SFR25560R | C6 | 0.1μF, 63V | 146-079 |
| R23 | 18Ω | SFR2518R | C7 | 0.1μF, 63V | 146-079 |
| R24 | 1k | SFR251K | C8 | 0.1μF, 63V | 146-079 |
| R25 | 39Ω | SFR2539R | C9 | 0.1μF, 63V | 146-079 |
| R26 | 1.5k | SFR251K5 | C10 | 0.1μF, 63V | 146-079 |
| R27 | 560Ω | SFR25560R | C11 | 0.1μF, 63V | 146-079 |
| R28 | 680Ω | SFR25680R | C12 | 10μF, 50V | 105-867 |
| R29 | 680Ω | SFR25680R | C13 | 0.1μF, 63V | 146-079 |
| R30 | 680Ω | SFR25680R | C14 | 0.1μF, 63V | 146-079 |
| R31 | 39k | SFR2539K | C15 | 100μF, 63V | 148-869 |
| R32 | 33Ω | SFR2533R | C16 | 0.1μF, 63V | 146-079 |
| R33 | 270 | SFR25270R | C17 | 1μF, 35V | 100-900 |
| R34 | 820 | SFR25820R | C18 | 10μF, 50V | 105-867 |
| R35 | 10k | SFR2510K | C19 | 1μF, 35V | 100-900 |
| R36 | 2.2k | SFR252K2 | C20 | 0.1μF, 63V | 146-079 |
| R37 | 2.2k | SFR252K2 | C21 | 100μF, 16V | 108-828 |
| R38 | 56k | SFR2556K | C22 | 0.1μF, 63V | 146-079 |
| R39 | 56k | SFR2556K | C23 | 0.1μF, 63V | 146-079 |
| R40 | 1M | SFR251M | C24 | 10μF, 50V | 105-867 |
| R41 | 100k | SFR25100K | C25 | 10μF, 50V | 105-867 |
| R42 | 33k | SFR2533K | C26 | 0.1μF, 63V | 146-079 |
| R43 | 33k | SFR2533K | C27 | 0.1μF, 63V | 146-079 |
| R44 | 56k | SFR2556K | C28 | 1μF, 63V | 37011105 |
| R45 | 5.6k | SFR255K6 | C29 | 0.22μF, 100V | 36825224 |
| R46 | 5.6k | SFR255K6 | C30 | 10μF, 50V | 105-867 |
| R47 | 1k | SFR251K | C31 | 0.01μF, 63V | 146-076 |
| R48 | 3.9k | SFR253K9 | C32 | 0.1μF, 63V | 146-079 |
| R49 | 33k | SFR2533K | C33 | 1nF, 100V | 104-860 |
| R50 | 33k | SFR2533K | C34 | 10μF, 16V | 100-880 |
| R51 | 10k | SFR2510K | C35 | 1μF, 63V | 37011105 |
| R52 | 470 | SFR25470R | C36 | 10μF, 50V | 105-867 |
| R53 | 150 | SFR25150R | C37 | 10μF, 50V | 105-867 |
| R54 | 120 | SFR25120R | C38 | 330pF, 160V | 105-063 |
| R55 | 22k | SFR2522K | C39 | 2,700pF, 160V | 105-890 |
| R56 | 2.2k | SFR252K2 | C40 | 2,700pF, 160V | 105-890 |
| R57 | 100k | SFR25100K | C41 | 4.7μF, 16V | 100-878 |
| R58 | 8.2k | SFR258K2 | C42 | 0.1μF, 63V | 146-079 |
| R59 | 5.6k | SFR255K6 | C43 | 0.1μF, 63V | 146-079 |
| R60 | 10k | SFR2510K | C44 | 0.1μF, 63V | 146-079 |
| R61 | 10k | SFR2510K | C45 | 1nF, 63V | 146-072 |
| R62 | 4.7k | SFR254K7 | C46 | 0.1μF, 63V | 146-079 |
| R63 | 4.7k | SFR254K7 | C47 | 0.1μF, 63V | 146-079 |
| R64 | 4.7k | SFR254K7 | C48 | 0.1μF, 63V | 146-079 |
| R65 | 4.7k | SFR254K7 | C49 | 10μF, 50V | 105-867 |
| R66 | 22Ω | SFR2522R | C50 | 27pF, 100V | 68334279 |
| R67 | 15Ω | SFR2515R | C51 | 22pF, 100V | 68334229 |
| R68 | 68Ω | SFR2568R | C52 | 0.1μF, 63V | 146-079 |
| R69 | 330Ω | SFR25330R | C53 | 10μF, 50V | 105-867 |

All resistors except R9 are 0.4W, 5%

| | | | | | |
|-----|-------------|------------|------------------|--------------|---------------|
| C54 | 330pF, 100V | 68358331 | | | |
| C55 | 33pF, 100V | 104-884 | VR10 | 10k | 3590S10K |
| C56 | 0.1µF, 63V | 146-079 | VR11 | 1k | 108-236 |
| C57 | 100µF, 16V | 108-828 | VR12 | 10k | 108-239 |
| C58 | 1µF, 35V | 100-900 | | | |
| C59 | 1nF, 100V | 104-860 | T1 | 9-0-9V, 50VA | 177-205 |
| C60 | 10µF, 50V | 105-867 | | | |
| C61 | 1µF, 35V | 100-900 | SW1 | DPST | 149-905 |
| C62 | 1nF, 100V | 104-860 | SW2 | DPDT-L | 176-478 |
| C63 | 0.1µF, 63V | 146-079 | SW3 | DPDT-L | 176-478 |
| C64 | 100µF, 16V | 108-828 | SW4 | DPDT-L | 176-478 |
| C65 | 0.1µF, 63V | 146-079 | SW5 | DPDT-L | 176-478 |
| C66 | 0.1µF, 63V | 146-079 | | | |
| C67 | 0.1µF, 63V | 146-079 | CN1 | 3W | 151-790 |
| C68 | 0.1µF, 63V | 146-079 | CN2 | 10W | 143-523 |
| C69 | 100pF, 100V | 104-890 | CN3 | 2W | 143-139 |
| C70 | 100pF, 100V | 68334101 | CN4 | 2W | 143-139 |
| C71 | 0.1µF, 63V | 146-079 | CN5 | 2W | 143-139 |
| | | | CN6 | 2W | 143-139 |
| D1 | 1N4007 | 1N4007 | CN7 | with U2 | - |
| D2 | 1N4007 | 1N4007 | CN8 | IEC | L1950A |
| D3 | 1N4007 | 1N4007 | CN9 | with U1 | - |
| D4 | 1N4007 | 1N4007 | CN10 | 2W | 143-139 |
| D5 | 1N4148 | 1N4148-NSC | CN11 | 10W | 143-523 |
| D6 | BZX79C3V3 | BZX79C3V3 | CN12 | 6W | 143-142 |
| D7 | BZX85C5V6 | BZX85C5V6 | CN13 | 2W | 143-139 |
| D8 | BZX85C13V | BZX85C13V | CN14 | 6W | 143-142 |
| D9 | BZX79C5V6 | BZX79C5V6 | CN15 | 2W | 143-139 |
| D10 | LED | 178-310 | | | |
| D11 | BZX79C6V2 | BZX79C6V2 | L1 | 33µH | 106-224 |
| D12 | LED | 178-310 | L2 | 4.7µH | 106-221 |
| D13 | 1N4148 | 1N4148-NSC | | | |
| D14 | 1N4007 | 1N4007 | RLY1 | 12V DPCO | 179-333 |
| D15 | 1N4148 | 1N4148-NSC | | | |
| D16 | 1N821 6V2 | 1N821A | M1 | 100µA f.s.d. | 143-509 |
| D17 | 1N4148 | 1N4148-NSC | | | |
| D18 | 1N4007 | 1N4007 | F1 | 500mAT, 20mm | 151-422(10) |
| D19 | LED | 178-310 | F2 | 100mAF, 20mm | 151-486(10) |
| D20 | 1N4148 | 1N4148-NSC | F3 | 1.5AF, 20mm | 151-491(10) |
| D21 | 1N4148 | 1N4148-NSC | F4 | 1AF, 20mm | 151-490(10) |
| D22 | BZX79C22V | BZX79C22V | | | |
| D23 | BZX79C12V | BZX79C12V | Shell | 2W | 143-126 × 6 |
| D24 | LED | 178-310 | Shell | 6W | 143-129 × 2 |
| D25 | LED | 178-310 | Shell | 10W | 143-131 × 2 |
| D26 | LED | 178-310 | | | |
| D27 | 1N4007 | 1N4007 | IC skt | 8W | 179-891 × 3 |
| BR1 | 4A, 200V | KBU4D | IC skt | 14W | 179-892 |
| | | | IC skt | 16W | 179-893 |
| Q1 | TICP106D | TICP106D | | | |
| Q2 | TIP31A | TIP31A | Shrouds | For T1 | 177-223 × 2 |
| Q3 | BD135 | BD135 | F1 fuseholder | | F455 |
| Q4 | TICP106D | TICP106D | F2-4 fuseholders | | 146-123 × 3 |
| Q5 | BF494 | BF494 | F2-4 covers | | 146-124 × 3 |
| | | | U1 | UM1286 | See notes |
| IC1 | 78S12 | L78S12CV | U2 | AT2334 | See notes |
| IC2 | 7805 | LM7805CT | Crimps | | 143-116 (box) |
| IC3 | TL081 | TL081CDP | Boot | | L1867 |
| IC4 | LM358 | LM358N-SGS | Mains lead | | 148-703 |
| IC5 | LM317T | LM317T | F connector | | 150-684 |
| IC6 | NE592 | NE592N | for U2 | | |
| IC7 | XR215N | See notes | Phono connector | | 147-013 |
| IC8 | TL081 | TL081CDP | for U1 | | |
| | | | Buttons | | 176-491 × 4 |
| VR1 | 500Ω | 108-235 | | | |
| VR2 | 1k | 108-236 | | | |
| VR3 | 100Ω | 108-234 | | | |
| VR4 | 500Ω | 108-235 | | | |
| VR5 | 100Ω | 108-234 | | | |
| VR6 | 10k | 108-239 | | | |
| VR7 | 100k | 534100K | | | |
| VR8 | 10k | 108-239 | | | |
| VR9 | 10k | 108-239 | | | |

Notes: IC7 is available from Microlog Ltd., 14 Monument Way East, Woking, Surrey GU21 5LY. U1 and U2 are available from Oakbury Components Ltd., Oakbury House, Mill Lane, Lambourn, Berks RG16 7YP who can also supply LNBs and polar rotators.

emitter-follower transistor Q5. This provides the video drive for the u.h.f. modulator.

Energy dispersal flicker is partly removed by the high-pass filter at the input to the video amplifier, the value of C37 being a compromise between video distortion and flicker. In addition the d.c. clamp at the emitter-follower's input acts to remove the energy dispersal signal. This leaves only a trace of flicker. The video amplifier obtains d.c. bias from the i.f. block. Though this is only about 2V it gives acceptable results.

Power Supply Circuitry

The power supply has been designed as a separate module, partly in view of future developments on the signals board and also because it serves as a general purpose module. I decided to use a linear circuit as this avoids the need to construct various coils and transformers, which can be tricky. In addition switch-mode power supplies tend to produce high levels of h.f. noise which can be difficult to filter and screen – witness for example the noise produced by some computers.

Fig. 4 shows the power supply circuitry. The mains transformer feeds a bridge rectifier which, in conjunction with a full-wave voltage multiplier arrangement, produce unregulated 11V, 22V and 33V supplies from a 9-0-9V transformer. Standard series regulator chips provide regulated 12V and 5V supplies, a 2A device being used for the 12V rail. The 28V tuning supply is derived from the 33V rail via the series regulator transistor Q2 – this approach has been adopted to obtain high stability. D16 provides a 6.2V reference voltage which is buffered by IC8 for good stability. D16 and IC8 receive their supplies from the 28V rail, a feed from the 12V rail being used as a start-

up supply. IC3 is an error amplifier that compares the reference voltage with the voltage tapped from VR1 in the potential divider network across the 28V line. IC3 is supplied from the 33V rail as its output must be able to go above 28V in order to drive Q2 properly.

Note that with the specified heatsink the supply runs quite warm. If a different heatsink is used it must be rated at 3°C/W or better, i.e. it should have a lower °C/W rating.

A switched 13/17V supply is provided for the LNB. If desired this can be hard-wired to fix the output at one voltage. Otherwise it can be used to select different polarisation, as with the Marconi-type LNB, or different frequency bands, as with some Sharp LNBs. An LM317T adjustable voltage regulator chip, IC5, is used to provide this supply, the switching being done by altering its control voltage.

In addition a current source that gives either approximately 5mA or 105mA is provided for use with magnetic-type polar rotators, these values being adjustable over a small range. This implies that the LNB is used in a vertical or horizontal plane rather than at 45° with respect to the incoming signal. The current source switching is independent of the LNB voltage selection.

The 5V supply is protected by a crowbar circuit (Q1) while the 12V and 28V supplies are protected by a latch which disconnects them via a relay. Protection is also provided by means of zener diodes on the signals panel. The overvoltage protection can be omitted and the relay contacts linked out if desired. This circuitry proved invaluable however during the development of the receiver.

Construction and setting up details to follow in Part 2 next month

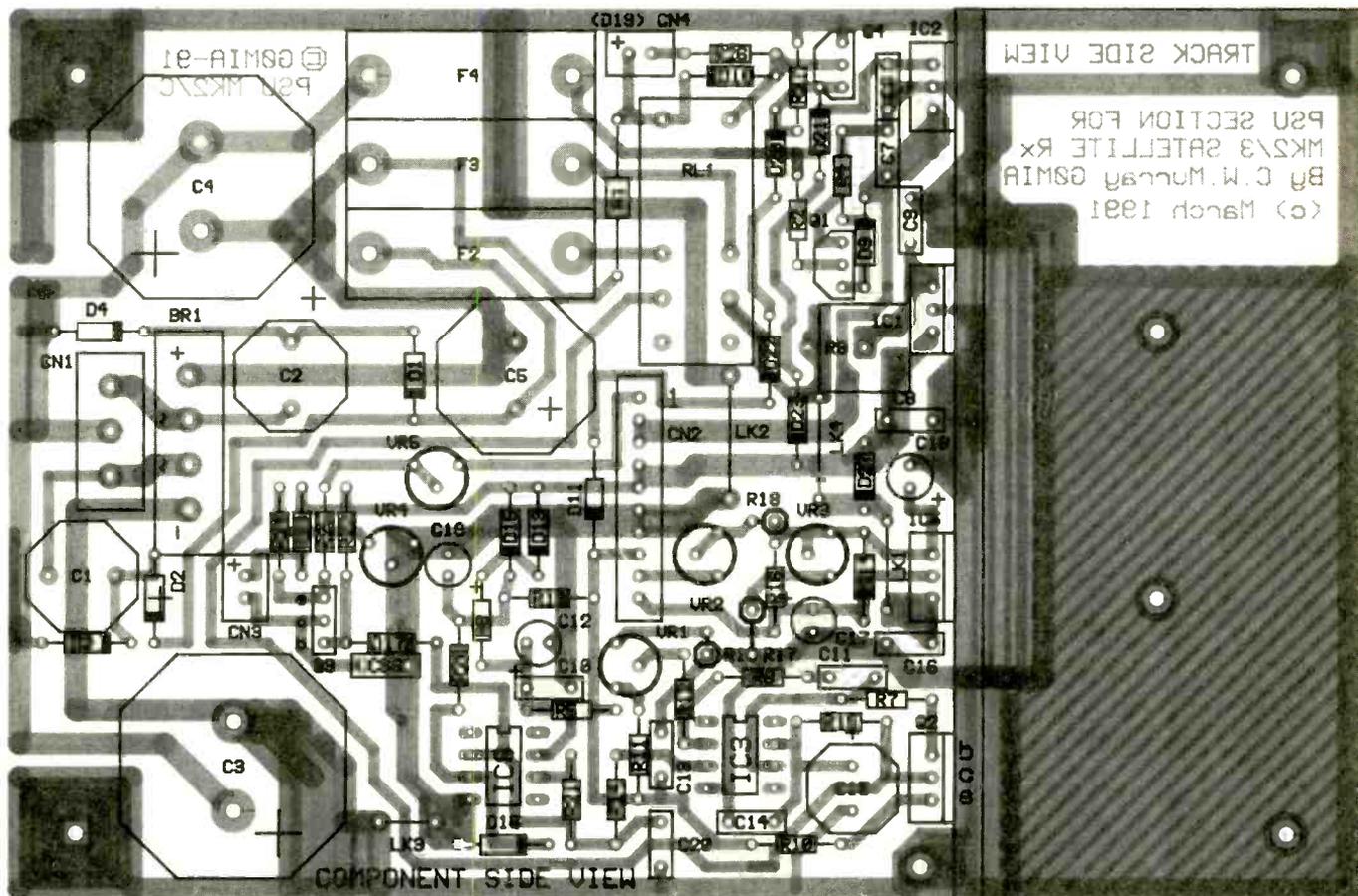


Fig. 3: Component layout on the power supply PCB.

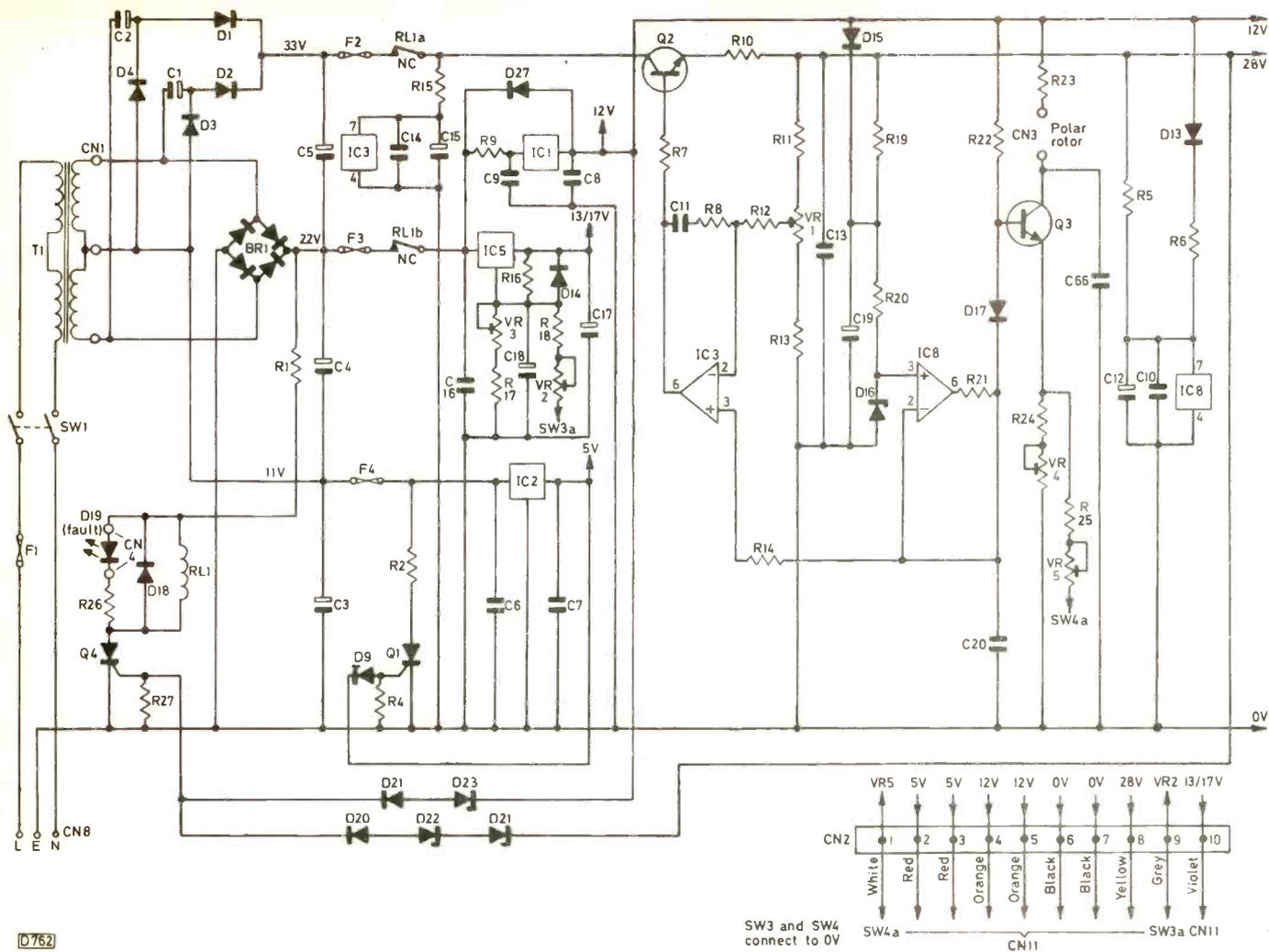


Fig. 4: The power supply circuitry.

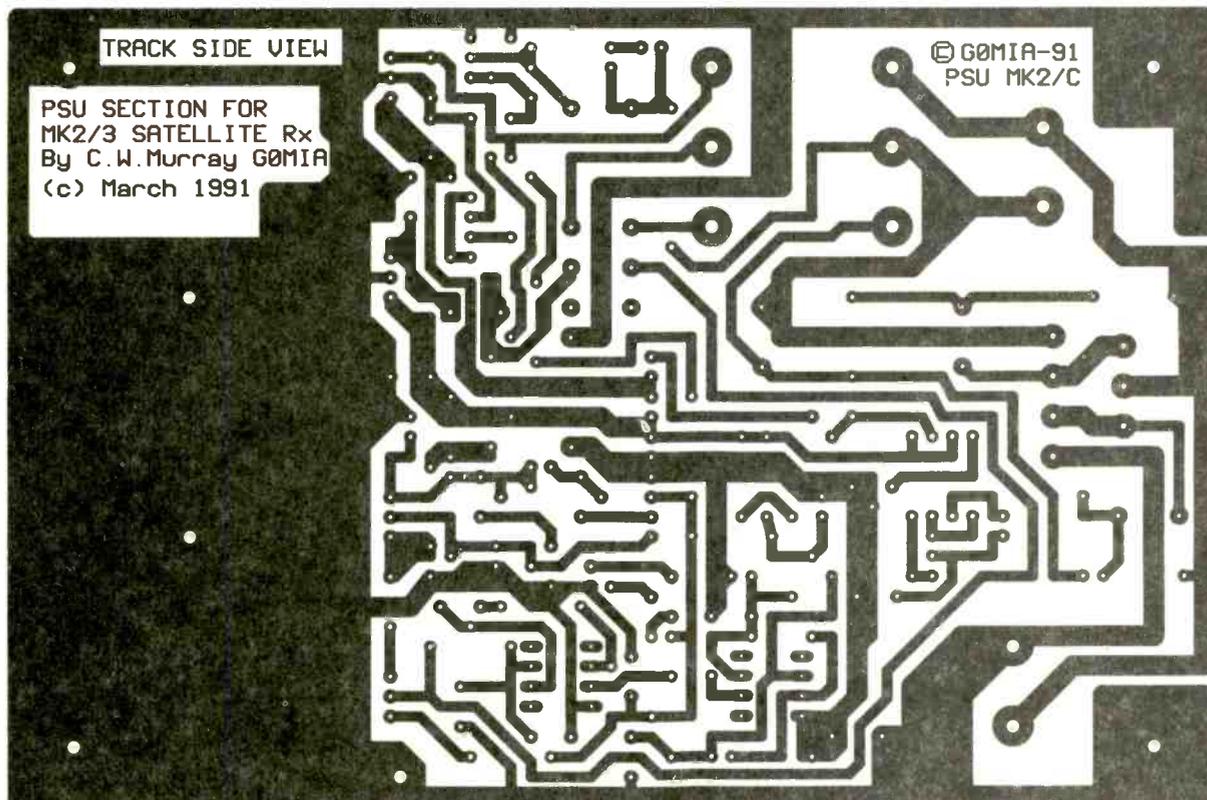


Fig. 5: Print pattern, power supply PCB.

Servicing the Fisher FVH-P520 VCR

John Coombes

The Fisher FVH-P520 is a VHS machine dating from 1982-3. The following is a list of the main fault symptoms we've encountered and the steps to take when fault-finding. The basic power supply circuitry is shown in Fig. 1.

Timer LED Out

If the timer LED doesn't light though the a.c. mains supply is applied, check that the PSU is supplying -48V to the timer panel - this voltage should be present at pin 4 of plug/socket PV903. If this voltage is present, suspect a fault on the timer board: if it's not present, check whether rectifier diode D907 is open-circuit then if necessary check by replacement the protection capacitor C914 and reservoir capacitor C915. Next check for 16V across C931. Absence of this voltage should lead to a check on D908/9, C916/7 which could be leaky, and C931 - check by replacement. If the 16V supply is present, carry out checks on the 9.8V regulator circuit (ZD902, Q904/5 etc.). There should be 11V across ZD902. If this voltage is low or absent, check ZD902 by replacement, check D905 and R906 for being open-circuit and C918 by replacement. If the conditions at the zener diode are o.k., check Q904/5 then C919/920 as necessary. There should be 9.8V at pin 2 of plug/socket PV903.

Function LED Out

The no results with the function LED not alight symptom calls for a detailed check on the power supply system. For the function LED to light, the 18V, 5V, 15V and 9.5V lines must all be present. If the 18V supply at pin 3 of PV902 is missing, check fuse F902. It can go open-circuit on its own account (check by replacement). If the replacement blows, check for shorts in D901-4, C906 and C902-5. If F902 is o.k., T901 could have shorted turns.

The regulated 15V supply is switched by IC501 which is on the syscon panel. IC501 receives its supply (at pin 21) from a 5V regulator on the syscon panel. If this supply is missing, check ZD503 and Q505. The regulator is fed from the 18V line. For the regulated 15V supply to be present pin 2 of IC501 should be low. This is turn requires pin 13 (power in) to be high and pin 15 (reset) to be low. If pin 15 is high, check ZD504, Q506 and Q507 in the reset circuit as necessary. If pin 15 is low and pin 2 is high or pin 13 low, check IC501 (HD44801A19) by replacement. If the 15V supply switching is o.k. but the regulated 15V output is not present at pin 4 of PV902, check Q901, Q902, Q903 and ZD901. If the 15V supply is correct, check the 9.5V regulator (fed from the 15V line) on the syscon panel - Q501 (2SC2274), Q502 (2SD536NP), ZD501 (GZA6.2) and Q891 (2SD3131).

The function LED might not light because the setting of the timer switch in the off position is incorrect.

Dew Fault

If the function LED lights but there's no operation and the stop light won't flash, suspect a dew fault. If dampness is present leave the machine switched on for twenty minutes or dry carefully with a hairdryer. If there's no dampness, ensure that the end lamp isn't disconnected.

Also check whether there's a fault in the dew sensor circuitry.

Channel LEDs Out

If the channel LEDs don't light, check for 12V at pin 9 of plug/socket PH004 on the tuner/r.f. converter panel. Check whether Q512 (2SC2274) is short-circuit should this voltage be missing. If it's present and correct check the voltages around Q005 (2SA984). Replace it if necessary. If the transistor is operating correctly, check the channel LEDs and replace as necessary. R012 (820Ω) being open-circuit will also cause failure of the LEDs to light.

No Picture or Sound

If a channel indicator lights but there's no picture or sound, first check for 12V at pin 9 of PH005. Absence of this voltage should lead to a check on Q512 (2SC2274). If the supply is present check for 7V at pin 3 of PH006. Check Q007 and/or Q004 (both type 2SC536) should this voltage be missing. If still without signals, check for a fault condition on the tuner/i.f. panel. Check the tuner/aerial input connections, then that the voltage at pin 2 of PH005 varies when the channel is changed. If not, check for 45V at pin 2 of PH003. Should this voltage be missing check that it's present at pin 2 of PV904. Presence of 45V here means that there's a broken, dry-jointed or disconnected lead from the power supply to the tuner/r.f. converter board. No voltage at pin 2 of PV904 should lead to a check on D906 and C913.

If the voltage at pin 2 of PH003 is correct, check D001 and D008 (both type DS442), then the channel selector, Q001/2/3 (all type 2SC2274) and ZD001 (μ PC574J) as necessary.

Various Faults

In the event of no rewind/fast forward operation, check the idler. If this is o.k., check the following items in this order: the reel motor; the main brake assembly for incorrect operation; the supply reel/take-up reel rubber for no rewind/fast forward respectively; and finally the roller wind assembly that links the drive idler to the reel motor.

For no mechanical play operation check the take-up idler by replacement and for wear on the take-up reel rubber. Check that the brake solenoid has not seized.

The main cause of bent verticals or even picture pulling is incorrect back tension. The correct tension is between 30 and 35g-cm. Incorrect tension can be caused by a slightly stretched tension arm spring or a broken/damaged tension band. Check also that the tension arm hasn't been bent. Remember that excessive back tension will shorten the life of the video heads.

For mechanical noise on playback, check and regrease the drum spindle under the drum bush.

Cutting out for no apparent reason is very often caused by a faulty capstan motor. Check by replacement.

Noise bars across the screen are often first noticed with prerecorded tapes. If the f.m. envelope is examined you will find that it's badly out of shape. To correct this, set up the alignment of the guide poles.

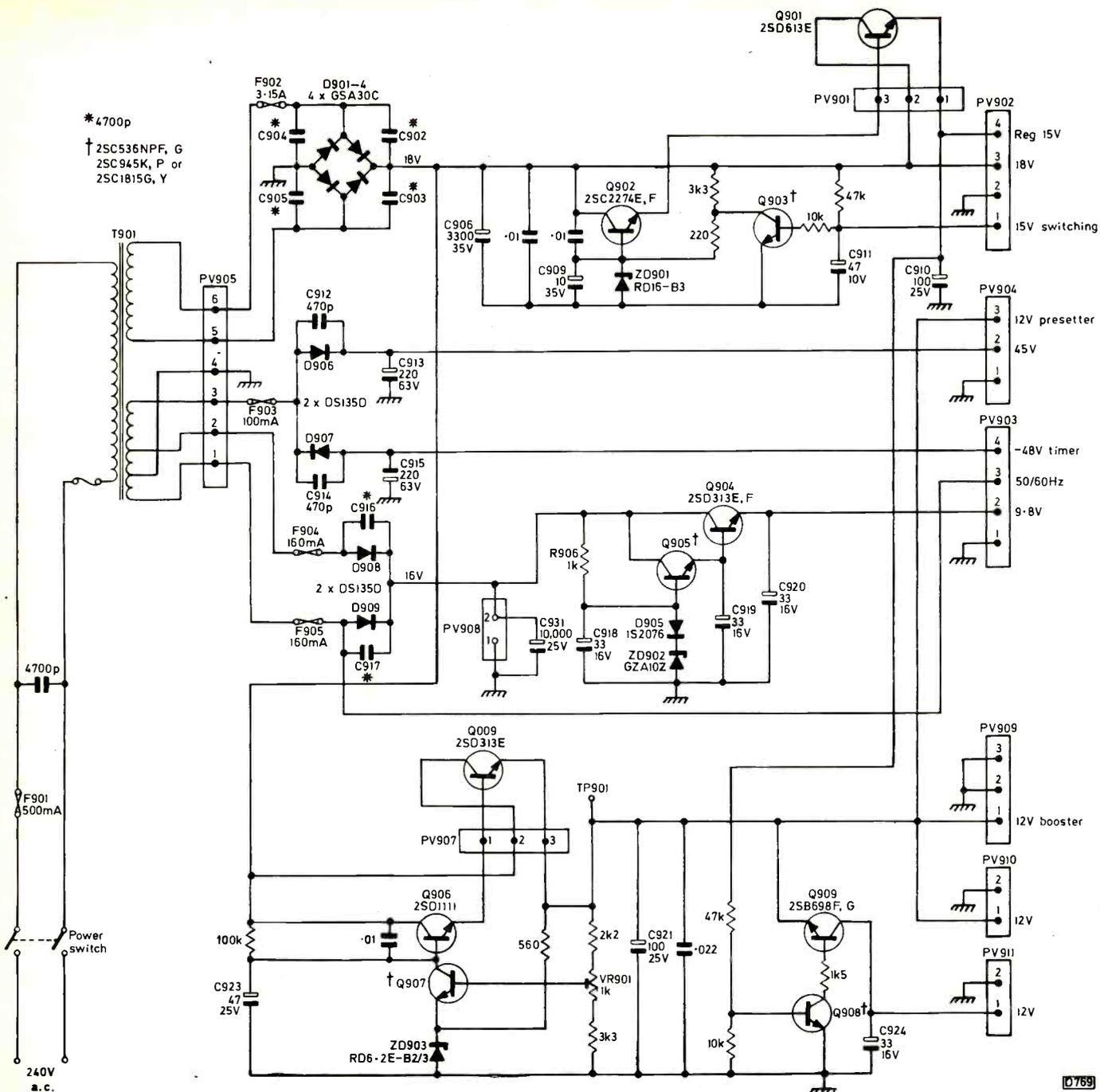


Fig. 1: Basic power supply circuit in the Fisher FVH-P520 VCR. There are additional regulators on other panels.

The picture and sound being out of sync means that the tape path between the video and the audio/control heads is incorrect. Check for mechanical faults such as a bent loading arm.

For no colour-check the d.c. conditions around the HA11741 chip IC203. If incorrect voltages are found check IC203 by replacement. If the fault persists, check for dry-joints or cracks on the PCB. Crystal X202 can also be responsible for this fault.

No Tape Action

For no tape action first check whether the cassette has completely unloaded when eject is pressed. If it has, check that the mechanism is functioning correctly. If the cassette has not unloaded completely, check that pin 6 of the microcomputer chip IC501 (HD44801A19) is low. If not, check whether pins 24 (forward end sense), 32 (cassette

holder) and 33 (dew) are high. If any of these are high, check the end sensor, the stage switch (WH203) and the dew sensor respectively. If these pins are not in the high state replace the chip.

If the fault persists with pin 6 of IC501 low, check for 9V at pin 3 of plug/socket PV522. If this voltage is missing, check at pin 1. If the voltage here is less than 15V, check Q901 in the power supply and its associated components as necessary. Should the voltage be higher than 15V, check ZD501 (GZA6.2), ZD502 (GZA10) and Q893 (2SD313) in the motor supply circuitry.

If the voltage at pin 3 of PV522 is correct, check that pin 3 of plug/socket PV881 is in the low state. If this is correct, check at pin 1 for a high state. If this is also correct, check the condition of the loading belt and for a faulty loading motor. If pin 1 is not in the high state, check for a fault in the system control drive circuitry - items to check are Q868 (2SD612), IC863 (003) and IC864 (004).

Micro Clinic

Roger Burchett

Commodore faults seem to come in groups. The fault with several Commodore 64s that came in recently was blank video, with no chips overheating and the kernel ROM being selected at power up. The solution was to replace the kernel ROMs.

Ken Taylor put his finger on it (forgive the pun!) when he advised checking the temperature before wading in with the meter etc. This symptom is often caused by faulty RAM(s), but they usually show up quite quickly by overheating.

Sinclair Spectrum

A plain, unmodulated display *can* be caused by a faulty ULA chip. This is not a common fault but when you do get it a quick check can be made on the ULA if it's in a holder – 15, 16 and 17 are the relevant output pins.

An old Issue 2 machine in a keyboard came in with the complaint that it crashed. All the stock faults were present – dry-jointed power socket, dirty edge connectors, etc. – but the machine was very reluctant to initialise after these had been attended to. When it did, all functions were normal. Gently flexing the board would then make the machine crash. As there's no support for the centre of the board I thought that maybe heavy-handed connection of the keyboard had cracked it. While examining it carefully with an eyeglass however I noticed that one of R33's end caps was off. This 680Ω resistor is fitted under the

heatsink, so how it came to be broken is a mystery. It's in the ROM select line from the ULA chip – hence the inability to select the on-board ROM.

I had an interesting problem recently with a Spectrum 48K: the keyboard worked all right, caps shift too, but symbol shift and extended mode produced incorrect symbols. The ROM was responsible for this. All the symbols were valid, they just appeared to be on the wrong keys: presumably there was a fault in the ROM's column/row matrix.

Acorn Mouse

It's worth noting that the switches used in the Acorn mouse are the same as those used for most front-panel controls in electronic VCRs. A quick, effective and, most importantly to us, profitable repair can thus be done without recourse to Acorn's agents. I mean the smaller type of switch of course, as used by Mitsubishi, not the large type used by Sharp amongst others.

Worn Cassette Player Heads

Will not load from a tape is a common accusation these days as microcomputers and cassette units bought some Christmases ago reach middle age. A BBC micro and a brace of Commodore 64s were unfairly accused recently. The BBC micro was being used with an Acorn unit and the wear was visible to the naked eye. Incidentally, full volume output also usually prevents loading – 6 or 7 on the numbered volume control is about right. The C64 is even more critical with respect to playback head wear, also of the type of head fitted. It's best to use genuine Commodore types, though increasing the value of R8 (should be 2.2MΩ) in the filter can help with other heads.

Letters

CHANNEL PLANNING

Apparently with only a few exceptions the Channel 5 transmissions are going to be cross-polarised with respect to the other four services. I wonder who was responsible for such a stupid idea? When I telephoned the ITC about it I was told that the reason was to prevent interference to Irish and French transmitters that use channels 35 and 37. While I sympathise with the established users of these frequencies, has anyone considered the implications for UK viewers? Their existing aerials, even if of the wideband type, will probably give poor results with cross-polarised signals. Mounting the aerial at 45° might work, albeit with a 3dB loss, but then the protection against co-channel interference with cross-polarised signals will be lost.

Connecting two aerials via a combiner/splitter will probably be unsatisfactory. The new aerial will pick up a degree of signal on the other channels and this, when added out-of-phase, will result in ghosts, cancellation, etc. Use of a proper diplexer with filters would solve the problem, but in A and B group areas the new channel will generally be only four channels away from an existing one and although filters with a sufficiently sharp cut-off are feasible their cost would approach that of a TV set: this is clearly not a price the average viewer would pay just to get one extra channel. Another solution would be for manufacturers to fit two aerial sockets to their receivers and

VCRs, with the choice of sockets being part of the programming process, but I can't see that happening.

The crux of the matter is that these two channels are not in most cases the right ones to use. There are alternatives. Channels 36 and 69 are not used for TV in the UK. Channel 36 is used for airport radar, and I'm told that channel 69 is a military allocation, though I don't think it's used. CT2 phones have recently been given part of this channel. These users should be kicked out of the u.h.f. bands permanently. Then there are Bands I and III, which were originally to have been re-engineered for 625-line transmissions. No doubt the same old story about shortage of spectrum space would be brought up to oppose such suggestions. I'm sure that they have an equally pressing need for spectrum space on the Continent, but they manage to hang on to all their broadcasting bands. Perhaps they are better at planning than our DTI is. Broadcasters always seem to have been pushed about in the UK. Shortly before ITV started, back in 1953, Band III was given over to PMR use and had to be got back again, some of it not until some years later, thus holding up the growth of the ITV network. And we all know about the consequences of over half of the f.m. band being given away for PMR use. The top 3MHz is still being used for this purpose. Even the m.w. and l.w. bands don't escape, with various navigational beacons being dotted about in them.

Now is the time to sort out our broadcast bands once and for all. It would be a pity and very damaging to introduce a new service that will be virtually unreceivable by the vast majority of people without going to great expense.

Finally, when are VCR, satellite receiver and games

machine manufacturers going to start fitting to their equipment modulators that can be tuned over the complete u.h.f. band?

*Gareth Foster,
Whitton, Middx.*

IR HANDSET REPAIRS

Further to Mel Davies' comments (October) on IR handset repair, another remedy could be employed. Rough up the surface of the carbon impregnated pad, using sandpaper, and apply a micron of electrically conductive paint. Leave to dry overnight.

As to testing, the following method has a good success rate. Switch on a radio receiver set for long-wave reception. Turn up the volume to give an audible response. Hold the handset close to the radio and, while holding a remote control button down, tune up and down the scale. If the handset is working the radio will produce an audible clicking noise. Each button can be checked in turn.

*T. Giddings,
Harlow.*

EQUIVALENTS AND HOT PSUs

I was pleased to see the list of Ferguson/Thorn TV sets/chassis in the November issue. Here's one you missed out: Model 3762 is fitted with the 9600 chassis. It's also perhaps worth noting that Model numbers starting with a 3 are Ferguson models, those that start with a 4 are Marconiphone models while those starting with a 6 are Ultra models.

On the subject of chopper power supplies in VCRs, one that's used in various Philips models is totally enclosed. The overheating that this causes results in a greater number of faults than with a simple power supply. I gather that the enclosure is to prevent r.f. pick-up on the head amplifier leads.

*P. Watts,
Barrow-on-Humber, S. Humberside.*

SATELLITE SOUND ADAPTOR

Further to my article last month (November), I've discovered that the flicker experienced when a VCR is connected to the Amstrad SRD400 satellite receiver's baseband video output socket is apparently due to this output not being clamped. The problem can be solved by using the video signal at pin 19 of the receiver's scart socket to feed the VCR. The sound adaptor I described should still be fed from the satellite receiver's baseband "video output" socket as this output comes from the vision demodulator direct instead of via the Videocrypt decoder.

*S. Pearson,
Chipping Norton, Oxon.*

CIRCUIT DIAGRAMS

The circuit diagrams in recent manuals leave much to be desired. In particular it's most frustrating to find that the diagram doesn't agree with the unit you have in for repair. This is usually because of modifications. A code of practice is required. All manuals and diagrams should show the latest state, but the original circuit and all subsequent modifications should also be shown. It would help if manufacturers designated sets Mark I/II/III or version A/B/C etc. I have wasted money on manuals only to find that the set is post-modification while the circuit diagram is

next month in

TELEVISION

YOUR FREE YEAR PLANNER

Our January issue comes with a separate Year Planner for 1992 – useful for noting rep. calls, orders, etc.

● SERVICING THE FERGUSON 3V29

This popular VCR of early Eighties vintage was designed and built by JVC (equivalent HR7200) but was distributed under a number of brand names. It came on the market at the time of the video boom and was sold and rented in large numbers. Having stood the test of time, many of these machines are now circulating on the secondhand market in excellent working order. Because of their reliability and the ready supply of cheap spares, these machines are often well worthwhile overhauling. Joe Cieszynski highlights common problem areas and in a follow-up John Coombes will provide a fault guide.

● BANG AND OLUFSEN LINK SYSTEMS

The B and O Link System provides integration and complete control of the company's entertainment electronics products from many locations. Nick Beer describes the technology used.

● TOSHIBA CTV POWER SUPPLY SERVICING

John Coombes provides a guide to dealing with common power supply fault conditions experienced with the Toshiba 255T7B, 175R9B, 218D9B, 261T4B and 212R4B.

● TEST REPORT: COMPONENT TESTER

David Botto tests the Beckman Industrial Scopemate 2, an i.c. and component tester with many additional features. An account is included of its mode of operation. A particularly useful feature is that the Scopemate 2 can be used to make comparative tests with known good devices. The Scopemate 2 has been designed with the concerns of video/TV/microcomputer service engineers expressly in mind.

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pre-modification or vice versa.

Some other faults. Most diagrams today are too small and poorly printed. Once there were loops where lines crossed, making it obvious that there's no connection: it's often difficult nowadays to know whether there's a connection or not as poor printing results in unintended blobs.

I'm glad however that the meaningless rectangle is beginning to be dropped as the symbol for a resistor.

*K.J. Treeby,
Plymouth, Devon.*

LOOSE RESISTORS

What a life Donald Bullock is leading! "Free bonus resistors dancing around loose" in one of our FV31Rs? – I refer of course to his November article. If he'd looked at it a little harder I think he would have found that the 'resistor' is in fact a capacitor. Having found the capacitor he should also have found a small coil spring. If he didn't one shudders to think where it might now be if it was left inside the machine. Far from being bonuses, these two items have a definite purpose. As mentioned in issue 49 (August 1990) of *Ferguson Feedback*, they "are used to earth the bottom metal cover to the main mechanical deck and, being under tension, may pop out when the cover is removed for servicing. They are there to increase the recorder's immunity to external interference and to fulfill r.f.i. regulations in some European countries. They have no other function and in normal circumstances their absence will not create a fault condition or affect the operation of the machine".

I trust that this clears up the mystery of the 'unsoldered resistor' – bonus indeed!!

*Bernie Hinton, Regional Technical Manager,
Ferguson Ltd., Enfield, Middx.*

HELP WANTED

Can anyone supply a circuit diagram for the Advance signal generator Model E2, serial no. 10365, also a mains inductor choke for it?

*Henry D. Richmond, 52 Thornhill Square,
Islington, London N1 1BE.
071-700 4846.*

Can anyone supply a line output transformer for the Sanyo CTP6102 (RS61022 chassis) and the Waltham 1401?

*B. Battams, 23 Dudley Drive,
South Ruislip, Middx HA4 6QN.
081-845 5123.*

Can anyone supply a TDB1033 amplifier/comparator i.c. for the ultrasonic receiver panel used in the Philips G11 chassis? Is there a modification to overcome its demise?

*C.T. Marden, 20 West Street,
Ecton, Northants NN6 0QF.*

Could anyone help me locate a service manual for the Korting 82512 colour-bar generator, which was distributed in the UK by Decca Radio and TV?

*M. Nair, 348 Barkerend Road,
Bradford BD3 9NS.*

Can anyone supply a pinch roller and idler wheels for the Ferrograph Model 724 reel-to-reel tape recorder? Will buy several if available.

*W. Watt, 564 Smithfield Road,
Greenfield Park, New South Wales, 2176, Australia.*

Can anyone supply a tube for a Sinclair flat-screen TV set?

*J. Jordan, 36 Hillcrest Road,
Cashes Green, Stroud, Glos GL5 4NW.
0453 763 914.*

Can anyone supply a video/sound input/output panel for the Mitsubishi Model CT2227BM, in any condition?

*Nicholas Jackman, 36 Ferrybank,
Arklow, Co. Wicklow, Ireland.
0402 31138.*

Can anyone supply a system switch slider for the Thorn 1400 chassis – preferably a scrap main PCB with the slider intact? All costs would be met.

*Brian Renforth, 174 Helmsley Road,
Sandyford, Newcastle-upon-Tyne NE2 1RD.*

Does someone have an old camcorder for sale? One with an unrepairable tape mechanism would do.

*Douglas Biggar, 27 Auld Lea Road,
Beith, Ayrshire KA15 2DA.
05055 2118.*

Can anyone supply a copy or lend me the Philips circuit supplement 727 17794 for Model 16CT3715/05?

*C. Williams, TDC Ltd., 135 Ditton Walk,
Cambridge CB5 8QD.
0223 244 133.*

Can anyone supply a copy of *Television* dated May 1978?

*Bob Netherway, GOPDV, 28 Snowdon Road,
Fishponds, Bristol BS16 2EJ.
0272 654 230.*

SAFETY REQUIREMENTS

Recent correspondence on mains plugs and their replacement has been concerned with the legal liability that might arise if plugs are not changed automatically for the new shielded-pin type, and whether or not changing the plug constitutes adequate safety precautions. From the consumer point of view there are two issues here: first, maintaining a safe household, and secondly obtaining good service from the repair organisation. The legal profession generally bases its judgements on what a reasonable person would do in the circumstances in question: examples of safe custom and practice would be used as case law. Older readers will remember that there were once no radial-ply tyres for cars, yet there was no suggestion that cross-ply tyres should have been removed and replaced with radial-ply ones when a car was serviced. Improvements in safety as a result of technological change have not normally been applied retrospectively. Whether a shielded pin is a technology change is a point that would have to be left to the lawyers. As regards customer service, I personally would feel dissatisfied if, without having been asked, a perfectly good plug had been replaced.

Perhaps we should be more concerned when equipment with a 3A mains lead is connected to the mains supply via a plug with a 13A fuse. According to the local fire station a recent house fire in this area during the night, caused by a two-year-old TV set, was a million-to-one chance event. It was not stated whether the mains lead was correctly fused, but how many engineers check this automatically? In the case of insulation failure the intense local heating that could occur would, it seems to me, be such that the fuse value would be of secondary importance. The 500W available from a 2A fused supply is an enormous amount of energy to dissipate within a mains switch or between the

conductors of a poorly moulded cable. Perhaps these are the million-to-one chances that give American lawyers their living.

*Ray Porter, M.Sc., C.Eng.,
Stourbridge, W. Midlands.*

I've noticed with interest the letters about the safety aspects of fitting plugs etc. to items that come in for repair. Merely to check and replace the plug and fuse is not acceptable under the new health and safety at work act, which is similar to the electrical safety in factories act but now applies to everyone involved in the supply, use and installation of electrical equipment. The only defence against prosecution is to provide records of testing. This implies that even brand-new equipment should be tested to prove that it complies with the relevant standards. Every time that an item is brought in for repair the plug, lead, case and insulation should be tested and the results noted. Also if an item has an earth connection the integrity of the earth should be tested.

Rental companies should institute a programme of

regular testing. It's not acceptable to use a standard insulation tester as this doesn't supply sufficient current. Special portable appliance testers (PATs) are now manufactured to comply with the requirements - examples are the Seward 1000 PAT and the Megger PAT 2. In general the insulation should be tested at 500V and one-and-a-half times the rating of the supply cable. Flash testing at 1.5kV is carried out after the repair. Simple go/no-go testers are not acceptable because they will not show up insulation impairment that occurs over the years.

If a customer refuses a quote, it would be advisable to get him to sign something to the effect that in your opinion the item is unsafe to use if you find this to be the case.

So, back to the plug. The act specifically states that it's an offence to attach any faulty or dangerous item to the mains supply. Thus if the health and safety executive visits your premises and finds a faulty plug connected to your bench power supply you could be prosecuted. This applies to any test equipment.

*Jim Fenton,
Hull, N. Humberside.*

What a Life!

Donald Bullock

I get a lot of sets from countryfolk. Last week a smallholder, Mr. Nutt, phoned from Woodbury. His problem gave me the chance to exercise the wealth of psychological insight I've gained from my years in the TV servicing trade.

"My neighbour has a supersonic alarm system, Mr. Bullock. He's using it to detect, in conjunction with my television set, my every thought and movement. I want the Post Office to vet this system, but first of all they want you to check and clear my set and aerials".

I asked him to bring his set along to start with and half an hour later he arrived with a Sanyo 12T280 monochrome portable.

"I've got a thick, tall evergreen hedge all around my acreage, yet my neighbour knows everything I do. His dogs bark at me when I go down my garden each evening to water it, and there are other things. I can tell when they are doing it. The set here picks up their signals, moans softly then groans, and a spectre comes up on the screen."

After he'd departed I switched the set on. An hour later it began to grate and hum intermittently. Operating the tuner had an effect on the trouble, reminding me of a similar symptom with Thorn mechanical tuners when their earthing plates "floated" because of a build-up of green gunge between them and the tuner's body. So I carefully cleaned the ones in the Sanyo tuner and tried the set again. It made no difference. Bridging the r.f. and i.f. decoupling electrolytics got me nowhere, so I tried adding suitable electrolytics in the power supply and then the line output stage. Half an hour later I was no further forward, so I boxed the set up and kept an eye on it whilst tackling the next job.

Intermittent Timer

This was a Ferguson 3V35 with intermittent timer trouble. It could be set up all right, but sometimes failed to

come on at the appointed time. Because of this intermittency, I felt that the cause of the trouble was possibly a poor contact somewhere. Careful inspection revealed no obvious dry-joints, so I cleaned the plugs and sockets at both ends of their harnesses and, for good measure, went over the joints on the timer chip under the clock. Then I put it all together again and set it to come on repeatedly every ten-fifteen minutes throughout the day. As it worked every time I pronounced it fit.

Greeneyes then brought the tea along and asked, sweetly, for Snoddie's phone number.

"Come on" I said, "Let's have the funny".

"Nothing much" she said, "but the video in the bar has been dead for over a week and I'd like it repaired."

A JVC HRD180

I got it and put it on the bench. When powered it lit up all right but was otherwise dead. It's a Ferguson 3V30. The obvious thing to do was to busy myself in the power pack. The fuses were all intact and I couldn't find anything wrong. But it refused to work. Eventually I put it to one side and picked up a JVC HRD180. Its "operate" light didn't come on yet it worked. But pressing the buttons brought on the wrong functions - pressing eject for example got the spools rotating. The trouble was caused by the notorious STK5481 chip in the power supply. I noticed that it was new, devoid of heatsink paste and clear of the chassis on one side. Whilst fitting a new one, with heatsink compound, I noticed that one of the securing threads had been stripped because of overtightening. So I fitted a suitable nut to both screws and tightened the chip to chassis. That cured the trouble.

When the customer came to collect it he said "let's hope it's third time lucky. Snoddies have done it twice for the same trouble."

"I don't think it will go again for a while" I told him.

"Done our recorder?" asked Greeneyes.

"Not yet. It's tricky. I've had to put it on one side for a bit."

She went over and looked into the mechanism as though she was as clever as I. After switching it on and off she said "shouldn't that little cassette light flash on when you switch on the video? It doesn't, you know."

"I wondered how long you'd take to spot that" I said as

brightly as I could. A new lamp cured it of course. I think my brain cells are thinning out.

I put Mr Nutt's portable back on the bench and wondered how I was going to exorcise its ghost. Whilst I was listening to the set's moans, the ghost rose up on the screen and gave me an agonised groan. As I studied the set, the phenomenon occurred again. It was caused by a rapid and wide stretching of the frame, so that a central strip of the picture was momentarily stretched vertically to fill the screen. It was obvious that raw a.c. was briefly modulating the display. Recalling a similar effect experienced with the old Decca Gypsy and a particular KB/ITT portable, I gently warmed the bridge rectifier diodes. This proved that they were responsible. So I replaced D701 and D702 (two three-legged devices each with a back-to-back pair of diodes), using four BY127s. The result was a complete remedy and I was able to tell Mr. Nutt that I'd cured his neighbour's tricks.

"I'm very grateful, Mr. Bullock" he said when he came to collect it. "But my troubles aren't over. He's now got a big dish near the top of his house, pointed straight at my place. It's a sound detector, like they used during the war."

The Crazy FV21R

As he departed, Victor Smallpiece eased this thin face round the door. "My video's gone crazy" he said.

"Then step in with it. This is where it belongs" I replied.

It was a Ferguson FV21R, the annoying one with the tiny Phillips securing screws and the top panel that hangs about awkwardly instead of hinging back. All the buttons produced each other's functions.

"Well Mr. Smallpiece" I said, "we've great experience of this fault and can approach it in one of two ways. We can either relabel all the buttons or we can fit a new STK5481 chip – if I haven't run out of them."

"Which would be quickest and cheapest?" he asked.

"That was a *joke*" I screamed.

Mr. Smallpiece left after a new STK5481 had been fitted. At the same time Mrs. Forthright strode in with a Philips VR6463 VCR.

And a Mental VR6463

"What's up with it?" I asked. "Not jammed with a cassette in?"

"No, it's gone mental. You'll see."

When I tried the machine I found that it was unstable in the E-E, record and playback modes. I'd a different scrap machine with a similar r.f. panel, so I found it and swapped over the r.f. panel. The instability was much improved, but the screen gradually became heavily patterned. Then the sound began to break up.

Thinking of the troubles caused by the power supply chip in the last repair, I wondered whether swapping over the power panel would help. After making this swap I had perfect E-E results on all channels. Delighted at my diagnostic skill I inserted a cassette and selected play. The sound was perfect, but instead of a picture I had the test signal and couldn't move it.

I tried to think logically. It was obvious that the original panel was faulty as the swapped one seemed to have cured all the faults – though I couldn't be sure about the playback picture since I didn't have one. And where was the permanent test signal coming from?

I put the original panel back. This cleared the test pattern on playback but the other faults rang the changes as before. I took the panel out and studied it. All three

chips had been rather messily changed – the joints were heavily fluxed. I looked at the circuit and found that the correct chips had been fitted, so I decided to change them all again, using those from the scrap board. This made no difference. Since most of the board is obscured by daughter boards and the machine has no removable baseplate, checking voltages while the machine is in operation is difficult. I took the panel out again and examined it carefully. I could find no print breaks but decided to clean off the tacky flux still present. After ten minutes with the surgical spirit I refitted the panel.

The results with all functions were now stable and quite good – except that the playback picture looked a little bleached. It seemed that the flux which had been used, perhaps plumbers' flux, had been conductive.

I then noticed that transistor 7002 had been changed and was without its heatsink clip. It was also very hot and was a BD138 instead of a BD678. When the correct type had been fitted the last of the faults had been cleared. As I put the recorder together I reckoned that I'd earned the rest of the day off, so I retired to my chalet to write.

As I began Mrs. Forthright rang. "Did you manage to mend the video Mr. Bullock?"

"I did Mrs. Forthright."

"Well I never" she said. "Snoddies had it for months then gave it back to me."

Amstrad PCW9512 Printer

In the September issue I mentioned my problem with an Amstrad PCW9512 printer and asked whether anyone could suggest a remedy. A number of offers came in, and I've now got it working again. If you recall, the original trouble was that a first attempt at printing a letter resulted in apparently normal behaviour of the printer except that nothing appeared on the paper. Asking it again produced faint printing, much of it gibberish. A third try improved matters and the fourth try gave me a perfect letter.

Eventually however the fault worsened, until the printer would work only after a blast of hot air from a hairdryer. Finally not even this helped, so I decided to have a go. I removed the mechanism and examined it closely. As I couldn't see anything obviously wrong I felt that a general clean and lubrication might help. I brushed it and gave it a spray of Servisol, then I put it back together carefully and found that it didn't work at all now. It wouldn't even accept a sheet of paper. That was when I asked for help.

Amstrad do have a technical department that offers advice to those in the trade. I was advised to fit a new print hammer which CPC supplied by return for less than £2. I fitted it, but since the printer no longer worked I couldn't try it. Back to Amstrad Technical.

Various causes were suggested and tried, but the printer steadfastly declined to work. I borrowed one like it and swapped over the single printed panel. No difference. Then I swapped over the mechanism and transferred the fault. At least I now knew that the mechanism was the cause of the trouble, but my efforts at tracking down the cause of the fault came to nothing. Back to Amstrad Technical again.

I told them that the cause of the trouble was in the mechanism and asked them what they thought. "Try the sensor" I was told, "it's a little bead-like device beside the print hammer." I found it, and tiny it was. I looked at it through my magnifier. It seemed to have a cataract, so I gave it a wash with surgical spirit and a rub with a cotton bud. On reassembly it worked a treat.

Moral: never squirt a printer mechanism in the eyeball!

The History of BBC Stereo TV

Keith Hamer and Garry Smith

On August 31st 1991 BBC Television launched its Nicam 728 stereo-with-TV service. The coverage at the start is shown in Fig. 1. Several of the commercial TV networks had begun their stereo-TV services during the previous year, though it seems that some of the earlier programmes were transmitted using "pseudo-stereo", i.e. electronically engineered/enhanced sound, rather than the real McCoy.

Nicam (Near Instantaneously Companded Audio Multiplex) digital stereo was developed by the BBC and accepted by the UK government in 1986 as the standard for broadcasting stereo-TV in the UK. It was recommended as the digital standard for terrestrial television stereo broadcasting in Europe by the European Broadcasting Union in 1987. The BBC-2 transmitter at Crystal Palace began experimental broadcasts in 1986, with BBC-1 following in 1987. The official start of the BBC's service was timed to coincide with the start of the autumn schedules. June 29th 1990 saw the start of the first regular Nicam stereo service, in Central Scotland: it was part of the IBA's initiative to bring the new technology to almost 80 per cent of UK viewers by the end of that year.

Nicam System Parameters

The Nicam system adds two high-quality sound channels to each TV channel – see Fig. 2. The quality is similar to that obtained from a compact disc. A second sound carrier, which is digitally modulated and transmitted at a frequency of +6.552MHz and a level of -20dB with respect to the vision carrier, is used. Table 1 shows the specification. The system can also be used to transmit a second-language sound track. To receive Nicam the TV set or VCR must of course incorporate a decoder.

Nothing New!

So Nicam is the latest technological innovation to be unleashed on the viewing/listening public. It may come as a shock to some to learn that stereo TV sound was being transmitted on an experimental basis as long ago as the Fifties. Those test transmissions were radiated for the purpose of assessing the feasibility of stereo radio, but because a radio receiver and a TV set were required to receive them it could be argued that they were also the first stereo TV sound trials.

The very first series of stereo TV/radio test transmissions took place on January 13th and 14th 1958, from London transmitters only. Further test transmissions were made from all UK transmitters on May 11th and 17th of the same year. Regular fortnightly experimental stereo transmissions started on October 18th. The Network Three transmitters, both medium-wave and v.h.f., were used for one channel (left hand) while the BBC's TV sound transmitters carried the other channel (right). Listeners required a TV set and either a medium-wave or, preferably, a v.h.f. radio receiver. For best results the loudspeakers of the two receivers should have been positioned approximately eight feet apart.

One of the stereo broadcasts on November 1st 1958 included Act 1 of Verdi's "Falstaff" plus some items specially recorded by the BBC Variety Orchestra – we thought you might like to know what stereo delights you

missed! Incidentally 1958 was a busy year for BBC Engineering: experimental 625-line TV transmissions in Band V from the Crystal Palace transmitter started during that year.

Are You Sitting Comfortably

In 1958 the BBC Engineering Information Department issued a useful leaflet for the general public giving details of the experimental stereo sound transmissions, which were broadcast on Saturday mornings. A slightly updated version of the leaflet was produced in 1962. The authors still have a copy in their archives and it's worth quoting some of the information in the leaflet: "It is impossible for various reasons to reproduce in the home precisely the

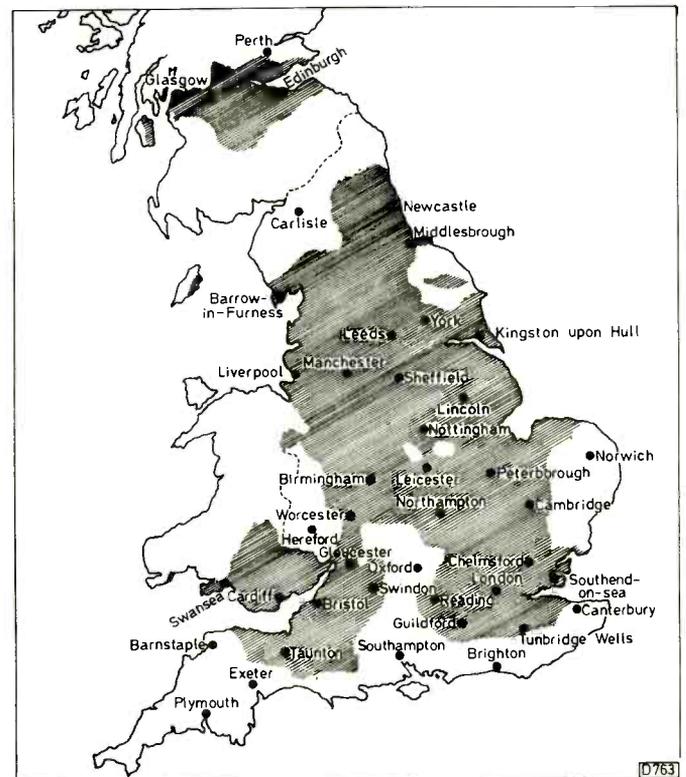


Fig. 1: BBC Nicam TV sound coverage at August 31st, 1991. Over the next few years the BBC will be extending the coverage to virtually the whole of the UK.

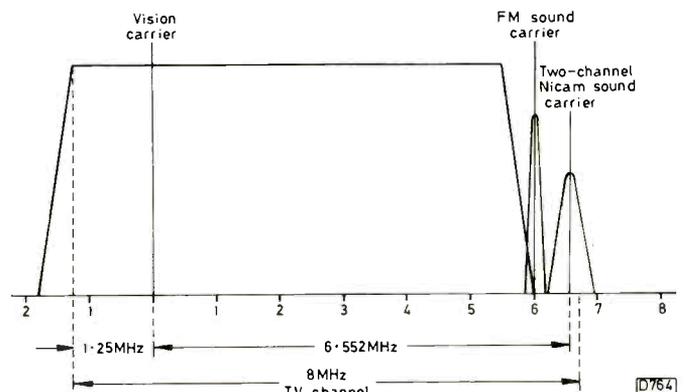


Fig. 2: Where the Nicam 728 digital sound carrier fits in the TV channel bandwidth.

sound that would be heard in a concert hall, broadcasting or recording studio. The aim is, therefore, to provide the most pleasing reproduction avoiding any annoying distortions. Modern equipment can provide such reproduction – especially that having controls with which the listener can adjust the response to suit personal taste and the acoustics of the room. Stereophonic sound reproduction is an additional aid to the pleasure of listening. Its aim is to give the listener some indication of the relative positions and movement of the various sources of sound and also to give a general effect of spaciousness.

To enable the BBC to explore the possibilities of this system of broadcasting, and to give listeners an opportunity of hearing for themselves the stereophonic effects that may be achieved, experimental transmissions will be broadcast on alternate Saturday mornings from 9.30 to 10.30 a.m. Any changes in the times or dates and information about the programme will be found in the current issue of the *Radio Times*.

To hear these broadcasts stereophonically a sound receiver and a television receiver are required. Listeners should sit and face the two loudspeakers with the sound receiver on the left, tuned to Network Three preferably on VHF, and the television receiver on the right, tuned to BBC Television sound. The receiver loudspeakers should be about the same height from the floor and spaced about six to ten feet apart. The best listening positions will be found by experiment and are usually in a small area situated at approximately equal distances from the two loudspeakers. If the television set has its loudspeaker mounted on the side it may be better to turn the set round so that the loudspeaker is facing towards the front; sometimes a better effect can be obtained if the two loudspeakers are turned towards the central listening area.

Before the experimental broadcast a short period of music will be transmitted (but not stereophonically) on both channels. This may be used to adjust volume and tone controls so as to make the reproduction from each loudspeaker sound as alike as possible. After the music there will be two minutes of stereophonic test speech during which the relative volume of the two sets should be adjusted as far as possible to make the speaker's voice appear to come from a point mid-way between the loudspeakers. This adjustment is easier if carried out by one person (standing clear of the loudspeakers) while another checks the results in the listening area. Increasing the volume of one loudspeaker will tend to move the apparent source of sound towards it and vice versa.

If the test speech cannot be satisfactorily centralised, one loudspeaker may be out of phase; i.e. the movement of the loudspeaker cones is not in sympathy. In this case the loudspeaker connections in one of the receivers will have to be reversed. In many sound receivers the loudspeaker is connected by means of plugs and sockets at the back of the set and all that need be done is to reverse the positions of the plugs in the sockets. Other receivers have soldered connections and the modification will require more skill. It is not advisable for anyone who is not an expert to remove the back of the set to make alterations.

Listeners receiving the transmissions from stations more than about 100 miles from London may not obtain a true stereophonic effect because of differences in the characteristics of the programme lines connecting the transmitters with the London studio. This has the effect of putting the loudspeakers partially out of step, which is one of the problems that needs to be overcome in stereophonic broadcasting. However, even under these conditions an effect of spaciousness and greater realism than is possible

Table 1: Nicam 728 system parameters.

| |
|--|
| Carrier frequency: 6.552MHz above the vision carrier. |
| Carrier level: –20dB with respect to the peak vision carrier. |
| Modulation: Differentially encoded quadrature phase-shift keying. |
| Spectrum shaping: 100 per cent cosine roll-off, split equally between the transmitter and receiver. Overall digital signal bandwidth approximately 728kHz. |
| Overall bit rate: 728kbit/sec. |
| Pre-emphasis: CCITT recommendation J17. |
| Sampling frequency: 32kHz. |
| Initial resolution: 14 bits/sample. |
| Companding: Near instantaneous with compression to 10 bits/sample. |
| Coding for compressed samples: Twos complement. |
| Number of coding and protection ranges: Five and seven respectively, signalled by 3-bit scale factor. |
| Error protection: One parity bit added to each 10-bit sample to check the six most significant bits (parity modified for scale-factor signalling). |
| Scale-factor signalling: Modification of 9 parity bits per scale factor, detected by majority decision logic. Three bits/second coding block, two blocks per frame. |
| Bit interleaving of sound data: 44 × 16 (frame alignment word not interleaved). |
| Frame format: 728 bits frame length (1msec) with 8-bit lumped frame-alignment word. |

with reception of normal transmissions will be obtained.

The transmission of stereophonic sound requires two or more channels from programme source to listening room. The present experiments are a basic arrangement of two channels each consisting of separate microphones, programme lines, transmitters on different wavelengths, receivers and loudspeakers. It has, however, a number of disadvantages and could not be used for a regular stereophonic broadcasting service. It is not compatible, i.e. properly balanced reproduction cannot be obtained when listening with one receiver to either channel alone, and it uses additional wavelengths which are not normally available. For these reasons the experimental transmissions have to be made outside normal programme times. Various systems offering promise of overcoming these disadvantages are being studied for possible adoption in a future stereophonic broadcasting service.”

Subsequent Developments

On August 28th, 1962 the BBC broadcast stereo test transmissions by radio and TV using a Zenith-GE system. The radio service, by then renamed The Third Network, still carried the left-hand signal. In December 1964 the Saturday morning stereo test transmissions, which began in 1958, came to an end – the Music Programme had been extended and no further time was available for the experimental broadcasts, which required two wavelengths.

In the mid-Sixties experiments in which two stereo channels were broadcast from a single v.h.f. transmitter, London Wrotham, were started. This was done by switching each stereo channel in turn to the v.h.f. transmitter. An electronic switch in the receiver switched

the two received signals, after demodulation, to two audio channels. A separate pilot signal was transmitted to ensure synchronisation of the switching, which was done at 38kHz.

On July 30th 1966 stereo broadcasts using the Zenith-GE compatible system were introduced into the Music Programme and Third Programme schedules – there were two or three programmes each day.

In the early Seventies the BBC developed a system for distributing mono TV sound signals between the studios and transmitters as part of the video signal. The sound was converted to digital form, compressed and inserted in the line sync portion of the video waveform – for obvious reasons the technique was known as sound-in-syncs. A new system called dual sound-in-syncs was under development in 1987. This provided distribution of two digital sound channels. The system design was finalised in April 1989.

Official Start of Stereo TV

Now, some four decades after the first experimental transmissions, stereo TV sound has finally arrived. The

new Nicam service has been described as “the most exciting television development since colour”. Apart from that the publicity has not been great, though BBC Television did produce 250,000 leaflets designed for TV retailers and rental outlets, explaining just what a difference stereo sound would make to forthcoming BBC-TV programmes.

Strangely, the first BBC Nicam stereo programme to be listed in *Radio Times* was the children’s programme “The 8.15 from Manchester”, shown on August 31st at 0815 on BBC-1. No mention was made at the start of the programme that it was in stereo. The first BBC-1 programme to be officially transmitted with stereo sound was the feature film “Indiana Jones and the Temple of Doom”: the BBC-1 globe caption actually had the word “stereo” superimposed – that was about as much excitement the Corporation could muster for the occasion.

Prior to the launch of the service many programmes had been transmitted with stereo sound, but the first to be officially broadcast with Nicam 728 stereo was Mahler’s Symphony No. 8 in E flat which was shown on BBC-2 at 6 p.m. on Saturday, August 31st. Interestingly this programme also featured the wide-screen presentation.

CD Player Casebook

*Reports from Mike Leach,
Brian Storm and S. DaCosta*

Philips CD450 Series

When loading or unloading a disc this machine would occasionally jump a tooth on the main cam. I’ve noticed that it’s becoming a common problem with this series of machines. Philips first used the mechanism in Models CD150/160, and it was still being used until fairly recently. The most common cause of tooth jumping is the plastic bar on the main chassis: it holds the centre gear (item 119 in the exploded view in the manual) in position. A new mechanism is the obvious cure of course, but it’s possible to apply a little heat to the plastic bar, using a soldering iron, to melt it back into position. This is best done when the centre gear is back in its correct position and realigned, otherwise there’s a risk that the plastic bar will be snapped when the gear is replaced. I’ve found that this is an adequate cure.

After I’d done this with the CD450 it took on a mind of its own. It would occasionally open the drawer and not close it again, and would sometimes spin but not read the disc. The cause of the problem was again poor crimping of the leads on one of the plugs, this time the lead from the servo board to the front panel. As a replacement we used a lead from a scrap Philips VR6462 VCR. All is now well.

M.L.

Technics SLP420 Series

On page 515 of the May issue I commented on a problem with the Technics SLP420. Briefly, the machine didn’t read discs and the turntable span too fast. The cause of the fault was IC304, which is the data slicer and e.f.m. chip.

It would seem that this is becoming a common fault with this series of machines. I’ve had several in recently that had it. You will usually find that the disc spins much too fast for you to be able to see the r.f. eye pattern, but if you slow the disc down with your finger the eye pattern is usually viewable at the appropriate test point. In nine out of ten cases the chip is the cause of the fault: it’s type EHDGA1234 and is available from SEME. If you suspect

this chip, a check is to heat it slightly with the tip of a soldering iron: it should start to work all right for a few minutes and the machine should spring to life. **M.L.**

Technics SLP8

This elderly three-beam pickup machine greeted me with a harsh mechanical clicking noise, failing miserably to read the TOC. As the pickup sled was sticking on its drive thread the pickup was not able to return to the centre of the disc to read the TOC. Out came the brass drive screw, nylon runner and drive belt: all were replaced, along with the Moritone grease on the guide shafts.

When I switched on again the sled returned to base and the disc rotated, but there was still no TOC reading. I clipped a scope probe to the r.f. test point and tried again. Nothing doing. When I adjusted the focus gain potentiometer a clean and ample eye pattern came up and the TOC appeared on the display, but when I pressed the play key there was again nothing, no eye waveform at all. The disc started to play when I increased the focus gain. I quickly reset the row of potentiometers on the side of the mechanism, but there was still no eye pattern at the correct focus gain setting. My next check was on the turntable height: it was way out! After adjusting this the machine performed immaculately. The owner later told me that someone had “adjusted” it for him as it had started to play up. It hadn’t worked since. **B.S.**

Sony CDP-M26

This machine gave a “no disc” indication – the laser unit failed to focus. The cause of the trouble was that the flex wire from the optical unit to the main panel was only half pushed in. Several models suffer from this sort of trouble.

In another of these machines the tray would move out but not in and the sled motor remained permanently on. The cause was the LA6065 control chip. **S.DaC.**

VCR Clinic

Panasonic NV-G40

The fault note read "noise like a machine gun". Sure enough the deck solenoid was firing continually. Quick checks in the power supply showed that the Reg. 12V, Reg. 6V, Reg. 5V and power-off lines were all pulsing. I was about to look at the system control chip when I noticed from the i.c. block diagram that the Reg. 6V supply isn't controlled by the power-off line. A new STK5340 chip was required. **P.B.**

Grundig VS540

For a dead machine with no output from the power supply, check whether C420 is open-circuit. **P.B.**

Panasonic NV730

I've had a few of these machines with the following complaints: intermittent fast forward or rewind, intermittent tape damage when ejecting a cassette, intermittent play, etc. In all cases the cause was ageing of the solder connections to Q1504. This power transistor is mounted on the right-hand heatsink: it gets rather hot, the result being dry-joints on all three legs. Removing the old solder then resoldering with high melting-point solder restores reliable supplies to the reel motor. **B.S.**

Panasonic NV370/NV830

A problem with these now rather elderly machines is intermittent lapsing into the dew mode – even when the dew sensor is disabled. Panasonic used to recommend fitting a 560Ω resistor in series with an 0.01μF capacitor between pin 22 of IC6001 and chassis. By decoupling the power on/off line from the operate switch on the front panel this modification prevents the syscon microcomputer chip from misoperation, avoiding "chatter". Because of the age of the machines the only cure now is to replace the switch – part no. VSP0145. **B.S.**

Alba VCR6000X

This machine would accept a cassette but after that there were no further functions, including eject. The cause of the trouble was the DMB5208VT chip IC701 on the front panel. **E.R.**

Matsui VX755/Saisho VR3600

The complaint with this machine was that it wouldn't play tapes and left a loop of tape inside when the cassette was ejected. We removed the cover and inserted a cassette. When play was selected the machine laced up but there was neither drum nor capstan rotation. Thus after a couple of seconds the machine unlaced, without taking the tape back into the cassette. The cause of the trouble was the OEC9005 chip IC2001: fitting a replacement restored normal operation. **E.R.**

GEC 4006/05

This machine, which is a Marantz clone, operated all right in the rewind and fast forward modes. When play

Reports from Philip Blundell, AMIEE, Brian Storm, Ed Rowland, J. Edwards, S. DaCosta, Mick Dutton, Michael Dranfield and Graham Richards

was selected however it laced up then immediately unlaced, ejected the cassette and switched off. The cause was no capstan rotation. Quite a bit of time was spent checking the capstan motor and its supply voltages before we discovered that the pinch roller had seized on its mounting – it was so tight that it had to be prised free. A clean up and a new pinch roller restored normal operation. **E.R.**

Akai VS1

The complaint with this machine was that playback and E-E were o.k. but it wouldn't record. On test all modes worked fine except when record was selected. The machine's record indicator then blinked on and off a few times after which the cassette was ejected. The anti-record safety leaf switch mounted on the carriage turned out to be the culprit. Its plastic mounting hooks had broken and were hanging loose. Part no. 11906SW from Chas Hyde Ltd. **J.E.**

Sanyo VHR2300

Replace the STK5482 regulator chip if the symptoms are as follows: no E-E picture or sound; accepts a tape; fast forward and rewind are very slow; shuts off when play is selected. **J.E.**

Sanyo VHR3100

The complaints were of no sound in the E-E mode and failure to record sound. The picture was fine and playback of prerecorded tapes was normal. My first thoughts were of a fault in the tuner/i.f. area, but a glance at the rear of the machine revealed all: the external link that couples the tuner audio out to audio in was missing. A temporary wire link produced good sound in all modes. When our field engineer returned the machine he found the link under the base of the TV/video stand. It took him a while to live that one down. **J.E.**

Orion VH200 and Clones

When the machine was switched on the record light stayed on permanently and there were no deck functions. If you get this situation, check that the regulated 12V supply is present before delving into the syscon department. It's derived from the STK5326 chip which you will probably have to replace. The record light stays on even when the syscon chip is removed! **S.DaC.**

Panasonic NV-G20/NV-G21

There are only minor differences in the power supply circuitry used in these two models. We've had the following faults:

- (1) No power. Usually the fuse is blown and blackened. The mains rectifier fails and the STR11006 chip usually reads short-circuit between pins 2, 3 and 5. At times Q1011 goes short-circuit collector-to-emitter. L1001 sometimes melts.
- (2) No power with the fuse o.k. The STR11006 chip is short-circuit between pins 2 and 4.

(3) Intermittent power failure. Check for dry-joints at pins 1, 2 and 3 on the sub-power PCB.

(4) Machine dead but all supplies are present except at pins 3, 4 and 5 of P1001. The voltages at these pins are restored when they are isolated, but when the connector is fitted they fall to zero. The STK5338 chip is faulty.

(5) The r.f. booster doesn't work. Q1004 is open-circuit and D1012 is short-circuit. **S.DaC.**

Panasonic NV-G12

The picture was o.k. with some tapes but on others there were tracking lines. No amount of tracking control adjustment would cure this. We found that playback of the machine's own recordings was perfect, and that these were o.k. with other machines. Someone had a go and tried almost everything – head cleaning, drum assembly, guides etc. After much resetting and realignment the fault was still present. Fortunately another one of these machines then turned up. It had a broken display although it worked well. We decided to sort this out by swapping over the timer panels. The first machine then worked perfectly with all tapes. So it was the timer panel! In fact the (–) tracking control was permanently shorted and as a result the tracking was set at its most negative end. **S.DaC.**

Ferguson 3V24/JVC HR2200

The complaint with this portable was that it wouldn't load a tape. On test we found that the capstan ran all the time while the operation switch didn't work. After much searching we discovered that the 2SC1881 10V regulator transistor on the mechanism panel had gone open-circuit. **M.D.**

Salora SV8600/Mitsubishi HS337

The complaint with this machine was that it would shut down intermittently or sometimes fail to power up from cold. After some searching we found that in the fault condition the switched 5V supply was missing. We traced the cause to the regulator transistor Q9A2 which was dry-jointed on all three legs. **M.D.**

Sharp VC-A140

The customer complained that this machine creased the bottom edge of the tape. We suspected the pinch roller, but the pinch roller arm turned out to be the cause of the problem. **M.D.**

Hinari VXL5

There was no E-E or playback audio. A scope check at pin 9 of the i.f. module showed that the audio signal was present here and wasn't being muted by Q301. Audio was present at two of the pins of IC309, an electronic switch, so this device was ruled out – it's a one-pole, two-way switch, though the manual doesn't say so. The audio signal was then traced to the servo board. It was present at pin 13 of the LA7096 audio chip IC103 but there was no output at pin 18. We got low-level E-E audio by connecting a 47 μ F electrolytic capacitor between pins 13 and 18 of this chip, thus ruling out anything that followed it. A new chip failed to cure the fault (Sod's Law), so further checks had to be made on the components around it. The 12V supply was present at pin 27, but there was no voltage at pin 3. A small 47 μ F decoupling electrolytic capacitor between this pin

and chassis was short-circuit. Fitting a replacement cured the fault.

This is not the first time we've had capacitor troubles with this particular model. A fault we've had many times is that the machine loads then immediately unthreads. This is caused by loss of the drum PG pulses. In every case we've found that C145 (100 μ F 10V) in the PG amplifier circuit had gone short-circuit. **M.Dr.**

Saisho VR605/VR1000, Matsui VX500/VX800

To overcome slight loss of torque when unloading, possibly due to a worn reel motor, change zener diode D27 (D2027 in the VR1000/VX800) from a 7.5V to a 10V type. **M.Dr.**

Philips VR6870

There was a loud buzzing noise in the power supply when this machine was plugged in. The clock display segments lit at random and flashed on/off. Another dealer mentioned to us that he'd had a similar problem which was caused by a faulty capacitor. We removed a small subpanel from the power supply can and used a digital capacitance meter to test the three electrolytic capacitors on it – C7, C11 and C27. All were very low in value. After fitting replacements the machine worked normally. **M.Dr.**

Sharp VC387

Signals from the tuner disappeared about five minutes after switch-on. On test I found that the 12V tuner BU line dropped to about 3V when the fault occurred. After completing the difficult job of getting the power supply out of the machine I used the hairdryer to check for a thermal fault and found that the problem occurred when the small 2.2 Ω disc thermistor in the supply to the switching converter was heated. But a replacement didn't cure the fault. Silly me! The thermistor was doing its job, heating up and restricting the current flow because the converter was drawing excess current.

Further checks showed that the cause of the fault was on the primary side of the converter circuit. It was eventually traced to the 10 μ F damping capacitor C954 which was low in value at about 2 μ F. In view of the difficulty in getting the power supply out, and not wanting a bouncer, I checked the other electrolytics in this complex power supply. Several had to be replaced as they were drying up. It seems that sealing hot-running circuitry in a can is a recipe for failure. **M.Dr.**

Granada DS2/Sanyo VHR2300

This machine was dead with very little coming from the STK5482 regulator IC1. There was no change however when a replacement was fitted. After obtaining a manual we realised that the reason for no 5V and 12V outputs from the chip was no switching voltage at pins 5 and 10. This comes from the collector Q5002. There should be 31.4V at the collector but this voltage was missing – the correct 50V was present at the emitter. A resistance check showed that there was a short across this line. It was traced to the presetter board where the UPC574J 33V regulator IC6204 had gone short-circuit. When a replacement was fitted the machine worked but there was no clock. The –30V supply at pin 5 of connector CN5002 was missing because the 27V and 4.3V zener diodes D5006 and D5005 were both short-circuit. No further problems were noted during a soak test. **G.R.**

ECONOMIC DEVICES 32 TEMPLE STREET, WOLVERHAMPTON, WV2 4AN

| | | | | | | | | | | | | | | | | | | | | | | | |
|---------|------|-------------|------|---------|------|-----------|------|--------|------|-----------|------|-------------|-------|----------|-------|-----------|-------|-----------|-------|-----------|------|-----------|-------|
| 1560H | 3.72 | 2SC1583 | 0.34 | AN2140 | 2.40 | BC207 | 0.19 | 90XS48 | 0.33 | BU126 | 1.10 | HA1196 | 7.43 | MC1330P | 1.98 | SAS560T | 5.42 | STR1906 | 4.78 | TA970 | 3.86 | TD4444 | 1.95 |
| 1565F | 3.72 | 2SC1617 | 3.88 | AN235 | 4.66 | BC2126 | 0.26 | BDX53A | 2.09 | BU204 | 1.58 | HA1300 | 1.63 | MC1350P | 1.56 | SAS570T | 5.42 | STR490 | 12.65 | TA990 | 3.96 | TD4442 | 3.18 |
| 17052 | 4.50 | 2SC1678 | 1.98 | AN236 | 3.33 | BC1215L | 0.17 | BDX63A | 0.26 | BU204 | 1.58 | HA1300 | 1.63 | MC1351P | 1.25 | SAS570T | 1.95 | STR440 | 5.18 | TA2205 | 3.79 | TD4500 | 4.74 |
| 17053 | 5.51 | 2SC1741 | 0.21 | AN240P | 0.99 | BC214 | 0.10 | BDY20 | 1.98 | BU206 | 1.27 | HA1340Z | 7.06 | MC1352P | 1.40 | SAS580 | 2.85 | STR451 | 5.77 | TA2705Q | 1.05 | TD500-2 | 1.92 |
| 17074 | 1.10 | 90U30 | 2.06 | AN241 | 4.81 | BC225 | 0.40 | BDY81 | 1.18 | BU207 | 1.65 | HA13403 | 11.86 | MC1357P | 2.15 | SAS6600 | 1.33 | STR454 | 4.96 | TC2A90A | 2.39 | TD4610 | 5.99 |
| 17089 | 3.45 | 2SC1815 | 0.20 | AN245 | 5.89 | BC237 | 0.10 | BF115 | 0.39 | BU208 | 1.12 | HA1342A | 8.98 | MC1358P | 1.48 | SAS660 | 2.37 | STR50103A | 3.90 | TC420A | 2.16 | TD4620 | 7.40 |
| 17127 | 2.50 | 2SC1826 | 0.69 | AN253 | 1.80 | BC238 | 0.10 | BF117 | 0.66 | BU208 | 2.35 | HA1364 | 12.25 | MC14493P | 3.99 | SAS6700 | 1.33 | STR6200 | 6.16 | TC440 | 1.89 | TD45500 | 14.25 |
| 17376 | 1.58 | 2SC1849 | 3.95 | AN250 | 3.85 | BC238B | 0.06 | BF118 | 0.66 | BU208A | 1.12 | HA1367 | 2.75 | MC14587 | 1.10 | SAS670 | 2.96 | TR618V | 1.07 | TC4640 | 2.25 | TD45700 | 6.75 |
| 1N4001 | 0.04 | 2SC1875 | 4.50 | AN258 | 0.82 | BC239 | 0.11 | BF122 | 0.50 | BU209 | 1.72 | HA1368B | 1.95 | MC1468P | 1.50 | SAS670 | 2.96 | TR618V | 1.07 | TC4640 | 2.25 | TD45700 | 6.75 |
| 1N4002 | 0.06 | 2SC1893 | 3.85 | AN295 | 6.28 | BC251A | 0.31 | BF123 | 0.13 | BU209 | 1.09 | HA1374A | 2.88 | MC1712 | 3.88 | SCR4203 | 19.35 | TB037 | 2.11 | TC4730 | 6.50 | TD49403 | 1.50 |
| 1N4003 | 0.06 | 2SC1921 | 1.37 | AN301 | 5.26 | BC294 | 0.30 | BF127 | 0.37 | BU209 | 1.07 | HA1374A | 2.88 | MC1712 | 3.88 | SCR4203 | 19.35 | TB037 | 2.11 | TC4730 | 6.50 | TD49403 | 1.50 |
| 1N4004 | 0.05 | 2SC1923 | 0.30 | AN302 | 3.96 | BC300 | 0.36 | BF137 | 0.29 | BU209 | 1.09 | HA1377 | 1.59 | SCR340 | 1.40 | SDA2006 | 17.10 | TB044V | 0.97 | TC4750 | 2.25 | TD49403 | 1.56 |
| 1N4005 | 0.05 | 2SC1929 | 2.35 | AN305 | 8.88 | BC301 | 0.35 | BF153 | 0.58 | BU406 | 1.49 | HA1388 | 1.87 | MC1592 | 19.50 | SDA2010 | 15.06 | TB045 | 1.20 | TC4800 | 1.60 | TD49513 | 3.12 |
| 1N4006 | 0.10 | 2SC1943 | 1.12 | AN306 | 2.46 | BC302 | 0.40 | BF154 | 0.26 | BU407 | 1.24 | HA1389P | 2.65 | MC1724CP | 3.49 | SDA21122 | 12.98 | TB049 | 1.45 | TC4803 | 2.38 | TD01613S | 1.25 |
| 1N4007 | 0.06 | 2SC1959 | 0.20 | AN316 | 4.48 | BC303 | 0.48 | BF177 | 0.33 | BU407 | 1.24 | HA1389P | 2.65 | MC1724CP | 3.49 | SDA21122 | 12.98 | TB049 | 1.45 | TC4803 | 2.38 | TD01613S | 1.25 |
| 1N4148 | 0.03 | 2SC1957 | 0.95 | AN318 | 7.16 | BC307A | 0.13 | BF158 | 0.18 | BU412 | 1.59 | HA1392 | 4.38 | MC2927 | 1.25 | SG613 | 12.37 | TB058 | 4.95 | TC4900 | 2.04 | TEA1002 | 1.54 |
| 1N4448 | 0.05 | 2SC1953 | 1.93 | AN320 | 5.47 | BC308A | 0.11 | BF159 | 0.18 | BU425A | 6.27 | HA1394 | 2.56 | MD411 | 0.75 | SG629 | 8.27 | TB059 | 4.22 | TC4910 | 1.65 | TEA1009 | 1.63 |
| 1N5401 | 0.11 | 2SC1962 | 1.93 | AN321 | 2.25 | BC309 | 0.17 | BF160 | 0.31 | BU500 | 1.53 | HA1397 | 2.75 | MD502 | 0.26 | SG630 | 14.28 | TB063V | 1.25 | TC4940 | 3.30 | TEA1014 | 3.90 |
| 1N5402 | 0.13 | 2SC1969 | 1.79 | AN322 | 7.62 | BC317A | 0.13 | BF167 | 0.30 | BU500A | 1.50 | HA1398 | 2.55 | MD610 | 0.26 | SG630D | 20.62 | TB070 | 4.95 | TC4940E | 2.93 | TEA1020SP | 4.00 |
| 1N5403 | 0.18 | 2SC1983 | 5.17 | AN327 | 5.37 | BC327 | 0.09 | BF173 | 0.34 | BU503 | 1.53 | HA1405 | 2.07 | MD902 | 0.45 | SK2P104 | 1.25 | TB071V | 1.42 | TC4950 | 6.95 | TEA2018A | 1.52 |
| 1N5404 | 0.10 | 2SC1985 | 0.60 | AN340P | 1.53 | BC328 | 0.11 | BF175 | 0.50 | BU505 | 1.57 | HA1405 | 2.07 | MD902 | 0.45 | SK2P104 | 1.25 | TB071V | 1.42 | TC4950 | 6.95 | TEA2018A | 1.52 |
| 1N5408 | 0.16 | 2SC2009 | 0.30 | AN355 | 1.65 | BC337 | 0.09 | BF178 | 0.40 | BU505 | 1.63 | HA1457W | 2.23 | MD9A955 | 2.50 | SK2P106 | 0.30 | TB071V | 1.25 | TC4950H | 2.64 | TEA2018A | 1.52 |
| 1N914 | 0.04 | 2SC2029 | 2.15 | AN362 | 1.50 | BC338 | 0.12 | BF179 | 0.36 | BU806 | 0.98 | HD3870Z-A23 | 4.76 | MDJ501 | 3.30 | SK2P208 | 1.07 | TB071V | 1.90 | TC4950 | 1.00 | TEA2018A | 1.52 |
| 1S1555 | 0.18 | 2SC2028 | 1.11 | AN370 | 3.95 | BC368 | 0.17 | BF180 | 0.36 | BU807 | 0.56 | HD38705A53 | 5.77 | MDJ300 | 2.37 | SK2P208 | 0.85 | TB0934V | 1.34 | TC4A1001B | 2.35 | TC1647 | 0.77 |
| 1S44 | 0.10 | 2SC2063 | 0.99 | AN511 | 3.43 | BC440 | 0.69 | BF181 | 0.32 | BU826A | 0.95 | HD38705A-78 | 8.53 | MDJ2955 | 0.84 | SK2P210 | 0.99 | TB0935V | 1.49 | TC4A1003A | 1.47 | TC1720 | 0.55 |
| 1S90 | 1.10 | 2SC2063 | 2.73 | AN511 | 4.50 | BC440 | 0.69 | BF182 | 0.34 | BU844 | 1.58 | HD38800A50 | 14.12 | MDJ3055 | 1.15 | SK2P210 | 1.36 | TB0951 | 8.07 | TC4A1005A | 2.02 | TC1710 | 0.34 |
| 2N2191A | 0.29 | 2SC2073 | 0.73 | AN520H | 1.66 | BC443 | 0.69 | BF183 | 0.34 | BU844 | 1.58 | HD38800A50 | 14.12 | MDJ3055 | 1.15 | SK2P210 | 1.36 | TB0951 | 8.07 | TC4A1005A | 2.02 | TC1710 | 0.34 |
| 2N3053 | 0.33 | 2SC2085 | 1.65 | AN520S | 5.04 | BC460 | 0.47 | BF184 | 0.42 | BU845 | 1.43 | HD38800A50 | 14.12 | MDJ3055 | 1.15 | SK2P210 | 1.36 | TB0951 | 8.07 | TC4A1005A | 2.02 | TC1710 | 0.34 |
| 2N3054 | 0.99 | 2SC2091 | 1.30 | AN525E | 1.86 | BC461 | 0.47 | BF185 | 0.39 | BU845 | 1.43 | HD38800A50 | 14.12 | MDJ3055 | 1.15 | SK2P210 | 1.36 | TB0951 | 8.07 | TC4A1005A | 2.02 | TC1710 | 0.34 |
| 2N3055 | 0.75 | 2SC2141 | 1.10 | AN561Z | 2.71 | BC462 | 0.51 | BF194 | 0.14 | BU127 | 0.09 | HM6211 | 14.55 | ML2328 | 3.01 | SL1430T | 3.21 | TB0955V | 3.86 | TC4A1011A | 1.36 | TC1726 | 0.38 |
| 2N3442 | 1.16 | 2SC2166 | 0.98 | AN561Z | 4.20 | BC463 | 0.30 | BF195 | 0.14 | BU133 | 0.15 | HM6251 | 12.30 | ML237B | 1.95 | SL414 | 3.69 | TC470Z | 2.77 | TC4A1028 | 2.45 | TC1732 | 0.37 |
| 2N3702 | 1.10 | 2SC2216 | 0.88 | AN5630 | 3.95 | BC478 | 0.32 | BF196 | 0.14 | BU164 | 0.48 | HM6232 | 7.20 | ML238 | 5.65 | SL423A | 3.44 | TC4705 | 1.74 | TC4A1034B | 2.42 | TC1737 | 0.84 |
| 2N3703 | 0.10 | 2SC2233 | 1.20 | AN5701H | 1.66 | BC479 | 0.34 | BF197 | 0.14 | BU171 | 0.85 | HM6232 | 7.20 | ML238 | 5.65 | SL423A | 3.44 | TC4705 | 1.74 | TC4A1034B | 2.42 | TC1737 | 0.84 |
| 2N3705 | 0.10 | 2SC2236 | 0.60 | AN5702 | 1.75 | BC522 | 0.28 | BF198 | 0.17 | BU179 | 0.85 | HM7103 | 2.87 | ML238A | 3.45 | SL4711 | 1.60 | TC4705 | 2.55 | TC4A1034B | 2.42 | TC1737 | 0.84 |
| 2N3706 | 0.14 | 2SC2278 | 1.14 | AN6300 | 4.73 | BC546 | 0.68 | BF199 | 0.17 | BU182 | 1.00 | HM9032 | 4.00 | MS5314N | 8.99 | SL480 | 7.24 | TC4706AP | 0.71 | TC4A1037 | 2.68 | TC1739A | 0.46 |
| 2N3707 | 0.16 | 2SC2314 | 0.87 | AN6310 | 2.54 | BC547 | 0.37 | BF199 | 0.37 | BU182 | 1.00 | HM9032 | 4.00 | MS5314N | 8.99 | SL480 | 7.24 | TC4706AP | 0.71 | TC4A1037 | 2.68 | TC1739A | 0.46 |
| 2N3711 | 0.11 | 2SC2335+KIT | 7.00 | AN6340 | 5.62 | BC548 | 0.10 | BF218 | 0.36 | BU189 | 1.76 | HT4207 | 11.99 | MS5318N | 3.11 | SL901B | 8.32 | TC4706P | 3.13 | TC4A1044 | 2.19 | TC1739C | 0.33 |
| 2N3711 | 1.55 | 2SC2551 | 0.29 | AN6341 | 2.22 | BC549 | 0.10 | BF224 | 0.17 | BU198 | 1.62 | HT4207 | 11.99 | MS5318N | 3.11 | SL901B | 8.32 | TC4706P | 3.13 | TC4A1044 | 2.19 | TC1739C | 0.33 |
| 2N3712 | 1.55 | 2SC2551 | 0.29 | AN6341 | 2.22 | BC549 | 0.10 | BF224 | 0.17 | BU198 | 1.62 | HT4207 | 11.99 | MS5318N | 3.11 | SL901B | 8.32 | TC4706P | 3.13 | TC4A1044 | 2.19 | TC1739C | 0.33 |
| 2N3713 | 1.61 | 2SC2570 | 0.46 | AN6531 | 0.95 | BC556 | 0.13 | BF240 | 0.19 | BU208 | 1.81 | MC6301C | 1.90 | MS4814N | 7.90 | SL4702P | 8.82 | TC4707P | 2.57 | TC4A1059H | 6.00 | TC1905 | 0.69 |
| 2N3819 | 0.40 | 2SC2577 | 1.50 | AN6551 | 0.69 | BC557 | 0.08 | BF241 | 0.17 | BU210-400 | 0.17 | MC6301C | 1.90 | MS4814N | 7.90 | SL4702P | 8.82 | TC4707P | 2.57 | TC4A1059H | 6.00 | TC1905 | 0.69 |
| 2N3823 | 0.17 | 2SC2578 | 5.24 | AN6552 | 0.68 | BC558 | 0.10 | BF245 | 0.10 | BU245 | 0.50 | MC6301C | 1.90 | MS4814N | 7.90 | SL4702P | 8.82 | TC4707P | 2.57 | TC4A1059H | 6.00 | TC1905 | 0.69 |
| 2N3904 | 0.63 | 2SC2571 | 0.62 | AN6610 | 1.18 | BC559 | 0.10 | BF245B | 0.49 | BU210-800 | 0.35 | MC6301C | 1.90 | MS4814N | 7.90 | SL4702P | 8.82 | TC4707P | 2.57 | TC4A1059H | 6.00 | TC1905 | 0.69 |
| 2N4101 | 1.33 | 2SC280A | 1.85 | AN7111 | 1.14 | BC626A | 2.67 | BF223 | 1.98 | LA1210 | 1.56 | MP1292 | 15.55 | MS2975N | 6.04 | TC47093P | 3.99 | TC4A1902 | 2.48 | TC1931C | 0.54 | TC1932 | 0.54 |
| 2N4240 | 2.85 | 2SC312 | 1.40 | AN7145 | 2.52 | BC635 | 0.20 | BF245A | 0.20 | BU245-600 | 4.95 | LA1230 | 1.18 | MP2794 | 4.00 | SN2972Z | 11.95 | TC4718P | 1.61 | TC4A1200 | 1.51 | TC1932A | 0.35 |
| 2N4905 | 9.99 | 2SC373 | 1.36 | AN7146 | 1.90 | BC638 | 0.20 | BF257 | 0.34 | BU227 | 1.20 | LA1357N | 3.06 | MP256C | 0.60 | SN29764AN | 2.60 | TC47120P | 0.64 | TC4A1236 | 3.88 | TC1935 | 0.46 |
| 2N5293 | 0.50 | 2SC383 | 1.15 | AN7151 | 2.37 | BC639 | 0.19 | BF258 | 0.33 | BU228 | 1.20 | LA1364 | 3.02 | MPSA42 | 0.22 | SN29778B | 7.71 | TC4712AP | 2.34 | TC4A1327A | 6.93 | TC1936 | 0.89 |
| 2N5294 | 0.50 | 2SC384 | 0.83 | AN7152 | 2.70 | BC640 | 0.24 | BF259 | 0.30 | BU229-600 | 1.20 | LA1365 | 3.02 | MPSA45 | 0.15 | SN29778B | 7.71 | TC4712AP | 2.34 | TC4A1327A | 6.93 | TC1936 | 0.89 |
| 2N5296 | 0.55 | 2SC394V | 0.61 | AN7158 | 2.67 | BC642 | 0.55 | BF262 | 0.57 | BU229-600 | 1.20 | LA1365 | 3.02 | MPSA45 | 0.15 | SN29778B | 7.71 | TC4712AP | 2.34 | TC4A1327A | 6.93 | TC1936 | 0.89 |
| 2N5297 | 0.60 | 2SC400 | 0.80 | AN7178 | 0.80 | BF263 | 0.57 | BF265 | 0.57 | BU229 | 0.11 | LA1385 | 1.53 | MPSA56 | 0.11 | SN29778B | 7.71 | TC4712AP | 2.34 | TC4A1327A | 6.93 | TC1936 | 0.89 |
| 2N5298 | 0.61 | 2SC458 | 0.92 | AN7223 | 0.10 | BF265-600 | 0.25 | BF271 | 0.34 | BU295 | 0.15 | LA1231 | 3.04 | MC1355D | 1.98 | SN29723A | 14.46 | TC4713P | 3.71 | TC4A1368 | 1.89 | TC1941A | 0.29 |
| 2N6109 | 1.58 | 2SC495 | 0.19 | AN7227 | 7.72 | BD124 | | | | | | | | | | | | | | | | | |

Servicing the Finlux 1000 Chassis

Steve Cannon

The sets that use the Finlux 1000 series chassis have been around for several years now. Apart from a couple of points they have proved to be very reliable. This means that when problems do arise they can be difficult to sort out – because engineers are unfamiliar with the chassis. Fortunately the circuitry is straightforward, so that servicing is reasonably simple.

Black Marks

Just a couple of black marks mar the sets' good reputation. The main one – it applies to the 2000 series as well – concerns the scan coil plug modification. In a couple of cases the problem has led to considerable damage to the set and a fire hazard. The modification takes the form of a couple of metal rivets that must be soldered on to the pins of the line scan coil connections on the copper side of the main PCB. A full modification kit with instructions is available from Finlux. There has been mention of this modification in the national newspapers: it must be carried out whenever an unmodified set is encountered.

The other problem arises in the field output stage, where a fault can develop in the field scan coupling capacitor Ck10. When this occurs the scan coils can overheat and crack the c.r.t.'s neck. The modification to prevent this is to replace the two 1.2Ω resistors Rk3 and Rk4 that filter the supply to the field output chip with a single 1.5Ω fusible resistor. At the same time replace Ck10 (1,000μF, 25V). Finlux recommend that this is done whenever an unmodified set comes into the workshop.

On/off switches

The on/off switches tend to be unreliable – replacement is generally straightforward. These sets have remote control as a standard feature, and the only thing to watch out for (apart from the shock hazard) when replacing the switch is that the remote/standby contacts are plugged into the correct socket. The plug normally fits into the three-pin socket on the front panel, but there's also a three-pin socket that will accommodate the plug on the left-hand signals panel. If the plug is inserted here the set remains dead: the standby LEDs light but the set won't power up.

Chassis Variations

There are a few chassis variations, mainly on the left-hand side signals panel. The most obvious one is that some sets have stereo sound, with an advanced audio output stage and provision to accommodate an optional Nicam decoder. These sets also have a stereo logic panel as standard.

There are differences in the luminance/chrominance department. Earlier versions have a single-chip decoder while later versions incorporate colour transient improvement (CTI) which sharpens the chroma signal transitions. In other words the smudging of the red ball on the green baize background of a snooker table, something we've all seen and a few of our customers have complained about, should be improved by the addition of CTI circuitry. That's the theory, but in practice the improvement is barely perceptible.

The only other main difference relates to the microcomputer chip mask codes. The chip is always an SDA2010, but with some models the mask code is A006 while with others it's A022. They are not interchangeable. I don't know why the chip makers do it. Why can't they simply call one an SDA2010 and the other an SDA2011? It does make life confusing for us engineers, especially when some chips have ten or more mask codes.

Teletext

There's provision for adding teletext. All you have to do is to cut half a dozen links on the signals panel and mount the text panel. Mullard type teletext panels are available with two- or four-page storage, but sets with the earlier mask code will run only a two-page panel. The majority of teletext faults occur with the two-page version. In most cases soldering the lead-through pins will cure the faults, but the BD241A or TIP31A 5V regulator transistor Tt12 and the 5.6V zener diode ZDt1 have been known to cause problems.

Chopper Power Supply

The chopper power supply (see Fig. 1) is the same on all models and is of the well-known TDA4600 type. The only real fault is that the ramp-generator resistors tend to go high in value, as a result of which the set will be dead or go off intermittently. In this chassis they are Ru21 and Ru22, 120kΩ and 150kΩ respectively. This fault can also destroy the BU908 chopper transistor. Use metal-film resistors.

If you have a dead set with the mains fuse Su1 (2A time-lag or anti-surge type) blasted, first check the chopper transistor. If this is o.k. and no other shorts can be found replace the degaussing thermistor (use type 98009). This device becomes unreliable as it ages.

If the set is dead and the fuse is o.k. the usual cause is that one of the rectifiers on the secondary side of the chopper transformer is short-circuit. Check the 17.5V rectifier Du20 first. Use a BY299 or, even better, a BY399 as a replacement. Sometimes there's a fusible safety resistor (Ru44) in series with the 17.5V rectifier. This resistor will pop if the rectifier goes short-circuit. The symptom is a dead set though the other outputs from the chopper circuit and the e.h.t. are present and the LED display is alight.

There are four outputs from the chopper circuit: 138V (U2), 25V (U4), 17.5V (U5) and 7V (U7).

Field Output Chip

The field output stage uses a TDA3652 chip. Many setmakers have used this chip but now find it in short supply. As a result they've begun to supply the TDA3654 as a replacement with a modification kit. Not Finlux so far however – the firm seems to have an endless supply. The chip's failure rate is as high as with other setmakers. The circuit reference number is ICK1. When this chip fails Rz11 and Rz12, both 1Ω fusible, usually go open-circuit. The symptom will usually be a dark, blank screen rather than field collapse, though the latter will be seen if the tube's first anode voltage is increased (control on line output

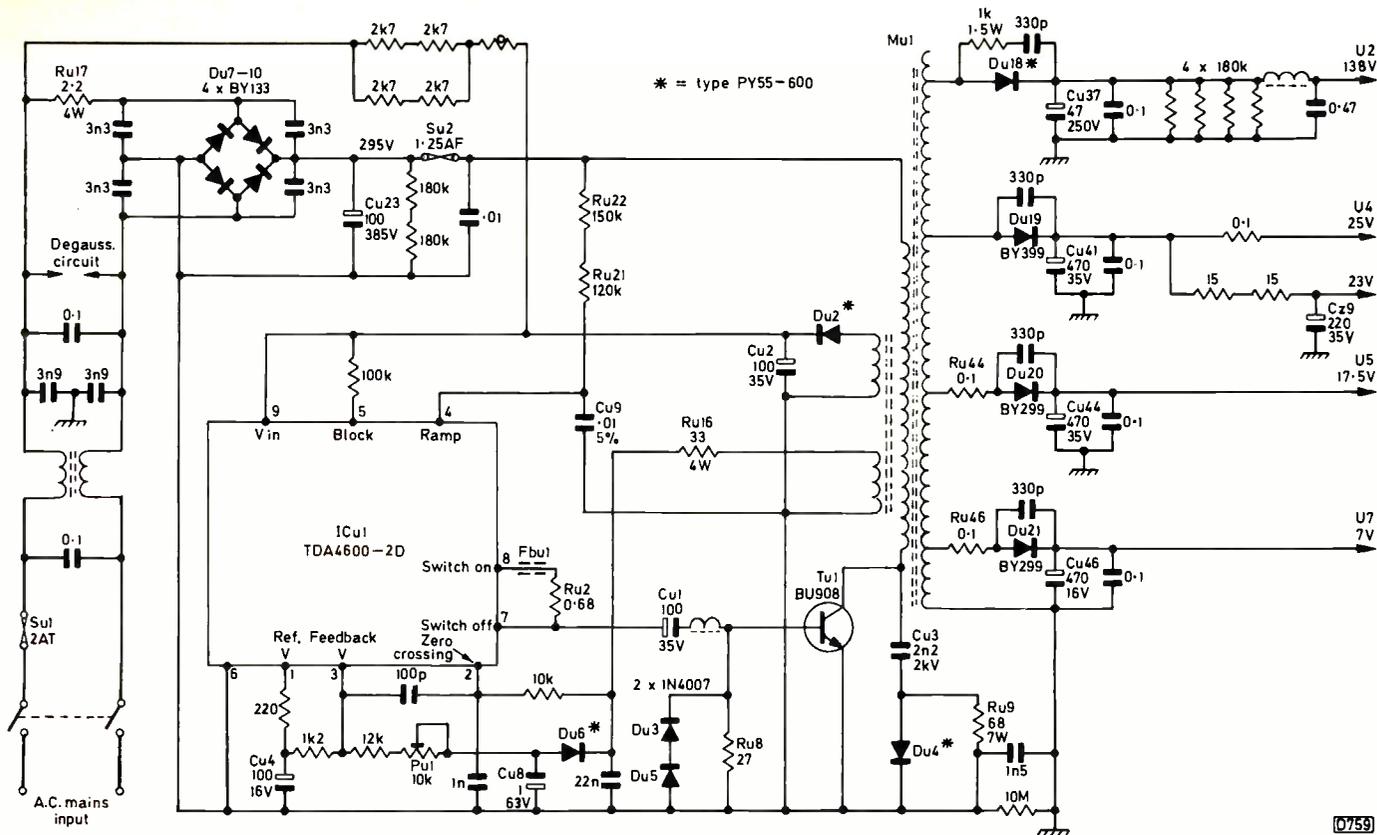


Fig. 1: The switch-mode power supply circuit used in the Finlux 1000 series chassis. Note that the chopper transformer also provides mains isolation, the components on its primary side being non-isolated.

transformer). Return the setting of the first anode potentiometer to its normal position after doing this

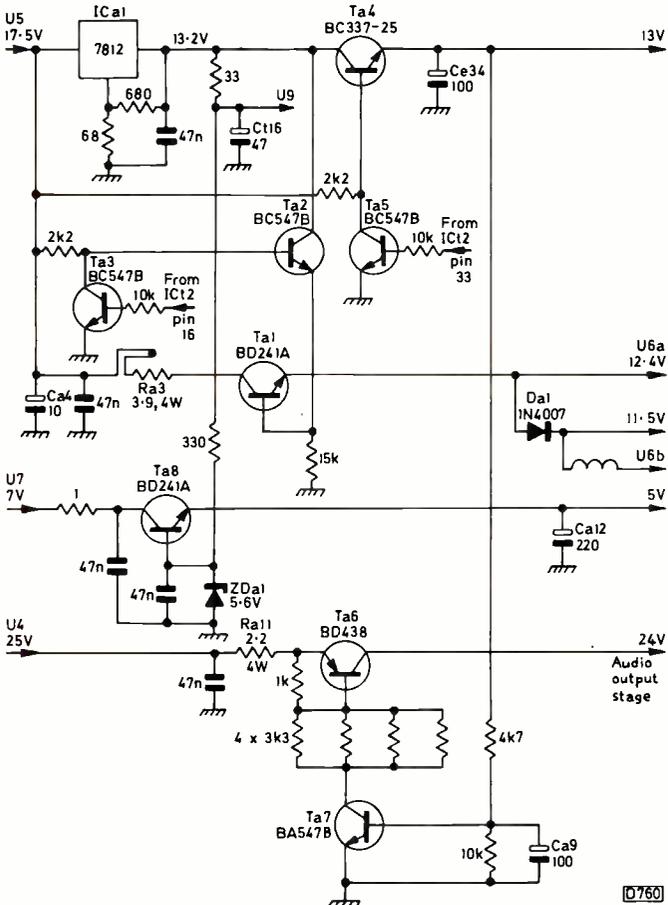


Fig. 2: Circuitry in the voltage regulator section on the signals panel.

otherwise problems with the auto grey-scale operation may occur. The reason for this protection is clear: I'm sure most engineers have had at least one customer who left his set on with field collapse in order to listen to the sound. Unfortunately such customers don't like the thin horizontal black line left across the screen because the phosphors couldn't take any more. Neither are they keen on a bill for a new c.r.t.

Sync Processor Chip

The TDA2578A sync processor/timebase generator chip IC1 provides this protection by modifying its sandcastle pulse output at pin 17. This is fed to the colour decoder chip which assesses the situation and if necessary cuts off the drives to the RGB output stages. There should be a video input feed at pin 5 of the TDA2578A chip while field and line drive outputs should be present at pins 1 and 11 respectively. Usually that's all we need worry ourselves about.

Line Drive/Output Stages

The line drive is passed via the BC547B buffer transistor Tz2 to the BC637 line driver transistor Tz3. Not many problems here, nor in the line output stage which is bog standard with a BU508A as its powerhouse. The supplies derived from the line output transformer are the e.h.t., the c.r.t. heater supply, the focus and first anode voltages, 190V for the RGB output stages and 26V for the field timebase and the EW modulator control circuit. On a few occasions we've had the focus/first anode supply part of the line output transformer become defective. The symptom is curious, in that the screen intermittently lights up bright cyan or green. It took us a while to establish the cause when we first had this fault: we found that the first anode

voltage was varying and upsetting the auto black-level and drive circuit operation in the colour decoder chip ICb1.

Tuning

Frequency-synthesis tuning is used, controlled by the SDA2010 microcomputer chip ICt2 with an SDA2116 non-volatile memory chip ICt3 to store the tuning information. For VCR playback the time-constant can be altered and stored on any channel.

The tuner has caused a few minor problems, usually as a result of dry-joints at the internal earthing connections. The symptom is intermittent black lines flashing on the screen. There are 5V and 12V supplies to the tuner and the i.f. output is at pin 6.

Signals Panel

As mentioned before there are some differences in the circuitry on the signals panel with different models. In all versions however there are separate outputs from the SAWF for the sound and vision i.f. sections. The vision signal passes to either a TDA3541 or a TDA4443 i.f. amplifier/demodulator chip then to a TEA2014 signal switching chip. In mono versions the sound i.f. from the SWAF passes via a TDA2545A i.f. amplifier chip, which produces a 6MHz output, to a TDA1236 chip. This carries out demodulation, provides volume/bass/treble control and has an audio amplifier to drive the TDA2006 audio output stage.

With stereo sets the SAWF's sound i.f. output passes to a TDA2545A whose 6MHz output goes to a TBA120U for detection. The output from this chip is passed to the stereo logic board which provides scart/off-air and stereo/mono switching of the audio signals. It also splits the incoming mono signal for feeding to identical left- and right-hand channels. These return to the TDA4292 dual-channel audio processing chip which controls all the stereo audio characteristics including a pseudo-stereo effect. The audio signals are finally passed to a TDA4930 stereo output chip that provides 15W per channel of music power.

Colour Decoders

The CTI version of the colour decoder uses three chips. ICb1 is a multi-standard decoder which handles PAL, SECAM or 4.43MHz NTSC signals: its type TDA4555. The CTI correction is carried out by ICb2, type TDA4560. The final chip ICb3, type TDA3505, matrixes the colour-difference and luminance signals to produce RGB outputs. Beam current limiting and automatic black-level clamping are carried out in this chip, which also incorporates a switching circuit to enable external/text or off-air programme signals to be passed on.

The non-CTI decoder uses the well-known TDA3565A chip in position ICb1. Saturation is controlled by the voltage at pin 5: this comes from the microcomputer chip and varies between 1.8V for minimum colour and 3.6V for saturated colour. An optional SECAM/NTSC board can be fitted to this version of the chassis. External/teletext RGB inputs arrive at pins 12, 14 and 16 respectively: switching is selected by the blanking signal at pin 9 – zero voltage here selects the off-air programme signals while 0.7V or above selects teletext/external RGB. One of the most important signals in the set, the sandcastle pulse, enters at pin 7. It controls the burst gating, black-level clamping and field and line flyback blanking. Contrast and brightness control voltages from the microcomputer chip

are applied to pins 6 and 11 respectively. These lines are also connected via diodes Db1 and Db2 to the earthy side of the e.h.t. system to provide beam limiting. Should the beam current exceed 0.8mA these diodes conduct, reducing the contrast and brightness control voltages. Pin 18 of the chip receives the feedback from the RGB output stages for automatic black-level clamping.

FAULTS LIST

We'll conclude with a fault list. There are not that many: as we've said it's a very reliable chassis.

Field foldover at the bottom of screen: Ck10, 1,000 μ F 25V, leaky.

Field collapse with Rk3 and Rk4 burning up: Ck10 is short-circuit. Replace and carry out previously mentioned modification.

Intermittent black lines flashing on the screen: Solder the earthing can connections inside the tuner.

White flashing lines on the picture and unable to enter the teletext mode: Solder the earth pins on the text panel. If fault persists replace the BD241 5V regulator transistor Tt12 and 5.6V zener diode ZDt1 on the text panel.

No sound or picture with e.h.t. present, or intermittent failure to come on: Solder dry-joints at and around the BD241A 5V regulator transistor Ta8 on the signals panel.

Set dead or intermittently goes dead: Ru21 and/or Ru22 in the chopper circuit high in value or open-circuit.

Set dead: Check the BY299 17.5V rectifier Du20 fed from the chopper transformer.

Set dead with LED display lit: Check Du20 and Ru44. The diode goes short-circuit and burns out the resistor, which must be a fusible, 0-1 Ω type.

Set dead but all h.t. lines present and LED display lit: Check Ra3 (3.9 Ω , 4W) on the signals panel. It's a fusible type and its solder trip might have gone open. If so, resolder and check/replace transistor Ta1 (BD241A).

Set dead with the e.h.t. and all secondary supplies present but all control voltages from the microcomputer chip are low, giving the symptoms no sound and a blank, dark screen: Replace the microcomputer chip ICt2 and/or the memory chip ICt3. Remember previous note on ICt2's mask codes.

Colour patches on screen or screen tinted one colour overall: Replace the 98009 degaussing thermistor.

Picture goes very bright and tinted intermittently: Fault could be due to one of the RGB output transistors breaking down. Alternatively the line output transformer may have to be replaced because the first anode control and resistor ladder network is defective.

Line tearing or ragged verticals: The BY299 diode Dz8 in the EW modulator circuit is breaking down.

Excessive width: Dz8 (BY299) is short-circuit.

Life at The TV Workshop

John Hopkins

I decided to open the shop here at Felixstowe back in June 1986. It seemed a good idea to work beside the sea in a leisurely atmosphere without too much hassle. The shop is double-fronted, and my wife Liz had the idea that if business became too slow we could use one window for TV repairs and the other for a comic shop for my son.

When we opened we started to sell reconditioned TV sets that I'd repaired prior to moving. It was quite a success. Customers started to flock in, and before very long I was so busy doing repairs that I'd no time to renovate old sets. I concentrated on full-time repair work and selling new TV sets, VCRs and satellite TV systems.

One day as I was sweeping the forecourt an old lady of about eighty peered in at one of the windows. She was looking at a large number of resistors, capacitors and transistors I'd put there to attract the hobbyist and do-it-yourself customers. "Can't see what they sell" she complained, "it's only rubbish". I agreed with her. A few days later she came into the shop. "Have you got any firelighters?" "No luv, try the hardware shop around the corner." Off she went, but next day she was back. "A loaf of bread please." Again sorry. About a week later she put in another appearance. "Do you sell wool?" Yes I said, next door in our wool department. "Bloomin' shop doesn't sell anything" she muttered as she went out.

It wasn't long before I needed someone to help with the repairs. That's when Liz started to pay for all the years I've been carrying her! Ouch.... I didn't realise that she was reading this over my shoulder. Anyway, to cut a long story short I packed her off to college. When she came back she had a City and Guilds certificate to say that she had qualified in Electronics Servicing and she started telling me what to do.

It took some time for a lot of people to get used to the fact that a mere woman can repair their TV sets better than most men, but now she can sit at the workbench muttering over an obstinate intermittent fault and complaining about stupid design problems with the best of us.

When the gales hit East Anglia we were in the thick of it. One day my son was out walking the dog when they caught a squirrel made homeless by the storms. He brought it home and within a few days it was living in the shop and jumping out at unwary customers. It stayed with us for some months, and would go out perched on my shoulder, much to the delight of several customers. He left us at Christmas for pastures greener, but we felt richer for

having known him.

Things are going quite well for us now. We don't make a fortune, but Liz handles most of the TV repairs and I do the videos. She's much more diplomatic than I am so I handle most of the customers. We find that this keeps the work load down...

At the time of writing this Bennetts and Colourvision are both selling Amstrad 48-channel satellite systems for £175. So we've dropped out of that market as we are unable to compete. We do however recommend that our customers buy from whoever can give them the best deal, and so far our honesty doesn't seem to have hurt our business.

We do get our share of awkward jobs of course. Our policy is that we don't charge unless we complete the repair. Today Liz had a 16in. Pye set of the CTX-E type. It had been knocked off its stand by an eighteen-months old child. After stripping the set down and bridging a few cracks Liz switched it on, only to discover that there were just faint sound and no voltages other than the 300V supply. After quite a lot of searching for other "drop faults" she discovered that the 26V supply rectifier D6590 in the line output stage was short-circuit. Replacing this cured all except... the tube neck was displaying a pretty blue colour due to a loose pin. So another no-charge job and the task of explaining to the customer why his set wasn't worth repairing.

Incidentally I bought a new computer for the shop a few months ago. By shopping around I was able to buy it from a local dealer for £325 plus VAT with two disc drives, a mono monitor, a mouse and software. It was the brand I tell other people not to buy, so it shouldn't have been a surprise when two days later the thing broke down. After a couple of weeks the supplier got the spare circuit board as an advance replacement. I was allowed to see the cost of the invoice - £629 plus VAT. Put a bit of mark-up and labour on that and you can see why people learn not to buy brands that are unrepairable.

One of the things that have been essential to us over the years is information. Service manuals, diagrams, equivalents books and so on. But one of the best sources has always been *Television* - for stock faults, supplier addresses and news of new products it can't be beaten. And it's tax deductible!

Well that's about it for now. But before I go, are there any other qualified ladies out there repairing TV sets? If so, why don't we hear from you? It's your magazine too!



The TV Workshop at Felixstowe.



Liz in the workshop.

Long-distance Television

Roger Bunney

As often occurs, there was an increase in tropospheric propagation during the first half of September. Though the conditions could hardly have been described as "wide open", many signals were received throughout the UK from Central Europe, France, the Benelux countries and the nearer parts of Scandinavia. The first spell of enhanced propagation occurred from the 4th to the 10th, when high-level signals from the above sources were received on most days. German and Danish Band III signals were received on the 4/5th. The second spell, on the 16/17th, was more dramatic: in addition to the more common signals, Band III and u.h.f. signals were received from Norway and Sweden. The 18th brought Swiss signals on chs. E6, 7, 31 and 34.

There was some Sporadic E reception during the month, though the number of signals and their strength fell to a relatively low level – not unexpected at this time of the year. With the approach of winter and sunspot activity still relatively high it will pay to monitor chs. R1/E2 during the 0800-1000 period for possible F2 reception. The rather brief SpE log is as follows:

4/9/91 JRT (Yugoslavia) chs. E3, 4; RAI (Italy) IA, B; DR (Denmark) E3; CST (Czechoslovakia) R1; C+ (France) L2, 3, 4; TVE (Spain) E2; RTP (Portugal) E3.
6/9/91 RAI IA; TVE E3.
9/9/91 JRT E3; ARD (Germany) E2.
10/9/91 NRK (Norway) E3; SVT (Sweden) E3.
11/9/91 TVE E2, 3; RAI IA; DR E3.
13/9/91 NRK E2, 3; SVT E2; TSS (USSR) R1; TVE E2.
14/9/91 TVE E2, 3, 4.
28/9/91 TVE E2, 3; C+L2.
29/9/91 DR E3; TVE E2, 3.
30/9/91 SVT E2; NRK E2.
1/10/91 TSS R1, 2; MTV (Hungary) R1; JRT E3; EPT (Greece) E3; TVE E2, 3; RTP E2, 3; SVT E2.

An interesting letter from a reader in Brussels reports that Lille ch. E35, which had been carrying test patterns, has ceased transmissions. During a recent tropospheric opening however a test pattern from the transmitter, using SECAM L, was seen along with a continuous 1kHz tone.

My thanks to the following for sending in logs and reception reports: Roger Fussel (Torpoint), Brian Williams (Penarth), Peter Schubert (Rainham), Cyril Willis (King's Lynn), Ryn Muntjewerff (Holland) and Simon Hamer (Powys).

News Items

Greece: The government is to introduce legislation to regulate the rapidly growing number of radio/TV stations. The number of radio stations in the Athens area is likely to be reduced by 75 per cent and the number of TV stations halved. There are at present 26 authorised TV stations.

Germany: Mitteldeutscher Rundfunk (MDR) has been formed to provide coverage in Saxonia, Saxonia-Anhalt and Thuringia.

Sri Lanka: The Independent Television Network (ITN) is to be privatised. It's hoped that a fresh injection of capital

will enable the old equipment to be replaced and updated. The Maharaja Organisation may set up a third channel using satellite technology to obtain material from Darwin.

New Zealand: TVNZ is to offer a free six-month trial service to Fiji. Canterbury Television is to offer an independent regional service covering most of the South Island. The main studio centre will be at Christchurch and the service should start in early 1993.

Ghana: The US company Harris Allied International has offered to provide two new dual 10kW transmitters that should provide coverage over 80 per cent of the Tamale region, which has been without TV for ten years, in the north of the country. Once this project is complete, services are planned for the Volta, Amedzofe and Akatsi regions.

Malta: Introduction of a new Broadcasting Act is expected to lead to ten more commercial v.h.f. radio stations and an island-wide cable TV service being set up.

Scandinavia: The new Norwegian commercial TV franchise has been won by the TV2 group, which is based in Bergen. Transmissions are expected to start in the autumn of 1992. In Sweden the TV3-Kinnevik (Scansat) group has successfully applied to set up a commercial TV network.

Luxembourg: The government has broken the CLT broadcasting monopoly. At least four regional and forty local radio stations are to be opened together with a new TV service.

In brief: The ZDF (Germany) Marlow transmitter has changed from channel E43 to channel E46, with vertical polarisation . . . The first Finnish ch. E12 transmitter has just been opened by TV3 at Pyhavuori . . . Osaka, Japan is to have a 33-channel cable TV service catering for 350,000 subscribers.

A correction is required to last month's reports. The Polish transmitting mast that collapsed did not carry TV services. It was actually the 646m mast at Gabin, serving the Polish 225kHz long-wave transmitter. It was the world's largest transmitting aerial mast. At present it's being used with reduced signal levels.

Satellite DX

The dramatic fall in the price of satellite TV reception equipment is making satellite DXing a more viable proposition. The Amstrad receiver package for example, with a 65 or 80cm dish, mounting hardware and a receiver, is being offered brand new in the UK for £199. Used or refurbished systems are available for much less. Enthusiasts can easily modify the basic Amstrad equipment for multi-satellite reception – it's advisable to go for an 80cm dish. Though the basic Amstrad receiver has limited audio subcarrier capability, inexpensive upgrade boards that give full subcarrier tuning are available.

Satellite TV is not just Sky Movies and Filmnet: there are many craft offering all types of programme material. DX signals that call for all the care and ingenuity of terrestrial DX-TV reception are available. Take for example Intelsat VA F12 at 1°W. This has three sharply focused beams, carrying the three Israeli TV programme feeds, centred on Tel Aviv. To resolve a picture in the UK is all but impossible, but by using a 1.5m dish, a low-noise LNB and i.f. bandwidth filtering (via an outboard filter box), and by inserting locally generated sync pulses, I find that it's just possible to resolve and lock very weak pictures.

A letter on this theme came recently from Ian Roberts, a TV-DXer of old, who lives near Johannesburg. He's using a home-made 3m fibreglass dish, an LNB with a noise

figure of 1.1dB and a receiver with an i.f. bandwidth of 14MHz – sufficient to resolve the audio and colour with Astra 1A signals. Good results – he has supplied photographs – have been obtained with the Astra channels that use horizontal polarisation: the vertically polarised signals give only weak syncs however. A 6m dish in his area gives noise-free pictures. Ian estimates that the carrier-to-noise ratio is around 6-6.5dB, 2dB below threshold. He reckons that with horizontal polarisation the signal level is about 27dBW, some 25dBW down on the main boresight centre level of 52dBW. Eutelsat I F4 provides noisy black-and-white pictures with the Greek ETI feed and noisy colour from Visnews in the Ku band: Eutelsat craft in other orbital slots produce only weak syncs.

All this shows that microwave satellite TV-DXing is feasible. Feedback from readers confirms that the Amstrad receiving package gives inexpensive access to the Ku satellite band, with reception from various Eutelsat and Intelsat craft.

Absent Channels

The North American low-band transmissions start with channel A2, while in Europe Band I starts with channel E2 – not to forget the French start with channel F2. Some may puzzle over the missing channels A1, E1 and F1. In past issues we've discussed the E1 allocation that was used during the formative days of European TV. The early days of American TV compare with those in the UK. A number of experimental stations were in operation in the mid-1930s. In 1936 the FCC issued several experimental licences to enable various bands to be tested, including 42-56 and 60-86MHz. Some of the stations used the 2.7-2.85MHz m.f. band for the accompanying sound. Stations permitted to test at v.h.f. were W2XAX (Atlantic Broadcasting Co.), W2XF (NBC, at 5kW) and W2XDR in New York City; W1XG (500W) in Boston; W9XD (500W) in Milwaukee; W3XE (1.5kW) and W3XEP (30kW, a very high power for that era, operated by RCA) in Philadelphia; Jackson and Iowa City also had low-power transmitters. Operation at 42MHz confirmed the feasibility of TV transmissions and the FCC subsequently allocated six channels, starting with A1 at 44-50MHz. Due to pressure from other services expanding into the v.h.f. bands the A1 allocation was withdrawn before it ever came into use for TV.

Italian Band I Private Stations

Dario Monferini (Milan) has sent us, via the BDXC, the following update information on private Italian Band I transmitters:

Ch. E2: Antenna Blu TV, Genova, Liguria; Tele Alta Italia Rete 90, Genova, Liguria (also relays Screensport).

Ch. IA: Audiovision, Milano, Lombardia; Baia del Sole TV, Savona, Liguria; D.J. Radio Television, Napoli, Campania; Quarta Rete TV, Torino, Piemonte; Telesettelaghi SRL, Varese, Lombardia.

Ch. IB: Tele Bari, Bari, Puglia; Telelibera, Perugia, Umbria.

Ch. IC: Rete 7, Torino, Piemonte; Telelibera, Perugia, Umbria.

Satellite News

By the time that this is read the Eutelsat II F3 satellite should have been launched into orbit at 16°E, with sixteen Ku band transponders. The Spanish pan-European service TVE International has been transferred from a superbeam to a widebeam via Eutelsat II F2 at 10°E. The frequency is

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Current consumption: Average, 55mA

Battery life: with 2Ah alkaline cells, approx. 36hrs with 500mAh Ni-Cad cells, approx. 9 hrs.

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11.149GHz (horizontal). This will give expanded coverage though domestic receivers will call for the use of an 80cm dish within the 47dBW contour and up to 1.2m within the 44dBW contour.

Scansat is testing Eurocrypt scrambling on its TV3S (Swedish) and TV3N (Norwegian) cable service feeds, with variations between in the clear, scrambled with and without access and conditional access. TV1000, also from Scansat, was at times in the clear during September whilst cable systems re-equip with Eurocrypt decoders.

Intelsat shuffles are as follows: VI F5, currently on test, will be at 25.5°W; VI F2 is moving from 24°W to 60°E; VA F15 is moving from 60°E to 18°W; V F6 is moving from 18°W to 50°W.

The fault with the C band Anik E-11 satellite has been corrected and it's to go into operation. After launch the main aerial system had failed to deploy. Canadian engineers spun the craft, at about 4.5 r.p.m., dislodging the jammed arm. This remote-controlled repair follows the recent success with the Olympus satellite, which was brought under control from earth after being almost a write off during the 76 days since the trouble started. It has been seen carrying TV again, with RAI-SAT.

The French "TV Sport" has been using Eutelsat II F1 at 13°E, the frequency being 12.708GHz with vertical polarisation. The UK "Sportscast" facility that provides a sports service coverage for clubs and pubs, mainly in the Midlands and NW, intends to expand its service nationwide: a transponder aboard Eutelsat II F3 has been leased.

Super Channel is for a trial period carrying the US originated Consumer News and Business Channel (CNBC) which receives its US link via Intelsat VI F4 at 27.5°W.

At the CD-I Launch

George Cole

During October Philips took a party of European journalists to the USA for the world launch of the Compact Disc Interactive (CD-I) system. It's a multi-media format that stores sound, pictures, text, animation and (soon) full-motion video on a 5in. compact disc. The system is described as interactive because the user can control and manipulate the mix of pictures and sound: Philips has coined the slogan "Television with a mind of its own - yours".

CD-I is being aimed at the consumer and educational markets. It will be launched in Japan at the end of the year and in Europe next year. The system is backed by Matsushita, Sony and Kodak who, with Philips, have developed a sub-format called Photo CD, enabling users to store photographs on a CD and view them via a TV set.

The launch took place on October 16th, at the Ed Sullivan theatre in New York. There was standing room only as some 700 members of the press, TV and publishing industries gathered for the event. Plenty of razzmatazz was laid on, with lasers, dry ice and guest presenters. Jan Timmer, Philips' Chairman and President, made the opening speech. He explained that CD-I was designed to be a "buy and play" system: consumers will buy a deck, plug it into their existing TV and hi-fi systems and play the discs, using a remote control handset.

It was interesting to note that the CD-I deck is being sold under the Philips name rather than the company's usual US brand name Magnavox. The company has decided to adopt an aggressive marketing campaign which will raise its profile in the USA. There was plenty of literature around telling how Philips had developed the audio cassette, the laser video disc and, with Sony, the compact disc. Unlike the Laser disc, CD-I is all-digital. This means that the discs can be bought and played anywhere.

First CD-I Deck

The first CD-I deck is the Philips CDI901. It looks like an upmarket CD player or VCR. A Motorola M68070 microprocessor is used to process and interleave the various items stored on the disc. There's 1Mbyte of RAM to store the data, 8Kbytes of non-volatile RAM to store user information such as the score for a game or quiz when the power is switched off, and 512Kbytes of ROM for the operating systems. The CD-I has a signal-to-noise ratio of over 50dB. It offers six video modes, from Delta YUV which gives photographic images with up to 16 million colours to run-length encoding, a digital compression system that offers just eight colours but is fine for cartoon animation. There are four audio modes providing CD to a.m. quality sound. The CDI901 measures 16.6 x 3.5 x 15.8in. and is operated with a "thumbstick" remote control (this looks like a remote control handset combined with a tiny joystick) or a computer mouse, joystick and kids' controller. The latter is a large, bright control unit with large buttons and a trackerball.

The CDI901 will play many types of compact disc, including 3 and 5in. audio CDs, CD-I discs, CD-I Ready discs (these have an audio portion that can be played via a normal CD deck and pictures/text that can only be seen

using a CD-I deck), CD-plus-Graphics discs and CD-ROM-XA (CD-I with extended architecture ROM) bridge discs. The latter can be used with CD-I decks and specially adapted CD-ROM drives or players. Several types of bridge discs are planned, including Photo CDs, games discs for a new type of Nintendo player, and 3in. CD-ROM "electronic book" discs that can be played on CD-I decks and hand-held CD-ROM units.

The first machines will be "full-motion video ready". Philips has been waiting for the international digital full-motion video standard (known as MPEG) to be finalised and for chipsets to be produced - they should be available next year. Existing CD-I deck owners will then be offered an upgrade cartridge that slots into the back of the player. Its price has not yet been decided.

Marketing

The CDI901 is being sold as "The Imagination Machine", partly because most consumers won't know what interactivity means and partly because it neatly points to the fact that users need no longer sit passively in front of their TV sets. CD-I isn't the first consumer multi-media format: Commodore launched its CD-TV system earlier this year, but so far it has sold poorly and few shops seem to stock it. The suggested retail price of the CDI901 is the equivalent of about £625, though most shops seemed to be selling it at a price of around £500.

Philips is spending nearly £16m on promotion, which includes press and magazine advertising and 1,000 CD-I kiosks. These, sited in retail stores throughout the country, allow potential purchasers to play CD-I material and experience interactivity. Several thousand in-store demonstrators have been trained. CD-I is initially available in some 2,000 retail outlets across the USA. In addition Tandy is planning to stock Memorex-branded players (made by Philips) in 750 of its Radio Shack stores. Around thirty CD-I titles were available at the launch. This catalogue is to be extended to fifty by Christmas. The discs sell at prices from the equivalent of £13 to £30. Knowing that a good range of software is vital for the success of the CD-I system, Philips has formed the US CD-I Association, a consortium of publishers and producers etc. whose aim is to develop and exploit the system's potential.

Support Systems

The US trip included visits to Optimage in Des Moines and Philips Interactive Media America (PIMA) in Los Angeles. Optimage is a joint venture between Philips, Microware and Sun Microsystems, originally set up in 1988. Microware developed the OS9 operating system, a version of which is used by CD-I players - it's called CD-RTOS (CD Real Time Operating System). Optimage's main aim is to design and develop authoring equipment. It has launched Media Mogul, a CD-I authoring system designed for non-programmers. Optimage is an impressive operation: it has succeeded in making CD-I production faster, simpler and cheaper. PIMA was formed in 1986, under the name American Interactive Media (AIM). Its purpose is to develop and publish CD-I titles.

A number of major publishers including Time-Life, Maxwell Communications, Hanna-Barbera, Polygram (which is owned by Philips) and Bertelsmann are backing the CD-I system. The first discs include sport, children's interest and arts titles. PIMA receives digital master tapes from producers and tests them. This process takes one-two weeks. During our visit we saw twenty people sitting in

booths trying out discs. The testers report on any bugs, for example poor quality colour, and whether the disc does what it should. After correction, the producer submits a second version to PIMA. The testing cycle is very labour intensive and it's hard to see how it could be automated. This is bound to affect the cost of CD-I discs.

Sony plans to launch a portable CD-I unit and several karaoke CD-I discs next year. Matsushita and Sony are producing CD-I Ready discs. Will CD-I be a success? Its progress will be slower than that of the audio CD, but when consumers see what it offers them the system should really take off.

TEST CASE

348

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.

The looks of portable sets don't date much and they are often used as "second sets", not putting in as many hours' use as the main TV receiver. Thus 14 and 16in. sets that are still capable of giving bright, sparkling pictures after ten or more years' use are regularly seen in the workshop. One such set was an ITT CP0341/1 (CVC801 chassis) which was having a hard time of it on the corner bench near the door. A succession of resounding bangs echoed around the service department. They were produced by a Certain Engineer who had hold of a 220 μ F, 385V electrolytic and was alternately dabbing it across the mains bridge rectifier's reservoir capacitor C658 then discharging it to the metal chassis rib. It's not hard to guess that the symptom was a horizontal hum bar across the screen!

The remnant of picture that was present was very distorted and torn. Also the set would tune to only the lower u.h.f. channels, even with the presets screwed as far as they would go. Certain Engineer had convinced himself that the horizontal black bar was caused by mains-rate hum. Hence the crash and bang session, which in fact had virtually no effect on the symptom.

Since there was only a single hum bar across the screen it was suggested that the mains bridge rectifier D654-7 might have an open-circuit leg, thus giving a 50Hz output. An oscilloscope check proved that the ripple at C658 was in fact at 100Hz and had a mere 6V peak-to-peak amplitude. Tests at C757, which smooths the 110V output from the chopper power supply, proved that the power supply was working correctly. Attention was next turned to the receiver section's output signal. This section of the set consists of a module which incorporates the tuner and the i.f. strip. At TZ23, where it emerges, the video output waveform was seen to have a huge field-rate hump and much line-rate hash superimposed on it. The next check

was at TZ14, where the 12.6V supply enters the module. The voltage was correct and there was only a small – a few tens of millivolts – line-rate ripple on it. A large capacitor – CE is very handy with them – was connected between TZ14 and chassis. This smoothed the supply completely but did nothing for the picture fault. So it appeared that the cause of the trouble lay within the receiver module. Unfortunately it's not easy to work on the module with the set operational, because it plugs into only one side of the PCB and is completely screened by a metal can.

CE looked at the circuit diagram of the module. He noted a couple of likely culprits in the a.g.c. circuit, C212 and C209. Before going to get replacements he checked whether there was a complete module in the basement scrapyard. No luck. On his return with the two capacitors he hoped would cure the fault he found that coffee had arrived and that a colleague was sitting at the bench watching the defective picture with interest. The scope waveforms and voltage readings were discussed, and the fault's effect on the screen was examined. When the aerial lead was disconnected the display reverted to snow, without any sign of the hum bar.

Maybe this new clue reinforced the argument that it was an a.g.c. problem, maybe not. Anyway they got to work again with the oscilloscope, and by the time the coffee was finished the cause of the fault had been discovered. What was the culprit? Was it in the receiver module or elsewhere? Would CE have found it more quickly had he at the outset taken full account of all the symptoms? For the answer and a further test case puzzle, see next month.

ANSWER TO TEST CASE 347 – page 50 last month –

It's a pity that Real Technician didn't take a careful look at the top of the tape deck while the fault he was dealing with in a Toshiba V81 was present. When servicing, time spent closely examining faulty equipment is seldom wasted.

The problem had been (the machine had put itself right while on test) that the tape moved much too fast, giving the same on-screen effect as the cue mode but with the sound unmuted – it was high-pitched and squeaky. RT had jumped to the conclusion that the capstan motor's speed was too high. In fact the capstan rotated at the correct speed throughout, confirmed by its correct supply voltage. So if the capstan speed was correct, how could the tape be travelling along at high speed? How about if the pinch roller wasn't in contact with the tape? This is what was happening, and would have been obvious from a careful look at the deck while the machine was running in the fault condition. The tape was being pulled along by the reel-drive system alone: realisation of this would have saved all that painstaking prodding, poking and measuring in the servo circuit.

There are several reasons, mostly mechanical, for a pinch roller not pulling in. In this case the mode/cam switch SM61 was responsible.

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FLOPPY DISCS. Pack of 15 3 1/2" DSDD £10.00 ref 10P88. Pack of 10 5 1/4" DSDD £5.00 ref 5P168R

SONIC CONTROLLED MOTOR One click to start, two click to reverse direction. 3 click to stop! £3.00 each ref 3P137R

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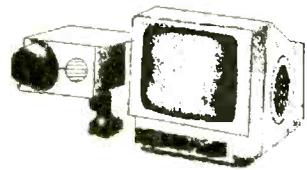
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| AN6341 £2.75 | BA6239 £3.75 | LA1436 £1.50 | M5213L £3.10 | SAA5000 £3.00 | STK5476 £6.00 | TA7325P £1.50 | TDA1510A £3.20 | TDA3810 £2.90 | UC1458 £1.95 | 2SD1391 £4.20 |
| AN6344 £6.50 | BA6259 £3.00 | LA1437 £1.50 | M52184 £1.00 | SAA5000 £3.00 | STK5481 £5.00 | TA7328 £2.80 | TDA1512 £1.00 | TDA3950 £3.00 | UC1458 £1.95 | 2SD1391 £4.20 |
| AN6345 £4.50 | BA6301 £2.00 | LA1440 £1.90 | M52314 £1.10 | SAA5012 £6.60 | STK5482 £5.20 | TA7335 £1.50 | TDA1515A £2.50 | TDA440 £2.00 | UC1520CA £2.48 | 2SD1398 £2.25 |
| AN6346 £4.50 | BA6302A £1.80 | LA1440 £1.90 | M52314 £1.10 | SAA5012 £6.60 | STK5482 £5.20 | TA7335 £1.50 | TDA1520 £3.95 | TDA4420 £2.45 | UC1520CA £2.48 | 2SD1426 £4.50 |
| AN6359 £5.50 | BA6304 £1.70 | LA1412 £2.00 | M54519P £1.00 | SAA5020 £5.80 | STK5482 £5.20 | TA7335 £1.50 | TDA1670A £2.60 | TDA4422 £3.95 | UC1539 £1.50 | 2SD1453 £1.60 |
| AN6360 £3.75 | BA6305 £1.75 | LA1410 £1.70 | M54543 £1.75 | SAA5030 £3.00 | STK5482 £5.20 | TA7335 £1.50 | TDA1701 £3.00 | TDA4500 £3.80 | UC1539 £1.50 | 2SD1455 2SD1730 £3.10 |
| AN6362 £4.25 | BA681 £0.90 | LA1460 £1.25 | M54544 £1.85 | SAA5040A £5.00 | STK6972 £6.00 | TA7350 £2.10 | TDA1770A £3.00 | TDA4501 £4.00 | UC1539 £1.50 | 2SD1496 £4.00 |
| AN6387 £5.50 | BA7001 £1.90 | LA1482 £2.10 | M54548 £4.50 | SAA5040B £9.90 | STK7216 £6.10 | TA7358 £1.50 | TDA1870A £2.60 | TDA4503 £4.50 | UC1539 £1.50 | 2SD1497 £2.60 |
| AN6388 £2.20 | BA718 £1.80 | LA1483 £2.75 | M5497P £4.75 | SAA5041 £9.50 | STK7308 £7.00 | TA7358 £1.50 | TDA1908A £1.75 | TDA4505 £3.95 | UC1539 £1.50 | 2SD1497 £2.60 |
| AN6391 £1.10 | BA728 £1.10 | LA1483 £2.75 | M5497P £4.75 | SAA5050 £14.00 | STK7309 £7.00 | TA7607AP £2.40 | TDA1940 £1.80 | TDA4510 £3.40 | UC1539 £1.50 | 2SD1497 £2.60 |
| AN6391 £1.10 | BA728 £1.10 | LA1483 £2.75 | M5497P £4.75 | SAA5050 £14.00 | STK7309 £7.00 | TA7607AP £2.40 | TDA1940 £1.80 | TDA4510 £3.40 | UC1539 £1.50 | 2SD1497 £2.60 |
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| AN | | | | | | | | | | |

A.Z. ELECTRICS

Stock items despatched by return

Access & Visa Accepted

| | | | |
|------------------------|-------|-------------|--------------|
| TD8180 ORIGINAL | | | £9.50 |
| TRANSISTORS | | | |
| BC184 | £0.09 | BD24C | £0.30 |
| BC212 | £0.09 | BD278A | £0.30 |
| BC213 | £0.09 | BD434 | £0.30 |
| BC214A | £0.07 | BD508 | £0.30 |
| BC214B | £0.07 | BF195 | £0.07 |
| BC214L | £0.09 | BF195 | £0.15 |
| BC237 | £0.07 | BF197 | £0.15 |
| BC238 | £0.07 | BF198 | £0.17 |
| BC307 | £0.12 | BF199 | £0.14 |
| BC308B | £0.07 | BF244 | £0.40 |
| BC327-25 | £0.07 | BF259 | £0.22 |
| BC328-40 | £0.05 | BF422 | £0.15 |
| BC337 | £0.07 | BF458 | £0.22 |
| BC372 | £0.05 | BF459 | £0.22 |
| BC392 | £1.50 | BF469 BF471 | £1.00 |
| HC441 | £0.25 | BF471 | £0.25 |
| HC461 | £0.25 | BF471 | £0.25 |
| BC548 | £0.07 | BF870 BF472 | £0.50 |
| BC549 | £0.07 | BF870 | £0.50 |
| BC557 | £0.30 | BU108 | £0.75 |
| BC559B | £0.07 | HU126 | £0.70 |
| BC5639 | £0.18 | BU208 | £1.00 |
| BC5640 | £0.30 | BU208A | £1.00 |
| BD131 | £0.50 | BU208B | £1.00 |
| BD132 | £0.40 | BU208T | £1.00 |
| BD137 | £0.35 | BU208T | £1.00 |
| BD237 | £0.22 | (TOSHIBA) | |
| BD238 | £0.22 | | |
| BD243B | £0.30 | BU326A | £1.00 |
| BD243C | £0.40 | | |

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| BELT KITS | | | |
| Bell Kits for most models are stocked. Some examples are: | | | |
| AKAI | | | |
| VS1 2.5 | 1.20 | | |
| VS4 6.9 15 | 1.10 | | |
| Ask for models not listed. | | | |
| AMSTRAD | | | |
| TVR1 2.3 VCR4600 | | | |
| NV230 250 280 370/380 | 1.90 | | |
| 430 450 460 465 485 630 | | | |
| 810 830 850 870 890 | 1.60 | | |
| NV300 330 332 333/430 | | | |
| 366 | 1.60 | | |
| NV700 7200/2000 | | | |
| 2010 | 1.50 | | |
| Ask for models not listed. | | | |
| PHILIPS | | | |
| VR6367/6467/6561/6751/6760 | 2.25 | | |
| VR640 6920 6520 | 2.40 | | |
| Ask for models not listed. | | | |
| FISHER | | | |
| FVHP520 530 | 1.00 | | |
| FVHP615 620 622 710/711/715/716 720/721/725 830 | | | |
| 840 | 1.00 | | |
| FVHP905 906 907 908 910/911 915/916 | 1.20 | | |
| SHARP | | | |
| VCF3VCA02 500 571/581/582/583 584/585 | 1.10 | | |
| 460 | 0.65 | | |
| VC9300 9500 9700 | 1.95 | | |
| VC8000 8300 | 1.95 | | |
| 265 267 | 2.20 | | |
| Ask for models not listed. | | | |

MODE CONTROL MOTORS
 Ferguson 3V42, 43, 44, 45, 48, 49, 52, 53 £6.00
 Ferguson 3V58, 59, 65, FV10, 11, 12, 13, 14, 20, 21, 22, 26 £4.50
Sharp Reel Motor Pulley only £1.20
 Replacement of plastic pulley on a number of Sharp Reel Motors with the above metal pulley gives better rewind/FF performance.

REMOTE CONTROLS
 Ferguson, Grundig, I.T.T., Philips, Pye, Sony, Hitachi, Matsui, Logik, Panasonic, Saisho, Salora, Samsung, Tashiko, Tatung, Toshiba Various models TV & Video From £14.50
MANY HITACHI TV REMOTE CONTROLS NOW IN STOCK.
SONY REMOTE CONTROL RUBBER PADS. STATE MODEL FOR PRICE.

IDLER ASSEMBLIES
FERGUSON
 Take up Clutch (Mechanical models) £5.00
 3V29/30 Take up Idler £2.00
 3V29/30 Take up Clutch £2.85
 3V29/30 Reel Idler £3.00
 3V35 Reel Idler £3.00
 3V35, 36, 38, 39 Take up Clutch £2.85
 3V58, 59, 64, 65, FV10, 11, 12, 13, 14 Idler Arm £1.80
 Clutch Assembly 3V44, 45, 48, 49, 52, 53. 54 55 £14.00
 Clutch Assembly 3V42, 43 £14.00

New Additions
 Universal Remote Control £25.00
 Sony type RC670, RM670, RM673 £15.50
 Sony type RC661, RM652, RM654, RM657 £15.50
 RM663, RM664, RM651 £15.50
 Panasonic Models TC2110, 2255, 2655, 2680 TX1752, 2251, 2656, 5500 £14.50
 Panasonic Models TC1632, 1642, 2232, TX2034, 2044, 2200, 2234, 2244, 2636, 3300 £14.50

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| DIODES AND THYRISTORS | | | |
| BA157 | £0.07 | BY206 (BY96R) | 0A91 £0.20 |
| BR100 | £0.20 | OT112 | £2.20 |
| BR101 | £1.40 | BY210/800/BY96 | RGPI5G £0.45 |
| BR103 | £0.75 | BY227 | £0.55 |
| BR303 | £1.50 | BY227 | RGPI5K £0.35 |
| BR556 | £0.75 | BY228 | £0.50 |
| BT116 | £2.50 | BY229 | £1.15 |
| BT128P | £4.50 | BY299 | £0.50 |
| BT129P | £4.50 | BY300 | £0.50 |
| BT151 800R | | BY96D | £1.00 |
| | £1.75 | BYW56 | £0.50 |
| | £0.20 | BYW96 | £0.50 |
| | £0.08 | BYX10 | £0.50 |
| | £0.20 | BYX5/600 | £0.55 |
| | £0.90 | FD206 | £1.50 |
| | £1.64 | SKB202 | £1.00 |
| | £0.90 | IN4002 | £0.06 |
| | £1.10 | IN4004 | £0.10 |
| | £1.10 | IN4005 | £0.10 |
| | £1.10 | IN4006 | £0.08 |
| | £2.00 | IN4148 | £0.10 |
| | £2.00 | IN5408 | £0.25 |

GRUNDIG
 VS400/410/440/450/460 0.65
 VS180/200/220/262/265/267 2.20
 Ask for models not listed.

Many other belt kits in stock. Examples are Alba, Funai, GEC, Goldstar, Granada, Grundig, Hinari, I.T.T., Mitsubishi, NEC, Orion, Saisho, Samsung, Schneider, Sony, Tensai etc.

NEW LINES
 LOPT Hitachi CPT1476 £18.00
 LOPT Hitachi CPT2276 etc £19.00
 LOPT Matsui 1440 £18.00
 Trip Grundig CUC2401 etc £17.00

OTHER GRUNDIG TRIPPLERS IN STOCK
LINE OUTPUT TRANSFORMERS
 Decca 100 9.50
 I.T.T. CVC20 12.50
 I.T.T. CVC25/30/32 9.50
 I.T.T. Compact 80 Series 110 16.75
 I.T.T. Compact 80 Series 90 19.75
 I.T.T. CVC45 18.00
 I.T.T. I109F 14.00
 I.T.T. CVC1204 11.50
 I.T.T. CVC800/1/3 21.50
 I.T.T. CVC1100 16.50
 I.T.T. CVC1150/1175 20.00
 I.T.T. 6325 18.50
 I.T.T. 3546 18.50
 I.T.T. 1200.1 20.00

FISHER
 FVHP615, 905, 910, Idler Assembly Original £5.00
 FVHP615 Gear Idler Assembly £4.35
 FVHP905, 910 Gear Idler Assembly £5.00
 FVHP520, 530 Idler £3.00
 FVHP520 530 Pulley £0.70

HITACHI
 VT11 33 etc. Original Idler Arm £2.50
 VT11, 33 etc. Idler Replacement £1.75
 VT9300, 9500 etc. Play Idler £3.65
 VT9300, 9500 etc. F/F Idler £2.95
 VT9300, 9500 etc. Idler £2.95
 VT8000, 8500 etc. F/F Rew Idler £2.95
 VT800, 8500 etc. Play Idler Assembly £3.00
 VT8000, 8500 etc. F/F Rew Pulley £0.70
 VT11, 33 etc. Clutch Assembly £8.00

PHILIPS
 VR6460, 6920 Idler Arm (Original) £3.00
 DV464, 6462, 6463, 650 etc. Idler Mod. Kit £4.50
 VR6542, 6843 Reel Idler £6.50
 VR6542 Reel Drive Pulley £7.75
 VR6843 Reel Drive Pulley £9.50

PANASONIC (All Original)
 NV370 Idler Arm Unit VXP0521 Gen. £3.00
 NV8600, 8610 Play Idler VXP0243 £0.95
 NV332, 777, 788 Idler Unit VXP0463 £3.00
 NV600, 688 Idler VXP0515 £3.00
 NV333, 366 Idler Arm 2 Unit VXL0997 £10.50
 NV8400, 8600, 8610 etc. VXP0245 £0.95
 NV333, 366 etc. Idler VXP0401-NV700, 7200, 7800 Idler VXP0344 £0.90
 NV2000, 3000 Play Idler VXP0331-1 £1.10
 NV2000, 3000 Idler Unit VXP0329 £1.10
 Back Tension Bands From £1.50
 All Panasonic Maintenance Kits POA

VIDEO HEADS

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| AMSTRAD | | | |
| 3HSSR-VCR7000 (Saisho/Orion) | | | £18.00 |
| PSF1-VCR4500, 5200, 9000 | | | £15.00 |
| PSF2-VCR4600, 4700 | | | £15.00 |
| PSF3-VCR6000 | | | £21.50 |
| FERGUSON | | | |
| 3HSSV-2 Head universal | | | £7.50 |
| 3HSSVA-3V42, 44, 45, 46 etc | | | £20.00 |
| 3HSS4B-3V32/HR7655 | | | £25.00 |
| 3HSS4VC-3V48 HRD565 | | | £26.00 |
| 3V48, 59, 65, FV10, 11, 12, 13, 14, 20, 21, 26 | | | |
| And most other Fergusons | | | POA |
| HITACHI | | | |
| 3HSSHA-VT800, 9000 series | | | £17.00 |
| 3HSSHB-VT11, 33 etc | | | £17.00 |
| 10082-VT120, 220 | | | £29.00 |
| 10081-VT130, 135 | | | £30.50 |
| PANASONIC | | | |
| 3HSSN-2 Head universal | | | £7.50 |
| 3HSSUN-NV100, 370, 380/Philips VR6460 | | | £11.00 |
| 3HSSUN-NV230, 470, 480, G9, 10, 11, 15PX | | | £21.00 |
| 3HSSU3N-NV430, 460 | | | £16.00 |
| 3HSS3N-NV777, 330 | | | £18.50 |
| 3HSS4NB-NV730 | | | £26.00 |
| 3HSS4NA-NV366 | | | £24.00 |
| NV630, 33, 40, 45, 46, 130, & most other Panasonics | | | POA |
| SANYO | | | |
| 3HSSSY-VHR1100, 1110, 1300 | | | £20.00 |
| 3HSS3SY-VHR1500 | | | £34.00 |
| SHARP | | | |
| 3HSSSP-VC9300, 9500, 9700, 381, 481, 482, 483, 486 etc | | | £17.00 |
| 3HSSSPB-VC581, 583, 651, 670 etc | | | £17.00 |
| VC7000, 8000 series (Brass) | | | £42.00 |
| OTHER MAKES | | | |
| Alba 4000, Goldstar 8000, Sentra 8000, 1000 | | | £22.50 |
| Fisher FVHP510, 520, 530, 615, 710 etc | | | £18.00 |
| Fisher VBS7000, 9000 etc | | | £25.00 |
| Hinari VXL2, 4, 3, 20, 25 | | | £18.00 |
| Hinari VXL5, 6, 20H | | | £15.00 |
| Mitsubishi HS306, 710 | | | £30.00 |
| Orion VC150, 180, VHI, 2, 3 etc | | | £18.00 |
| Saisho VR100, 605, 705, 805, 905 | | | £18.00 |
| Samsung Universal 2 Head | | | £24.25 |
| T o s h i b a | | | |
| V71, 73, 74, 75, 81, 82, 83, 84, 85, 87 | | | £20.00 |
| Toshiba V93 | | | £21.00 |

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|---|--|--|--------|
| REEL MOTORS | | | |
| Ferguson 3V29/30 | | | £20.00 |
| Ferguson 3V58, 59, 65, FV10, 11, 12, 13, 14, 20, 21, 22 | | | £17.25 |
| Ferguson FV260 | | | £14.50 |
| Hitachi 8000, 8300, 8500 | | | £8.50 |
| Sanyo VTC5000, 5150, 5400, 5300, 6500 | | | £7.50 |
| Sharp VC9300, 9500 etc. Original | | | £15.00 |
| Panasonic NV333, 366 Original | | | £13.20 |
| All other Panasonics | | | POA |
| CAPSTAN MOTORS | | | |
| Ferguson 3V35, 36 Original | | | £22.50 |
| Ferguson JVC (Mechanical models) | | | £20.00 |
| Hitachi VT11 Original | | | £30.00 |
| Hitachi VT33 Original | | | £32.00 |
| Hitachi VT64 Original | | | £19.75 |
| Hitachi VT8000 series Original | | | £34.50 |
| Hitachi VT9000 series Original | | | £34.50 |
| Sharp VC7000 series Original | | | £30.50 |

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 Fidelity Panel for ZX2000 1.00
 Fidelity 22" ZX3000 24.50
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 Philips KT3 12.95
 Rank Bush T20A 11.50
 Thorn TX100 Green Spot 110 16.75
 Ferguson TX90 LOPT 17.75
 Ferguson 3V35/36 Mains Transformer 23.00
 Ferguson 3V44/44.45 Mains Transformer 18.85

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 Idler VHR1100, 1300, 1500 £5.50
 Idler VHR2100, 2300, 2500, 2700 £5.50
 Reel Drive Pulley Unit VTC5000, 5150, 6500 £5.00
 Idler Roller Assembly VTC5000, 5150, 6500 £2.25

SHARP
 Idler VC9300, 9500 etc. £1.75
 Idler VC481, 581 etc. £1.95
 Idler (original) VC9300, 481, 581 etc. £3.50
 Idler Assembly (original) VC651, 681, 685 £6.50
 Idler Assembly (original) VC780, 781, 785, 787, 793, VCT72 £6.50

OTHER SPARES

Universal Video Copying Kit £4.25
 Universal Copying Kit (Scart) £5.20
 Universal Camcorder Kit £6.90
 Video Cassette Lamps from £0.50
 CRT Anode Caps £0.60
 Video Tape Splicing Kit £6.95
 Hitachi TV Frame Module HM6251 £5.50
 Hitachi TV Frame Module HM6232 £5.50
 Cassette Housing Assembly Ferguson 3V35, 36, 38, 39, 42, 43, 44 £25.25
 Cassette Loading Roller Assembly 3V23, 3V31, 3V32 £3.50
 Philips 1.2V Back up Battery £1.75
 Philips 2.4V Back up Battery £2.80
 5.5V Back up Cap £1.85
 Degaussing Positor Blue £3.00
 Degaussing Positor White £1.30
 Cassette Housing Assembly Hitachi VT11 £19.50
 End Sensor for Hitachi VT63, 64, 65 (Pair) £2.75
 Cassette LED Sensor for Panasonic etc £1.60
 I. C. Circuit Protectors £0.60
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 Cassette Housing Modification Kit for Sharp VCA113HM Series Includes cassette switch and star sensor PCB. Fault symptom No eject & intermittent load/unload £6.50
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 Video Washer & E Clip Kit £5.50
 Universal Video head Puller £16.00

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RESISTORS, ELECTROLYTIC CAPACITORS, FUSES ETC. NOW IN STOCK.

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THIS MONTHS TECHNICAL TIP
 Fault symptom of no picture and/or colour on some Goldstar or Boots portable TV's. Replace ICU8060B with equivalent ICTDA3561A. No telephone calls for technical advice please!

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|---------|-------|----------|-------|------------|-------|----------|-------|-----------|-------|-----------|--------|----------|-------|--------|-------|
| AN3215K | £4.50 | AN7172K | £2.95 | HAI11713 | £3.50 | LA4178 | £2.75 | PLLO2A | £5.00 | STK5325 | £6.75 | TA7628P | £1.95 | BFR91 | £1.20 |
| AN3312 | £2.95 | AN7173K | £3.50 | HAI11714 | £3.50 | LA4180 | £1.95 | SA1124 | £1.95 | STK5332 | £3.50 | TA7640AP | £1.95 | BFY99 | £0.50 |
| AN3320K | £4.95 | AN7176 | £1.95 | HAI11715 | £3.50 | LA4182 | £1.95 | SA5030 | £2.50 | STK5337 | £2.75 | TC9106BP | £4.95 | BRV56 | £0.20 |
| AN3821K | £5.95 | AN7470 | £2.20 | HAI11717 | £4.75 | LA4190 | £1.75 | SA5042 | £8.00 | STK5421 | £6.50 | TD10110 | £1.40 | BU208A | £1.00 |
| AN3822K | £6.95 | BA1335 | £2.50 | HAI11718 | £4.75 | LA4192 | £1.75 | STK5422 | £6.50 | STK5422 | £6.50 | TD10111 | £1.40 | BU208D | £1.30 |
| AN5010 | £3.95 | BA1355 | £2.20 | HAI11724 | £8.00 | LA4201 | £1.60 | STK5451 | £3.50 | STK5451 | £3.50 | TD10115 | £1.50 | BU326A | £1.20 |
| AN5011 | £3.95 | BA5102A | £2.50 | HAI11727 | £8.50 | LA4260 | £2.30 | STK5471 | £3.50 | STK5471 | £3.50 | TD1170N | £1.50 | BU406 | £0.95 |
| AN5030 | £4.50 | BA5115 | £2.50 | HAI11736 | £6.50 | LA4261 | £2.20 | STK5481 | £2.75 | STK5481 | £2.75 | TD1170S | £1.50 | BU407 | £0.70 |
| AN5032 | £1.75 | BA6129 | £2.20 | HAI11750 | £5.00 | LA4446 | £2.20 | STK435 | £2.75 | STK435 | £2.75 | TD1500 | £4.95 | BU408 | £0.80 |
| AN5071 | £1.20 | BA5402A | £2.50 | HAI11745 | £5.75 | LA4280 | £2.95 | STK0029 | £4.75 | STK0029 | £4.75 | TD1510 | £3.60 | BU426A | £0.70 |
| AN5153K | £3.95 | BA5406 | £1.50 | HAI11745NT | £7.00 | LA4420 | £1.50 | STK0039 | £4.75 | STK5275 | £4.25 | TD1510S1 | £3.95 | BU426E | £0.70 |
| AN5150 | £5.50 | BA5408 | £2.20 | HAI11747A | £7.50 | LA4422 | £1.50 | STK0040 | £4.25 | STK5275 | £4.25 | TD1515A | £2.50 | BU500 | £1.50 |
| AN5151N | £5.50 | BA6104 | £2.20 | HAI11747AT | £7.50 | LA4440 | £2.50 | STK0049 | £5.50 | STK6732 | £1.75 | TD1522 | £1.95 | BU508A | £1.00 |
| AN5256 | £2.20 | BA6119 | £1.60 | HAI11749 | £4.25 | LA4445 | £2.20 | STK433 | £5.25 | STK6732 | £1.75 | TD1770A | £2.95 | BU508D | £1.00 |
| AN5265 | £1.75 | BA6129 | £2.20 | HAI11750 | £5.00 | LA4446 | £2.20 | STK435 | £2.75 | STK7303 | £8.50 | TD2000 | £1.50 | | |
| AN5410 | £3.95 | BA6124 | £2.50 | HAI12002 | £1.95 | LA4460 | £1.80 | STK437 | £3.95 | STK7348 | £4.95 | TD2003 | £0.95 | | |
| AN5435 | £2.20 | BA6208 | £1.95 | HAI12003 | £2.20 | LA4461 | £1.80 | STK443 | £8.50 | STK7404 | £6.95 | TD2004 | £1.95 | | |
| AN5436 | £2.20 | BA6209 | £1.95 | HAI12045 | £3.25 | LA4465 | £2.30 | STK457 | £7.50 | STK8050 | £9.50 | TD2005 | £1.95 | | |
| AN5510 | £2.75 | BA6218 | £1.95 | HAI12016 | £3.75 | LA4466 | £2.30 | STK459 | £7.75 | STK8250 | £9.50 | TD2006 | £1.50 | | |
| AN5512 | £2.95 | BA6219 | £2.20 | HAI13001 | £1.90 | LA4500 | £2.50 | STK463 | £9.50 | STK8260 | £12.50 | TD2007 | £1.50 | | |
| AN5515 | £2.20 | BA6229 | £2.20 | HAI13007 | £1.50 | LA4505 | £2.80 | STK466 | £3.95 | | | TD2008 | £1.50 | | |
| AN5521 | £2.20 | BA6238A | £1.95 | HAI13119 | £2.50 | LA4508 | £2.50 | STK1050i | £7.25 | | | TD2010 | £1.50 | | |
| AN5610N | £4.50 | BA6239A | £2.20 | HAI13118 | £2.75 | LA4510 | £1.75 | STK1060 | £7.95 | STR370 | £5.20 | TD2011 | £1.50 | | |
| AN5615 | £2.95 | BA6230A | £1.80 | HAI13403V | £5.50 | LA4520 | £1.50 | STK1070i | £9.75 | STR380 | £5.20 | TD2611A | £1.30 | | |
| AN5620K | £3.50 | BA6304 | £1.75 | | | LA4570 | £2.75 | STK2028 | £7.50 | STR381 | £5.20 | TD2653A | £3.50 | | |
| AN5622 | £3.20 | BA6305 | £1.95 | KA2101 | £1.95 | LA6358D | £1.50 | STK2029 | £5.50 | STR400 | £5.20 | TD2653B | £3.50 | | |
| AN5633 | £3.75 | BA6328 | £2.20 | KA2201 | £1.75 | LA7031 | £2.60 | STK2038 | £5.50 | STR410 | £5.20 | TD2653C | £3.50 | | |
| AN5700 | £1.75 | BA6411 | £2.20 | KA2212 | £1.20 | LA7032 | £2.95 | STK2048 | £6.75 | STR411 | £5.20 | TD2653D | £3.50 | | |
| AN5701 | £1.20 | BA7005 | £2.20 | KA2216 | £1.20 | LA7042 | £2.80 | STK2125 | £6.75 | STR412 | £5.20 | TD2653E | £3.50 | | |
| AN5750 | £3.75 | BA7023L | £2.50 | KA2284 | £1.20 | LA7520 | £3.25 | STK2129 | £6.95 | STR413 | £5.20 | TD2653F | £3.50 | | |
| AN5753 | £1.95 | BA7751AL | £1.95 | | | LA7800 | £1.50 | STK2139 | £6.95 | STR414 | £5.20 | TD2653G | £3.50 | | |
| AN5900 | £2.20 | | | LA1130 | £2.50 | LA7801 | £1.50 | STK2155 | £6.95 | STR415 | £5.20 | TD2653H | £3.50 | | |
| AN5130N | £2.50 | EX8341 | £4.50 | LA1135 | £2.50 | LA7806 | £2.50 | STK2230 | £6.95 | STR416 | £5.20 | TD2653I | £3.50 | | |
| AN5136 | £1.95 | | | LA1140 | £2.50 | LA7808 | £2.75 | STK2340 | £6.95 | STR417 | £5.20 | TD2653J | £3.50 | | |
| AN5247 | £1.75 | HAI1196 | £1.75 | LA1150 | £1.75 | LA7820 | £2.75 | STK2350 | £6.95 | STR1095 | £4.95 | TD2653K | £3.50 | | |
| AN5250 | £1.50 | HAI1197 | £1.80 | LA1170 | £1.75 | LA7830 | £2.20 | STK3041 | £6.50 | STR1096 | £4.95 | TD2653L | £3.50 | | |
| AN5610 | £3.50 | HAI1199 | £1.50 | LA1185 | £1.60 | LA7831 | £2.50 | STK3042 | £6.50 | STR1097 | £4.95 | TD2653M | £3.50 | | |
| AN5626N | £3.50 | HAI1338 | £2.95 | LA1230 | £1.50 | | | STK3044 | £6.50 | STR1098 | £4.95 | TD2653N | £3.50 | | |
| AN5627 | £3.50 | HAI1339A | £3.50 | LA1231N | £2.00 | | | STK3062 | £6.75 | STR1099 | £4.95 | TD2653O | £3.50 | | |
| AN5628 | £3.50 | HAI1363 | £3.75 | LA1232 | £1.50 | | | STK3063 | £6.75 | STR1100 | £4.95 | TD2653P | £3.50 | | |
| AN5630 | £3.95 | HAI1372 | £3.50 | LA1365 | £1.50 | LB1403 | £1.50 | STK3102i | £6.75 | STR1101 | £4.95 | TD2653Q | £3.50 | | |
| AN5632 | £4.75 | HAI1377 | £2.20 | LA1385 | £1.95 | LB1416 | £1.50 | STK3152i | £6.75 | STR1102 | £4.95 | TD2653R | £3.50 | | |
| AN5634 | £3.75 | HAI1388 | £2.95 | LA1460 | £2.75 | LB1649 | £2.20 | STK4017 | £5.75 | STR1103 | £4.95 | TD2653S | £3.50 | | |
| AN5632N | £4.50 | HAI1392 | £2.20 | LA2000 | £1.75 | | | STK4025 | £6.50 | STR1104 | £4.95 | TD2653T | £3.50 | | |
| AN5644 | £4.75 | HAI1394 | £2.50 | LA2100 | £2.95 | | | STK4121i | £6.50 | STR1105 | £4.95 | TD2653U | £3.50 | | |
| AN5646N | £3.95 | HAI1396 | £2.95 | LA2101 | £2.95 | | | STK4122i | £6.50 | STR1106 | £4.95 | TD2653V | £3.50 | | |
| AN5656N | £3.85 | HAI1397 | £2.50 | LA2400 | £1.50 | LC7137 | £4.50 | STK4131i | £6.75 | STR1107 | £4.95 | TD2653W | £3.50 | | |
| AN5657N | £4.50 | HAI1398 | £2.50 | LA3101 | £1.75 | LC7363 | £4.50 | STK4132i | £6.75 | STR1108 | £4.95 | TD2653X | £3.50 | | |
| AN5659N | £3.50 | HAI1122W | £2.95 | LA3160 | £0.95 | LC7815 | £2.95 | STK4141i | £7.50 | STR1109 | £4.95 | TD2653Y | £3.50 | | |
| AN5660 | £2.50 | HAI1211 | £2.30 | LA3161 | £1.20 | | | STK4141v | £7.50 | STR1110 | £4.95 | TD2653Z | £3.50 | | |
| AN5662 | £4.50 | HAI1215A | £2.20 | LA3201 | £0.95 | | | STK4142i | £7.50 | STR1111 | £4.95 | TD2653AA | £3.50 | | |
| AN5671 | £3.25 | HAI1221 | £1.75 | LA3211 | £1.20 | LM1303N | £1.50 | STK4151i | £7.50 | STR1112 | £4.95 | TD2653AB | £3.50 | | |
| AN5687 | £3.50 | HAI1251 | £2.20 | LA3220 | £1.50 | LM3914N | £2.75 | STK4161i | £7.95 | STR1113 | £4.95 | TD2653AC | £3.50 | | |
| AN5692 | £1.50 | HAI1223W | £2.50 | LA3300 | £1.65 | LM3915N | £2.75 | STK4161i | £7.95 | STR1114 | £4.95 | TD2653AD | £3.50 | | |
| AN6610 | £1.80 | HAI11225 | £1.95 | LA3301 | £1.30 | | | STK4162i | £7.95 | STR1115 | £4.95 | TD2653AE | £3.50 | | |
| AN6617K | £4.95 | HAI1226 | £4.50 | LA3310 | £2.75 | | | STK4171i | £8.95 | STR1116 | £4.95 | TD2653AF | £3.50 | | |
| AN6676 | £3.50 | HAI1227 | £2.20 | LA3350 | £1.30 | M5218L | £1.95 | STK4172i | £8.95 | STR1117 | £4.95 | TD2653AG | £3.50 | | |
| AN6677 | £4.50 | HAI1235 | £1.95 | LA3361 | £1.95 | M5220 | £0.95 | STK4181i | £9.95 | STR1118 | £4.95 | TD2653AH | £3.50 | | |
| AN6816 | £2.50 | LA3370 | £2.95 | LA3370 | £2.50 | M51102L | £2.95 | STK4191i | £9.50 | STR1119 | £4.95 | TD2653AI | £3.50 | | |
| AN7062 | £1.75 | HAI1251 | £2.50 | LA3376 | £2.20 | M51104L | £2.20 | STK4192i | £9.50 | STR1120 | £4.95 | TD2653AJ | £3.50 | | |
| AN7106K | £2.50 | HAI1401 | £2.80 | LA3600 | £1.50 | M51358P | £1.75 | STK4332 | £4.50 | STR1121 | £4.95 | TD2653AK | £3.50 | | |
| AN7143 | £2.50 | HAI1423 | £2.20 | LA4030 | £2.50 | M51393AP | £4.50 | STK4352 | £5.90 | STR1122 | £4.95 | TD2653AL | £3.50 | | |
| AN7147 | £2.20 | HAI1440 | £2.95 | LA4031P | £1.95 | M51397AP | £5.50 | STK4793TV | £3.50 | STR1123 | £4.95 | TD2653AM | £3.50 | | |
| AN7148 | £2.30 | HAI1550 | £2.25 | LA4032P | £1.90 | M521403 | £1.90 | STK4803 | £3.50 | STR1124 | £4.95 | TD2653AN | £3.50 | | |
| AN7149N | £2.50 | HAI1552 | £2.50 | LA4100 | £2.50 | M51522L | £2.50 | STK4833 | £3.50 | STR1125 | £4.95 | TD2653AO | £3.50 | | |
| AN7156N | £2.50 | HAI1703 | £4.50 | LA4101 | £1.00 | M54543L | £1.75 | STK4843 | £9.95 | STR1126 | £4.95 | TD2653AP | £3.50 | | |
| AN7161 | £3.50 | HAI1704 | £5.20 | LA4102 | £1.40 | M54544L | £1.75 | STK4853 | £9.50 | STR1127 | £4.95 | TD2653AQ | £3.50 | | |
| AN7166 | £3.70 | HAI1705 | £5.95 | LA4110 | £1.75 | M54545L | £1.75 | STK5211 | £6.75 | STR1128 | £4.95 | TD2653AR | £3.50 | | |
| AN7168 | £2.75 | HAI1706 | £3.75 | LA4145 | £1.70 | M53730 | £2.20 | STK5314 | £6.75 | STR1129 | £4.95 | TD2653AS | £3.50 | | |
| AN7169 | £2.95 | HAI1710 | £3.75 | LA4160 | £2.20 | M53731 | £2.25 | STK5315 | £6.75 | STR1130 | £4.95 | TD2653AT | £3.50 | | |
| AN7171K | £3.50 | HAI1711 | £6.50 | LA4170 | £1.75 | M58841 | £5.75 | STK5324 | £6.75 | STR1131AP | £4.95 | TD2653AU | £3.50 | | |

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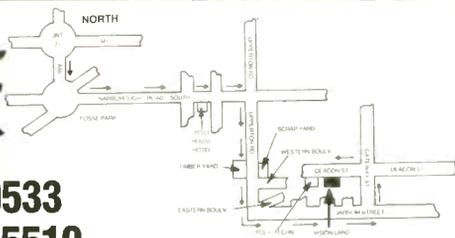
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| | Hitachi VT33 | £70 |
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but include handsets (where appropriate).

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ALL OUR LONG-DISTANCE CUSTOMERS**

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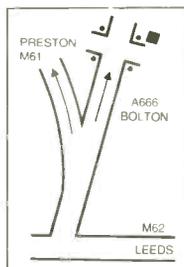
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12 Months Old

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from £129

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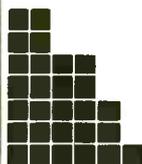
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IN DECEMBER FOR SHERRY AND MINCE PIES**

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GUARANTEED WORKING.

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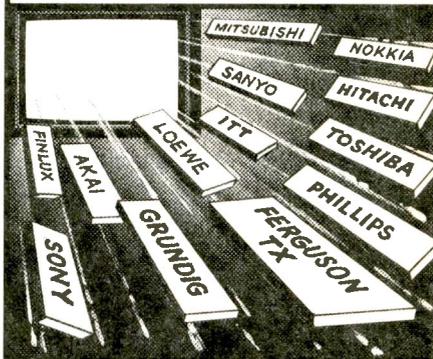
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TV or VCR**



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£55

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TX9-10
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CHEAP
COLOUR
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3V35
£80

PRICE IS
RIGHT COME
DOWN
NOW!

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£45

ALL PRICES
ARE SUBJECTED
TO V.A.T.

Only 10 Minutes Away from M5 Junction 1

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NOW UNDER NEW MANAGEMENT — KNOWN AS

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BASIC TV'S WORKING
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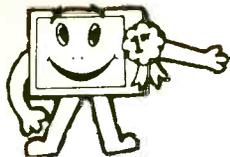
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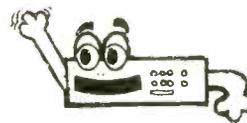
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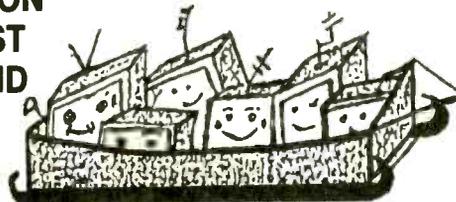
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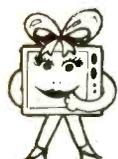
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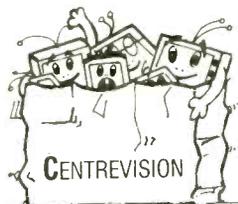


**Make
Your
Money
Go
Further
This
Christmas**

Merry Xmas and a Happy New Year to all our customers.



**THE LARGEST
WHOLESALE
IN WALES**



**SPECIAL
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i.e. or 51cm FAST TEXT WITH NICAM

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- 32 Function Remote ●

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Full remote control ● Digital Display on Screen ●
from £130

EX-RENTAL TVs

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3V29, 3V30...£55 QUANTITY...£50

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TOO MANY TO LIST

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NEW PHILEX UNIVERSAL REMOTE CONTROL
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MASSIVE ELECTRICAL AUCTION (Strictly to the Trade)

Of new returned TV, Video, Hi-Fi, Computers, P. Stereos, Cassette Recorders, Telephones, Camcorders, Satellite Receivers etc.

Also a large amount of part exchange and ex-rental TV and Videos

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£500,000's WORTH OF ELECTRICAL GOODS NOW IN STOCK!

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| CD Minis from | £50.00 |
| FST, Remote, Text TVs from | £50.00 |
| CD Players from | £33.00 |
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| Home Computers from | £40.00 |

NEW 'B' GRADE STOCK (VAT Exclusive)

| | |
|--|---------|
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| VHS Twin Speed Video Player | £95.00 |
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| Long Play, LCD, Remote VHS Videos | £135.00 |

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MERRY CHRISTMAS TO ALL OUR CUSTOMERS



LOOK OUT FOR NEXT MONTHS SPECIAL OFFER – 14" COLOUR TV

LOPTS

| | |
|--|--------------|
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|------------|-------|
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EX-RENTAL TV

| | |
|------------------------|--------------|
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| THORN TX10 Text | £50.00 |
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| THORN FST Basic R/C | From £85.00 |
| THORN FST Text | From £100.00 |
| THORN FST Stereo/text | £120.00 |
| DORIC MK3 | From £15.00 |
| FINLANDIA Basic | From £15.00 |
| FINLANDIA R/C | From £25.00 |
| FINLANDIA Text | From £45.00 |
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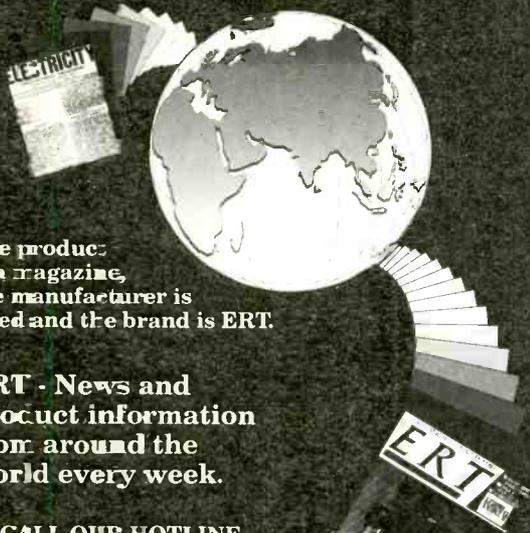
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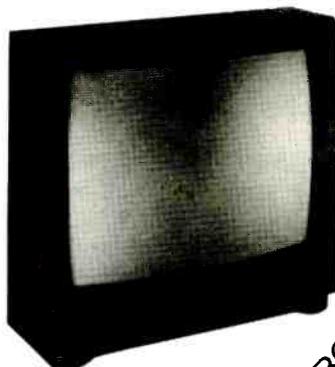
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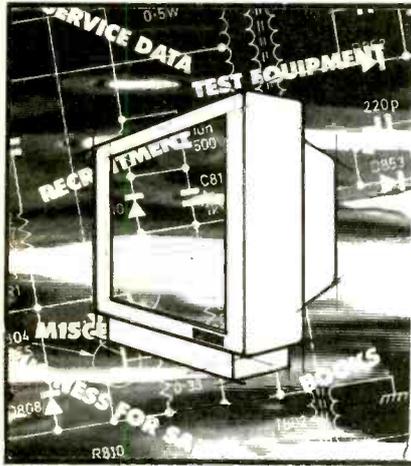


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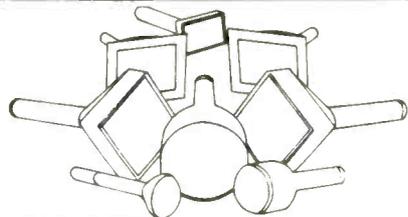
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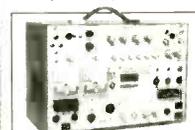
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| Receiver TX100 Panel I.C. No. SAB3035 —MAB8440P/D066 —SAA1060 —PCFR5711 | £6.00 | K4 Focus Pot £1.00 | U 19885 40p U 3832 15p U 3845 15p MR 508 10p MR 501 10p MR 502 10p BCW 71R 30p BYF 1202 10p BYF 1204 10p BYF 3126 40p BYF 3214 40p BYX 10 10p BYX 36/60 35p BYX 38/30 25p BYX 49/60R 75p BYX 55/501 £10.00 BYX 71/350 20p BYX 71/600 20p BYX 72/300 20p BYX 36/60 50p BYV 95B 10p BYV 95C 12p BYV 96D 10p BYZ 106 10p BPW 41 15p BYW 56.2A/1000V G11 8p BYW 29/50 15p BYW 95C 10p BZU 1524 54p BZY 93675 54p BZW 15/18 30p BZW 15/30 30p BZW 706v2 10p BZW 79.3v 10p | MC 301 front panel £5.00 MC 303 front panel £5.00 | |
| New Model Philips Meter | £20.00 | Fidelity Tube Base with transistor & focus pot £1.50 | U 19885 40p U 3832 15p U 3845 15p MR 508 10p MR 501 10p MR 502 10p BCW 71R 30p BYF 1202 10p BYF 1204 10p BYF 3126 40p BYF 3214 40p BYX 10 10p BYX 36/60 35p BYX 38/30 25p BYX 49/60R 75p BYX 55/501 £10.00 BYX 71/350 20p BYX 71/600 20p BYX 72/300 20p BYX 36/60 50p BYV 95B 10p BYV 95C 12p BYV 96D 10p BYZ 106 10p BPW 41 15p BYW 56.2A/1000V G11 8p BYW 29/50 15p BYW 95C 10p BZU 1524 54p BZY 93675 54p BZW 15/18 30p BZW 15/30 30p BZW 706v2 10p BZW 79.3v 10p | CMC 301 front panel £5.00 CMC 303 front panel £5.00 | |
| 7001 Hills Meter | £12.00 | Bush Tube Base on panel £1.00 | R 2305 50p R 2306 50p R 2322/2323 pair 80p R 2323 10p R 2396 10p R 2461 30p R 2430 30p R 2433-BD124 30p R 2540 40p R 2737 40p R 2738-TIP41 30p R 2775-TIP41 40p R 3129-TIP47 40p T 6068V 50p R 4051 10p S 2006B 80p S 2006B 80p S 2006B 80p S 25D098B 10p S 25C1942 10p | CMC 302 Panel with TC mains switch etc £5.00 CMD 800 Decoder £8.00 | |
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| BB 103 | 10p | H100 L.O.P.T. Green Spot | R 2305 50p R 2306 50p R 2322/2323 pair 80p R 2323 10p R 2396 10p R 2461 30p R 2430 30p R 2433-BD124 30p R 2540 40p R 2737 40p R 2738-TIP41 30p R 2775-TIP41 40p R 3129-TIP47 40p T 6068V 50p R 4051 10p S 2006B 80p S 2006B 80p S 2006B 80p S 25D098B 10p S 25C1942 10p | C7 Hand Set £6.00 | |
| BB 105A x12 | £1.00 | TX100 Thorn | R 2305 50p R 2306 50p R 2322/2323 pair 80p R 2323 10p R 2396 10p R 2461 30p R 2430 30p R 2433-BD124 30p R 2540 40p R 2737 40p R 2738-TIP41 30p R 2775-TIP41 40p R 3129-TIP47 40p T 6068V 50p R 4051 10p S 2006B 80p S 2006B 80p S 2006B 80p S 25D098B 10p S 25C1942 10p | 3 I.C. Power Supply G11 Full Remote Receiver Panel £3.00 | |
| BB 105B x12 | £1.00 | Line Transformers | R 2305 50p R 2306 50p R 2322/2323 pair 80p R 2323 10p R 2396 10p R 2461 30p R 2430 30p R 2433-BD124 30p R 2540 40p R 2737 40p R 2738-TIP41 30p R 2775-TIP41 40p R 3129-TIP47 40p T 6068V 50p R 4051 10p S 2006B 80p S 2006B 80p S 2006B 80p S 25D098B 10p S 25C1942 10p | Meters Hills 520 £17.00 Meters Hills 420 £10.00 Hills HD5000-Digital Meter 1000V D.C. 750AC 10 Amp 20 MRG Ringers £28.00 | |
| BB 105C x12 | £1.00 | GR Lopt £5.00 | R 2305 50p R 2306 50p R 2322/2323 pair 80p R 2323 10p R 2396 10p R 2461 30p R 2430 30p R 2433-BD124 30p R 2540 40p R 2737 40p R 2738-TIP41 30p R 2775-TIP41 40p R 3129-TIP47 40p T 6068V 50p R 4051 10p S 2006B 80p S 2006B 80p S 2006B 80p S 25D098B 10p S 25C1942 10p | ITT100 Multimeter £6.75 ITT200 Multimeter £7.75 ITT500 Multimeter £9.00 ITT700 £15.00 HD1000 Digital £20.00 HD1200 Low Cost Digital £13.00 HD2500 £18.00 HD3000 Digital £25.00 HD5000 Digital £29.00 HD6000 Digital £32.00 HD8000 Digital £35.00 HD9500 Digital with capacity Temp Trans Voltz Ohms and Amps ranges £60.00 | |
| BB121a | 10p | Split Diode Trans £7.00 | R 2305 50p R 2306 50p R 2322/2323 pair 80p R 2323 10p R 2396 10p R 2461 30p R 2430 30p R 2433-BD124 30p R 2540 40p R 2737 40p R 2738-TIP41 30p R 2775-TIP41 40p R 3129-TIP47 40p T 6068V 50p R 4051 10p S 2006B 80p S 2006B 80p S 2006B 80p S 25D098B 10p S 25C1942 10p | Works at 24 feet — Sound repeater. Works off 9 volt battery Fits in top pocket. £8.00 | |
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| 1A/1600V DG3P EQV-BY228 | 10p | G11 Split Diode £12.00 | R 2305 50p R 2306 50p R 2322/2323 pair 80p R 2323 10p R 2396 10p R 2461 30p R 2430 30p R 2433-BD124 30p R 2540 40p R 2737 40p R 2738-TIP41 30p R 2775-TIP41 40p R 3129-TIP47 40p T 6068V 50p R 4051 10p S 2006B 80p S 2006B 80p S 2006B 80p S 25D098B 10p S 25C1942 10p | Philips Handsets Philips K4-K35, RCS350-RCS380, RCS370, RCS375, repaired same day £10.00 RC4001 Full Remote KT3 K30 Teletext Handsets exchanged £15.00 | |
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| U344 | £10.00 |
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| MMS580 | £3.00 |
| PCD857P | £3.00 |
| K35 Philips Receiver IC | |
| MA1250 BJC | £3.00 |
| M491BB1 | £3.00 |
| M5840H-84RS | £5.00 |
| MMS290N-4 | 75p |
| MMS318N | £4.00 |
| MM650 | £1.00 |
| MN1250BJC | £2.00 |
| MR1366 | 20p |
| NR4100 | £1.00 |
| NE555P | 60p |
| NE555 | 60p |
| NE556 | 50p |
| NE646 | 50p |
| HD38980C | £2.00 |
| OPT600 | 20p |
| OPT601 | 20p |
| PH2369 | 10p |
| PCD857P | £2.00 |
| PCD8571P | £2.00 |
| PCD8572P | £2.00 |
| SAA611 | £1.00 |
| SAA661 | £1.75 |
| SAA674 | £3.00 |
| SAA1024 | £2.00 |
| SAA1073 | £3.00 |
| SAA1074 | £3.00 |
| SAA1123 | £2.00 |
| SAA1130 | £2.50 |
| SAA1174 | £3.00 |
| SAA1274 | £3.00 |
| SAA1275 | £3.00 |
| SAA1276 | £3.00 |
| SAA1293 | £3.00 |
| SAA1302 | £3.00 |
| SAA3000A | £1.50 |
| SAB3013 | £2.00 |
| SAB3037 | £2.00 |
| SAB3210 | £3.00 |
| SAB3210 | £2.00 |
| SAB4209 | £2.00 |
| TB00124 | £1.00 |
| SAA3088P | £2.00 |
| SAA3000A | £2.00 |
| SAA9010 | £2.20 |
| SAA9012A | £5.00 |
| SAA9025D | £3.00 |
| SAA9031 | £4.50 |
| SAA9040 | £2.00 |
| SAA9042A | £2.00 |
| SAA9042A | £2.00 |
| SAA9043 | £4.00 |
| SAA9048 | £4.50 |
| SAA9051 | £2.00 |
| SAA9052 | £2.00 |
| SAA9053 | £2.00 |
| SAA9054 | £2.00 |
| SAA9055 | £2.00 |
| SAA9056 | £2.00 |
| SAA9057 | £2.00 |
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| SAA9066 | £2.00 |
| SAA9067 | £2.00 |
| SAA9068 | £2.00 |
| SAA9069 | £2.00 |
| SAA9070 | £2.00 |
| SAA9071 | £2.00 |
| SAA9072 | £2.00 |
| SAA9073 | £2.00 |
| SAA9074 | £2.00 |
| SAA9075 | £2.00 |
| SAA9076 | £2.00 |
| SAA9077 | £2.00 |
| SAA9078 | £2.00 |
| SAA9079 | £2.00 |
| SAA9080 | £2.00 |
| SAA9081 | £2.00 |
| SAA9082 | £2.00 |
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| SAA9093 | £2.00 |
| SAA9094 | £2.00 |
| SAA9095 | £2.00 |
| SAA9096 | £2.00 |
| SAA9097 | £2.00 |
| SAA9098 | £2.00 |
| SAA9099 | £2.00 |
| SAA9100 | £2.00 |

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|--------------|-------|
| TBA625 | 50p |
| TBA651 | £2.00 |
| TBA673 | £1.00 |
| TBA7500 | £2.50 |
| TBA780 | £1.50 |
| TBA800 | 50p |
| TBA810AP | 60p |
| TBA811 | 60p |
| TBA820 | £3.00 |
| TBA820M | 25p |
| TBA920 | £1.50 |
| TBA920C | £1.50 |
| TBA980C | £1.50 |
| PCD857N | £2.00 |
| TMS1943 NCL | |
| (clock chip) | £1.00 |
| TMS9981 | £4.00 |
| TMS9901 | £1.00 |
| TMS2708JG45 | 45p |
| TMS2710JL | £1.00 |
| TMS3529 | £1.00 |
| TMS3720ANS | £3.00 |
| TMS4014 | 70p |
| TX-012 | £1.00 |
| TMS9902 | £1.20 |
| ULN2844P | £6.00 |
| ULN2216 | 75p |
| UPC5661H | £1.00 |
| UPC585C | £1.00 |
| UPC1009C | 20p |
| UPC1031H | £2.00 |
| PH2369 | £1.00 |
| UPC1363C | £2.75 |
| UPC1364C | £2.00 |
| UPX1365C | £2.00 |
| UPC1366C | £2.00 |
| UPC1378H | £2.00 |
| UPC1514C | £3.00 |
| UPC1525C | £2.00 |
| UPD1943G | £2.00 |
| UPD8491HC | £2.00 |
| SN29848 | £2.50 |
| SN29770BN | £2.00 |
| SN29771BN | £2.00 |
| SN29721BN | £2.00 |
| SN76001 | £1.00 |
| SN76013ND | £2.00 |
| SN76018 | £1.00 |
| SN76110N | £1.00 |
| SN76115AN | £1.00 |
| SN76131 | 50p |
| SN76141N | £1.00 |
| SN76226 | £1.00 |
| SN76227N | £1.00 |
| SN76228N | £1.00 |
| SN76270 | £1.00 |
| SN76532N | £1.00 |
| SN76535N | £3.00 |
| SN76546 | £2.00 |
| SN76550 | 30p |
| SN76552 | 30p |
| SN76570 | £1.00 |
| SN76600N | £1.00 |
| SN76620AN | £1.00 |
| SN76666 | 50p |
| SN76705N | £1.00 |
| SN76707N | 75p |
| SN76708AN | 75p |
| SN76720 | £1.00 |
| SN76709N | £2.00 |
| UA783P3C | £5.00 |
| BT100A02 | 40p |
| BT13810A | 30p |
| BT146 | 30p |
| TBA5400 | £1.50 |
| TCA270 | £1.00 |
| TCA270Q | 75p |
| TCA270S | 75p |
| TCA270S0 | £1.00 |
| TL471P | £4.00 |
| TL471 | 50p |
| SL480 | £1.00 |
| SL401B | £4.50 |
| SL971B | £3.00 |
| SL918 | £4.50 |
| SL1430 | £1.00 |
| SLK4793 | £3.00 |
| STRK5471 | £3.00 |
| STRS8041 | £5.00 |
| TA712 | £1.15 |
| TA712A | £1.00 |
| TA712B | £1.00 |
| TA712C | £1.00 |
| TA712D | £1.00 |
| TA712E | £1.00 |
| TA712F | £1.00 |
| TA712G | £1.00 |
| TA712H | £1.00 |
| TA712I | £1.00 |
| TA712J | £1.00 |
| TA712K | £1.00 |
| TA712L | £1.00 |
| TA712M | £1.00 |
| TA712N | £1.00 |
| TA712O | £1.00 |
| TA712P | £1.00 |
| TA712Q | £1.00 |
| TA712R | £1.00 |
| TA712S | £1.00 |
| TA712T | £1.00 |
| TA712U | £1.00 |
| TA712V | £1.00 |
| TA712W | £1.00 |
| TA712X | £1.00 |
| TA712Y | £1.00 |
| TA712Z | £1.00 |
| TA712AA | £1.00 |
| TA712AB | £1.00 |
| TA712AC | £1.00 |
| TA712AD | £1.00 |
| TA712AE | £1.00 |
| TA712AF | £1.00 |
| TA712AG | £1.00 |
| TA712AH | £1.00 |
| TA712AI | £1.00 |
| TA712AJ | £1.00 |
| TA712AK | £1.00 |
| TA712AL | £1.00 |
| TA712AM | £1.00 |
| TA712AN | £1.00 |
| TA712AO | £1.00 |
| TA712AP | £1.00 |
| TA712AQ | £1.00 |
| TA712AR | £1.00 |
| TA712AS | £1.00 |
| TA712AT | £1.00 |
| TA712AU | £1.00 |
| TA712AV | £1.00 |
| TA712AW | £1.00 |
| TA712AX | £1.00 |
| TA712AY | £1.00 |
| TA712AZ | £1.00 |
| TA712BA | £1.00 |
| TA712BB | £1.00 |
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| TA712BI | £1.00 |
| TA712BJ | £1.00 |
| TA712BK | £1.00 |
| TA712BL | £1.00 |
| TA712BM | £1.00 |
| TA712BN | £1.00 |
| TA712BO | £1.00 |
| TA712BP | £1.00 |
| TA712BQ | £1.00 |
| TA712BR | £1.00 |
| TA712BS | £1.00 |
| TA712BT | £1.00 |
| TA712BU | £1.00 |
| TA712BV | £1.00 |
| TA712BW | £1.00 |
| TA712BX | £1.00 |
| TA712BY | £1.00 |
| TA712BZ | £1.00 |
| TA712CA | £1.00 |
| TA712CB | £1.00 |
| TA712CC | £1.00 |
| TA712CD | £1.00 |
| TA712CE | £1.00 |
| TA712CF | £1.00 |
| TA712CG | £1.00 |
| TA712CH | £1.00 |
| TA712CI | £1.00 |
| TA712CJ | £1.00 |
| TA712CK | £1.00 |
| TA712CL | £1.00 |
| TA712CM | £1.00 |
| TA712CN | £1.00 |
| TA712CO | £1.00 |
| TA712CP | £1.00 |
| TA712CQ | £1.00 |
| TA712CR | £1.00 |
| TA712CS | £1.00 |
| TA712CT | £1.00 |
| TA712CU | £1.00 |
| TA712CV | £1.00 |
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