APRIL 1992

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SERVICING-VIDEO-SATELLITE-DEVELOPMENTS

FREE 32-PAGE CATALOGUE



Inside the Ferguson TX80 Chassis
All About Solders and Fluxes
Fault Notes on HRD110/3V38 VCRs
Build this Simple AC/DC HV Tester
Satellite TV Notebook DX-TV
VCR Clinic TV Fault Finding

UNAOHM REACHES 2000... MHz THRESHOLD!

UNAOHM has a long tradition as a leading manufacturer of instrumentation developed to solve all the problems related to the reception of television signals – terrestrial and satellite, analog (PAL, SECAM, etc.) and digital (Teletext, Pay TV, MAC, etc.).

The field strength meter, in particular, has become indispensable for the proper installation of a TV distribution system. The recent technological developments in TV reception make continuously increasing use of frequencies up to 2 GHz. As a result, technicians and installers must consider these developments when designing and carrying out new installations and, therefore, procure the necessary instrumentation to meet the latest requirements and those of the near future.

UNAOHM is proud to present a new line of 2 GHz instruments including sweep generators/markers/noise generators/attenuators and related accessories, all of which have been recently developed to meet the standards of the latest and most advanced technological requirements.

Our engineering team is at the complete disposal of our professional clientele to study the possibility of modifying our standard models to meet their specific needs.



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SWEEP MARKER EP 688

- Frequency Range: 10 MHz 2 GHz in two bands.
- Output Level: +6 dBm -80 dBm.
- Calibrated Attenuator: 0 86 dB, in 1 dB steps.
- Impedance: 50 Ω.
- Synthesized Marker: from 10 MHz up to 2 GHz.
- Band Marker: ±2 to ±14 MHz in 0.5 MHz steps.
- · C.R.T. display of all programmed functions.

TV SWEEP MARKER EP 657

- Frequency Range: 4-1800 MHz in nine bands.
- Output Level: +6 dBm -69 dBm.
- RF Attenuator: 1 dB step calibrated up to a total of 75 dB.
- Impedance: 50 Ω.
- Markers: comb, fixed band and variable (in the same ranges as the sweep).
- Digital Frequency Meter.



RF ATTENUATORS AT 71/50 - AT 71/75

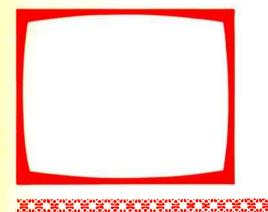
- Attenuation: 0-127 dB, programmable with variable steps from 1 to 10.
- Impedance: 50 Ω (for AT 71/50) and 75 Ω (for AT 71/75).
- Frequency: 0-2 GHz (AT 71/50) and 0-1,8 GHz (AT 71/75).
- Connector: N (AT 71/50) and BNC (AT 71/75).
- · Reading: displayed on a backlit LCD.



NOISE GENERATOR NG 752

- Frequency Range: 50 MHz to 2 GHz.
- Attenuator: three steps: 6, 10 and 20 dB.
- Output Level: -30 dBm/MHz BW
- Output Impedance: choice of 50 \(\Omega\) (NG 752-50) and 75 \(\Omega\) (NG 752-75).

SATELLITE SOLUTIONS (UK) LTD.



TELEVISION

April 1992 Vol. 42, No. 6 Issue 498

On sale March 18th

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QUERIES

We regret that we cannot answer technical queries over the telephone nor supply service sheets. We will endeavour to assist readers who have queries relating to articles published in *Television*, but we cannot offer advice on modifications to published designs nor comment on alternative ways of using them.

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OUR NEXT ISSUE DATED MAY WILL BE PUBLISHED ON APRIL 15

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TDA2004 90p TDA2005 90p TDA2006 70p TDA2007 180p	TDA7273 100p TDA7274 100p	2SA748 90p 2SA769 130p 2SA770 200p 2SA771 130p	2SA544 650p 2SA571 650p 2SA614 150p	2SC1161 110p 2SC1162 35p 2SC1164 600p 2SC1165 750p	2SC1970 200p 2SC1971 400p 2SC1972 600p 2SC1973 150p	2SC2588 600p 2SC2590 75p 2SC2591 140p 2SC2592 200p	2SC3212 510p 2SC3225 100p 2SC3244 80p	2SC4023 325p 2SC4056 350p 2SC4106 200p 2SC4123 450p	2SD-1163A 220p 2SD-1407 160p 2SD-1910 280p 2SD-1164 120p 2SD-1409 190p 2SD-1941 500p 2SD-1168 425p 2SD-1415 190p 2SD-1984 150p 2SD-1169 280p 2SD-1425 360p 2SJ-149 425p
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TDA2841 400p TDA2840 200p TDA3047 200p	UPC1023 60p UPC1025 230p UPC1026 95p	2SA1051 300p 2SA1052 40p 2SA1060 150p	2SB755 310p 2SB772 45p 2SB774 50p	2SC1448 100p 2SC1449 120p 2SC1450 200p	2SC2221 650p 2SC2222 1350p 2SC2228A 60p	2SC2791 650p 2SC2792 550p 2SC2793 700p	2SC3409 400p 2SC3412 800p 2SC3416 80p	2SD637 40p 2SD638 60p 2SD639 60p	RTV306307309311315316520 £20.00 RTV310311A312317319320 £16.00 RTV324325 £20.00 RTV328 £20.00
TDA3048 150p TDA3082 300p TDA3083 250p	UPC1028 90p 2 UPC1031H 180p 2 UPC1032 60p 2	2SA1069 150p 2SA1076 280p 2SA1077 300p	2SB775 160p 2SB791 280p 2SB795 60p 2SB825 135p	2SC1454 320p 2SC1470 120p 2SC1471A 400p	2SC2229 25p 2SC2230 80p 2SC2233 100p 2SC2235 60p	2SC2808 40p 2SC2810 360p 2SC2812 40p 2SC2814 40p	2SC3417 90p 2SC3419 120p 2SC3420 120p	2SD640 350p 2SD642 50p 2SD655 60p	RTV424 £50.00 RTV444 £50.00 RTX260 £33.50
TDA3190 100p TDA3300B 480p TDA3301B 380p TDA3303 400p	UPC1177H 250p 2 UPC1180C 200p 2	2SA1081 80p 2SA1082 80p 2SA1084 100p 2SA1085 75p	2SB861 160p 2SB882 180p 2SB886 225p	2SC1472 40p 2SC1473 70p 2SC1474 125p 2SC1475 60p	2SC2235 60p 2SC2236 30p 2SC2237 600p 2SC2238 70p	2SC2814 40p 2SC2824 75p 2SC2825 90p 2SC2826 200p	2SC3422 110p 2SC3423 100p 2SC3446 150p 2SC3447 200p	2SD661 60p 2SD666 70p 2SD667 70p 2SD668 120p	TO TO THE SALES
TDA3310 120p TDA3330 500p TDA3410 170p	UPC1183 200p 2 UPC1185H 230p 2 UPC1186 80p 2	2SA1091 100p 2SA1093 300p 2SA1094 190p	2SB950 180p 2SB951 190p 2SB1009 110p 2SB1077 180p	2SC1505 80p 2SC1506 75p 2SC1507 140p	2SC2240 25p 2SC2245 1050p 2SC2258 120p	2SC2827 200p 2SC2832 300p 2SC2834 400p	2SC3450 350p 2SC3456 200p 2SC3457 200p	2SD669 40p 2SD673 350p 2SD676 250p	VRP25 £10.00 VRP30 £33.50
TDA3420 250p TDA3501 400p TDA3502 600p TDA3505 300p	UPC1187 150p 2 UPC1188H 400p 2 UPC1197 140p 2	2SA1095 400p 2SA1096 125p 2SA1102 180p 2SA1103 200p	2SB1109 100p 2SC182 75p 2SC369 80p	2SC1509 45p 2SC1514 65p 2SC1515 60p 2SC1520 120p	2SC2259 80p 2SC2270 75p 2SC2271 60p 2SC2274 40p	2SC2837 360p 2SC2839 40p 2SC2853 70p 2SC2876 120p	2SC3459 250p 2SC3460 300p 2SC3461 400p 2SC3466 350p	2SD716 115p 2SD717 180p 2SD718 100p	VK31/34/35 £7.00 VK32/33/36/37/38/39/45/48/49/312/313/319/329/419S £7.00 VK329 £23.00
TDA3506 300p TDA3507 500p TDA3540 300p	UPC1222 130p 2 UPC1225H 220p 2	2SA1104 200p 2SA1105 250p 2SA1106 160p	2SC372 80p 2SC380 20p 2SC382 120p	2SC1541 110p 2SC1545 120p 2SC1567 140p	2SC2275 50p 2SC2278 120p 2SC2283 800p	2SC2877 120p 2SC2878 40p 2SC2879 3200p	2SC3466 70p 2SC3468 70p 2SC3481 600p	2SD722 240p 2SD725 350p 2SD734 60p 2SD-741 120p	VK426/429/438/439/455 £19.00 VK437 £24.50 VK445 £17.00
TDA3541 200p TDA3560 260p TDA3561 200p	UPC1238 120p 2 UPC1252H 220p 2 UPC1263 230p 2	2SA1111 120p 2SA1112 150p 2SA1115 40p	2SC388A 60p 2SC394 60p 2SC403 80p	2SC1568 75p 2SC1569 140p 2SC1570 40p	2SC2284 1200p 2SC2287 1050p 2SC2290 1800p	2SC2883 60p 2SC2898 400p 2SC2899 120p	2SC3482 300p 2SC3486 450p 2SC3502 120p	2SD-743 130p 2SD-756 100p 2SD-757 120p	VK449 £33.00 VK849 £30.00 ČANON
TDA3561A 220p TDA3562 260p TDA3563 350p TDA3565 300p	UPC1274V 250p 2 UPC1277 240p 2 UPC1278 240p 2	2SA1123 70p 2SA1124 80p 2SA1127 50p 2SA1133 200p	2SC454 45p 2SC458 15p 2SC460 10p 2SC461 30p	2SC1571 50p 2SC1573 50p 2SC1576 450p 2SC1580 600p	2SC2291 125p 2SC2295 60p 2SC2298 120p 2SC2307 500p	2SC2901 60p 2SC2909 60p 2SC2911 120p 2SC2912 120p	2SC3503 90p 2SC3504 120p 2SC3505 600p 2SC3506 600p	2SD-758 140p 2SD-762 140p 2SD-763 140p 2SD-768 180p	VR10 £10.00 VR30A/30B/30E/40A £33.50 DAEWOD
TDA3566 330p TDA3571BQ 675p TDA3576B 400p	UPC1288V 230p 2 UPC1298V 320p 2 UPC1318 300p 2	2SA1141 350p 2SA1142 150p 2SA1143 40p	2SC491 200p 2SC495 60p 2SC496 80p	2SC1583 30p 2SC1585 270p 2SC1586 540p	2SC2308 40p 2SC2310 50p 2SC2312 300p	2SC2915 8200p 2SC2921 650p 2SC2922 610p	2SC3507 650p 2SC3509 750p 2SC3518 120p	2SD-772 200p 2SD-773 40p 2SD-774 60p	912 £22.00 VCP 11 RAF £22.00
TDA3580 500p TDA3586 750p TDA3590 320p TDA3591 450p	UPC1350 115p 2 UPC1352 400p 2 UPC1358H 250p 2	2SA1145 50p 2SA1152 150p 2SA1156 150p 2SA1162 30p	2SC497 150p 2SC515A 100p 2SC535 50p 2SC536 20p	2SC1617 140p 2SC1623 50p 2SC1624 140p 2SC1625 150p	2SC2314 70p 2SC2316 150p 2SC2320 40p 2SC2324 120p	2SC2928 550p 2SC2929 280p 2SC2934 75p 2SC2937 250p	2SC3519 550p 2SC3526 120p 2SC3531 225p 2SC3547 100p	2SD-777 400p 2SD-784 650p 2SD-786 100p 2SD-787 80p	8300 £10.00 8400/8500 £6.50 DUAL
TDA3592A 350p TDA3640 350p TDA3651 200p	UPC1363 190p 2 UPC1363C 300p 2 UPC1364C 350p 2	2SA1169 500p 2SA1170 500p 2SA1175 40p	2SC558 275p 2SC563 120p 2SC603 40p	2SC1626 75p 2SC1627 60p 2SC1628 75p	2SC2329 480p 2SC2331 150p 2SC2333 200p	2SC2938 400p 2SC2939 400p 2SC2944 620p	2SC3549 200p 2SC3552 750p 2SC3568 200p	2SD-788 100p 2SD-789 80p 2SD-792 400p	EVR 101 £23.00 VR7071/7480819091 £6.50 VR 8596 £23.00
TDA3652 500p TDA3653 150p TDA3654 200p TDA3710 320p	UPC1365 320p 2 UPC1367 500p 2 UPC1370C 300p 2	2SA1184 120p 2SA1186 500p 2SA1198 70p 2SA1206 100p	2SC605 100p 2SC619 100p 2SC641 80p 2SC643 500p	2SC1634 50p 2SC1664 300p 2SC1669 100p 2SC1674 50p	2SC2334 240p 2SC2335 120p 2SC2344 150p 2SC2347 60p	2SC2958 75p 2SC2960 60p 2SC2962 800p 2SC2979 320p	2SC3583 170p 2SC3584 200p 2SC3595 220p 2SC3596 280p	2SD 794 100p 2SD-795A 140p 2SD-811 450p 2SD-819 400p	VR 97 £33.00 EDISON VC213021332135214028302930293229343122 £6.50
TDA3730 550p TDA3740 600p TDA3750 400p	UPC1377C 200p 2 UPC1378 210p 2 UPC1382 110p 2	2SA1208 70p 2SA1209 100p 2SA1210 120p	2SC644 25p 2SC647 300p 2SC681 340p	2SC1675 200p 2SC1678 120p 2SC1683 100p	2SC2353 120p 2SC2360 120p 2SC2361 150p	2SC2987 325p 2SC2988 280p 2SC2995 60p	2SC3604 650p 2SC3605 60p 2SC3606 100p	2SD-820 450p 2SD-821 550p 2SD-822 400p	VK2132/2512 £23.00 VK2436/2340 £6.50 VK2530/2532/2631/2541 £16.00
TDA3760 470p TDA3771 460p TDA3791 400p	UPC1384 425p 2 UPC1387C 250p 2 UPC1394 170p 2	2SA1215 60p 2SA1216 550p 2SA1217 100p	2SC683 120p 2SC708 100p 2SC710 20p	2SC1684 45p 2SC1685 60p 2SC1729 900p	2SC2362 50p 2SC2365 500p 2SC2363 6000p	2SC2999 50p 2SC3001 1400p 2SC3012 300p	2SC3607 150p 2SC3608 120p 2SC3631 130p	2SD-826 100p 2SD-836 150p 2SD-836A 200p	VK2632 £17.00 VK2637 £30.50 VKH2545 £24.50 VKH26392439 £33.00
TDA3800 350p TDA3803A 500p TDA3810 300p TDA3950 300p	UPC- 1403CA 750p 2	2SA1220 120p 2SA1227A 300p 2SA1232 275p 2SA1242 80p	2SC711 40p 2SC717 50p 2SC730 450p 2SC732 40p	2SC1730 40p 2SC1735 70p 2SC1740 40p 2SC1741 45p	2SC2369 100p 2SC2371 45p 2SC2373 210p 2SC2383 50p	2SC3019 320p 2SC3021 1250p 2SC3025 500p 2SC3026 550p	2SC3636 280p 2SC3651 600p 2SC3657 400p 2SC3659 600p	2SD-837 80p 2SD-838 400p 2SD-841 160p 2SD-844 200p	E11V/IP1000VP1400VCR4000V1/2SVCR4500V 4800VCR5200560054006600VIP3000 £12.00
TDA4050 250p TDA4180 400p TDA4190 250p	1420CA 500p 2 UPC- 2 1421CA 650p 2	2SA1244 120p 2SA1246 80p 2SA1249 100p	2SC733 25p 2SC735 40p 2SC738 40p	2SC1752 70p 2SC1755 90p 2SC1756 40p	2SC2389 45p 2SC2407 110p 2SC2408 120p	2SC3030 750p 2SC3037 125p 2SC3038 125p	2SC3668 120p 2SC3675 160p 2SC3678 280p	2SD-844 200p 2SD-845 250p 2SD-850 260p 2SD-856 80p	VCR480064006800 £12.00 FISHER FVHP510620530615622710715720721/722/
TDA4280 380p TDA4280 400p TDA4282 400p	UPC- 1423CA 550p 2 UPC1470 200p 2	2SA1261 150p 2SA1262 160p 2SA1263 280p	2SC739 150p 2SC761 150p 2SC762 150p	2SC1758 30p 2SC1765 1000p 2SC1775 20p	2SC2412K 50p 2SC2413 50p 2SC2429 900p	2SC3039 140p 2SC3040 260p 2SC3042 300p	2SC3679 200p 2SC3680 380p 2SC3685 450p	2SD-858 250p 2SD-863 60p 2SD-864 200p	910FVHP6207119059069089119159165000 £13.00 VBS3500750076009900VB5350071007600′ 9900VBR330 £20.00
TDA4290 250p TDA4400 350p TDA4420 180p TDA4421 400p	UPC1505C 400p 2 UPC- 2	2SA1264 280p 2SA1265 280p 2SA1283 60p 2SA1284 60p	2SC783 105p 2SC790 80p 2SC792 380p 2SC805 225p	2SC1781 65p 2SC1789 100p 2SC1809 40p 2SC1810 250p	2SC2431 900p 2SC2437 1000p 2SC2440 350p 2SC2458 40p	2SC3057 150p 2SC3058 2500p 2SC3059 900p 2SC3060 1100p	2\$C3687 650p 2\$C3688 750p 2\$C3691 150p 2\$C3692 150p	2SD-866 120p 2SD-866A 140p 2SD-868 450p 2SD-870 400p	VBS7000VBS7100VBS9000 £22.00 FVH71V71572V722FVHD720 £15.00
TDA4426 250p TDA4427 500p TDA4431 200p	UPC- 1515CA 250p 2 UPC1520CA 2	2SA1285 60p 2SA1286 60p 2SA1290 150p	2SC805A 250p 2SC828 25p 2SC829 20p	2SC1815 15p 2SC1819 140p 2SC1826 40p	2SC2459 50p 2SC2461 400p 2SC2462 50p	2SC3061 1600p 2SC3068 60p 2SC3070 120p	2SC3705 120p 2SC3715 480p 2SC3717 120p	2SD-871 450p 2SD-879 60p 2SD-880 40p	GRANDATA LTD K.P. HOUSE, UNIT 15,
TDA4437 450p TDA4439 300p TDA4440 250p TDA4442 320p	UPC1536C 550p 2 ZN424 100p 2	2SA1294 450p 2SA1295 500p 2SA1301 350p 2SA1302 400p	2SC839 25p 2SC869 120p 2SC870 100p 2SC898 275p	2SC1827 120p 2SC1829 500p 2SC1832 400p 2SC1833 40p	2SC2470 65p 2SC2481 120p 2SC2482 40p 2SC2483 120p	2SC3074 200p 2SC3075 150p 2SC3077 120p 2SC3086 150p	2SC3719 150p 2SC3729 450p 2SC3743 270p 2SC3746 120p	2SD-882 80p 2SD-892A 100p 2SD-894 120p 2SD-895 200p	POP IN COMMERCIAL CENTRE,
TDA4445 250p TDA4480 280p TDA4500 360p	ZN423 100p 2 ZN426 260p 2 ZN427 560p 2	SA1303 400p SA1304 110p SA1306 110p	2SC900B 300p 2SC930 20p 2SC941 25p	2SC1834 50p 2SC1844 50p 2SC1845 20p	2SC2484 240p 2SC2491 200p 2SC2495 1900p	2SC3089 250p 2SC3098 100p 2SC3099 100p	2SC3747 120p 2SC3752 250p 2SC3769 700p	2SD-896 200p 2SD 900 400p 2SD-905 600p	SOUTHWAY, WEMBLEY, MIDDLESEX, ENGLAND Tel: 081-900 2329 Fax: 081-903 6126
TDA4501 450p TDA4502 900p	ZN428 425p 2	2SA1307 160p 2SA1309 50p	2SC943 160p 2SC944 140p	2SC1846 100p 2SC1847 120p	2SC2498 50p 2SC2500 80p	2SC3101 750p 2SC3102 2800p	2SC3781 150p 2SC3783 600p	2SD-916 130p 2SD-917 300p	FOR EVEN MORE BARGAINS

TELEVISION APRIL 1992

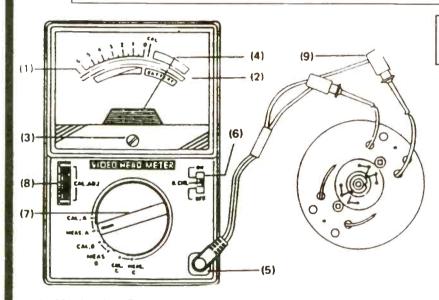
FISHER FVHP725/830	£30.00	NATIONAL NV730NV770 4 Head	£18.50	VCR		HITACHI VT9700	£0.60	FLOPPY DISCS
FVHP25930 FVHP990 GOLDSTAR	£32.00	NV366 NV180	£18.50 £25.00	AKAI		VT14, VT17, VT19, VT35,	£1.20	51/4 inch DSDD (10 in box) Branded Name £6.0
8000 3HSSDB GVH51/GVH1221/VCP4000/VCP4100/	£19.00	NV370NV380 NV788	£8.50 £43.50	V\$9300, V\$9500, V\$9700, V\$9800 V\$1, V\$2, V\$3, V\$4, V\$5, V\$6, V\$9,	£2.50	VT52, VT62, VT64, VT65,		51/4 inch DSDD
VCP4200 GHV12321/1245/1246/8210/8215/GHVP 1241/GHVP1247/1248/VCP400	£18.00 P1240/	NV810NV830 NV850NV950 NV870NV890NV970	£35.00 £38.00 £48.00	VS10 VS105, VS112, VS115, VS116, VS126, VS244, VS245, VS247, VS248, VS515,	€3.20	VT86	£1.50	(bulk pack) 25 £10.0 3½ inch DSDD (10 in box)
G.E.C.	£17.50	NVG33 NVG30NVG31/NVG130	£38.00 £20.00	V\$516 V\$201, V\$301, V\$303, V\$304, V\$603.	£2.50	VR3605, 3905, 3935, VR3985	£1 00	Branded Name £11.0
4000H4001H/4002H V4001H/V4004	£16.00 £16.00	NVG10NVG11NVG12NVG14NVG15/ NVG16NVG120NV250NV280/		VS606, VS607, VP58-P82 VS125, VS155, VS165, VS220, VS240,	£2.50	VR3913, VR3914	£1.00	3 inch CF2 Branded Name £2.1 3 inch CF2D Branded Name £2.5
GRANADA CS1/DS2	£21.50	NV450NV465 NVG18 NVG20NVG21NVG22NVG25NVG28/	£16.50 £30.00	VS250, VS512, VSX9 AMSTRAD	£2.50	JVC		
GRAET2 4312/4605/4905/4912/4913/P4833/TR460	305/	NVG200/NVD48 NVG50	£25.00 £30.00	VCR4500, VCR4600, VCR4600 MKII, VCR4700	€2.50	HR3300, HR3330 HR3360,	04 -0	*******
481249054912/TR491349144943 49354943/496349854993/TR4833493	£6.50	NVG45/NVG46 NVH70	£30.00 £50.00	VCR5200 VCR7000	£3.20 £3.20	11114100	£1.50 £1.80	* MOD KIT TAPE CREASING
4985/4993 49204927/4930 4946/TR49064916	£6.50 £17.00 £16.00	NV688 NV600 NVH65	£23.00 £50.00	FERGUSON 3V00, 3V16, 3V22, 3V23	£2.50	HR7200 HR7600	£0.70 £0.80	★ VCR450, 4600, 4700 620p
TR4994 TR4995	£23.00 £33.00	NVG7NVG9NV230 N.E.C.	£18.00	3V29, 3V30, 3V31, 3V32 3V35, 3V36, 3V38, 3V39, 3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55,	£2.50	HR7610 HR7650	£0.95 £0.75	******
GRUNDIG VS400410440450460500505510	£17.00	N9011M9012M9013EM9014EM9014G/ N9015M9016M901AM902AM9033/	,	3V56, 3V57, 3V58, 3V59, 3V64, 3V65, FV10, FV11, FV12, FV14	£2.50	HR7655	£0.90	SERVICE KITS
HINAR! VXL2VXL3VXL4VXL20VXL25VXL35	5 £13.00	N9034/N9054/N9063/N9065/N9066/ N906A	£20.00	FISHER FVHP420, FVHP520, FVHP530	£3.20	HR7700 HRD110, HRD111, HRD120,	£0.77	Each Kit Contains
VXL5V20H VXL6	£13.00 £18.00	N911AN915AN916AN917 PCV754PV2300PV2400PV760/	£27.00	FVHP615, FVHP710, FVHP715, FVHP716, FVHP722, FVHP725, FVHP830		HRD225, HRD250, HRD455, HRD565, HRD566, HRD725,		Belts Set, Pinch Roller, Tension Band & Idler Tyres
VXL8VXL9VXL10VXL11VTV100 HITACHI	£20.00	PV794/PV770/PV774/PVC763E N380N381/N830N831/N832/N833/ N834/N835/N836	£18.00 £7.00	FVHP905, FVHP970, FVHP980, FVHP990	€3.20	HRD755 HRD170, HRD180, HRD230,	£1.00	rension band & idler tyres
VT11/VT14/16/30/33/34/330/340/503/ 640/5030	£13.00	8261/AH1	£45.00	VT11, VT33	£2.50	HRD370, HRD430, HRD530	£1.30	NATIONAL
VT7/VT17/VT18/VT19 VT35/VT38/VT39 VT100/110/111/112/113/115/118/120/1	£25.00 £33.00	NORDMENDE 4609-460V100V140V200V250/	€7.00	VT61, VT62, VT63, VT64, VT65, VT86, VT88, VT110, VT122, VT120, VT128,		MITSUBISHI		NV300/NV340 £5.80
128/220/225 VT3000	£21.00 £10.00	V304V341V450V550 V1001V1005V1015V1025V1035/ V1041V1055V1065V1105V2006	£18.00	VT130, VT135, VT138, VT150, VT168, VT220 VT5000, VT8000, VT9300, VT9500	£2.50 £2.50	HS200	£2.00	NV7000/NV7200 £5,50 NV2000 £6,25
VT4000/4200/5000/5500 VT77/680/3000/6500/7000/8000/8030/	£15.00	V110V333	£20.00	nt		NATIONAL		NV2000 £6.25
8040/8100/8300/VT8500/8700/9000/93 9500/9700/9900 VT8/VT9/VT56/VT57	300/ £13.50 £34.00	V200V300V3005V300V301V302/ V350V500 V1205V1215V1235V1245	£7.00 £20.00	VR3605, VR3905, VR3935, VR3985, VR3986, VR3993, VR3994 VR3913, VR3914, VR3943, VR3954,	£3 .20	NV300	£1.60	IVC 9. EEDCUSCO
VT65 VT130/VT135/VT138/VT145/VT150/	£35.00	V1305 V380	£33.50 £27.00		£3.20	NV777	£1.35 £1.00	JVC & FERGUSON 3V35-36,38-39 £5.50
VT250/VT255 VT61E/VT62E/VT63/VT64	£29.50 £20.00	V502V503V5005 ORION	£37.00	HR300, HR3330, HR3360, HR3660, HR4100, HR7700	£2.50	NV2000 NV3000	£1.50 £1.60	3V29/30 £6.25
VT150 VT530	£35.00 £25.00	VH3VH555VH600VH700VH844VH900 VH1000 (ALL MODELS)	£13.00	HR7200, HR7300, HR7600, HR7610, HR7650, HR7655	£2.50	NV7000	£0.95	HRD110/111/120/225 £5.50 HR7200 £6.25
H-M.V. HV1000/2000/3000 HV4000/7000/8000	£6.50 £6.50	PHILIPS VR6460VR6520VR692064VR60/		HRD110, HRD111, HRD120, HRD121, HRD140, HRD150, HRD160, HRD225, HRD455, HRD565, HRD725	£2.50	NV7200 NV8600	£0.90 £1.60	10.25
m		VR6420 VR6711 4 HEAD	£8.50 £41.00	MITSUBISHI	12.00	NV7500, NV7800 NV340, NV366	£1.10 £1.40	HITACHI
VR3605/3905/3935/3943/3954/3985/3990 VR3833/VR3913/VR3914/VR3963/ VR3975	£6.50 £6.50	6920VR6440 VR6441VR6540VR6541VR6640	£58.00	HS200, HS300, HS301, HS302, HS303, HS304, HS310, HS320, HS700 HS306, HS307, HS400, HS710	£2.50 £2.50	NV600, NV788 NV230, 250, 280, 370, NV380	£1.20	VT11/VT33 £6.25
VR3986 JVC 3HSS	£20.00	RANK	£14.00	NATIONAL	22.00	450, 460, NV465, 600, 630, 73 NV810, 830, 850, 870, NV890	30,	
HR2200HR3300HR3320HR3330/ HR3350HR3360HR3660HR3750/		BV6900AS NB30EARV300RV310RV320RV330	£18.00	NV100, NV180, NV300, NV333, NV340, NV366, NV600, NV688, NV777, NV788 NV230, NV370, NV430, NV460,	£2.50	147010, 030, 030, 070, 147030	L1.33	FISHER
HR3860/HR4100 FERGUSON 3HSS	£6.50	RV340RV350RV380	£7.00	NV730, NV810, NV830, NV850, NV870, NV890, NV2000, NV2010,		PHILIPS		SERVICE KIT £5.5
3292690369006901/8902/8903/ 89066922/8928/3VO1/3V06/3V22	£6.50	MR100 SABA	£17.00	NV3000, NV7000, NV7200, NV7800, NV8600, NV8610, NV8620, NVG14 NVG7, NVG19, NVG12, NVG18	£2.50 £3.20	VR6460	£1.70	
JVC 3HSSL PIN HR3660/HR7600/HR7610/HR7650/		2A102A702B20 4A104B20	£23.00 £33.50	NVG21, NVG25, NVH65 PHILIPS	£3.20	SANYO		HITACHI T.V.
HR7700HRD110HRD111/HRD120/ HRD121/HRD220HRD225/HRS100	€6.50	6A106A70 8A10VR6038 CVR6083VR6006VR6007/VR6008/	£33.00 £39.50	VR6460 VR2020, VR2021, VR2022, VR2023,	£2.50	VTC5000 VTC5300	£0.75 £1.00	OUTPUT MODULE HM 6251 REF: 2370551 £6.5
FERGUSON 3HSSL PIN 8904/8924/8941/8943/8944/3V16/3V23/	60.50	VR6009/VR7006/VR7007 PVR6068/PVR6070/PVR8070/VR2000/	£18.50	VR2024 SANYO	£3.20	VTC5500 VTC9300	£0.95 £2.20	10.5
3V24/3V31/3V35/3V36/3V38/3V39/3V49 JVC 3HSSVA		VR6000VR6010VR6012VR7000/ VR9010 VHR7000VR5005	£7.00	VHR1100, VHR1300, VHR1500, VHR2300 VTC5000, VTC5150, VTC5500, VTC9300,		VTC1100, 1300, 1500	£1.00	SERVICE AIDS
HRD140HRD14VHRD143HRD150HRD HRD158HRD160HRD510VHRS10 FERGUSON	£15.76	VR6004VR6005VR6011VR6013/ VR6014VR6020VR6022VR8014/	£15.00	VTCM10, VTCM20 SHARP	€2.50	SHARP		SERVISOL PRODUCTS
8947/8948/3V42/3V44/3V45/3V46/ 3V47/3V52/3V54/3V55/3V56/3V57	£15.75	VR6023/VR6024/VR7004/VR7011/ VR7014/VR7720/VR7730/VR8011	£7.00	VC381, VC386, VC2300, VC3300, VC7300, VC7700, VC8300, VC9100,		VC381, VC383, VC386	£1.25	V. HEAD CLEANER 125
89508951/3V64FV10FV11/3V65FV20/ FV21/FV22/FV26	£17.00	VR6018/VR7018 VR6028 VR7016	£30.00 £27.00 £24.00	VC9300, VC9500, VC9700 VC387, VC481, VC483, VC486, VC496, VC581, VC582, VC583, VC585	£3.20	VC6300 VC7300, 7700, 7500	£1.50	SWITCH CLEANER 130 SILICONE GREASE 150
3V48 3V43/3V63 8930/8940/3V29/3V30	£24.50 £31.50 £10.00	SAISHO	224.00	VC651, VC681, VC685, VC750, VC780, VC781, VC785, VC787, VC793, VCT72	£3.20	VC8300 VC8381, VC9100	£1.50 £1.25	FREEZE IT 140 FOAM CLEANER 140
8945 3V00	£24.00 £10.00	VR100VR605VR705VR805VR905/ VR1000VR1100VR1200VR1600 VR3300XVR3600XVR3650VR3800	£13.50 £15.00	SONY SLC5, SLC6, SLC7	£3.20	VC9300, VC9500	£1.35	ANTI-STATIC 140
JVC HRD170171/210/211			£16.00					
HRD565/566	£17.00 i	VR3200VR3500 VR3300VR3600	£16.00	SLC9, SLC20, SLC24, SLC30, SLC33, SLC44, SLHF100, SLF1, SLF11, SLF25,		SONY		AEROKLEANE 125
HRD725/HRD755	£17.00 £24.50 £31.50	VR3300VR3600 SALORA		SLC9, SLC20, SLC24, SLC30, SLC33, SLC44, SLHF100, SLF1, SLF11, SLF25, SLF30, SLF60, SLF100	£3 .20	SL-C5, SL-C6	£1.40	AEROKLEANE 125 AERO DUSTER 140 PLASTIC SEAL 130
BR7000E/BR7000S HR7200/7300/7350/2650	£24.50 £31.50 £30.00 £7.20	VR3300VR3600 SALORA 65006600 SAMSUNG	£16.00	SLC9, SLC20, SLC24, SLC30, SLC33, SLC33, SLC44, SLHF100, SLF1, SLF11, SLF11, SLF25, SLF30, SLF60, SLF100 VCR BELT KITS AKAI	£3.20	SL-C5, SL-C6 SL-C7 SL-C9	£1.40 £1.65	AEROKLEANE 125 AERO DUSTER 140 PLASTIC SEAL 130 GLASS CLEANER 130
BR7000E/BR7000S HR7200/7300/7350/2650 HRD455 HRD520	£24.50 £31.50 £30.00	VR3300VR3600 SALORA 65006600		SLC9, SLC20, SLC24, SLC30, SLC33, SLC44, SLHF100, SLF1, SLF11, SLF25, SLF30, SLF60, SLF100 VCR BELT KITS AKAI VP7100 VS-1	£1.60 £1.50	SL-C5, SL-C6 SL-C7	£1.40	AEROKLEANE 125 AERO DUSTER 140 PLASTIC SEAL 130
BR70005BR7000S HR7200730073502850 HRD455 HRD520 JVC & FERGUSON 3V328942HR7555 HRD1803V59FV12LHRD230	£24.50 £31.50 £30.00 £7.20 £20.00 £22.00 £23.00 £30.80	VR3300VR3600 SALORA 65006600 SAMSUNG SVX301V/B900VB910VVT510VT320 VT5800VX510VX511VX520VX616 VX626VX627VX717 SANYO	£21.50	SLC9, SLC24, SLC100, SLC24, SLC30, SLC33, SLC34, SLC100, SLC74, SLC100, SLC74, SLC100, SLC74, SLC25, SLC30,	£1.60 £1.50 £1.00 £1.20	SL-C5, SL-C6 SL-C7 SL-C9 SL8000, SL8080	£1.40 £1.65 £2.00	AEROKLEANE 125 AERO DUSTER 140 PLASTIC SEAL 130 GLASS CLEANER 130 If you purchase more than one Servisol product postage will
8R7000E8R7000S HR70007390073502650 HR0455 HR0520 JVC & FERGUSON 3V328842HR7655 HR01803703V58FV12LHRD230 HR03703V58FV13LHRD430HRD470 HR0250	£24.50 £31.50 £30.00 £7.20 £20.00 £22.00 £23.00 £30.80	VR3300VR3600 SALORA 66006800 SAMSUNG SXX930VR3690V8910VVT510VT320 VT5600VX510VX511VX520VX616 VX626VX622VX717 SANYO VTC5000VTC5400VTC6000VTC6500 VPR5000VTC1500VTCM10VTCM11 VTCM20VTCX2VTCM25VTC2000 VTCM20VTCX2VTCM25VTC2000	£21.50	SLC9, SLC24, SLC100, SLC13, SLC30, SLC33, SLC34, SLC1000, SLF1, SLF25, SLC44, SLF100, SLF100, SLF100, SLF100, SLF100, SLF100, SLF100 VCR BELT KITS AKAI VPT100 VS-1 VS2EG VS3900 VS3900 VS9500	£1.60 £1.50 £1.00 £1.20 £1.00 £1.60 £1.55	SL-C5, SL-C6 SL-C7 SL-C9 SL-8000, SL8080 TOSHIBA V55, V57	£1.40 £1.65 £2.00	AEROKLEANE 125 AERO DUSTER 140 PLASTIC SEAL 130 GLASS CLEANER 130 If you purchase more than one Servisol 140
BR700056B70005 HR7200730073502B50 HR0455 HR0455 HR0520 JVC& FERGUSON 3V326942HR7565 HR01807V96P112LHR0230 HR03707V58FV13HHRD430HRD470 KENWOOD KY90YKV903KV905	£24.50 £31.50 £30.00 £7.20 £20.00 £22.00 £23.00 £30.80 £31.00 £27.00	VR3300VR3600 SALORA 66006800 SAMSUNG SXX930VR3600VR510VX7510V7320 V75800VX510VX511VX520VX616 VX626VX622VX717 SANYO V7C5000VTC5400VTC6800VTC6500 VPR5000VTC1500VTCM10VTCM10 VTCM20VTCA2VTCM25VTC2000 VTC5100VTC5150VTC5300V	£21.50	SLC9, SLC24, SLC100, SLC13, SLC30, SLC33, SLC34, SLC1000, SLF1, SLF25, SLC44, SLF100, SLF100, SLF100, SLF100, SLF100, SLF100 VCR BELT KITS AKAI VPT100 VS-1 VS2EG VS3900 VS3900 VS39700 VS3900 VS39700 VS3900	£1.60 £1.50 £1.00 £1.20 £1.00 £1.60	SL-C5, SL-C6 SL-C9 SL-C9 SL8000, SL8080 TOSHIBA V55, V57 V5250, V5280 V5480	£1.40 £1.65 £2.00 £0.85 £2.30 £2.10	AEROKLEANE 125 AERO DUSTER 140 PLASTIC SEAL 130 GLASS CLEANER 130 If you purchase more than one Servisol product postage will
887000568770005 HR7200730073502550 HR0455 HR0455 HR0520 JVC & FERBUSON 3V326942H77655 HR01803V59FV12L4HR0230 HR03703V59FV13L4HRD430HRD470 HR03703V58FV13HHRD430HRD470 HR03703V5V905 KV90V5V903KV905 KV917	£24.50 £31.50 £30.00 £7.20 £20.00 £22.00 £23.00 £31.00 £27.00 £6.50 £24.50	VR3300VR3600 SALORA 65006800 SAMSUNG SX430VR9800VB910VVT510VT320 VT5600VX510VX511VX520VX616 VX626VX622VX717 SANYO VTC5000VTC5400VTC6800VTC6500 VTC5000VTC5100VTCM10VTCM10 VTCM20VTCW20VTC5300 VTC5400VTC5300VTC540VTC800VTC540VTC840VTCM10VT	£21.50 £19.00	SLC9, SLC24, SLC100, SLC34, SLC30, SLC33, SLC34, SLC1010, SLF1, SLF25, SLC44, SLF100, SLF1, SLF25, SLF30, S	£1.60 £1.50 £1.00 £1.20 £1.00 £1.65 £1.60 £1.55	SL-C5, SL-C6 SL-C7 SL-C9 SL-8000, SL8080 TOSHIBA V52, V57 V5250, V5280 V54490 V5475 V75440	£1.40 £1.65 £2.00 £0.85 £2.30 £2.10 £1.60 £1.60	AEROKLEANE 125 AERO DUSTER 140 PLASTIC SEAL 130 GLASS CLEANER 130 If you purchase more than one Servisol product postage will be £2.00
887000569R70005 HR7200730073502550 HR0455 HR0455 HR0520 JVC & FERBUSON 3V326942HR7655 HR01803V59FV12LHRD230 HR03703V58FV13HHRD430HRD470 HR03703V58FV13HHRD430HRD470 HR097050 KV901KV903KV905 KV917 LOGIK VR960 VR966	£24.50 £31.50 £30.00 £7.20 £20.00 £22.00 £23.00 £30.80 £31.00 £27.00	VR3300VR3600 SALORA 65006800 SAMSUNG SX430VR9800V8910VVT510VT320 VT5600VX510VX511VX520VX616 VX626VX627VX717 SANYO VTC5000VTC5400VTC6000VTC6500 VTC5000VTC5100VTC510VTC700 VTC510VTC5150VTC700 VTC5400VTC5300 VTC540VTC7830VTC30V VTC540VTC7830VTC350V VTC540VTC7830VTC350V VTC540VTC7830VTC350V VTC540VTC7830VTC350V VTC540VTC7830VTC350V VTC540VTC7830VTC350V VTC540VTC350VTC300VTC330V VTC350VTC3355VTC3455VTC9500 VTC350VTC3355VTC3455VTC9500	£21.50 £19.00 £18.50 £19.00	SLC9, SLC24, SLC100, SLC24, SLC30, SLC33, SLC30, SLC34, SLC1010, SLC71, SLC25, SLC42, SLC100, SLC7100, SLC71, SLC25, SLC30, SLC60, SLC610, SLC7100,	£1.80 £1.50 £1.00 £1.20 £1.80 £1.65 £1.55	SL-C5, SL-C6 SL-C9 SL-69 SL8000, SL8080 TOSHIBA V55, V57 V5250, V5280 V5480 V5475	£1.40 £1.65 £2.00 £0.85 £2.30 £2.10 £1.60	AEROKLEANE 125 AERO DUSTER 140 PLASTIC SEAL 130 GLASS CLEANER 130 If you purchase more than one Servisoi product postage will be £2.00 **********************************
BR70005BR70005 HR7200730073502550 HR0455 HR0455 HR0455 JVC & FERGUSON 3V3269324HR7655 HR01803V396V12LHRD230 HR03070396V13HHRD430HRD470 HR03050 KY901KV903KV905 KV917 LOGIK VR960 VR950 VR950 VR950 LOEWE	£24.50 £31.50 £30.00 £7.20 £20.00 £22.00 £33.50 £31.00 £27.00 £4.50 £17.00 £21.50	NR3300VR3600 SALORA 6000600 SAMBUNG SXX301VB900V8910VVT510VT320 VT5800VX510VX511VX520VX616 VX628VX62VX717 SANYO VTC5000VTC5400VTC6000VTC6500 VPR5000VTC5100VTC5100VTC75300 VTCM20VTC75300VTC5300 VTC5400VTC5300VTC5300 VTC5400VTC5300VTC5300 VTC540VTC7530VTC5300 VTC540VTC75350VTC5300 VTC540VTC75350VTC5300 VTC540VTC75450VTC5455VTC9500 VTC540VTC75350VTC5455VTC9500 VTC3350VTC5355VTC3455VTC9500 VTC3350VTC3350VTC3455VTC9500 VTC3350VTC3350VTC3455VTC3500 VTC3350VTC3350VTC3455VTC3500 VTC3350VTC3350VTC3455VTC3500 VTC3350VTC3350VTC3455VTC3500 VTC3350VTC3350VTC3455VTC3500 VTC3350VTC3350VTC3455VTC3500 VTC3350VTC3350VTC3455VTC3500 VTC3350VTC3350VTC3455VTC3500 VTC3350VTC3350VTC3455VTC3300 VTC3350VTC3350VTC3455VTC3500 VTC3350VTC3350VTC3455VTC3300 VTC3450VTC3455VTC3455VTC3300 VTC3450VTC3455VTC3455VTC3455VTC3450VTC3455VTC3455VTC3450VTC3455VTC3450VTC345VTC3	£21.50 £19.00 £18.50 £19.00 £16.00	SLC9, SLC24, SLC100, SLC24, SLC30, SLC33, SLC30, SLC33, SLC34, SLC1010, SLF1, SLF25, SLC44, SLF100, SLF100, SLF100, SLF100, SLF100 VCR BELT KITS AKAI VP7100 VS-1 VS-26 VS-26 VS-26 VS-26 VS-26 VS-26 VS-26 VS-26 VS-27 VS-26 VS-27 VS-26 VS-27 VS-26 VS-27 VS-2	£1.60 £1.50 £1.00 £1.20 £1.00 £1.60 £1.55 £1.60 £1.55	SL-C5, SL-C6 SL-C7 SL-C9 SL-8000, SL8080 TOSHIBA V55, V57 V5250, V5280 V5480 V5475 V7540 V8600 V9600	£1.40 £1.65 £2.00 £0.85 £2.30 £2.10 £1.60 £1.50 £0.85	AEROKLEANE 125 AERO DUSTER 140 PLASTIC SEAL 130 GLASS CLEANER 130 If you purchase more than one Servisol product postage will be £2.00
887000568770005 887200730073802550 HRD0455 HRD0455 HRD0520 JVC& FERGUSON 3V326942H87655 HRD1803V59FV12LHRD230 HRD3703V58FV13HHRD430HRD470 HRD3703V58FV13HHRD430HRD470 HRD3703V58FV13HHRD430HRD470 HRD3703V58FV13HHRD430HRD470 KENWOOD KV901KV903KV905 KV917 LOGIK VR950 VR950 COEWE OC4104204440 OC500CC55/OC60/OC65	£24.50 £31.50 £30.00 £7.20 £20.00 £22.00 £31.00 £31.00 £31.00 £27.00 £6.50 £24.50 £17.00 £21.50	VR3300VR3800 SALORA 66006800 SAMSUNG SXX910VB900VB910VVT510VT320 VT5800VX510VX511VV520VX616 VX626VX62VX717 SANYO VTC5000VTC5400VTC8000VTC8500 VTC5400VTC1500VTCM10VTCM17 VTCM20VTCN21VTCM25VTC2009 VTC540VTC550150VTC5500 VTC540VTC550VTC5500 VTC540VTC550VTC5500VTC5400VTC4500 VTC540VTC550VTC550VTC5500 VTC540VTC5550VTC550VTC5500 VTC540VTC5550VTC550VTC5500VTC5300VTC540VTC5500VTC5560VTC5560VTC5560VTC5560VTC5560VTC5560VTC54600 VHR1100VHR1300V	£21.50 £19.00 £18.60 £19.00 £16.00	SLC9, SLC24, SLC100, SLC24, SLC30, SLC33, SLC30, SLC33, SLC34, SLC1010, SLF1, SLE25, SLF30, SLF60, SLF610, SLF6100, SLF6100, SLF6100, SLF6100, SLF610, SLF6100, SL	£1.60 £1.50 £1.00 £1.00 £1.00 £1.60 £1.55 £1.55 £2.10 £2.10 £2.10 £2.10 £2.10 £0.80	SL-C5, SL-C6 SL-C7 SL-C9 SL-8000, SL8080 TOSHIBA V55, V57 V5250, V5280 V5480 V5475 V7540 V8600 V9600	£1.40 £1.65 £2.00 £0.85 £2.30 £2.10 £1.60 £1.50 £0.85	AEROKLEANE 125 AERO DUSTER 140 PLASTIC SEAL 130 GLASS CLEANER 130 If you purchase more than one Servisoi product postage will be £2.00 **********************************
BR70005BR70005 BR7200730073802550 HR00455 HR00455 HR00520 JVC & FERGUSON 3V326942HR7655 HR01803V99FV12LHRD230 HR03703V98FV13H-HRD430HRD470 HR03703V98FV13H-HRD430HRD470 HR0250 KV901KV903KV905 KV917 LOGIK VR960 VR960 VR960 VR960 VR960 C4104204440 OCS0*OCS5*OC60/OC65 LUXOR 9/225 MATSUI	£24.50 £31.50 £30.00 £7.20 £20.00 £22.00 £33.50 £31.00 £27.00 £4.50 £17.00 £21.50	\text{VR330VR3600} SALORA 6000600 SAMSUNG SX30VR36009810VVT510VT320 VT5600VX510VX511VX520VX616 VX626VX62VX717 SANYO VTC5000VTC5400VTC6000VTC8500 VPR5000VTC5400VTC6100VTC7500 VTCM20VTCM20VTCM10VTCM10 VTCM20VTCM20VTCM20VTC200 VTC5400VTC5300VTC5300 VTCN410VTCNX15VTCN20V VTCN40VTCNX15VTCN20V VTCN40VTCNX15VTCNX20 VTCNX15VTCNX15VTCNX20 VTCNX15VTCNX20 VTCNX15V	£21.50 £19.00 £18.50 £19.00 £16.00 £18.00 £18.00	SLC9, SLC24, SLC100, SLC24, SLC30, SLC33, SLC30, SLC33, SLC34, SLC1010, SLF1, SLE25, SLC44, SLF100, SL	£1.60 £1.50 £1.20 £1.20 £1.00 £1.60 £1.55 £1.55 £2.10	SL-C5, SL-C6 SL-C9 SL-C9 SL-8000, SL8080 TOSHIBA V55, V57 V5250, V5280 V5480 V5475 V7540 V8600 V9600 SOLDERING IROI ANTEX XS25W 240V	£1.40 £1.65 £2.00 £0.85 £2.30 £2.10 £1.60 £1.50 £0.85	AEROKLEANE 125 AERO DUSTER 140 PLASTIC SEAL 130 GLASS CLEANER 130 If you purchase more than one Servisoi product postage will be £2.00 **********************************
BR70005@R70005 HR70073073802550 HR00455 HR00455 HR00450 JVC& FERGUSON 3V326942HR7655 HR01803V99FV12LHRD230 HR03703V98FV13H-HRD430-HRD470 HR03703V98FV13H-HRD430-HRD470 HR03703V98FV13H-HRD430-HRD470 HR03703V98FV13H-HRD430-HRD470 HR03703V8FV13H-HRD430-HRD470 HR03703V8FV13H-HRD430-HRD470 HR03703V8FV13H-HRD430-HRD470 HR03703VK903KV905 KV917 LOGIK VR960 VR950 LOEWE 0C4104204440 OC50/OC55*OC60/OC65 LUXOR 9225 MATSUI VX500C-VX500AVX800AVX810AVX810AVX800AVX770BVX7773BVX7773B	£24.50 £31.80 £7.20 £7.20 £22.00 £22.00 £30.80 £31.80 £31.00 £27.00 £27.00 £21.50 £21.50 £21.50	VR330VR3800 SALORA 85006800 SAMSUNG SXMSUNG SXX301VB900VB910VVT510VT320 VT5800VX510VX511VX520VX618 VX620VA622VX717 SANYO VTC5000VTC5400VTC6000VTC6500 VTC5100VTC510VTC5300 VTC5100VTC510VTC710VTC710V VTCM20VTC712VTCM25VTC200 VTC510VTC7139VTC5300 VTC510VTC7139VTC5300 VTC510VTC7139VTC5300 VTC510VTC7139VTC3300 VTC310VTC319VTC3300 VTC319VTC3355VTC9455VTC9500 VHR110VHR3100VHR3100 VHR3110VHR3100 VHR3100VHR3100 VHR3100VHR3100 VHR3100VHR3200 VHR3100VHR3200 VHR1100VHR3200 VHR3200VG380VC388VC388VC3307 VC389VC382VC488VC3307 VC389VC482VC488VC3300 VC388VC482VC488VC3300 VC388VC482VC488VC3300 VC388VC482VC489VC3300 VC388VC482VC488VC3300 VC388VC482VC489VC3300 VC388VC389VC389VC3900 VC388VC482VC489VC3300 VC388VC482VC489VC300 VC388VC482VC488VC300 VC388VC482VC488VC300 VC388VC482VC488VC300 VC388VC482VC488VC488VC300 VC388VC482VC488VC300 VC388VC482VC488VC300 VC388VC482VC488VC300 VC388VC482VC488VC300 VC388VC482VC488VC300 VC388VC482VC488	£19.00 £19.00 £18.50 £19.00 £18.00 £18.00 £28.00	SLC9, SLC24, SLC100, SLC34, SLC30, SLC33, SLC34, SLC1010, SLF1, SLE25, SLC44, SLF100, SLF1, SLF11, SLF25, SLC44, SLF100, SLF100, SLF100, SLF100 VCR BELT KITS AKAI VP7100 VS-1 VS-2 VS-4 VS-8 VS-8 VS-8 VS-8 VS-8 VS-8 VS-8 VS-8	£1.60 £1.50 £1.00 £1.00 £1.80 £1.60 £1.55 £2.10 £2.10 £2.10 £2.10 £2.10 £2.10 £2.10 £2.10 £2.10	SL-C5, SL-C6 SL-C7 SL-C9 SL-8000, SL8080 TOSHIBA V55, V57 V5250, V5280 V5480 V5475 V7540 V8600 V9600 SOLDERING IROI ANTEX XS25W 240V Soldering Iron 240Vac Spare Element for XS25W	£1.40 £1.65 £2.00 £0.85 £2.30 £2.10 £1.60 £1.50 £0.85	AEROKLEANE 125 AERO DUSTER 140 PLASTIC SEAL 130 GLASS CLEANER 130 If you purchase more than one Servisoi product postage will be £2.00 **********************************
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BR70005BR70005 BR70005BR70005 BR7200730073502550 HR0455 HR0455 HR0455 HR0456 HR0456 HR0456 HR0450304 HR0370395PV12LHRD230 HR0370395PV12LHRD230 HR0370395PV13HHRD430HRD470 HR0370395PV13HHRD430HRD470 HR0370305 KY917 LOGIK VR960 VR960 C410420440 OC50/CC55/CC50/CC65 LUXOR 9225 MATSUI VX500EVX800AVX800AVX810AV VX880AVX770BVX773B VX50EVX800AVX800AVX810AV VX880AVX770BVX773B VX50EVX800AVX765VX850 MITSUBISHI HS303HS304HS300HS700 HS307 HS319 HS30HS304HS302HS301 HS300HS301HS302HS301 HS300HS301HS302HS301 HS309HS301HS302HS301 HS300HS301HS302HS310 HS300HS300HS301HS302HS310 HS300HS300HS301HS302HS310 HS300HS300HS301HS302HS310 HS300HS300HS301HS302HS310 HS300HS300HS301HS302HS310 HS300HS300HS300HS300HS300HS300HS300HS3	£24.50 £31.50 £30.00 £7.20 £22.00 £31.60 £31.60 £31.60 £31.60 £31.60 £24.60 £17.00 £21.50 £21.50 £21.50 £15.00 £15	\text{VR330VR3600} SALORA 85006800 SAMSUNG SALORA 85006800 SAMSUNG SXX301VB900VB910VVT510VT320 VT5600VX510VX511VX520VX618 VX620VA622VX717 SANYO VTC5000VTC5400VTC6000VTC6500 VPR5000VTC5400VTC500VTC500VTC500VTC7600VTC540VTCM10VTCM10 VTCM20VTCAV2VTCM25VTC2300 VTCN100VTC3350VTC3370 VTCN100VTC5500VTC91350VTC3300 VTC3350VTC3350VTC9350VTC9455VTC9500 VTR1110VHR1500VHR3300 VHR1100VHR3300VHR3400 VHR1100VHR320VHR3400 VHR1100VHR1200 VHR1300VHR320VHR3400 VHR1100VHR1200 VHR1500VHR320VHR3400 VHR1100VHR1200 VHR1500VHR300VFR300VC8500VC	£18.50 £18.00 £1	SLC9, SLC24, SLC190, SLC34, SLC39, SLC39, SLC39, SLC39, SLC34, SLC1910, SLF1, SLF25, SLC44, SLF100, SLF1, SLF25, SLF30, S	£1.80 £1.50 £1.20 £1.20 £1.20 £1.20 £1.85	SL-C5, SL-C6 SL-C7 SL-C9 SL-8000, SL8080 TOSHIBA V55, V57 V5250, V5280 V5480 V5490 V9600 SOLDERING IROI ANTEX XS25W 240V Soldering Iron 240Vac Spare Element for XS25W 240V ANTEX C15W 240V Soldering Iron 240Vcm Spare Element for C15W 240V DESOLDERING PUI Desolder Pump Spare Nozzle SOLDER MOP 8 SOLDER MOP 8 SOLDER MOP 8 SOLDERING IROI SOLDERING IROI SOLDERING IROI SOLDER MOP 8 SOLDER MOP SOLDERING IROI	£1.40 £1.65 £2.00 £0.85 £2.30 £1.60 £1.60 £1.50 £0.85 £0.85 £0.85 £0.85 £0.60p £0.60p	AEROKLEANE AERO DUSTER 140 PLASTIC SEAL 130 GLASS CLEANER If you purchase more than one Servisol product postage will be £2.00 ** * * * * * * * * * * * * * * * * *
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IDLERS	& PULLEYS REPI	ACEMENTS Reference			ULLEYS REPLACE	MENTS — Cont.		VIDEO MO	TORS	
VCR7000		150280	£1.50	NATIONAL NV322, NV600, NV688.	IDLER UNIT	VXP0463	23.00	AMSTRAD VCR 7000	REEL MOTOR	£17.00
AKAI VS1-2, VS4-5, VS15 VS1-2, VS4-5, VS15 V9700 VS125, 126, 155,	FF-REW IDLER T-UP IDLER IDLER IDLER ASSY	M1327773 BV327815 BV321979 MZ366960J2	£4.50 £6.00 £6.00 £11.00	NV777, NV788 NV333 NV333, NV366 NV333, NV366 NV333, NV3000 NV333, NV2000, NV3000	IDLER ARM IDLER UNIT PLAY IDLER ACTION GEAR	VXL0997 VXP0401 VXP0433 VDG0016 VXP0325	£3.60 £0.75 £3.00 £0.60 £2.00	FERGUSON & JVC PU 45979, 3V16, 3V22, HR3300, HR3660	CAPSTAN MOTOR CAPSTAN MOTOR	£21.00 £19.50
VS165, 240, 244, VS245, 247, 248, VS250, 512, 515, 516				NV7800 NV333, NV2000, NV3000 NV333			£0.65 £1.00	PU 46414, 8904, 8922, HR3300, HR3320, HR3330, HR3360, HR3600, HR3660 PU 51381V, 3V39, 3V30, 8930, HR72 00 ,	DRUM MOTOR REEL MOTOR	£19.50 £26.50
FERGUSON 3V16-22	T-UP IDLER	PU47752	€4.50	NV366 NV370, NV430, NV730, NV830, NV850, NV870, NVG7, NVG10, NVG12,	IDLER ARM IDLER ARM	VXL0997 VXP0521	£3.60 £1.70	8950, 8951, FV10B, FV11R, FV12L, FV13H, FV20B, FV21R, FV22L, HRD170,	CAPSTAN MOTOR	£29.00
3V16-22 3V23, 3V29-30, 3V31-32, 3V35 3V23	T-UP IDLER REEL IDLER ROLLER ASSY	PU49280 PU48967 PU49042A	£6.30 £3.00	NVG18 NVG18 NV370, NV430, NV870, NV730, NV830, NV850	CAM GEAR	VDG0200	£1.20	HRD180, HRD230, HRD370, HRD430 PU 58636W, 3V58, 3V59, 3V64, 3V65, 8950, 8951, FV108, FV11R, FV12L, FV13H, FV14T, FV20B, FV21R, FV22L,	REEL MOTOR	£18.00
3V29-30, 3V31-32, 3V35-36, 3V38-39, 3V49 3V29-30,3V31-32	T-UP IDLER T-UP CLUTCH	51402 PU51380	£1.45 £2.60	NV730 NV2000, NV3000 NV2000, NV3000 NV2000, NV3000	IDLER UNIT IDLER UNIT IDLER UNIT CAM GEAR	VXP0581 VXP0331 VXP0329 VDG0069	£2.50 £1.20 £1.20 £1.00	HRD170, HRD180, HRD230, HRD370, HRD430, HRD530 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8945, 8947	LDADING MOTOR	28.00
3V35-36, 3V38-39, 3V49 3V35-36, 3V38-39, 3V49 3V58-59, 3V64-65, FV10-11, FV12-13, FV14		PU55374 PU55373 PU58645	£2.85 £2.25 £2.50	NV2000, NV3000 NV7000, 7200, 7800 NV7000, 7200, 7800	ACTION GEAR IDLER UNIT CLUTCH	VDG0016 VXP0344 VXP0343	£1.00 £1.00 £5.50	8948, HRD140, HRD150, HRD455, HRD565, HRD725, HRD755, HRP50, R73AF		
3V42 3V44 3V42, 43, 48, 53, 56	CLUTCH ASSY CLUTCH ASSY T-UP CLUTCH SUPPORT CLUTCH	PU55822 PU57658 PU56043-1-4 PU56044-1-5	£13.50 £11.50 £2.80 £2.80	NV8400, NV8600, NV8610, NV8620 NV8600, NV8610, NV862 NV8620	IDLER UNIT OPLAY IDLER CLUTCH	VXP0245 VXP0243 VXP0343	£1.20 £1.20 £5.50	288P02806, HS303, 304, 320, 330, 700	MOTOR REEL SPOOLING MOTOR REEL SPOOLING MOTOR REEL TAKE-UP GEN	£33.50 £31.50 £21.00
3V42, 43, 48, 53, 56 FISHER DANDE OF DANDE OF	FF-REW PULLEY	HI638531	£1.00	NV600 NVG21-25, NVG40-45 ORION	IDLER PULLEY UNIT	VXP0488 VXP0767	£3.50 £5.80	MYN 135V5L, NV332, NV333, NV340,	REEL MOTOR MOTOR REEL GEN	£13.50 £30.00
FVHP520, FVHP530 FVHP615 FVHP615 FVHP840	COMP. IDLER ASSY GEAR IDLER ASSY REEL T-UP ASSY	F11430420400300 F11430490400900 F11430410400900	£3.30 £5.50 £6.50	VH200-201 VH555-700, VH844-900, VH1000-1500, VH1800, VP200, VH530	IDLER	850A200004 850A200005	£3.50 £6.50	SANYO 4-529V-10800 (RM11), VTC5000, VTC5150 SNARP	REEL MOTOR	€6.30
FVHP905, 906, 908, FVHP910, 916 FVHP975, 990, 999, FVHP5000, 5100	GEAR IDLER ASSY IDLER	FI1430490402400 FI1430420400700	£6.20 £5.20	VH535-630, VH635-640, VH893-1440, VH2500- 2600, VH2700-4010,				RM0TV 1008GEZZ, VC200, VC381, VC384, VC385, VC386, VC483, VC3300, VC8381, VC9100, VC9300, VC9700 RMDTV 1007GEZZ, VC387, VC483, VC486,		£13.50 £16.50
GOLDSTAR	IDLER	435038A	£2.50	VH5010 PHILIPS DV464, VR6462, VR6463 VR6660, VR6860	, IDLER	52220334	£2.50	VC585 RMOTV 1010GEZZ, VC300, VC402, VC471, VC477, VC481, VC482, VC488, VC496, VC500, VC571, VC581, VC582, VC583,		£16.00
HITACHI	FF-REW IDLER	6886971	£1.50	VR6460, VR6520, 6920 DB532, VR6542, VR6843		40340162	£1.70 £7.50	VC584, VC5F3, VC8481, VC8581 SORY BHF 1100D, SLC7	CAPSTAN MOTOR	\$25.00
VT11-33, VT63-64, VT14, 17, 19, 38, 57, VT86, 88	PLAY IDLER CLUTCH ASSY	V-6861482 6879515	£3.20 £7.50	VHR110, VHR1300, VHR1500 VTC5000, VTC5150	IDLER FF-REW IDLER	1430662T14730 1430741T20001	£5.00 £3.00	CASSETTE H	_	
VT120-220 VT8000-8300, VT8500-8700 VT8000-8300.	FF-REW IDLER PLAY IDLER	6886824 6413663 6414221	£7.50 £2.80 £3.60	VTC9100, VTC9300 VTC9300 VTCM10-20 VHR2100, VHR2300	IDLER FF ROLLER ASSY REEL DRIVE PULLEY IDLER	1430551T01400 1430547T00200 1430662T10350 6130374899	£1.20 £2.20 £5.00 £5.00	3V38, 3V39, 8943, 8944, 8951, 3V35, 3V36, HRD121, HRD225 3V42, 3V43, 3V44, 3V45, 8945, 8947, HRD1- HRD455, HRD725	40, HRD141, HRD150,	£24.00 £24.00
VT8500-8700 VT8000-8300 VT8500-8700	FF-REW PULLEY	6383531 8681471	£0.80 £3.30	VTC5000, VTC5150 VTCM10 SHARP	PULLEY PULLEY	143-0-662T-01201 143-0-662T-10350	£5.20 £5.50	8948, 8950, FV10B, FV12L, FV13H, FV14T. F HRD230, HRD430, HRD530 3V58, 3V59, 3V64, 3V65, FV11R, HRD170, F	IRD180, HRD370	£24.00 £24.00
VT9300-9500 VT9300-9500 VT9300-9500	FF-REW IDLER PLAY IDLER IDLER IDLER	6861482 681505 687043	13.20 13.00 13.80	VC651, VC681, VC685 VC7300, VC7700 VC381, VC383, VC386,	IDLER ASSY PLAY IDLER KIT IDLER	NPLYV0107GEZZ NPLYV0041+ NDA1V1007 NIDL0005GEZZ	£6.15 ° £5.00 £1.50	UNIVERSAL VIDEO LAMPS 12V 60mA (300m PANASONIC VIDEO LAMPS	m WIRES)	£0.30 £0.50
VT11-33, VT63-64	FF-REW IDLER	6886971	£1.50	VC8381, VC9100, VC9300, VC9500, VC9700				Part No. 1-439-216-00 KV-2002E, 2010E, 2200E, 20 KV-2012ME, 2016ME, 2015	015, 1820E, 2010SE,	Price
VXL3, VXL20	REEL IDLER	40000009	£1.50	VC300, VC387, VC481, VC482, VC483, VC496, VC571, VC585 VC780-781, VC785-787,	IDLER REEL IDLER	NIDL0006GEZZ NPLTV0111GEZZ	£1.50 £7.00	1-439-256-11 KV-2704EC, 2704UB, 2704E 1-439-286-21 KV-2215UB, 2217UB, 2215E 1-439-289-21 KV-2705F, 2705FE, 2705UB 1-439-303-00 KV-206EC, 20PS1, 2082MI	I, 2215FE, 2212EX, 2215ET , 2705E, 2706UB, 2720EC	£40.00 £30.50 £40.00
VR3905, VR3906 VR3906 VR3913, VR3943	T-UP IDLER REEL IDLER REEL IDLER	PU51402 PU55374 PU48967	£1.45 £2.85 £3.00	VC793-VCT72 SAISHO VR1100, VR1200,	CLUTCH	850A20000	£6.50	KV-2062E(ESP) 1-439-311-00 KV-1440AEC, 1440AS MK2, KTX-1350NF, KTX-1430UB 1-439-332-21 KV-2756, 2730EC, 2730FE, 1-439-333-00 KV-1882EC, 1882UB, 1882F	2764EC, 2752UB, 2752F	£22.75 £22.00 £30.00
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Description Company	!5000 Kit	3.95 3.95 1.95 21.50	Belt Kit		25.95 .12.95 .3.95 .15.95 .19.50	Capstan Motor Clutch Assembly FF/REW Idler Pinch Roller Repair Kit Video Head VT63/64F	27.50 	Pinch Roller Reel Idler (Genu Video Head NV2000/2010	1.95 3.95 ine) 3.95 23.95	Video Head	VIDEO SPARES	95 1.95 1.50 S	Comments of the comments of th
Description Company	85000 t Kit		Belt Kit. Cassette Housing. Clutch Assembly. Pinch Roller. Remate Control. Video Head		25.95 12.95 3.95 15.95 19.50	Capstan Motor Clutch Assembly FF/REW Idler Pinch Roller Repair Kit Video Head VT63/64E Video Head VT65E	27.50 	Pinch Roller Reel Idler (Genu Video Head NV2000/2010 Repair Kit (Genu	1.95 3.95 ine) 3.95 23.95 ine) 21.50	SHARP VC9300/381 Belt Kit	VIDEO SPARE:	1.95 1.95 1.50 S	Comments of the comments of th
Description Company	R5000 t Kit th Roller tidder	3.95	Belt Kit. Cassette Housing Clutch Assembly Pinch Roller Remate Control Video Head 3V65/FV11 Repair Kit		1.50 25.95 12.95 3.95 15.95 19.50	11000 11000 11002 11111	27.50 	Pinch Roller Reel Idler (Genu Video Head NV2000/2010 Repair Kit (Genu Belt Kit Pinch Roller	1.95 3.95 ine) 3.95 23.95 ine) 21.50 1.95 3.95	Video Head SHARP VC9300/381 Belt Kit Pinch Rofter	(Genuine) 5 27 VIDEO SPARE: 2 (1.95 i.95 i.95 i.50 S	0 11480 4 1970 1980 1980 1980 1980 1980 1980 1980 198
Pinch Roller 3.35	R5000 t Kit	3.95	Belt Kit Cassette Housing Clutch Assembly Pinch Roller Remote Control Video Head 3V65/FV11 Repair Kit Beit Kit Canstar Motor		1.50 25.95 12.95 3.95 15.95 19.50	VT120/130E Belt Kit	27.50 .7.95 .2.50 .3.95 .17.95 .22.50 .34.95	Pinch Roller Reel Idler (Genu Video Head NV2000/2010 Repair Kit (Genu Belt Kit Pinch Roller Play Idler (Genu	1.95 3.95 ine) 3.95 23.95 ine) 21.50 1.95 3.95 ine) 25.50	Video Head SHARP VC9300/381 Belt Kit Pinch Rofler Reel Idler ((Reel Motor	(Genuine) 5. 27 VIDEO SPARE: 2	.95 .95 .50 S .50 .95 .95	0 11480 4 1970 1980 1980 1980 1980 1980 1980 1980 198
Rest	85000 I Kit	3.95	Repair Kit Beit Kit Capstan Motor Cassette Housing		11.95 1.75 27.50	VT120/130E Belt Kit Clutch Assembly	27.50 7.95 2.50 3.95 17.95 22.50 34.95	Pinch Roller Reel Idler (Genu Video Head NV2000/2010 Repair Kit (Genu Belt Kit Pinch Roller Play Idler (Genu Reel Idler (Genu	1.55 3.95 inel 3.95 23.95 ine) 21.50 1.95 3.95 ine) 1.25 ine) 1.25 ine) 1.25	SHARP VC9300/381 Belt Kit Pinch Rofler Reel Idler ((Reel Motor Video Head	(Genuine) 5. 27 VIDEO SPARE: 2	.95 .95 .50 S .50 .95 .95	
195	tS000 Kit ch Roller I Idler I Pulley eo Head	3.95	Repair Kit Beit Kit Capstan Motor Cassette Housing		11.95 1.75 27.50	VT120/130E Belt Kit Clutch Assembly FF/REW Idler	27.50 7.95 2.50 3.95 17.95 22.50 34.95	Beit Kd. Pinch Roller Reel Idler (Genu Video Head NV2000/2010 Repair Kit (Genu Beit Kt. Pinch Roller Play Idler (Genu Keel Idler (Genu Video Head	1.55 3.95 inel 3.95 23.95 ine) 21.50 1.95 3.95 ine) 1.25 ine) 1.25 ine) 1.25	SHARP VC9300/381 Belt Kit Pinch Roffel Reel Idler (Reel Motor Video Head VC481/482	(Genuine) 5. 27 VIDEO SPARE: 2. 2 3. 39 Genuine) 3. (Genuine) 12 17	1.95 1.95 1.50 1.50 1.95 1.95 1.95 1.95	
195	15000 Kit Sh Roller	3.95 1.95 21.50	Repair Kit Beit Kit Capstan Motor Cassette Housing		11.95 1.75 27.50	VT120/130E Belt Kit	27.50 7.95 2.50 3.95 17.95 22.50 34.95	Pert Kd. Pinch Roller Reel Idler (Genu Video Head NY2000/2010 Repair Kit (Gen. Belt Kit. Pinch Roller Play Idler (Genu Reel Idler (Genu Video Head NY7000/7200	1.55 3.95 ine) 3.95 23.95 ine) 21.50 1.95 3.95 ine) 1.25 ine) 1.25 ine) 1.25	SHARP VC9300/381 Belt Kit Pinch Roller Reel Idler (Reel Motor Video Head VC481/482 Belt Kit	(Genuine) 5. 27 VIDEO SPARE:	S .50 .550 .550 .550 .955 .955 .955	
6.95 FISHER VIDEO SPARES 18.75 Belt Kit. 1.95 Clutch Assembly 5.95 NN Pinch Roller 5.95 Microbial Paper Kit (Genuine) 1.25 Belt Kit. 1.95 Video Head 17.50 Mode Switch 3.95 1.95 Selt Kit. 1.95 Finch Roller 2.95 Video Head (NVG10/2) 1.95 Finch Roller 3.95 Video Head NVG10/2 2.95 Video Head (NVG10/2) 1.95 Finch Roller 3.95 Video Head NVG10/2 2.95 Video Head NVG10/2 2.95 Video Head NVG10/2 2.95 Finch Roller 3.95 Video Head NVG10/2 2.95 Finch Roller 3.95 Video Head NVG10/2 3.95	15000 Likit Lih Roller Lldler Lldler Lldler Lldler Lldler Lo Head AMSTRAD VIDEO SPARES	3.95 1.95 21.50	Repair Kit Beit Kit Capstan Motor Cassette Housing		11.95 1.75 27.50	VT120/130E Belt Kit Clutch Assembly FF/REW Idler Pinch Roller Repair Kit. Video Head VT120E	27.50 7.95 2.50 3.95 17.95 22.50 34.95 1.95 3.75 3.95 18.50 24.95	Pert Kr. Pinch Roller Reel Idler (Genu Video Head NV2000/2010 Repair Kit (Gent Belt Krt. Pinch Roller Play Idler (Genu Reel Idler (Genu Video Head NV7000/7200 Repair Kit (Gent	1.55 3.95 inel 3.95 inel 21.50 1.95 inel 1.95 inel 1.25 inel 1.25 9.50 inel 1.7.50	SHARP VC9300/381 Belt Kit. Pinch Roller Reel Hotor Video Head VC481/482 Belt Kit. Pinch Roller	(Genuine) 5 27 VIDEO SPARE: (95 95 95 95 95 95 95 95 95 95	
PANASONIC VIDEO SPARES NY30/430 RES PANASONIC VIDEO SPARES PANASONIC VIDEO SPARES NY20/430 RES NY20/430 RES NY20/430 RES NY20/430 Repar Kit (Genuine) 1.95 Resid Idler 5.95 Repar Kit (Genuine) 1.95 Resid Idler 5.95 Repar Kit (Genuine) 1.95 Resid Idler (Genuine) 1.95 Repar Kit (Genuine) 1.95 Resid Idler (Genuine) 1.95 Repar Kit (Genuine) 1.95 Resided Res NY3000/7000 Repar Kit (Genuine) 1.95 Resided Res N	N5000 It Kit ch Roller II deler II belley eo Head AMSTRAD VIDEO SPARES N4500/4660 KIT VCR4500	3.95 1.95 21.50	Repair Kit Beit Kit Capstan Motor Cassette Housing		11.95 1.75 27.50	VT120/130E Belt Kit Clutch Assembly FF/REW Idler Pinch Roller Repair Kit. Video Head VT120E	27.50 7.95 2.50 3.95 17.95 22.50 34.95 1.95 3.75 3.95 18.50 24.95	Beit Kit. Pinch Roller Reel Idler (Genu Video Head NV2000/2010 Repair Kit (Gent Beit Kit. Pinch Roller Play Idler (Genu Video Head NV7000/7200 Repair Kit (Gent Beit Kit. Pinch Roller	1.55 3.95 inel 3.95 inel 21.50 1.95 inel 1.95 inel 1.25 9.50 inel 1.25 9.50 inel 3.95 3.95 3.95 3.95 3.95 3.95 3.95	SHARP VC9300/381 Belt Kit. Pinch Roffer Reel Idler (C Reel Motor Video Head VC481/482 Belt Kit. Pinch Roffer Reel Idler (C Reel Motor) Reel Motor	(Genuine) 5 27 VIDEO SPARE: 2 2 3 3 5enuine) 3 (Genuine) 12 2 7 2 8 3 3 5enuine) 13 (Genuine) 14 (Genuine) 14	1.95 1.95 1.50 1.50 1.95 1.95 1.95 1.95 1.95 1.95 1.95 1.95	
Belt Kil 195 SPARES Clutch Assembly 5.595 NV230430 Repair Kit (Genuine) 12.95 Belt Kil 1.95 Mode Switch 1.95	15000 (Kit	3.95 1.95 21.50	Repair Kit Beit Kit Capstan Motor Cassette Housing Pinch Roller Reel Idler Reel Motor Video Head			VT120/130E Belt Kit Clutch Assembly FF/REW Idler Pinch Roller Repair Kit. Video Head VT120E	27.50 7.95 2.50 3.95 17.95 22.50 34.95 1.95 3.75 3.95 18.50 24.95	Belt Aft Pinch Roller Reel Idler (Genu VV2000/2010 Repair Kit (Gen. Belt Kit. Play Idler (Genu Video Head VV7000/200 Repair Kit (Gen. Reel Idler (Genu Video Head VV7000/7200 Repair Kit (Gen. Belt Kit. Pinch Roller Play Clutch (Ger.	1.55 ine) 3.95 ine) 3.95 ine) 21.50 ine) 21.50 ine) 1.95 ine) 1.25 ine) 1.25 ine) 1.25 ine) 1.25 ine) 1.25 ine) 4.95 ine) 4.95 ine) 4.95 ine) 4.95 ine) 4.95 ine) 4.95	Video Head SHARP VC9300/381 Belt Kit Pinch Roller Reel Idler (C. Reel Motor Video Head VC481/482 Belt Kit Pinch Roller Reel Idler (C. Reel Motor Video Head	(Genuine) 5 27 VIDEO SPARE: 2 2 3 3 5enuine) 3 (Genuine) 12 2 7 2 8 3 3 5enuine) 13 (Genuine) 14 (Genuine) 14	1.95 1.95 1.50 1.50 1.95 1.95 1.95 1.95 1.95 1.95 1.95 1.95	
Clutch Assembly 5.95 NV230:430 Fine 1.295 Real feller (Genuine) 3.95 AAA Batteries (Pkt 4)	5000 Kit sh Roller. I I Idler I Pulley 10 Head AMSTRAD VIDEO SPARES 4500/4600 Kit VCR4500 Kit VCR4500 Kit VCR4600	3.95 1.95 21.50	Repair Kit Beit Kit Capstan Motor Cassette Housing Pinch Roller Reel Idler Reel Motor Video Head			VT120/130E Belt Kit Clutch Assembly FF/REW Idler. Pinch Roller. Repair Kit Video Head VT120E Video Head VT130E	27,50 7,95 2,50 3,95 22,50 34,95 22,50 34,95 1,95 3,75 3,75 18,50 24,95 29,95	Belt Kr. Pinch Roller. Reel Idler (Genu Video Head NV2000:2010 Repar Kr. (Gen. Belt Kr. Pinch Roller. Play Idler (Genu Reel Idler (Genu Reel Idler (Genu Reel Idler (Genu Pinch Roller. Pinch Roller. Play Clutch (Geru Play Clutch (Geru Reel Idler (Genu	1.55 3.95 ine) 3.395 ine) 21.50 1.95 ine) 1.95 ine) 1.25	SHARP VC9300/381 Belt Kit Pinch Roffler Reel Idler (G Reel Motor Video Head VC481/482 Belt Kit Pinch Roffler Reel Idler (G Reel Motor Video Head VC581/582	(Genuine) 5. 27 VIDEO SPARE: 5. 5. 5. 5. 5. 6. 6. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7.	95 95 95 95 95 95 95 95 95 95 95 95 95 9	SATISFAL CONTROLLS
NRES	5000 Kit. ch Roller I clider I Pulley to Head AMSTRAD VIDEO SPARES 45004600 Kit VCR4500 Kit VCR4500 Iffication Kit to Head VCR4500.	3.95 1.95 21.50 1.95 1.95 1.95 6.95 18.75	Repair Kit Beit Kit Capstan Motor Cassette Housing Pinch Roller Reel Idler Reel Motor Video Head FISHER VIDEO FVII615/720 Beit Kit	O SPAI		VT120/130E Belt Kit Clutch Assembly FF/REW Idler Pinch Roller Repair Kit Video Head VT120E Video Head VT130E	27.50 7.95 2.50 3.95 22.50 34.95 1.95 3.75 3.75 3.95 24.95 29.95	Belt Kr. Pinch Roller. Reel idler (Genu Video Head NV2000:2010 Repair Kit (Gent Belt Kri. Pinch Roller. Play idler (Genu Reel idler (Genu Reel idler (Genu Reel idler (Genu Video Head NV7000/7200 Repair Kit (Gent Belt Kri. Pinch Roller. Play Clutch (Genu Video Head NV7000/7200 Repair Kri. Pinch Roller. Play Clutch (Genu Video Head	1.55 3.95 ine) 3.95 ine) 21.50 1.95 ine) 1.95 ine) 1.25 ine) 1.25 ine) 1.25 ine) 1.25 ine) 1.25 ine) 1.25 ine) 1.59	SHARP VC9300/381 Belt Kit Pinch Roller Reel Idler (E Reel Motor Video Head VC481/482 Belt Kit Pinch Roller Reel Idler (E Reel Motor Video Head VC581/582 Belt Kit Pinch Roller Reel Roller	(Genuine) 5 27 VIDEO SPARE: 1 2 1 3 2 5 2 1 3 3 6 nuine) 3 1 17 1 2 5 6 3 3 6 nuine) 3 1 3 1 (Genuine) 11 1 17 1 17 1 17	955 995 995 995 995 995 995 995 995 995	★ * SPECIALS * atternes (Pkt 4)
Design D	5000 Kit. h Roller I clider Pulley O Head AMSTRAD VIDEO SPARES 4500/4600 Kit VCR4500 Kit VCR4500 Ilification Kit O Head VCR4500.	3.95 1.95 21.50 1.95 1.95 1.95 6.95 18.75	Repair Kit Belt Kit Capstan Motor Cassette Housing Pinch Roller Reel Idler Reel Motor Video Head FISHER VIDEO FVII615/720 Belt Kit Clurch Accombin	O SPAI	11.95 1.75 27.50 29.95 3.95 2.75 15.95 23.50 RES	VT120/130E Bell Kit. Clutch Assembly FF/REW Idler. Pinch Roller. Repair Kit. Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430	27.50 7.95 2.50 3.95 22.50 34.95 1.95 7.95 3.75 3.95 18.50 24.95 29.95	Belt Kr. Pinch Roller. Reel Idler (Genu Video Head NY2000:2010 Belt Kri. (Gent Play Idler (Genu Reel Idler (Genu Reel Idler (Genu Reel Idler (Genu Reel Idler (Genu Pinch Roller. Play Clutch (Ger Reel Idler (Genu Video Head NY70012 Reel Idler (Genu Video Head NY70710412 Reel Reel Idler (Genu NY67710412 Repair Kri. (Gene	1.55 3.95 23.95 23.95 23.95 23.95 21.90 1.95 2.1.95	SHARP VC9300/381 Belt Kit. Pinch Roffer Reel Idler (C Reel Motor Video Head VC481/482 Belt Kit. Pinch Roffer Reel Idler (C Reel Motor Video Head VC581/582 Belt Kit. Pinch Roffer Pinch Roffer Reel Idler (C Reel Motor VC581/582 Belt Kit. Pinch Roffer Reel Idler (C	(Genuine) 5 27 VIDEO SPARE:	955 955 955 955 955 955 955 955 955 955	* * SPECIALS * Batteries (Pkt 4)
Design D	5000 Kit. h Roller I clider Pulley O Head AMSTRAD VIDEO SPARES 4500/4600 Kit VCR4500 Kit VCR4500 Ilification Kit O Head VCR4500.	3.95 1.95 21.50 1.95 1.95 1.95 6.95 18.75	Repair Kit Belt Kit Capstan Motor Cassette Housing Pinch Roller Reel Idler Reel Motor Video Head FISHER VIDEO FVII615/720 Belt Kit Clurch Accombin	O SPAI	11.95 1.75 27.50 29.95 3.95 2.75 15.95 23.50 RES	VT120/130E Belt Kit. Clutch Assembly. FF/REW Idler Pinch Roller Repair Kit. Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine)	27,50 7,95 2,50 3,95 3,75 2,50 3,95 3,75 3,95 3,75 3,75 3,75 3,85 24,95 VIDEO S	Belt Kr. Pinch Roller. Reel Idler (Genu Video Head NY2000:2010 Belt Kri. (Gent Play Idler (Genu Reel Idler (Genu Reel Idler (Genu Reel Idler (Genu Reel Idler (Genu Pinch Roller. Play Clutch (Ger Reel Idler (Genu Video Head NY70012 Reel Idler (Genu Video Head NY70710412 Reel Reel Idler (Genu NY67710412 Repair Kri. (Gene	1.55 3.95 23.95 23.95 23.95 23.95 21.90 1.95 2.1.95	SHARP VC9300/381 Belt Kit. Pinch Roffer Reel Idler (C Reel Motor Video Head VC481/482 Belt Kit. Pinch Roffer Reel Idler (C Reel Motor Video Head VC581/582 Belt Kit. Pinch Roffer Pinch Roffer Reel Idler (C Reel Motor VC581/582 Belt Kit. Pinch Roffer Reel Idler (C	(Genuine) 5.7 VIDEO SPARE: (Genuine) 3.6 (Genuine) 12 (Genuine) 3.7 (Genuine) 14 (Genuine) 14 (Genuine) 14 (Genuine) 14 (Genuine) 14 (Genuine) 18	955 995 995 995 995 995 995 995 995 995	* * SPECIALS * Batteries (Pkt 4) Batteries (Pkt 4) io kft
Age	5000 Kit. sh Roller I clider I Pulley Head AMSTRAD VIDEO SPARES 45004600 Kit VCR4500 Kit VCR4500 diffication Kit. Head VCR4500 FERGUSON VIDEO SPARES	1.95 21.50 1.95 21.50	Repair Kit Belt Kit Capstan Motor Cassette Housing Pinch Roller Reel Idler Reel Motor Video Head FISHER VIDEO FVII615/720 Belt Kit Clurch Accombin	O SPAI	11.95 1.75 27.50 29.95 2.75 15.95 23.50 RES 1.95 5.95 4.50 5.95	VT120/130E Belt Kit. Clutch Assembly. FF.REW Idler. Princh Roller. Repair Kit. Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit. Model Suitch	27.50 7.95 2.50 3.95 2.50 3.95 2.50 3.495 22.50 3.495 3.495 3.795 3.795 3.795 3.795 24.95 29.95 VIDEO S	Belt Kr. Pinch Roller. Reel Idler (Genu Vitleo Head NV2000-2010 Repair Kit (Gen. Belt Kri. Pinch Roller Play Idler (Genu Video Head NV7000/720 Repair Kri (Gen. Belt Kri. Pinch Roller Play Clutch (Gene Video Head NV7000/720 Repair Kri (Genu Belt Kri. Pinch Roller Play Clutch (Ger Reel Idler (Genu Video Head NV070012 Repair Kri (Genu Belt Kri. Mode Switch	1.55 3.95 23.95 23.95 23.95 23.95 21.50 21	SHARP VC9300.381 Belt Kit. Pinch Rollel Reel Idler (F Reel Motor Video Head VC881/482 Belt Motor Video Head VC981/482 Belt Motor Pinch Rollel Reel Idler (F Reel Motor Video Head VC981/582 Belt Kit. Pinch Rollel Reel Idler (F Reel Motor Video Head VC981/582 Reel Idler (F Reel Motor Video Head VC981/582	(Genuine) 5. 27 VIDEO SPARE: 2 5. 3 5enuine) 3. (Genuine) 12 2 7. 3 3 3 (Genuine) 44 (Genuine) 17 2 9. 3 3 (Genuine) 3	955 956 957 958 959 959 959 959 959 959 959	★ * SPECIALS ★ Batteries (Pkt 4) p Kr EHT Lead (Genuine)
No.	55000 Kit. ch Roller I clider I Pulley to Head AMSTRAD VIDEO SPARES 45500/4600 Kit VCR4500 Kit VCR4500 Giffcation Kit to Head VCR4600 FERGUSON VIDEO SPARES	1.95 1.95 21.50 1.95 1.95 6.95 18.75	Repair Kit Bell Kit Capstan Motor Cassette Housing Pinch Roller Reel Idler Reel Motor Video Head FISHER VIDE FVII615/720 Belt Kit Clutch Assembly Pinch Roller Reel Idler Video Head	O SPAI	11.95 1.75 27.50 29.95 2.75 15.95 23.50 RES 1.95 5.95 4.50 5.95	VT120/130E Belt Kit. Clutch Assembly. FF.REW Idler. Princh Roller. Repair Kit. Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit. Model Suitch	27.50 7.95 2.50 3.95 2.50 3.95 2.50 3.495 22.50 3.495 3.495 3.795 3.795 3.795 3.795 24.95 29.95 VIDEO S	Belt Kr. Pinch Roller. Reel Idler (Genu Vitleo Head NV2000-2010 Repair Kit (Gen. Belt Kri. Pinch Roller Play Idler (Genu Video Head NV7000/720 Repair Kri (Gen. Belt Kri. Pinch Roller Play Clutch (Gene Video Head NV7000/720 Repair Kri (Genu Belt Kri. Pinch Roller Play Clutch (Ger Reel Idler (Genu Video Head NV070012 Repair Kri (Genu Belt Kri. Mode Switch	1.55 3.95 23.95 23.95 23.95 23.95 1.9	SHARP VC3300/381 Belt Kil. Pinch Roller Real dider (Real Motor Video Head VC481/482 Belt Kil. Pinch Roller Real Motor Video Head VC581/582 Real Motor Video Head VC581 Belt Kil. Pinch Roller Beld Motor Video Head VC581 Belt Kil. Belt Motor Video Head VC581 Belt Motor Video Head VC581	(Genuine) 5. 27 VIDEO SPARE: 2 5. 3 Senuine) 3 (Genuine) 12 5. 5 Genuine) 14 (Genuine) 14 (Genuine) 14 (Genuine) 14 (Genuine) 16 (Genuine) 17 2 2 1 3 3 (Genuine) 17 2 2 1 3 3 (Genuine) 3 4 (Genuine) 17 2 2 1 3 3 (Genuine) 3 3	955 1.550 S 2.50 2.5	* * SPECIALS * Batteries (Pkt 4) ip Kit EHT Lead (Genuine) older Pland
No.	55000 Kit. ch Roller I clider I Pulley to Head AMSTRAD VIDEO SPARES 45500/4600 Kit VCR4500 Kit VCR4500 Giffcation Kit to Head VCR4600 FERGUSON VIDEO SPARES	1.95 21.50 1.95 21.50	Repair Kit Bell Kit Capstan Motor Cassette Housing Pinch Roller Reel Idler Reel Motor Video Head FISHER VIDE FVII615/720 Belt Kit Clutch Assembly Pinch Roller Reel Idler Video Head	O SPAI	11.95 1.75 27.50 29.95 2.75 15.95 23.50 RES 1.95 5.95 4.50 5.95	VT120/130E Belt Kit. Clutch Assembly. FF.REW Idler. Princh Roller. Repair Kit. Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit. Model Suitch	27.50 7.95 2.50 3.95 2.50 3.95 2.50 3.495 22.50 3.495 3.495 3.795 3.795 3.795 3.795 24.95 29.95 VIDEO S	Belt Kr. Pinch Roller. Reel Idler (Genu Vitleo Head NV2000-2010 Repair Kit (Gen. Belt Kri. Pinch Roller Play Idler (Genu Video Head NV7000/720 Repair Kri (Gen. Belt Kri. Pinch Roller Play Clutch (Gene Video Head NV7000/720 Repair Kri (Genu Belt Kri. Pinch Roller Play Clutch (Ger Reel Idler (Genu Video Head NV070012 Repair Kri (Genu Belt Kri. Mode Switch	1.55 3.95 23.95 23.95 21.50 1.95 3.95	SHARP VC3300/381 Belt Kil. Pinch Roller Reel Idler (I Reel Motor Video Head VC581/S2 Belt Kil. Pinch Roller Reel Idler (I Reel Motor Video Head VC581/S2 Belt Kil. Pinch Roller Reel Idler (I Reel Motor Video Head VC581/S2 Belt Kil. Pinch Roller Reel Idler (I Reel Motor Video Head VC581/S2 Belt Kil. Pinch Roller Reel Idler (I Reel Motor Video Head VC681	(Genuine) 5.27 VIDEO SPARE: 2.7 VIDEO SPARE: 2.7 3.3 3.2 3.2 3.2 3.2 3.2 3.3 3.2 3.2 3.3 3.2 3.3 3.2 3.3	955 550 S 550 550 550 550 550 550	* * SPECIALS * Batteries (Pkt 4) By Kit EHT Lead (Genuine) Jidder Braid
Repair Kit (Genuine) 13.75	5000 Kit. h Roller I Idder I Pulley O Head AMSTRAD VIDEO SPARES 4500/4600 Kit VCR4500 Kit VCR4500 Offication Kit O Head VCR4500 O Head VCR4600 FERGUSON VIDEO SPARES 07 Life About State Sta	1.95 1.95 21.50 1.95 1.95 1.95 1.875 18.75	Repair Kit Belt Kit Capstan Motor Cassette Housing Pinch Roller Reel Idler Reel Motor Video Head FISHER VIDE: FVII615/720 Belt Kit Clutch Assembly Pinch Roller Reel Idler Video Head FUFFORM ROLLER Reel Idler Video Head Clutch Assembly Clutch Assembly Clutch Assembly Clutch Assembly	O SPAI	11.95 1.75 27.50 29.95 3.95 2.75 15.95 23.50 RES 1.95 -5.95 4.50 -5.95 17.50	VT120/130E Belt Kit. Clutch Assembly. FF.REW Idler. Princh Roller. Repair Kit. Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit. Model Suitch	27.50 7.95 2.50 3.95 2.50 3.95 2.50 3.495 22.50 3.495 3.495 3.795 3.795 3.795 3.795 24.95 29.95 VIDEO S	Belt Kr. Pinch Roller. Reel Idler (Genu Vitleo Head NV2000-2010 Repair Kit (Gen. Belt Kri. Pinch Roller Play Idler (Genu Video Head NV7000/720 Repair Kri (Gen. Belt Kri. Pinch Roller Play Clutch (Gene Video Head NV7000/720 Repair Kri (Genu Belt Kri. Pinch Roller Play Clutch (Ger Reel Idler (Genu Video Head NV070012 Repair Kri (Genu Belt Kri. Mode Switch	1.55 3.95 23.95 23.95 21.50 1.95 3.95	Video Head SHARP VC3300,381 Belt Kit. Pinch Rolle Reel Idler (E Reel Motor Video Head VC581/82 Belt Kit. Pinch Rolle Reel Idler (E Reel Motor Video Head VC588 Belt Kit. Pinch Rolle Reel Idler (E Reel Motor Video Head VC688) Belt Kit. Pinch Rolle Reel Reel Reel Reel Reel Reel Reel R	(Genuine) 5.7 VIDEO SPARE: 2.7.3.3 Senuine) 3.0 (Genuine) 12 2.7.3.3 Senuine) 3.0 (Genuine) 14 17 2.7.3.3 Senuine) 3.0 (Genuine) 14 17 2.7.3.3 Senuine) 3.0 (Genuine) 3.0 (Genuine) 3.0 (Genuine) 18 (Genuine) 18 (Genuine) 17 (Genuine) 18 (Genuine) 17	995 550 995 995 995 995 995 995	* * SPECIALS * Batteries (Pkt 4) ip Kit EHT Lead (Genuine) ilder Pump sii Lever Assy, sis Rattery IV2
HITACH Sparr Sp	5000 Kit. h Roller I (I dier I Pulley. 10 Head AMSTRAD VIDEO SPARES 4500/4600 Kit VCR4500 Kit VCR4500 Kit VCR4600 Initication Kit. 0 Head VCR4600 FERGUSON VIDEO SPARES 1/22 Kit. h Roller - Up Ciutch (Large) - Up Ciutch (Small)	1.95 1.95 21.50 1.95 1.95 1.95 1.875 18.75 18.75	Repair Kit Belt Kit Capstan Motor Cassette Housing Pinch Roller Reel Idler Reel Motor Video Head FISHER VIDE: FVII615/720 Belt Kit Clutch Assembly Pinch Roller Reel Idler Video Head FUFFORM ROLLER Reel Idler Video Head Clutch Assembly Clutch Assembly Clutch Assembly Clutch Assembly	O SPAI	11.95 1.75 27.50 29.95 3.95 2.75 15.95 23.50 RES 1.95 -5.95 4.50 -5.95 17.50	VT120/130E Bell Kit. Clutch Assembly FF/REW Idler. Pinch Roller. Repair Kit. Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit. Mode Switch Pinch Roller. Reel Idler (Genuine) Tension Band Video Head NV230	27.50 7.95 2.50 3.95 2.50 3.95 2.50 3.495 22.50 3.495 3.495 3.795 3.795 3.795 3.795 24.95 29.95 VIDEO S	Belt Kr. Pinch Roller. Reel Idler (Genu Vitleo Head NV2000-2010 Repair Kit (Gen. Belt Kri. Pinch Roller Play Idler (Genu Video Head NV7000/720 Repair Kri (Gen. Belt Kri. Pinch Roller Play Clutch (Gene Video Head NV7000/720 Repair Kri (Genu Belt Kri. Pinch Roller Play Clutch (Ger Reel Idler (Genu Video Head NV070012 Repair Kri (Genu Belt Kri. Mode Switch	1.55 3.95 23.95 23.95 21.50 1.95 3.95	SHARP VC9300/381 Belt Kit. Pinch Roller Reel Idler (Faller) Reel Motor Video Head VC581/S2 Belt Kit. Pinch Roller Reel Motor Video Head VC581/S2 Belt Kit. Pinch Roller Reel Motor Video Head VC581/S2 Belt Kit. Pinch Roller Pinch Roller Reel Pinch Roller	(Genuine) 5.27 VIDEO SPARE: 2.7 VIDEO SPARE: 2.7 3.3 3.2 3.2 3.2 3.2 3.2 3.2	995 1.50 1	* * SPECIALS * Batteries (Pkt 4) ip Kit EHT Lead (Genuine) ilder Pump sui Lever Assy sp Battery 1V2 sp Battery 1V2 sp Battery 1V2 sp Battery 1V2
No. Price Page	5000 Kit. h Roller Lolder Pulley 10 Head AMSTRAD VIDEO SPARES 4500/4600 Kri VCR4500 Kri VCR4500 Hifcation Kit 00 Head VCR4600 FERGUSON VIDEO SPARES KIL h Holler LUP Clutch (Large) - Up Clutch (Small) 0 Head 0 Head 0 Head	1.95 1.95 21.50 1.95 1.95 1.95 1.875 18.75 18.75	Repair Kit Belt Kit Capstan Motor Cassette Housing Pinch Roller Reel Idler Reel Motor Video Head FISHER VIDE: FVII615/720 Belt Kit Clutch Assembly Pinch Roller Reel Idler Video Head FUFFORM ROLLER Reel Idler Video Head Clutch Assembly Clutch Assembly Clutch Assembly Clutch Assembly	O SPAI	11.95 1.75 27.50 29.95 3.95 2.75 15.95 23.50 RES 1.95 -5.95 4.50 -5.95 17.50	VT120/130E Belt Kit. Clutch Assembly. FF/REW Idler. Princh Roller. Repair Kit. Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit. Mode Switch Pinch Roller. Reel Idler (Genuine) Tension Band Video Head NV230 NV333/366	27,50 7,95 2,50 3,95 17,95 22,50 34,95 1,95 3,75 3,95 18,50 24,95 29,95 VIDEO S	Belt Kr. Pinch Roller. Reel Idler (Genu Video Head NV2000:2010 Repair Kit (Gent Belt Kr. Pinch Roller. Play Idler (Genu Reel Idler (Genu Video Head NV7000/7200 Repair Kit (Gent Belt Kit. Pinch Roller. Play Clutch (Ger Reel Idler (Genu Video Head NVG770012 Repair Kit (Genu Video Head NVG77012 Repair Kit (Genu Video Head (NV	1.59 3.95 ine) 3.95 ine) 21.50 ine) 21.50 ine) 21.50 ine) 12.5 ine) 2.5 ine) 2.5 ine) 2.5 ine) 2.5 ine) 2.5 ine) 2.95 ine) 3.95 ine) 2.95 ine) 3.95 ine) 2.95 ine) 3.95 ine) 3.9	SHARP VC3300/381 Belt Kil. Pinch Roller Reel Idler (I Reel Motor Video Head VC481/82 Belt Kil. Pinch Roller Reel Motor Video Head VC581/82 Belt Kil. Pinch Roller Reel Motor Video Head VC581/82 Belt Kil. Pinch Roller Reel Pinch Roller Reel Pinch Roller Reel Pinch Roller Reel Puller Video Head VC581	(Genuine). 5. 27 VIDEO SPARE: 2. 3. 3. 3. (Genuine). 3. 3. 3. (Genuine). 11 2. 3. 3. 3. (Genuine). 14 2. 3. 3. 3. (Genuine). 14 2. 3. 3. 3. (Genuine). 14 2. 3. 3. (Genuine). 17 2. 3. 3. (Genuine). 3. 3. (Genuine). 3. 3. (Genuine). 3. 3. (Genuine). 3. 3. 3. (Genuine). 3. 3. 3. (Genuine). 3. 3. 3. (Genuine). 3. 3. 3. (Genuine). 7. 7. 3. 3. (Genuine). 7. 3. 3. 3. (Genuine). 7. 7. 3. 3. 3. 3. (Genuine). 7. 7. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3.	955	* * SPECIALS * Batteries (Pkt 4) ip Kit EHT Lead (Genuine) ilder Pump sui Lever Assy sp Battery 1V2 sp Battery 1V2 sp Battery 1V2 sp Battery 1V2
1.95 Play Idler Genume 4.95 Repair Kit 1.95 Real Idler (Genume 1.95 Play Idler 1.95 Real Idler 1.95 Play Idl	5000 Kit. h Roller I clider Pulley 10 Head AMSTRAD VIDEO SPARES 4500:4600 Kri VCR4500 Kri VCR4500 Kri VCR4500 Infication Kit. 0 Head VCR4500 FERGUSON VIDEO SPARES VIDEO SPARES VIDEO Large Lup Clutch (Large) - Up Clutch (Large) - Up Clutch (Small) 0 Head	1.95 1.95 21.50 1.95 1.95 1.95 1.95 1.95 1.8.75 1.8.75 1.8.75	Repair Kit Belt Kit Capstan Motor Cassette Housing Pinch Roller Reel Idler Reel Motor Video Head FISHER VIDE: FVIII615/720 Belt Kit Clutch Assembly Pinch Roller Reel Idler Video Head FVIII615/730 Belt Kit Clutch Assembly Reel Idler Video Head Video Head Video Head	O SPAI	11.95 1.75 27.50 29.95 3.95 2.75 15.95 23.50 RES 1.95 -5.95 4.50 -5.95 17.50	VT120/130E Belf Kit Clutch Assembly FF.REW Idler Pinch Roller Repair Kit Video Head VT120E Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belf Kit Mode Switch Pinch Roller Reel Idler (Genuine) Tension Band Video Head NV230 NV333/366 Repair Kit (Genuine) Repair Kit (Genuine)	27,50 7,95 2,50 3,395 17,95 22,50 34,95 7,95 3,7	Belt Kr. Pinch Roller. Reel Idler (Genu Video Head NV2000/2010 Repair Kit (Gen. Belt Kri. Pinch Roller. Play Idler (Genu Reel Idler (Genu Belt Kri. Pinch Roller. Play Clutch (Ger Reel Idler (Genu Belt Kri. Mode Switch Pinch Roller. Reel Idler (Genu Belt Kri. Mode Switch Video Head (NV) Video Head (NV) PH	1.55 3.95 ine 3.95 23.95 23.95 ine 21.50 1.95 ine 1.25 in	SHARP VC3300/381 Belt Kil. Pinch Roller Reel Idler (I Reel Motor Video Head VC481/82 Belt Kil. Pinch Roller Reel Motor Video Head VC581/82 Belt Kil. Pinch Roller Reel Motor Video Head VC581/82 Belt Kil. Pinch Roller Reel Pinch Roller Reel Pinch Roller Reel Pinch Roller Reel Puller Video Head VC581	(Genuine). 5. 27 VIDEO SPARE: 2. 3. 3. 3. (Genuine). 3. 3. 3. (Genuine). 11 2. 3. 3. 3. (Genuine). 14 2. 3. 3. 3. (Genuine). 14 2. 3. 3. 3. (Genuine). 14 2. 3. 3. (Genuine). 17 2. 3. 3. (Genuine). 3. 3. (Genuine). 3. 3. (Genuine). 3. 3. (Genuine). 3. 3. 3. (Genuine). 3. 3. 3. (Genuine). 3. 3. 3. (Genuine). 3. 3. 3. (Genuine). 7. 7. 3. 3. 3. 3. (Genuine). 7. 7. 3. 3. 3. (Genuine). 7. 7. 3. 3. 3. 3. (Genuine). 7. 7. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3.	955	* * SPECIALS * Batteries (Pkt 4) Batteries (Pkt 4) Botteries (Pkt
2.95	5000 Kit. h Roller I clider Pulley 10 Head AMSTRAD VIDEO SPARES 4500:4600 Kri VCR4500 Kri VCR4500 Kri VCR4500 Infication Kit. 0 Head VCR4500 FERGUSON VIDEO SPARES VIDEO SPARES VIDEO Large Lup Clutch (Large) - Up Clutch (Large) - Up Clutch (Small) 0 Head	1.95 1.95 21.50 1.95 1.95 1.95 1.95 1.95 1.8.75 1.8.75 1.8.75	Repair Kit Belt Kit Belt Kit Capstan Motor Cassette Housing Pinch Roller Reel Idler Reel Motor Video Head FISHER VIDEO FVII615/720 Belt Kit Clutch Assembly Pinch Roller Video Head Belt Kit Clutch Assembly Pinch Roller Video Head HITAC	O SPAI	11.95 1.75 27.50 29.95 3.95 2.75 15.95 23.50 RES 1.95 5.95 4.50 5.95 17.50	VT120/130E Belt Kit. Clutch Assembly. FF/REW Idler. Princh Roller. Repair Kit. Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit. Mode Switch Pinch Roller. Reel Idler (Genuine) Tension Band Video Head NV230 NV333/366 Repair Kit (Genuine) Belt Kit.	27,50 7,95 2,50 3,95 17,95 22,50 34,95 1,95 3,75 3,75 3,75 3,75 3,75 3,75 3,75 3,7	Belt Kr. Pinch Roller. Reel Idler (Genu Video Head NV2000/2010 Repair Kit (Gent Belt Kri. Pinch Roller. Play Idler (Genu Reel Idler (Genu Play Clutch (Ger Reel Idler (Genu Video Head NVG7/10/12 Repair Kit (Genu Belt Kit Mode Switch Pinch Roller Reel Idler (Genu Video Head (NV) Video Head (NV) Video Head (NV) Video Head (NV) VIDEO	1.55 3.95 ine 3.95 21.50 ine 21.50 ine 1.95 3.95 ine 1.25 ine 1.295 ine	SHARP VC3300/381 Belt Kil. Pinch Roller Real dider (Real Motor Video Head VC481/82 Belt Kit. Pinch Roller Real Motor Video Head VC581/582 Belt Kit. Pinch Roller Real Motor Video Head VC681 Belt Kit. Pinch Roller Real Pulley Video Head VCA140/VC1 Real Real VCA140/VC1 Real Real Pulley Video Head VCA140/VC1 Real Real Pulley	(Genuine)	955	* * SPECIALS * Batteries (Pkt 4) ip Kit EHT Lead (Genuine) Joider Braid Joider Pump Sist Lever Assy Sps Battery 1V2 assol Gas from assol Tips. er 0.5Kg, 18 SW/G ng Kit
2.95	5000 Kit. h Roller I clider Pulley 10 Head AMSTRAD VIDEO SPARES 4500:4600 Kri VCR4500 Kri VCR4500 Kri VCR4500 Infication Kit. 0 Head VCR4500 FERGUSON VIDEO SPARES VIDEO SPARES VIDEO Large Lup Clutch (Large) - Up Clutch (Large) - Up Clutch (Small) 0 Head	1.95 1.95 21.50 1.95 1.95 1.95 1.95 1.95 1.8.75 1.8.75 1.8.75	Repair Kit Belt Kit Capstan Motor Cassette Housing Pinch Roller Reel Motor Video Head FISHER VIDE FVIII615/720 Belt Kit Clutch Assembly Pinch Roller Reel Idler Video Head VH905/910 Belt Kit Clutch Assembly Reel Idler Video Head Wideo Head HITAC VIDEO SI	O SPAI	11.95 1.75 27.50 29.95 3.95 2.75 15.95 23.50 RES 1.95 5.95 4.50 5.95 17.50	VT120/130E Belt Kit. Clutch Assembly. FF/REW Idler. Princh Roller. Repair Kit. Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit. Mode Switch Pinch Roller. Repair Kit (Genuine) Tension Band Video Head NV230 NV333/366 Repair Kit (Genuine) Belt Kit. Pinch Roller. Repair Kit (Genuine)	27,50 7,95 2,50 3,95 2,50 3,95 22,50 34,95 1,95 3,95 3,95 18,50 24,95 29,95 VIDEO S 12,95 3,95 3,95 3,95 24,95 25,95 1,95 3,95 2,95 1,95 3,95 3,95 3,95 3,95 3,95 3,95 3,95 3	Belt Kr. NY2000/2010 Repair Kit (Gen. Belt Kit. Pinch Röller. Play Idler (Genu Reel Kit (Gen. Belt Kit. Pinch Röller. Play Idler (Genu Reel Idler (Genu Pinch Röller. Pinch Röller. Reel Idler (Genu Reel Idler (G	1.55 3.95 ine 3.95 23.95 ine 21.50 1.95 ine 1.25	SHARP VC3300/381 Belt Kil. Pinch Roller Reel Idler (I Reel Motor Video Head VC481/482 Belt Kil. Pinch Roller Reel Idler (I Reel Motor Video Head VC581/582 Belt Kil. Pinch Roller Reel Idler (I Reel Motor Video Head VC581/582 Belt Kil. Pinch Roller Reel Idler (I Reel Motor Video Head VC581/582 Belt Kil. Pinch Roller Reel Pultey video Head VC4140/VC1 Belt Kil. Pinch Roller Reel Reel Reel Video Head VC4140/VC1 Reel Reel Video Head	(Genuine)	955	* * SPECIALS * Batteries (Pkt 4) ip Kit EHT Lead (Genuine) Joider Braid Joider Pump Sist Lever Assy Sps Battery 1V2 asol Gas from asol Tips. Tuner Tuners Tuners
2.95	5000 Kit. h Roller Idler Pulley o Head AMSTRAD VIDEO SPARES 4500/4600 Kri VCR4500 Kri VCR4600 iffication Kit o Head VCR4500 FERGUSON VIDEO SPARES VIDEO SPARES VIDEO UTCh (Large) -Up Clutch (Large) -Up Clutch (Large) -Uh Clutch (Small)	1.95 1.95 21.50 1.95 1.95 1.95 1.95 1.95 1.8.75 1.8.75 1.8.75	Repair Kit Belt Kit Capstan Motor Cassette Housing Pinch Roller Reel Motor Video Head FISHER VIDE FISHER FISHER VIDE FISHER FISHE	O SPAI	11.95 1.75 27.50 29.95 3.95 2.75 15.95 23.50 RES 1.95 4.50 5.95 17.50	VT120/130E Belt Kit Clutch Assembly FF.REW Idler Pinch Roller Repair Kit Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit Mode Switch Pinch Roller Reel Idler (Genuine) Tension Band Video Head NV230 NV333'366 Repair Kit (Genuine) Belt Kit Pinch Roller Pinch Roller Repair Kit (Genuine) Belt Kit Pinch Roller Repair Kit (Genuine) Pinch Roller Reel Idler (Genuine)	27,50 7,95 2,50 3,95 2,50 3,95 22,50 34,95 7,95 3,75 3,75 3,75 3,75 3,75 3,75 3,75 3,7	Belt Kr. Pinch Roller. Reel Idler (Genu Video Head NV2000:2010 Repair Kit (Gent Belt Kr. Pinch Roller. Play Idler (Genu Reel Idler (Genu Krideo Head NV7000/7200 Repair Kit (Gent Belt Kit. Pinch Roller. Play Clutch (Ger Reel Idler (Genu Video Head NVG07700/12 Repair Kit (Gent Belt Kit. Mode Switch Pinch Roller Piay Clutch (Ger Reel Idler (Genu Video Head (NV Video	1.59 ine) 3.95 ine) 3.95 ine) 21.50 ine) 21.50 ine) 1.95 ine) 1.25 ine) 1.95	Video Head Video Index I	(Genuine)	955 S S 50	* * SPECIALS * Batteries (Pkt 4) Batteries (Pkt 4) Batteries (Pkt 4) Both (Pkt 4) Batteries (Pkt 4) Ba
VT9300 9700E	5000 Kit. h Roller Idler Pulley o Head AMSTRAD VIDEO SPARES 4500/4600 Kri VCR4500 Kri VCR4600 iffication Kit o Head VCR4500 FERGUSON VIDEO SPARES VIDEO SPARES VIDEO UTCh (Large) -Up Clutch (Large) -Up Clutch (Large) -Uh Clutch (Small)	1.95 1.95 21.50 1.95 1.95 1.95 1.95 1.95 1.8.75 1.8.75 1.8.75	Repair Kit Belt Kit Capstan Motor Cassette Housing Pinch Roller Reel Motor Video Head FISHER VIDE FISHER FISHER VIDE FISHER FISHE	O SPAI	11.95 1.75 27.50 29.95 3.95 2.75 15.95 23.50 RES 1.95 4.50 5.95 17.50	VT120/130E Belt Kit. Clutch Assembly. FF/REW Idler. Princh Roller. Repair Kit. Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit. Mode Switch Pinch Roller. Reel Idler (Genuine) Reel Kit. NV333/366 Repair Kit (Genuine) Reel Repair Kit (Genuine) Reel Repair Kit (Renuine) Reel Repair Reel Reel Reel Reel Reel Reel Reel Ree	27,50 7,95 2,50 3,95 3,75 22,50 34,95 22,50 34,95 3,95 3,95 3,95 3,95 24,95 29,95 VIDEO S	Belt Kr. NY2000/2010 Repair Kit (Gen. Belt Kit. Pinch Roller. Play Idler (Genu Reel Krit. Pinch Roller. Play Idler (Genu Reel Krit. Pinch Roller. Play Cler (Genu Reel Idler (Genu Reel Krit. Pinch Roller. Play Clutch (Ger Reel Idler (Genu NY67/10/12 Repair Kit (Genu Belt Kit. Mode Switch Pinch Roller. Reel Idler (Genu Video Head (NV Video Head (NV Video Head (NV VIDEO VR6460/6520 Repair Kit Belt Kit. Pinch Roller. Phinch Roller. Reel Idler (Genu Reel Idler (Gen	1.55 3.95 ine 3.95 21.50 21.50 1.95 ine 1.25 ine	SHARP VC3300/381 Belt Kit. Pinch Roller Real dider (Real Motor Video Head VC481/482 Belt Kit. Pinch Roller Real Motor Video Head VC581/582 Belt Kit. Pinch Roller Real Motor Video Head VC581/682 Belt Kit. Pinch Roller Real Motor Video Head VC681 Belt Kit. Pinch Roller Real Motor Video Head VC681 Seel Pulley Video Head VC881 Seel Pulley Video Head VCA140-VC1 Belt Kit. Pinch Roller Real Pulley Video Head SONY SSONY SSONY SSONY	(Genuine) 5 27 VIDEO SPARES (Genuine) 3 (Genuine) 12 (Genuine) 3 (Genuine) 3 (Genuine) 3 (Genuine) 3 (Genuine) 14 (Genuine) 14 (Genuine) 17 (Genuine) 18 (Genuine) 18 (Genuine) 17 (Genuine) 17 (Genuine) 7 (Genuine) 7 (Genuine) 7 (Genuine) 7	955	* * SPECIALS * Asternes (Pkt 4) ip Kit EHT Lead (Genuine) Idder Paria John Salternes (Pkt 2) ps Battery 1V2 ps Battery 1V2 ps Battery 2V4 asol Gas from asol Tips. Tuner Tuner Clear Test Tape C Adaptor
VT9300 9700E VT93	5000 Kit. h Roller Idler Pulley. o Head AMSTRAD VIDEO SPARES 4500/4600 Kit VCR4500 Kit VCR4500 Kit VCR4500 Kit VCR4500 FERGUSON VIDEO SPARES W22 Kit h Gelevit (Large)	3.95 1.95 21.50 1.95 1.95 1.95 1.95 1.875 18.75 18.75 18.75 18.75 18.75 18.75 18.75 18.75 18.75 18.75 18.75 18.75 19.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5	Repair Kit Belt Kit Capstan Motor Cassette Housing Pinch Roller Reel Motor Video Head FISHER VIDE FISHER FISHER VIDE FISHER FISHE	O SPAI	11.95 1.75 27.50 29.95 3.95 2.75 15.95 23.50 RES 1.95 4.50 5.95 17.50	VT120/130E Belt Kit Clutch Assembly FF.REW Idler Repair Kit Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit Mode Switch Pinch Roller Reel Idler (Genuine) Tension Band Video Head NV230 NV333'366 Repair Kit (Genuine) Belt Kit Pinch Roller Reel Idler (Genuine) Repair Kit (Genuine) Reel Mider (Genuine) Reel Idler (Genuine)	27,50 7,95 2,50 3,95 2,50 3,95 22,50 34,95 7,95 3,75 3,75 3,75 3,75 3,75 3,75 3,75 3,7	Belt Kr. NY2000/2010 Repair Kit (Gen. Belt Kit. Pinch Roller. Play Idler (Genu Reel Krit. Pinch Roller. Play Idler (Genu Reel Krit. Pinch Roller. Play Cler (Genu Reel Idler (Genu Reel Krit. Pinch Roller. Play Clutch (Ger Reel Idler (Genu NY67/10/12 Repair Kit (Genu Belt Kit. Mode Switch Pinch Roller. Reel Idler (Genu Video Head (NV Video Head (NV Video Head (NV VIDEO VR6460/6520 Repair Kit Belt Kit. Pinch Roller. Phinch Roller. Reel Idler (Genu Reel Idler (Gen	1.55 3.95 ine 3.95 21.50 21.50 1.95 ine 1.25 ine	SHARP VC3300/381 Belt Kit. Pinch Roller Real dider (Real Motor Video Head VC481/482 Belt Kit. Pinch Roller Real Motor Video Head VC581/582 Belt Kit. Pinch Roller Real Motor Video Head VC581/682 Belt Kit. Pinch Roller Real Motor Video Head VC681 Belt Kit. Pinch Roller Real Motor Video Head VC681 Seel Pulley Video Head VC881 Seel Pulley Video Head VCA140-VC1 Belt Kit. Pinch Roller Real Pulley Video Head SONY SSONY SSONY SSONY	(Genuine) 5 27 VIDEO SPARES (Genuine) 3 (Genuine) 12 (Genuine) 3 (Genuine) 3 (Genuine) 3 (Genuine) 3 (Genuine) 14 (Genuine) 14 (Genuine) 17 (Genuine) 18 (Genuine) 18 (Genuine) 17 (Genuine) 17 (Genuine) 7 (Genuine) 7 (Genuine) 7 (Genuine) 7	95 95 95 95 95 95 95 95	* * SPECIALS * Batteries (Pkt 4) ip Kit Et al (Genuine) Jider Briad Jider Pump Jider Briad Jider Pary Jose Battery 1V2 asol Gas Iron asol Tips. Tuners Clear Test Tape C Adaptor Battery B Pestire B Pestire B Pestire
Capstam Motor 31 95	5000 Kit. h Roller Idler Pulley. o Head AMSTRAD VIDEO SPARES 4500/4600 Kit VCR4500 Kit VCR4500 Kit VCR4500 Kit VCR4500 FERGUSON VIDEO SPARES W22 Kit h Gelevit (Large)	3.95 1.95 21.50 1.95 1.95 1.95 1.95 1.875 18.75 18.75 18.75 18.75 18.75 18.75 18.75 18.75 18.75 18.75 18.75 18.75 19.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5	Repair Kit Belt Kit Capstan Motor Cassette Housing Pinch Roller Reel Motor Video Head FISHER VIDE FISHER FISHER VIDE FISHER FISHE	O SPAI	11.95 1.75 27.50 29.95 3.95 2.75 15.95 23.50 RES 1.95 4.50 5.95 17.50	VT120/130E Belt Kit Clutch Assembly FF.REW Idler Repair Kit Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit Mode Switch Pinch Roller Reel Idler (Genuine) Tension Band Video Head NV230 NV333'366 Repair Kit (Genuine) Belt Kit Pinch Roller Reel Idler (Genuine) Repair Kit (Genuine) Reel Mider (Genuine) Reel Idler (Genuine)	27,50 7,95 2,50 3,95 2,50 3,95 22,50 34,95 7,95 3,75 3,75 3,75 3,75 3,75 3,75 3,75 3,7	Belt Kr. Pinch Roller. Reel Idler (Genu Video Head NV2000/2010 Repair Kit Iden. Play Idler (Genu Reel Idler (Genu Video Head NV67/10/12 Repair Kit (Genu Belt Kit Mode Switch Pinch Roller. Reel Idler (Genu Video Head (NV Video Head	1.55 1.95	SHARP VC3300,331 SHARP VC3300,331 Belt Kit Pinch Roller Reel dider (f Reel Motor Video Head VC581/82 Belt Kit Pinch Roller Reel Motor Video Head VC581 Reel Motor Video Head VC681 Reel Motor Video Head VC681 Reel Motor Video Head VC581 Reel Pulley Video Head SONY CS67 Belt Kit SONY CS67 SONY CS67 Belt Kit Belt Belt Belt Belt Belt Belt Belt Bel	(Genuine) 5.27 VIDEO SPARE: (Genuine) 3.3 (Genuine) 32 (Genuine) 34 (Genuine) 34 (Genuine) 34 (Genuine) 34 (Genuine) 34 (Genuine) 34 (Genuine) 36 (Genuine) 37	955 956 957 958 959 959 959 959 959 959 959 959 959	* * SPECIALS * Batteries (Pkt 4) ip Kit Et al (Genuine) Jider Briad Jider Pump Jider Briad Jider Pary Jose Battery 1V2 asol Gas Iron asol Tips. Tuners Clear Test Tape C Adaptor Battery B Pestire B Pestire B Pestire
Capstam Motor 31 95	5000 Kit. h Roller Idler Pulley. o Head AMSTRAD VIDEO SPARES 4500/4600 Kit VCR4500 Kit VCR4500 Kit VCR4500 Kit VCR4500 FERGUSON VIDEO SPARES W22 Kit h Gelevit (Large)	3.95 1.95 21.50 1.95 1.95 1.95 1.95 1.875 18.75 18.75 18.75 18.75 18.75 18.75 18.75 18.75 18.75 18.75 18.75 18.75 19.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5	Repair Kit Belt Kit Capstan Motor Cassette Housing Finch Roller Reel Motor Video Head FISHER VIDE FISHER VIDE FISHER VIDE FISHER VIDE FISHER VIDE FISHER FI	O SPAI	11.95 1.75 1.75 2.75.0 2.9.95 2.75.0 2.9.95 2.75 1.95 2.75 1.95 5.95 4.50 1.95 5.95 1.77 5.0 1.95 5.95 1.77 5.0 1.95 5.95 1.77 5.0 1.95 5.95 1.77 5.0 1.95 5.95 1.77 5.0 1.95 5.95 1.77 5.0 1.95 5.95 3.77 5.0	VT120/130E Belt Kit. Clutch Assembly. FF/REW Idler. Pinch Roller. Repair Kit. Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit. Mode Switch. Pinch Roller. Reel Idler (Genuine) Less of the Roller. Pinch Roller. Reel Idler (Genuine) Reel Idler (Genuine) Reel Motor Tension Band Video Head NV333 Video Head NV333 Video Head NV3333	27,50 7,95 2,50 3,95 2,50 3,95 22,50 34,95 7,95 3,75 3,75 3,75 3,75 3,75 3,75 3,75 3,7	Belt Kr. Pinch Roller. Reel Idler (Genu Video Head NV2000/2010 Repair Kit Iden. Play Idler (Genu Reel Idler (Genu Video Head NV67/10/12 Repair Kit (Genu Reel Idler (Genu Video Head (NV Video H	1.55 1.55	SHARP VC3300/381 Belt Kit. Pinch Roller Real dider (I Real Motor Video Head VC481/882 Belt Kit. Pinch Roller Real Motor Video Head VC581/882 Belt Kit. Pinch Roller Real Motor Video Head VC581/882 Belt Kit. Pinch Roller Real Motor Video Head VC581/882 Belt Kit. Pinch Roller Real Pulley Video Head VCA140/VC1 Belt Kit. Pinch Roller Real Pulley Video Head VCS681 Belt Kit. Pinch Roller Real Pulley Video Head VCS681 Belt Kit. Pinch Roller Real Pulley Video Head SONY CS691 Belt Kit C5/7	(Genuine) 5.27 VIDEO SPARE: (Genuine) 3.3 (Genuine) 32 (Genuine) 34 (Genuine) 34 (Genuine) 34 (Genuine) 34 (Genuine) 34 (Genuine) 34 (Genuine) 36 (Genuine) 37	955 956 957 958 959 959 959 959 959 959 959 959 959	* * SPECIALS * Batteries (Pkt 4) ip Kit Et al (Genuine) Jider Briad Jider Pump Jider Briad Jider Pary Jose Battery 1V2 asol Gas Iron asol Tips. Tuners Clear Test Tape C Adaptor Battery B Pestire B Pestire B Pestire
1.295 Fr/REW Pulley 35 Pinch Roller 3.95 Video Head (Genuine) 42.95 Video Hea	5000 Kit. h Roller Lolder Pulley To Head AMSTRAD VIDEO SPARES 4500/4600 Kri VCR4500 Kri VCR4500 Kri VCR4500 Or Head VCR4600 FERGUSON VIDEO SPARES VIDEO SPARES VIDEO LORDER LOR	3.95 1.95 21.50 1.95 1.95 1.95 1.95 1.875 1.875 1.875 1.875 1.875 1.80 3.95 5.95 9.50 1.295 1.80 3.95 5.95 9.50 1.295 1.395 1.95 1.95 1.95 1.95 1.95 1.95 1.95 1.	Repair Kit Belt Kit Capstan Motor Cassette Housing Finch Roller Reel Motor Video Head FISHER VIDE FISHER VIDE FISHER VIDE FIGHER Belt Kit Clutch Assembly Pinch Roller Reel Idler Video Head FISHER VIDE FISHER VIDEO SI VIDEO SI VIDEO SI VIDEO SI VIBOO/8700E Belt Kit FF/REW Video FF/REW FINEO FF/REW FINE	O SPAI	11.95 1.75 1.75 2.75.0 2.9.95 2.75.0 2.9.95 2.75 1.95 5.95 5.95 5.95 5.95 5.95 5.95 5.9	VT120/130E Belt Kit. Clutch Assembly. FF.REW Idler. Pinch Roller. Repair Kit. Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit. Mode Switch Pinch Roller. Reel Idler (Genuine) Tension Band Video Head NV230. NV333/366 Repair Kit (Genuine) Reel Redie (Genuine) Tension Band Video Head Redie (Genuine) Tension Band Video Head Redie (Genuine)	27,50 27,50 3,95 2,50 3,95 34,95 22,50 34,95 34,95 3,95 3,95 3,95 24,95 29,95 VIDEO S 12,95 3,95 2,95 2,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 2,95 2,95 2,95 2,95 2,95 2,95 2	Belt Kr. NY2000 2010 Repair Kit (Gen. Revi (Ider (Genu. NY2000 2010 Repair Kit (Gen. Belt Kri. Pinch Roller. Play Idler (Genu. Revi (Ider (Ider (Genu. Revi (Ider	1.55 1.55	SHARP VC3300,381 Selt Kit. Pinch Roller Reel Idler (E Reel Motor Video Head VC431/482 Belt Kit. Pinch Roller Reel Idler (E Reel Motor Video Head VC531/582 Belt Kit. Pinch Roller Reel Idler (E Reel Motor Video Head VC531/682 Belt Kit. Pinch Roller Reel Pulley video Head VC5416/CE Belt Kit. Selt Kit. SonY CS5/67 Belt Kit C6 Pinch Roller Reel Pulley Video Head SONY CS6/67 Belt Kit C6 Pinch Roller Reel Pulley Video Head	(Genuine). 5.27 VIDEO SPARE: (Genuine). 3.3 Genuine). 3.3 Genuine). 3.3 Genuine). 3.4 Genuine). 3.4 Genuine). 3.4 Genuine). 3.4 Genuine). 3.7 2.7 2.7 2.7 3.7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	95 95 95 95 95 95 95 95	* * SPECIALS * Batteries (Pkt 4) Big Kit 4) Big River
2.59 Remote Control 15.95 Fersion Band 2.49 Repair Kit (Genuine) 21.50 Repair	5000 Kit. ch Roller I clider I Pulley to Head AMSTRAD VIDEO SPARES 45004600 Kit VCR4500 Kit VCR4500 Kit VCR4500 FERGUSON VIDEO SPARES V	3.95 1.95 21.50 1.95 1.95 1.95 1.95 1.8.75 1.8.75 1.8.75 1.8.75 1.8.75 1.8.0 3.95 5.95 9.50 1.95 3.25 1.80 3.25 1.80 1.95 1.80 1.95 1.95 1.95 1.95 1.95 1.95 1.95 1.95	Repair Kit Belt Kit Capstan Motor Cassette Housing Finch Roller Reel Motor Video Head FISHER VIDE FISHER VIDE FISHER VIDE FIGHER Belt Kit Clutch Assembly Pinch Roller Reel Idler Video Head FISHER VIDE FISHER VIDEO SI VIDEO SI VIDEO SI VIDEO SI VIBOO/8700E Belt Kit FF/REW Video FF/REW FINEO FF/REW FINE	O SPAI	11.95 1.75 1.75 2.75.0 2.9.95 2.75.0 2.9.95 2.75 1.95 5.95 5.95 5.95 5.95 5.95 5.95 5.9	VT120/130E Belt Kit. Clutch Assembly. FF.REW Idler. Pinch Roller. Repair Kit. Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit. Mode Switch Pinch Roller. Reel Idler (Genuine) Tension Band Video Head NV230. NV333/366 Repair Kit (Genuine) Reel Redie (Genuine) Tension Band Video Head Redie (Genuine) Tension Band Video Head Redie (Genuine)	27,50 27,50 3,95 2,50 3,95 34,95 22,50 34,95 34,95 3,95 3,95 3,95 24,95 29,95 VIDEO S 12,95 3,95 2,95 2,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 2,95 2,95 2,95 2,95 2,95 2,95 2	Belt Kr. Pinch Roller. Reel Idler (Genu Video Head NY2000:2010 Repair Kit Iden. Play Idler (Genu Reel Idler (Genu Video Head NY700/720 Repair Kit (Genu Belt Kit Mode Switch Pinch Roller. Reel Idler (Genu Video Head (NV Video Head	1.55 1.95	SHARP VC9300/381 Pench Roller Reel Idler (E Reel Motor VC981/Reel Reel Reel Motor VC981/Reel Reel Motor VC981/Reel Reel Motor Video Head VC981/Reel Reel Motor Video Head VC981/Reel Reel Motor Video Head VC981/Reel Video Head VC981/Reel Reel Reel Reel Reel Reel Reel Reel	(Genuine). 5.27 VIDEO SPARE: (Genuine). 3.3 Genuine). 3.3 Genuine). 3.3 Genuine). 3.4 Genuine). 3.4 Genuine). 3.4 Genuine). 3.4 Genuine). 3.7 2.7 2.7 2.7 3.7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	955 S S S S S S S S S S	* * SPECIALS * Batteries (Pkt 4) ip Kit HIL Lead (Genuine) Idder Paria Jidder Pump sui Lever Assy so Battery 1V2 ps Battery 1V2 ps Battery 1V2 ps Battery 2V4 asol Gas fron asol Tips. r to SKg, 18 SWG ig Kit Tuner Tuner Clear Test Tape C Addaptor Battery B 7 Sositor B 7 Positor D Positor D Positor D Leads Coorder Cooving Kit
2.59 Remote Control 15.95 Fersion Band 2.49 Repair Kit (Genuine) 21.50 Repair	5000 Kit. ch Roller I clider I Pulley to Head AMSTRAD VIDEO SPARES 45004600 Kit VCR4500 Kit VCR4500 Kit VCR4500 FERGUSON VIDEO SPARES V	3.95 1.95 21.50 1.95 1.95 1.95 1.95 1.8.75 1.8.75 1.8.75 1.8.75 1.8.75 1.8.0 3.95 5.95 9.50 1.95 3.25 1.80 3.25 1.80 1.95 1.80 1.95 1.95 1.95 1.95 1.95 1.95 1.95 1.95	Repair Kit Belt Kit Capstan Motor Cassette Housing Finch Roller Reel Motor Video Head FISHER VIDEO FISHER VIDEO FISHER VIDEO FISHER VIDEO FISHER FIS	O SPAI	11.95 1.75 2.750 2.995 2.75 3.96 2.75 2.350 RES 1.95 5.96 4.50 4.50 4.50 4.50 4.50 4.50 4.50 4.50	VT120/130E Belt Kit. Clutch Assembly. FF.REW Idler. Pinch Roller. Repair Kit. Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit. Mode Switch Pinch Roller. Reel Idler (Genuine) Tension Band Video Head NV230. NV333/366 Repair Kit (Genuine) Reel Redie (Genuine) Tension Band Video Head Redie (Genuine) Tension Band Video Head Redie (Genuine)	27,50 27,50 3,95 2,50 3,95 34,95 22,50 34,95 34,95 3,95 3,95 3,95 24,95 29,95 VIDEO S 12,95 3,95 2,95 2,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 2,95 2,95 2,95 2,95 2,95 2,95 2	Belt Kr. NY2000/2010 Repair Kit (Gen. Revi Idern Kiten Revi Idern Kiten Revi Idern Revi	1.55 3.95 ine 3.95 23.95 23.95 ine 21.50 1.95 ine 1.25 in	SHARP VC3300/381 Belt Kil. Pinch Roller Reel Idler (I Reel Motor Video Head VC481/82 Belt Kit. Pinch Roller Reel Idler (I Reel Motor Video Head VC581/582 Belt Kit. Pinch Roller Reel Motor Video Head VC681 Belt Kit. Pinch Roller Reel Pultey Video Head VCA140/VC1 Belt Kit. Pinch Roller Reel Video Video Reel Video VC581 Belt Kit. Pinch Roller Reel Video VC5861 Belt Kit. Pinch Roller Reel Video VC561 Belt Kit C5/9 Belt Ki	(Genuine). 5.27 VIDEO SPARE: (Genuine). 3.3 Genuine). 3.3 Genuine). 3.3 Genuine). 3.4 Genuine). 3.4 Genuine). 3.4 Genuine). 3.4 Genuine). 3.7 2.7 2.7 2.7 3.7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	955 S S S S S S S S S S	* * SPECIALS * Batteries (Pkt 4) ip Kit HIL Lead (Genuine) Idder Paria Jidder Pump sui Lever Assy so Battery 1V2 ps Battery 1V2 ps Battery 1V2 ps Battery 2V4 asol Gas fron asol Tips. r to SKg, 18 SWG ig Kit Tuner Tuner Clear Test Tape C Addaptor Battery B 7 Sositor B 7 Positor D Positor D Positor D Leads Coorder Cooving Kit
1.95 VT11/33E NV730 Lassette Housing 19.95 Salry 0 100 1.95 Note Corp. 19.95 Salry 0 100 1.95 Salry 0 1.95 Salry 0 100 1.95 Salry 0 100 1.95 Salry 0 100 1.95 Salry 0 1.95 Sa	5000 Kit. ch Roller I clider I Pulley to Head AMSTRAD VIDEO SPARES 45004600 Kit VCR4500 Kit VCR4500 Kit VCR4500 To Head VCR4500 To Head VCR4500 FERGUSON VIDEO SPARES VIDEO SPARES	3.95 1.95 21.50 1.95 1.95 1.95 1.95 1.875 1.875 1.875 1.875 1.875 1.80 3.95 5.95 9.50 1.295 1.80 3.95 2.95 2.95 2.95 1.85 2.95 2.95 2.95 2.95 2.95 2.95 2.95 2.9	Repair Kit Belt Kit Capstan Motor Cassette Housing Finch Roller Reel Motor Video Head FISHER VIDEO FISHER VIDEO FISHER VIDEO FISHER VIDEO FISHER FIS	O SPAI	11.95 1.75 2.750 2.995 2.75 3.96 2.75 2.350 RES 1.95 5.96 4.50 4.50 4.50 4.50 4.50 4.50 4.50 4.50	VT120/130E Belt Kit. Clutch Assembly. FF.REW Idler. Pinch Roller. Repair Kit. Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit. Mode Switch Pinch Roller. Reel Idler (Genuine) Tension Band Video Head NV230. NV333/366 Repair Kit (Genuine) Reel Redie (Genuine) Tension Band Video Head Redie (Genuine) Tension Band Video Head Redie (Genuine)	27,50 27,50 3,95 2,50 3,95 34,95 22,50 34,95 34,95 3,95 3,95 3,95 24,95 29,95 VIDEO S 12,95 3,95 2,95 2,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 3,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 1,95 2,95 2,95 2,95 2,95 2,95 2,95 2,95 2	Belt Kr. Pinch Roller. Reel Idler (Genu Video Head NV2000:2010 Repair Kit (Gent Belt Kr. Pinch Roller. Play Idler (Genu Reel Idler (Genu Video Head NV7000/7200 Repair Kit (Gent Belt Kr. Pinch Roller. Play Clutch (Ger Reel Idler (Genu Video Head NV70710/12 Repair Kit (Gent Belt Kr. Pinch Roller. Play Clutch (Ger Reel Idler (Genu Video Head NVG770/12 Repair Kit (Gent Belt Krt. Pinch Roller. Pinch Roller Pinch Roller Reel Idler (Genu Video Head (NV Video Head (Ger Video Head (Ge	1.55 3.95 ine 3.95 23.95 23.95 ine 21.50 1.95 ine 1.25 in	SHARP VC9300/381 Belt Kit. Belt Mitor Video Head VC9310/381 Belt Kit. Belt Motor Video Head VC9310/382 Belt Kit. Pinch Roller Reel Motor Video Head VC931/382 Belt Kit. Pinch Roller Belt Motor Video Head VC931/382 Belt Kit. Pinch Roller Belt Motor Video Head VC931/382 Belt Kit. Pinch Roller Reel Video Head SONY C561/3 Belt Kit. Sinch Roller Rewind Kit Kit. Finch Roller Rewind Kit Kit. Finch Roller Rewind Kit Video Head	(Genuine)	955 S S S S S S S S S S	* * SPECIALS * Batteries (Pkt 4) ip Kit Batteries (Pkt 4) ip Kit Batteries (Pkt 4) ip
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14.95 Capstan Motor V133E 29.95 Pinch Roller 3.35 VR6760 V1DEO LAMPS Add 17.5% VAT to this total 1.85 Clutch Assembly 7.95 Reel Idler (Genuine) 3.95 Repair for (Genuine) 21.50 Ferguson 3V00/22 50 Service Manuals £1.25 P/P e 2.25 Ferguson 2V00/22 50 Service Manuals £1.25 P/P e 2.25 Ferguson 3V00/22 50 Service	NS000 Kit Ch Roller I I I I I I I I I I I I I I I I I I I	3.95 1.95 21.50 1.95 1.95 1.95 1.95 1.875 1.875 1.875 1.875 1.875 1.80 3.95 5.95 9.50 1.295 1.80 3.95 2.95 2.95 2.95 1.85 2.95 2.95 2.95 2.95 2.95 2.95 2.95 2.9	Repair Kit Belt Kit Capstan Motor Cassette Housing Pinch Roller Reel Idler Reel Motor Video Head FISHER VIDE FVIII615/720 Belt Kit Clutch Assembly Pinch Roller Reel Idler Video Head Video Head FISHER VIDE FVIII615/720 Belt Kit Clutch Assembly Reel Idler Video Head VIDEO SI VT8000/8700E Belt Kit FF/REW Pulley Play Idler Video Head VT13009700E Belt Kit Capstan Motor FF/REW Idler	O SPAI	11.95 2.750 2.750 2.750 2.750 2.750 1.595 2.2350 8RES 1.95 5.95 5.95 5.95 5.95 1.95 5.95 5.95	VT120/130E Belt Kit Clutch Assembly FFREW Idler Repair Kit Video Head VT120E Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit Mode Switch Pinch Roller Reel Idler (Genuine) Tension Band Video Head NV230 NV333/366 Repair Kit (Genuine) Belt Kit Reel Idler (Genuine) Reel Motor Tension Band Video Head NV330 Video Head NV330 Video Head NV330 Repair Kit (Genuine) Reel Motor Tension Band Video Head NV336 NV370 Repair Kit (Genuine) Reel Motor Tension Band Video Head NV336 NV370 Repair Kit (Genuine) Repair Kit (Genuine) Reel Motor Tension Band Video Head NV336 NV370 Repair Kit (Genuine) Reel Motor Tension Band Video Head NV336 NV370 Repair Kit (Genuine) Reel Motor Tension Band Video Head NV336 NV370 Repair Kit (Genuine) Reel Motor Tension Band Video Head NV336 NV370 Repair Kit (Genuine)	27.50 27.50 7.95 2.50 3.95 17.95 22.50 34.95 17.95 3.95 3.95 3.95 3.95 3.95 3.95 3.95 3	Belt Kr. Pinch Roller. Reel Idler (Genu Video Head NY2000:2010 Repair Kit (Gent Rebler (Genu Reel Idler (Genu Krideo Head NY7000/200 Repair Kit (Gent Belt Kit. Pinch Roller. Play Clutch (Ger Reel Idler (Genu Video Head NY701/2012 Repair Kit (Gent Reel Idler (Genu Video Head NY67/10/12 Repair Kit (Gent Reel Idler (Genu Video Head (NV V	1.55 1.95	SHARP VC3300/381 Belt Kit. Pinch Roller Reel Idler (E Reel Motor Video Head VC481/482 Belt Kit. Pinch Roller Reel Motor Video Head VC581/582 Belt Kit. Pinch Roller Reel Motor Video Head VC581/582 Belt Kit. Pinch Roller Reel Motor Video Head VC681 Belt Kit. Pinch Roller Reel Motor Video Head VC581 Belt Kit. Pinch Roller Reel Video Reel VC681 Belt Kit. Pinch Roller Reel Video Head VCA140/VCI Belt Kit. Pinch Roller Reel Video Head SONY C56/17 Belt Kit. C5/5/67 Belt Kit. C5/5/67 Belt Kit. Video Head SONY C56/67 Belt Kit. Video Head SONY C56/67 Belt Kit. Video Head SONY C56/7 Belt Kit. Video Head SONY C56/67 Belt Kit. Video Head	(Genuine) 5.27 VIDEO SPARES (Genuine) 3.3 (Genuine) 12 (Genuine) 3.3 (Genuine) 14 (Genuine) 14 (Genuine) 14 (Genuine) 17 2 3 (Genuine) 3 (Genuine) 17 2 3 (Genuine) 7 7 VIDEO SPARES (Genuine) 7 VIDEO SPARES (Genuine) 7 (Gen	955 S S S S S S S S S S	* * SPECIALS * Batteries (Pkt 4) ip Kit Batteries (Pkt 4) ip Kit Batteries (Pkt 4) ip Kit End (Genuine) Jider Paria Jider Pump Jider Paria Jider Jid
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1.50	15000 Kit Loh Roller I Idder I	3.95 1.95 21.50 1.95 1.95 1.95 1.95 1.8.75 1.8.75 2.50 3.95 5.95 9.50 12.95 1.80 3.395 2.95 2.95 2.95 2.95 2.95 1.95 1.95	Repair Kit Belt Kit Capstan Motor Cassette Housing Pinch Roller Reel Idler Reel Motor Video Head FISHER VIDE FVIII615/720 Belt Kit Clutch Assembly Pinch Roller Reel Idler Video Head Video Head Video Head Video Head Video Head VIDEO SI VIBOOO/8700E Belt Kit Clutch Assembly Reel Idler Video Head VIDEO SI VIBOOO/8700E Belt Kit FF/REW Pulley Flay Idler Video Head VI3300 9700E Belt Kit Capstan Motor FF/REW Idler FF/REW Idler FF/REW Idler FF/REW Idler FF/REW Idler Video Head VI3300 9700E Belt Kit Capstan Motor FF/REW Idler FF/REW	O SPAI	11.95 2.95 3.96 2.75 15.95 2.75 15.95 2.35 1.95 5.95 5.95 5.95 5.95 5.95 5.95 5.9	VT120/130E Belt Kit Clutch Assembly FF/REW Idler Repair Kit Video Head VT120E Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit Mode Switch Pinch Roller Reel Idler (Genuine) Tension Band Video Head NV230 NV333/366 Repair Kit (Genuine) Belt Kit Reel Idler (Genuine) Belt Kit Reel Idler (Genuine) Reel Motor Tension Band Video Head NV333 Video Head NV333 Video Head NV333 Video Head NV333 Video Head NV335 Repair Kit (Genuine) Reel Idler (Genuine) Repair Kit (Genuine) Belt Kit Mode Switch Tension Band Video Head NV330 NV370 Repair Kit (Genuine) Belt Kit Mode Band Video Head NV309 Repair Kit (Genuine) Belt Kit Mode Switch	27.50 27.50 7.95 2.50 3.96 17.95 22.50 34.95 22.50 24.95 29.95 VIDEO S 12.95 3.95 3.95 3.95 3.95 3.95 3.95 3.95 3	Belt Kr. Pinch Roller. Reel Idler (Genu Video Head NV2000:2010 Repair Kit (Gent Belt Kr. Pinch Roller. Play Idler (Genu Reel Idler (Genu Krideo Head NV7000/7200 Repair Kit (Gent Belt Kr. Pinch Roller. Play Clutch (Ger Reel Idler (Genu Video Head NV607/70/12 Repair Kit (Gent Belt Kr. Pinch Roller. Play Clutch (Ger Reel Idler (Genu Video Head NV67/70/12 Repair Kit (Gent Belt Kr. Pinch Roller. Reel Idler (Genu Video Head (NV	1.55 1.95	SHARP VC9300/381 Belt Kit Belt Kit Pinch Roller Reel Motor VC841/82 Belt Kit Pinch Roller Reel Motor Video Head VCS81/82 Belt Kit Pinch Roller Reel Motor Video Head VCS81/82 Belt Kit Pinch Roller Reel Motor Video Head VCS81/82 Belt Kit Pinch Roller Reel Motor Video Head VCS81/82 Belt Kit Pinch Roller Reel Wotor Video Head VCS181 Belt Kit Pinch Roller Reel Wotor Video Head VCS183 Belt Kit SONY CS67 Belt Kit Video Head VIDE Akai VS1/37 Mitsubish I Sanyo 1100 S	(Genuine)	955 S S S S S S S S S S S S S S S S S S	* * SPECIALS * Batteries (Pkt 4) Batteries (Pkt 4) Botteries (Pkt
2.45 Pinch Roller. 3.95 Remote Control 15.75 Cassette Housing 19.95 Panasonic N/2000 95 charged at cost	ASO00 Kit Ch Roller If Idler If Idler IP Juley Be Head AMSTRAD VIDEO SPARES VIDEO SPARES VIDEO SPARES VIN VCR4500 KIT VCR4500 KIT VCR4500 FERGUSON VIDEO SPARES OZZ KIT KIT LIDE LI	3.95 1.95 21.50 1.95 1.95 1.95 1.95 1.875 1.875 1.875 2.50 3.95 5.95 5.95 3.95 5.95 1.80 3.250 3.250 1.80 3.250 1.80 3.250 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.8	Repair Kit Belt Kit Capstan Motor Cassette Housing Finch Roller Reel Idler Reel Motor Video Head FISHER VIDE FYII615/720 Belt Kit Clutch Assembly Pinch Roller Reel Idler Video Head FISHER VIDE FYII615/720 Belt Kit Clutch Assembly Reel Idler Video Head FYH905/910 Belt Kit FYREW Deler FYREW Puller Play Idler Video Head VI3900-9700E Belt Kit Capstan Motor FF/REW Utler FYREW Deler FYREW Deler FYREW THER	O SPAI	11.95 2.95 2.75 2.75 2.75 2.75 2.75 2.75 2.75 2.7	VT120/130E Belt Kit Clutch Assembly FFREW Idler Repair Kit Video Head VT120E Video Head VT130E PANASONIC SPARE NV230/430 Repair Kit (Genuine) Belt Kit Mode Switch Pinch Roller Reel Idler (Genuine) Belt Kit Mode Switch Pinch Roller Reel Idler (Genuine) Belt Kit Mode Switch Pinch Roller Reel Idler (Genuine) Belt Kit Mode Switch Pinch Roller Reel Idler (Genuine) Belt Kit Mode Switch Pinch Roller Reel Idler (Genuine) Reel Motor Tension Band Video Head NV333 Video Head NV333 Video Head NV336 NV370 Repair Kit (Genuine) Belt Kit Mode Switch Pinch Roller Reel Idler (Genuine) Tension Band Video Head NV336 NV370 Repair Kit (Genuine) Reel Idler (Genuine) Repair Kit (Genuine) Belt Kit NV330 NV330 NV330 NV330 NV330 NV330 NV330 Repair Kit (Genuine) Reit Kit NV300 NV330 NV300 NV300 NV300 NV300 Repair Kit (Genuine) Reel Idler (Genuine) Repair Kit (Genuine)	27.50 27.50 7.95 2.50 3.95 3.95 3.75 3.95 3.95 3.95 3.95 3.95 3.95 3.95 3.9	Belt Kr. Pinch Roller. Reel Idler (Genu Video Head NV2000/2010 Repair Kit I Gen. Belt Kri. Pinch Roller. Play Idler (Genu Reel Idler (Genu Reel Idler (Genu Reel Idler (Genu Belt Kri. Pinch Roller. Play Cluter (Gene Belt Kri. Pinch Roller. Play Cluter (Gene Belt Kri. Mode Switch Pinch Roller. Reel Idler (Genu Belt Kri. Mode Switch Pinch Roller. Reel Idler (Genu Video Head (NV Video Head (Ger VR6467 Repair Kit (Genu Belt Kit Cassette Housin Pinch Roller Assy Video Head (Ger VR6467 Repair Kit (Genu Belt Kit Cassette Housin Pinch Roller Assy Video Head (Ger VR6468 VR6468 VR6468 VR6468 VR6468 VR6468	1.55 1.95	SHARP VC3300/381 Belt Kit. Pinch Roller Reel Idler (F Reel Motor Video Head VC581/82 Belt Kit. Pinch Roller Reel Motor Video Head VC581/82 Belt Kit. Pinch Roller Reel Motor Video Head VC581/82 Belt Kit. Pinch Roller Reel Motor Video Head VC581/82 Belt Kit. Pinch Roller Reel Motor Video Head VC581 Belt Kit. Pinch Roller Reel Pulley Video Head VC54140/VC1 Belt Kit C5/7 Selt Kit C	(Genuine) 5.27 VIDEO SPARES 3.3 Jenuine) 3.3 Genuine) 12 5.5 5.5 1.7 VIDEO SPARES 6.7 6.7 6.7 7.7 7.7 7.7 7.7 7.	95 95 95 95 95 95 95 95	* * SPECIALS * Asteries (Pkt 4) ip Kit Batteries (Pkt 4) ip Kit HT Lead (Genuine) Inder Pump sil Lever Assy, sol Gas from
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- Bandwidth: DC 20MHz

 Sens: Ch.!, Ch.2, 1mV/cm

 Timebase: 0.1s 20ns/cm

 Triggering: DC 40MHz

 Active TV Sync Separator

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SPECIFICATIONS

- SPECIFICATIONS

 2 Channels

 8 andwidth: DC 60 MHz

 8 sens: Ch.1, Ch.2, 1mV/cm

 Timebase: 2.5s 5ns/cm

 Triggering: DC 80MHz

 Active TV Sync Separator

 After delay trigger

 Sweep delay

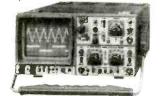
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SPECIFICATION

- SPECIFICATION
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 Bandwidth: DC 20MHz
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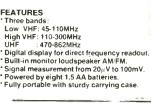
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		M54543L	400p STR5904		2SA473	35p	2SB-514	100p 40p	2SC-1214 2SC-1222	40p 20a	2SC-2026 2SC-2057	45p 250	2SD-426 2SD-427	300p	2SD-1427	275p
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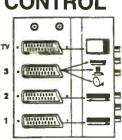
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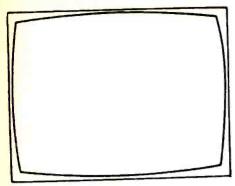
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COVER PHOTO

This month's cover photograph shows the Ferguson TX80 chassis – see article on pages 406-411.



Japanese Gloom

The Japanese consumer electronics industry is going through a difficult period. Sony is currently losing something like £1m a day and has announced that it expects to make its first full-year operating loss, of some ¥20bn (about £90m), since being listed on the Tokyo stock exchange in 1958. It has just announced a 36 per cent decline in profits for the third quarter of its financial year. Sony's position is not helped by having to service the considerable debt it took on when it purchased CBS records and Columbia Pictures. One result of this move however is that Sony's operating profits from its entertainment businesses are at present only 30 per cent less than what it makes on its electronic hardware. Despite the poor returns, Sony is increasing its output of consumer electronics products and is forecasting increased sales for the year, in the case of 8mm camcorders up from 3-8 to 4-1m units, an increase from 9-5 to 13m CD players, TV sets up from 6-1 to 7m and VCRs up from 3 to 3.5m. Its factories are still humming, but the prices it's having

to sell at aren't converting into profits.

For nearly all Japanese electronics companies the financial year end is in March, so announcements and projections are at the moment (early March) coming in thick and fast. It seems that a sharp decline in profitability has occurred since the autumn. Only last October JVC was forecasting a reasonable profit for the year, but poor sales since then have now led to forecast losses for the year. Matsushita is still operating profitably, but at a much reduced level. A fall of 43 per cent in pre-tax profits is forecast for the year, which is 26.6 per cent lower than a forecast made just three months previously. Other major Japanese electronics manufacturers have issued reduced profits forecasts, down by 37 per cent in the case of Hitachi and 58 per cent in the case of Toshiba, though it's not possible to assess the percentage relating to brown (black?) goods in these forecasts. Falling semiconductor prices, in particular for the latest generation of memory devices, are significant here while Toshiba has been having a difficult time with its portable computers. Many Japanese companies are considering reduced capital expenditure, though R and D budgets are likely to be left alone.

It's not that Japanese consumers have stopped buying. What seems to be happening is that demand for the current range of products has peaked and the traditional impetus provided by new products is for the present lacking. The result is fierce price competition to move current production and falling profitability. Export markets are flat.

One technique that has been a feature of the Japanese market is frequent model changes to stimulate sales. But, just when you might expect ever more frenzied activity in this respect, the powerful Ministry of International Trade and Industry (MITI) has called for fewer changes. Manufacturers of VCRs and air conditioners have been used to making model changes every six months. With cordless telephones and word processors face-lifts have been even more frequent. MITI has come down heavily against this, claiming that frequent model changes do not benefit the consumer, use up natural resources and lengthen working hours unnecessarily. There is also the problem that spares become difficult to obtain since it's obviously uneconomic to hold stocks of everything for such vast ranges of models. Mind you, things can be even worse in other Japanese markets. Back in 1981, during a battle between Honda and Yamaha over market share, Honda released 113 new models over an eighteen-month period and changed its entire range twice. If that sort of thing is going on throughout Japanese industry, it puts their R and D spending in something of a new light, with a decided question mark as to whether it's all worthwhile. Consumer electronics industry leaders seem to be in agreement with MITI's recommendations however, which include insistence that a new model remains unaltered for at least a year after its launch. Matsushita's vice president Tsuzo Murasa has pointed out that effort should go into added value rather than frequent model changes.

The reduced profitability has come quite quickly and could be a phase that will soon pass. It seems however that Japanese manufacturers are not too hopeful of this in the absence of truly new offerings. We have reported on several initiatives, in the form of multimedia products, in these pages recently. Accouncements continue. Matsushita has been holding talks with American Telephone and Telegraph with a view to setting up a joint venture to develop "pen-based portable computer systems", while Sharp has asked Intel to develop flash memory devices that could be used instead of magnetic storage in consumer and computer products. But such initiatives won't bear fruit overnight. Meanwhile the industry is stuck with difficult markets and declining profits.

COMPETITION

The winners of the two preset tuned f.m./m.w./l.w. radios in last month's competition were Alan Holden of Winford, Cheshire and C.H. Miller of Newport, Gwent. Our congratulations to them. For those interested in the questions that were asked, fifth harmonic tuning flattens the top of the line flyback pulse and thus improves the e.h.t. regulation; the chroma delay that has to be compensated for in the luminance channel is caused by the narrow chroma channel bandwidth – it's a basic factor in electronics that signals pass more quickly through wideband circuits; finally a short line sync timeconstant is required with off-tape signals to cater for short-term jitter.

The Images of the Future Conference

George Cole

On February 4th the trade journal *Electrical and Radio Trading* and the Television and Radio Industries Club cohosted the Images of the Future Conference. This year the conference was awash with new audio and video formats. Previous articles in this magazine have outlined the basic features of these new systems, many of which will be in the shops by the end of the year. A notable absence was the Sony Mini Disc format, a record/playback system that uses miniature compact discs.

Commodore had its CDTV system on show. It's a multimedia format that stores sound, pictures and text on a compact disc. The format was launched in the spring of 1991, but sales in the consumer market have been disappointing to date. Commodore has decided to rename the system Amiga CDTV and plans to launch, at around £300, a CD-ROM drive that can be connected to the company's best-selling Amiga 500 computer. There are some half a million Amiga 500s in the UK, and Commodore thinks that better progress will be made by concentrating on the computer market. The CD-ROM drive is expected to encourage software companies to develop discs for Amiga CDTV.

Gaston Bastiaens talked about the rival Philips CD-I (compact disc interactive) format, which was launched in the USA last autumn with machines selling for around £450. The system's Japanese launch will be this spring, with the European launch in the summer. Mr. Bastiaens revealed that Philips plans to launch a portable CD-I player later this year but couldn't confirm that the first CD-I players to be sold in Europe will have full-motion video capability. CD-I was undoubtedly one of the stars of the show: dealers who saw and used the system were very enthusiastic about it. They also seemed to like the Kodak-Philips Photo CD system, which allows the user to store up to a hundred photographs on a compact disc and display them on a TV set's screen. Photo CD will also offer sound, text and recording capability. Priced at around £400, the first Photo CD players should be available this summer. Photo CD discs can also be played on a CD-I deck.

Canon was demonstrating its ION still video camera. Still video has not been a success in the consumer market, so Canon is aiming to appeal to professional users and the educational market. Image data bases and desk-top publishing are two intended applications.

Philips' senior product manager Gerry Wirtz talked about the company's digital compact cassette (DCC) format, a high-quality digital audio tape system. DCC has the bonus of being backwards compatible with existing analogue compact cassettes. Mr. Wirtz produced some interesting statistics about the compact cassette. Around 2.5 billion cassettes and 180 million players are sold each year, excluding China, Eastern Europe and the Third World. About a billion cassette players are in use around the world, with each household owning an average of three cassettes. This puts the audio compact cassette in the same popularity league as the light bulb! But sales are declining, which is why Philips thinks that the time is right to introduce the new tape format. DCC will be launched in September, the first deck, provisionally called Model DCC900, costing around £350-400. The deck is smart, with a centre loading drawer and a display panel that gives you the name and number of the track.

The afternoon session was devoted to TV developments. It began with a talk by Jean Majo Cruzate, a special adviser to the EC commission, who admitted that the original 1986 EC directive on MAC and satellite broadcasting was flawed. The directive related only to high-powered DBS satellites, not medium-powered satellites like Astra. As a result, most Astra channels use PAL. As Mr. Cruzate explained, when the directive was drawn up no one expected medium-powered satellites to be used for direct-to-home transmissions.

The new directive was agreed by the twelve Council of Ministers in December 1991 and has a second reading in March. It states that any new service starting from 1995 must use D2-MAC, though dual PAL/MAC transmissions are permitted. The directive also leaves the door open for digital TV systems. Linked to the directive there's a memorandum of understanding which is designed to help launch a 16:9 D2-MAC service. Several hundred million ECUs will be made available to broadcasters, programme makers, hardware companies and other interested parties. The idea of this is to break the no hardware/no software block. Mr. Cruzate added that around twenty hours of HD-MAC broadcasts were made during the Albertville Olympics for showing at fifty reception sites around Europe. This is expected to rise to 1,000 sites during the Barcelona Olympics

BSkyB's public affairs director Roy Gallagher drew attention to the fact that thirteen per cent of the UK's population now receives BSkyB and that there are over a million subscribers to the film channels. He predicted that around 40-50 per cent of UK households will have a satellite TV dish or be connected to a cable system by the year 2000. He added that BSkyB sees D2-MAC as a possible system for widescreen TV. Earlier Astra's marketing managing director Jonathan Hart had dealt with possible interference problems between Astra 1B and Eutelsat II F3: he stated that those with properly installed 60cm or larger dishes shouldn't experience interference.

Widescreen TV

Nokia's marketing and sales vice president Michael Schmohl started on a controversial note by showing slides of press cuttings that described the EC's policies on MAC as a shambles. He suggested that companies should forget about D2-MAC and jump in now with 16:9 PAL sets as Nokia has done. He also claimed that 1,250-line double-scan pictures, as used by the Thomson widescreen set, actually lowered the picture resolution. Not surprisingly, this was denied by Ferguson and the next speaker, the BBC's assistant to the director of engineering Charles Sandbank, pointed out that the use of digital signal processing, i.e. interpolation, would improve the quality of double-scan pictures.

Mr. Sandbank talked about the PAL Plus project, which is part of the EC's Eureka programme whose members include broadcasting organisations such as ZDF, ORF and the BBC, and hardware companies like Nokia, Philips and Grundig. He began by stressing that PAL Plus is not a device to sabotage MAC. It's designed to improve the picture quality with terrestrial transmissions by offering widescreen pictures, reducing cross-colour and cross-

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luminance, increasing the luminance bandwidth and adding digital audio sound (though the UK already uses Nicam).

Mr. Sandbank explained that a 16:9 format reduces the picture content with a 4:3 set by 25 per cent as black bands occupy the top and bottom of the screen. A system called pan and scan can be used: this scans the central part of the picture, but Mr. Sandbank pointed out that this "shoot and protect" method puts all the action in the middle of the picture and wastes the potential of the 16:9 format. In the letterbox format a 4:3 receiver displays 432 visible lines while a 16:9 set detects a coded signal and expands the picture to 575 active lines. Mr. Sandbank said that any widescreen system would be only partly compatible with existing sets, in just the same way that the PAL system is with monochrome sets. He demonstrated widescreen pictures on a Nokia TV set and said that the 16:9 perspective is more like the way in which we view things in real life. Mr. Sandbank finished by saying that concern about the effects of 16:9 pictures on standard sets had

forced the group to consider a half-way house with a 14:9 aspect ratio and 504 active lines. This would introduce the public to widescreen TV gently. He predicted that PAL Plus and HD-MAC broadcasting would start in 1995 and that digital TV systems wouldn't appear before the year 2000.

During the question and answer session someone asked if dealers and the public would get confused by all the different approaches to widescreen TV. To recap, these are (1) Nokia's PAL 625-line/50Hz 16:9 sets, (2) the Thomson/Ferguson 1,250-line/50Hz PAL 16:9 sets, (3) the Philips 625-line/100Hz PAL 16:9 sets, (4) the prospect of D2-MAC 16:9 broadcasts, (5) the prospect of 16:9 or 14:9 PAL Plus broadcasts and (6) the prospect of HD-MAC 16:9 broadcasts. Not surprisingly no one seemed to be too sure about this, though it seems that dealers and TV service engineers can forget about HDTV in this century.

Finally my thanks to Bob Crabtree, *Electrical and Radio Trading's* product editor, for his help in the preparation of this article.

AC/DC High-voltage Tester

Ian Rees

As their popularity rises and many get older, microwave ovens appear for repair in ever increasing numbers. Faced with an oven whose light is on and the fan is working but nothing is heating, it would be nice to be able to check the 2kV a.c. and 4kV d.c. pulse voltages. I'm not very happy however about connecting any CMOS test equipment to circuits where more than 1kV is present, especially when it's in pulse or a.c. form. Using an old analogue $20k\Omega/V$ meter, I made a high-voltage probe to get some indication of voltage. Unfortunately ohms are a bit lawless under these circumstances, so the best I had was an indication of high voltage: the values obtained were meaningless, especially with pulsed d.c. Was there an alternative solution to the problem?

When I was still a student I recall reading about the early method of measuring the electrostatic charge stored in a bank of Leyden jars. Apparently monks would form a circle and hold hands. The end two would touch the jar's terminals and the resulting shock would make them jump. The height of the jump was used as a measure of the

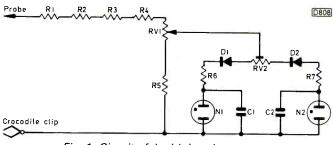


Fig. 1: Circuit of the high-voltage tester.

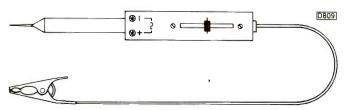


Fig. 2: Construction of the meter. To avoid arcing, it's best to connect the meter before switcing the oven on:

charge. I can vouch for the effectiveness of this method after my multimeter's earth lead became detached without my noticing it while I was probing the 4kV pulse. I can assure you that the jump was considerable, but the involuntary jerk of my arms sent the multimeter, which was still connected to the probe, crashing from the bench to the floor. My dignity and poise in tatters, I decided that there had to be a better way.

I like the idea of having an instrument in the form of the e.h.t. testers used with TV sets, where everything is in the handle so that you can pay attention to exactly where the probe tip is and read the scale easily without diverting your eyes. The instrument described in this article was built in this form and indicates a.c. or d.c. without the need to select ranges. A small bonus, though this is not needed with microwave ovens, is its ability to indicate whether there's a positive or negative potential at the tip.

Circuit Operation

Fig. 1 shows the simple circuit that evolved after much experimentation. R1-4 are the probe resistors, which are contained in the plastic body of a pen attached to a small box. RV1 is a $100k\Omega$ linear slide potentiometer that's calibrated in kV. R5 ensures that the required readings fall at about the centre of RV1's slider movement.

The voltage tapped from the slider is applied to the preset potentiometer RV2 which is used to balance the striking voltages of the two neons N1 and N2. The small wire-ended neons used light at around 65V. When they just strike their light output is very low, so they are not ideal as indicators. By adding capacitors C1 and C2 across them however the circuit becomes a relaxation oscillator. As the neons approach their striking voltage, the capacitors have been charging. At the moment of strike, the capacitor is discharged by the neon. This produces a bright flash that subsides until the capacitors are recharged via the series resistors R6 and R7 and the legs of RV2. A very accurate transition can be achieved, giving a very useful, unambiguous voltage indication.

D1 and D2 rectify the a.c. and make the neons flash

alternately. When a positive d.c. voltage is present at the probe tip only N1 will flash. In a microwave oven the voltage at the magnetron's cathode is negative, thus only N2 flashes.

The tester can be used in the same manner as a logic probe with digital circuits, but the slider is calibrated in kV. It draws around 1mA from the circuit being tested. Thus the probe resistors need to be rated at 1W. I have tried 0.25W resistors which seem to be o.k. if the test is brief, which it usually is.

Setting Up

The flash rate of the neons can be balanced by connecting 250V a.c. via a $47k\Omega$ resistor to the junction of R4 and RV1. With the slider of RV2 at its centre setting, adjust RVI until one of the neons flashes. Then adjust RV2 for an equal flash rate from both neons. Repeat the procedure a few times until you are sure that the two neons are giving an indication at the same point.

Calibration is a problem if, like me, you don't have access to an accurate high-voltage meter. I've found however that when connected to a good oven's 2kV a.c. output the tester will indicate with both neons just flashing at a rate of about one second when RV1 is at its midsetting. Similarly N2 only will flash, indicating a -4kV pulsed d.c. voltage, at a few millimetres to one side of the same setting. Any deviation from these conditions suggests that a fault is present.

Construction and Use

Provided care is taken over the construction and use of

this tester there's no reason for you to end up monk testing your microwave ovens. As Fig. 2 shows, the tester can be used single-handedly with the slider operated by your thumb.

An MPS (Maplin) "narrow box", part number FT31J, is used for the main case. Its dimensions are 124×29 × 29mm. To keep my fingers away from any hot parts I would have liked the slider potentiometer RV1 to have been an all-plastic affair. The one used, also bought from MPS, has a plastic shaft but a metal body. It's a dual potentiometer, but only one side is used. As a precaution 1 connected its metal body to the earthy crocodile clip end.

A piece of matrix board was cut and attached to the slide potentiometer. Apart from the probe resistors R1-4 all the components are mounted on this board. The probe resistors are strung up the body of the tube. This allows you to be at a respectable distance from the test point. A flying lead terminated with a strong crocodile clip completes the assembly.

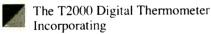
As an aside, it's always worth checking the integrity of the connections to the crococile clip lead before any tests are attempted in case a fracture may have occurred, particularly at the clip end.

Finally, remember that one hand in your pocket won't work with a microwave oven because the high voltage is earthed. Take care!

Component details

R1	470kΩ, 1W	RV2	250kΩ preset
R2-4	820kΩ, 1W	C1, 2	0·047μF, 400V
R5	47kΩ, 0·25W	D1, 2	BY127
R6. 7	100kΩ. 0⋅25W	N1, 2	Wire-ended neons

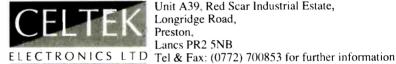




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Inside the Ferguson TX80 Chassis

J. LeJeune

Innovative and yet somehow familiar in its concept, the TX80 is the last of the old Ferguson designs to reach the market. The chassis shows some Thomson influence, but its Enfield origins are stamped plainly all over it. This is nowhere more so than in the power supply and line output section, which nostalgically recalls the Thorn 9000 series chassis with its Syclops circuit. The key element here is the use of a single transistor as both the chopper and the line output switching device.

Basically the TX80 is just another small-screen TV receiver for 90° c.r.t.s with screen sizes from ten to fifteen inches. It's no basic receiver however. Features incorporated as standard include microcomputer-based remote control, on-screen graphics with a simple menu system to make adjustment of the operating controls easy, a sleep timer and a child lock facility. There's considerable integration in the low-level stages, where a single LSI chip incorporates the vision and sound i.f. strips, the luminance and chrominance signal processing stages, sync separation and the timebase generator circuits. The designers didn't go i.c.-crazy however: where a single transistor is all that's necessary, that's what is used. Since the receiver has a live chassis there's no scart socket. In any case while the tube is

adequate for TV purposes its resolution is not sufficient for use as an 80-column computer monitor.

Picture quality is nevertheless excellent. The Samsung c.r.t.s give a bright picture with ample purity reserve. Audio on the other hand comes from a very small loudspeaker and leaves a little to be desired. Even so it's distortion free and the cabinet doesn't vibrate at high volume levels. The cabinet design is attractive, especially the 10in. model, and blends in with most domestic schemes.

Fig. 1 shows in simplified block diagram form the main sections of the chassis.

The heart of the set is of course the combined chopper and line output stage – it's known as a Wessel circuit. Fig. 2 shows the arrangement in block diagram form. Things start with the oscillator, which produces a line-frequency sawtooth output whose amplitude is determined by the comparator transistor TP03. The comparator senses the h.t. voltage produced by the chopper, and sets the supply to the oscillator. As this supply increases or decreases, so the amplitude of the sawtooth output is varied – see Fig. 3. The pulse-width modulator transistor TP05 converts the sawtooth waveform into a variable mark-space ratio

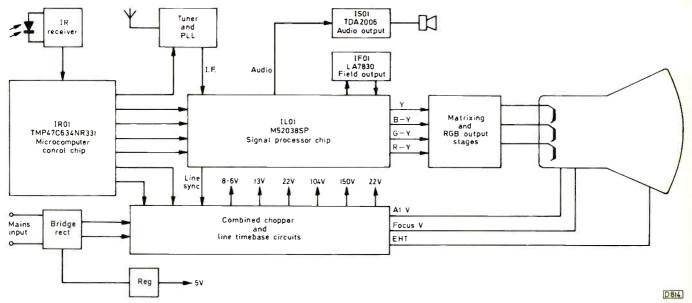


Fig. 1: The main sections of the Ferguson TX80 chassis, shown in block diagram form.

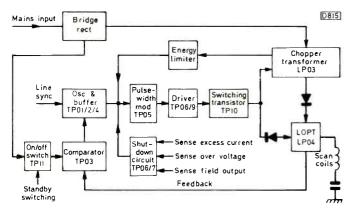


Fig. 2: Block diagram of the combined chopper power supply and line timebase arrangement.

squarewave which passes via the driver stage to the base of the switching transistor TP10. This drives two transformers, the chopper transformer LP03 (Wessel transformer) and the line output transformer LP04. In case anyone is puzzled by the idea of using a variable mark-space ratio waveform to drive the line output stage, the point to remember is that the switch-off time, which initiates the flyback, remains constant. It's the switch-on time during the forward scan that varies to take into account loading and mains input voltage variations. The initial part of the forward scan is controlled by the efficiency diode in the normal way. Comprehensive protection arrangements are built into the circuit.

We'll now take a closer look at the circuit action. Fig. 4 shows the complete circuit of the power supply/line output section of the receiver. Note that the receiver chassis is

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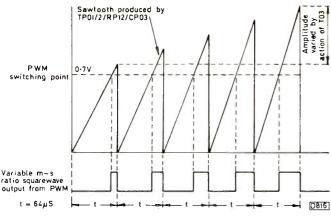


Fig. 3: Illustrating the action of the comparator, oscillator and pulse-wide modulator stages in providing a variable mark-space ratio drive waveform.

always live with respect to ground. It uses a bridge rectifier (DP26-29) to deliver three supplies, one full-wave rectified and the other two half-wave rectified. In this respect it could be said that the bridge is fully utilised. The full-wave output is smoothed by the reservoir capacitor CP31 and fed to the chopper transformer LP03 at approximately 360V d.c. One half-wave rectified supply is fed to the switch transistor TP11 whose collector feeds the comparator, oscillator, pulse-width modulator and driver stages. The half-wave rectified supply is smoothed by RP39/CP41 and fed to a 5V regulator which in turn provides the supply to the microcomputer control chip IR01. The latter produces the on or standby command at pin 20. This is fed to TP12 which in turn controls TP11: in the standby condition TP11 is off and there is thus no supply to the oscillator etc., shutting down the Wessel

The main switching transistor TP10 is driven by a bootstrapped low-voltage driver stage (TP06/9) which is d.c. coupled to the pulse-width modulator transistor TP05. The input to TP05 is a variable-amplitude sawtooth which is produced by a relaxation oscillator whose timing components are RP12 and CP03. The two transistors in this circuit, TP01/2, act in a thyristor-like manner, switching off when there's insufficient current to maintain them in saturation. CP03 charges via RP12 from the voltage at the collector of the comparator transistor TP03. As CP03 charges, the emitter voltage of the pnp transistor TP02 will increase until the point is reached where it's 0.7V above the fixed base voltage set by RP26/RP05. At this point TP02 switches on and passes current to the base of TP01 which thus also switches on. The two transistors saturate heavily, rapidly discharging CP03 via RP65. Once CP03 has been discharged, TP02 and TP01 switch off and CP03 begins to charge again. The sawtooth waveform produced in this way is fed via the emitter-follower buffer transistor TP04 to the base of the pulse-width modulator transistor TP05. CP48 blocks the d.c. voltage at TP04's emitter and DP37 acts as a d.c. restorer, clamping the negative-going peak of the sawtooth waveform to chassis. TP05 conducts when the slope of the sawtooth waveform exceeds 0.7V.

The comparator transistor TP03 receives its collector supply from TP11, via RP01, RP02 and its load resistor RP03. CP01 smooths the supply and DP02 stabilises it at 18V. TP03's base voltage is obtained from the potential divider network RP08, RP61, PP01, RP07 which is connected across the 104V h.t. line: this is the main supply produced by the line output transformer, thus the conditions in the line output stage are sensed. TP03's

emitter is held at 5.4V by DP46 and DP06. This combination of a zener diode and an ordinary signal diode gives a near-zero temperature coefficient.

Variations in the 104V h.t. supply are thus sensed by TP03 and inverted. A rise in the h.t. voltage will result in a fall in TP03's collector voltage and a corresponding fall in the amplitude of the sawtooth waveform fed to TP05. The action is illustrated in Fig. 3. When the h.t. voltage rises, the width of the drive pulses used to switch the chopper transistor TP10 on and off decreases. Thus TP10 remains on for a shorter period of time and the h.t. voltage is reduced to the correct figure. The action works in reverse should the h.t. voltage fall.

TP11 is used for standby switching. It has half-wave rectified mains voltage at its emitter at all times. Transistor TP12 inverts the control signal from the microcomputer chip, its base voltage going high to turn on the supplies and bring the set out of standby. When TP11 is switched on CP01 and CP13 charge via RP01 and RP17 respectively. TP03's collector and emitter voltages rise gently, so that the chopper comes to life gradually rather an abruptly. Once the chopper is running DP12 adds to the charge held by CP15. The feed to TP03's emitter circuit via RP27 provides a stable zener current to improve the regulation.

The driver stage is interesting as it employs a bootstrap circuit to ensure that the level of drive generated is adequate. The first transistor TP06 is an inverting amplifier: when it's on, the following transistor TP09 is off. In this condition DP08's cathode is at virtually chassis potential and the bootstrap capacitor CP07 will charge via DP36 from the 8.6V rail. During this time the switching transistor TP10 is also off. When the squarewave drive turns TP06 off, TP09's base voltage rises and it switches on. The negative side of CP07 is now connected to the 8.6V line via RP23 and TP09. Since CP07 is already charged to about 7V, its positive side is now at about 15V with respect to chassis. DP36 is thus cut off and the 15V appears at TP09's base via RP29. This ensures that TP09 is saturated throughout the time that TP10 is required to be conductive. When TP09's emitter voltage rises, CP08 charges via TP10's base, switching TP10 on. Diodes DP30, DP15 and DP16 conduct and limit the charge across CP08 to 2·1V. RP21 and LP02 in parallel provide some base drive current waveform shaping. When TP06 is switched on again to initiate the flyback, CP08's positive side is connected to chassis via DP08 and TP10's base is driven negative.

The receiver's principal supply rail, from which the line output stage is operated, is the 104V h.t. line. When TP10 is switched off, the line output transformer is tuned by CP18 to produce the flyback. At the end of the flyback the efficiency diode DP13 begins to conduct and the first half (approximately) of the forward line scan is produced. TP10 can be turned on during this period, but it will have no effect on the line scan because of the isolating action of diodes DP10 and DP48. Thus TP10 doesn't drive the line output side of the circuit until DP13 stops conducting. At this point TPl0 must be conducting in order to take over the supply of current to the line scan coils. The isolating action of DP10/48 enables TP10 to drive the chopper transformer before it also starts to drive the line output transformer. When DP13 switches off, the voltage at pin 2 of LP04 rises and DP10/48 switch on.

LP03 generates two secondary voltages during the flyback period. DP21 produces 22V across CP24 for the audio output chip while DP11 rectifies the output at pin 1. The cunning part of this circuit is that DP11 also serves as a boost diode, feeding pin 6 on the line output transformer

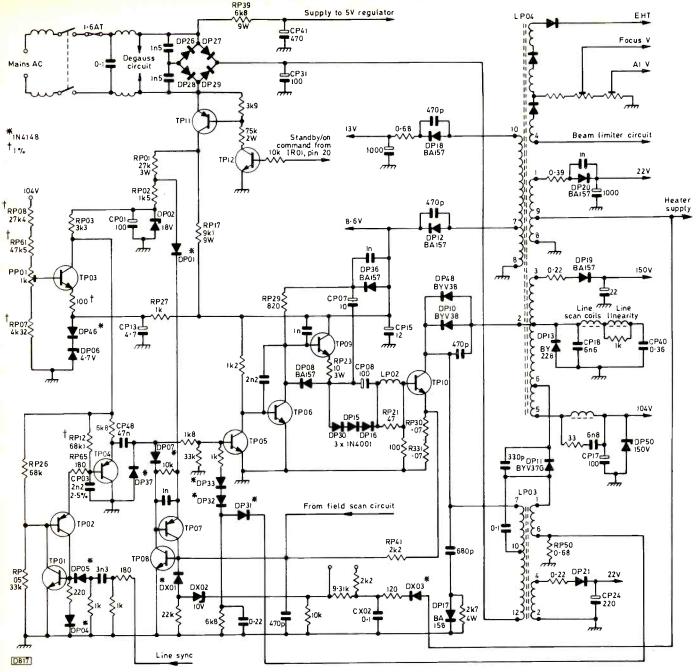


Fig. 4: Complete circuit of the power supply and line timebase sections of the chassis.

LP04. Autotransformer action between pins 6 and 5 of LP04 produces the 104V supply across CP17. No rectification is required at pin 5 as CP17 is the boost reservoir capacitor.

LP04 also produces various other supplies – the tube's heater supply, its e.h.t., focus and first anode supplies, 13V and 8·6V supplies, 22V for the field output stage and, from another overwinding on the primary, 150V for the RGB output transistors.

There are four protection systems in this circuitry. One guards against excessive voltages, which could cause the c.r.t. to produce X-rays; another guards against excessive current in TP10; a third (the energy limiter) prevents excessive current in the line output stage; the fourth protects the field scan coils in the event of the field scan coupling capacitor going short-circuit.

The shut-down circuit uses transistors TP08 and TP07 in a latching circuit that's identical in configuration to the oscillator TP01/2. Three inputs at the base of TP08 can trip the power supply. The first is via RP41 from the emitter of

TP10. If TP10 passes excessive current, the voltage developed across RP30/31 will be sufficient to produce the trip action. A second input comes from the field scan current circuit. If the field scan coupling capacitor goes short-circuit excessive power will be dissipated in the scan coils. The trip action prevents damage here. The third input comes via DX01, DX02 etc., the source being the heater winding on the line output transformer. This circuit looks for excessive voltage conditions in the transformer. DX03 rectifies the heater supply and if the voltage developed across CX02 rises sufficiently zener diode DX02 switches on to initiate the trip action.

If TP08's base voltage rises because of an increase in any of these inputs, TP08 and TP07 will switch on and latch up. This action discharges CP01 via DP01. Thus the oscillator is stopped and the drive to TP10 ceases. When CP01 has been discharged, TP08 and TP07 will switch off. CP01 can then charge again, giving a soft-start action. If the problem was a transient one and has cleared, the receiver will resume normal operation. If the fault is a permanent one

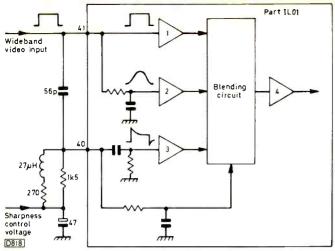


Fig. 5: Block diagram showing the operation of the sharpness control circuit.

however the power supply will trip continuously.

The fourth protection system, the energy limiter, monitors the voltage across RP50, which is connected between the earthy end of the winding on LP03 that supplies the line output stage and chassis. A rise in the current flowing in this winding, due to high current demand in the line output stage, will produce an increasingly negative voltage at pin 6. This negative bias is fed to the base of the pulse-width modulator transistor TP05, increasing its switch-on threshold. As a result it produces shorter drive pulses, reducing the power output.

Chopper power supplies operate by storing energy in the transformer as flux, releasing it during the off period of the switching device. It follows that the transformer's power output depends on the energy fed into it on the primary side. The input voltage is set by the peak value of the mains supply. The current that flows depends on the switching device's on time and the effect of back-e.m.f. in the transformer. Close regulation is achieved by adjusting the switching device's on period. The regulation loop in the TX80 starts with the 104V developed across CP17 and takes in the comparator, oscillator, pulse-width modulator, driver and output switching (TP10) stages.

Signal Circuits

We'll next take a brief look at the signal stages, most of which are incorporated in the M52038SP 52-pin processing chip IL01. This chip also incorporates the sync circuitry and produces field and line drive outputs. The latter is used to synchronise the oscillator in the power supply.

A Thomson tuner, type MTP-I-2021 for the u.h.f. bands only, is used. It features a dual-gate MOSFET r.f. amplifier stage and has excellent noise and gain figures. Tuning is effected by an integral phase-locked loop which is controlled by data and clock inputs from the microcomputer chip IR01 (42 pins this time).

Volume, brightness, contrast, colour and sharpness control are all carried out within IL01. An interesting item in this section of the receiver is VV01 which is in the circuit between the demodulated video output from IL01 and its luminance and chroma inputs. VV01 incorprates luminance and chroma separation filters, a chroma carrier trap and the luminance delay line.

Sharpness Control

The sharpness control system is another unusual feature,

see Fig. 5. Full bandwidth video (luminance) is fed in at pin 41 of IL01 while differentiated video (video with a high degree of overshoot) is fed in at pin 40, which also receives the sharpness control voltage. The full bandwidth luminance signal passes via amplifier 1 to the blending circuit. An h.f. reduced signal is fed to amplifier 2 while the h.f.-emphasised (differentiated) signal is fed to amplifier 3. The control voltage acts on the blending circuit which combines the outputs from the three amplifiers in various proportions, from insufficient to excessive h.f. content at the extremities of the range with a flat response at somewhere about the centre of the range. The control works very well and can be used to good effect when playing video recordings or with satellite TV transmissions that are not all they might be. The sharpness adjusted signal then passes to the contrast control part of the chip.

Colour Decoding

The luminance output from IL01 is passed via a buffer transistor to the the c.r.t. base panel which contains the RGB matrixing and output circuits. Chroma signal decoding is carried out in the conventional way within IL01 which provides B-Y, G-Y and R-Y outputs.

Sync System

IL01 has a separate video input pin for the sync separator section. There's an external field sync pulse integrating network. The line sync pulses are fed internally to a phase-locked loop that controls a 500kHz master crystal oscillator. A five-stage binary divider (divide by 32) gives 15-625kHz. This divided down output is fed to the phase detector whose other input consists of line flyback pulses which are obtained from the line output transformer's heater winding (the pulses from this source are also used for several other purposes in the receiver).

The Field Timebase

The integrated field sync pulses are fed back into IL01 at pin 45. They are then shaped to produce trigger pulses that are used to reset the vertical counter circuit. This divides down the line frequency pulses to 50Hz. Each trigger pulse resets the counter and at the same time resets the field ramp waveform to zero. This ramp voltage is produced across an external capacitor by a constant-current source within IL01. The charging rate is modified by feedback from the LA7830 field output chip IF01 to provide fixed linearity correction. There's also a.c. feedback to provide height control and d.c. feedback to stabilise the d.c.centre point of the output from IF01.

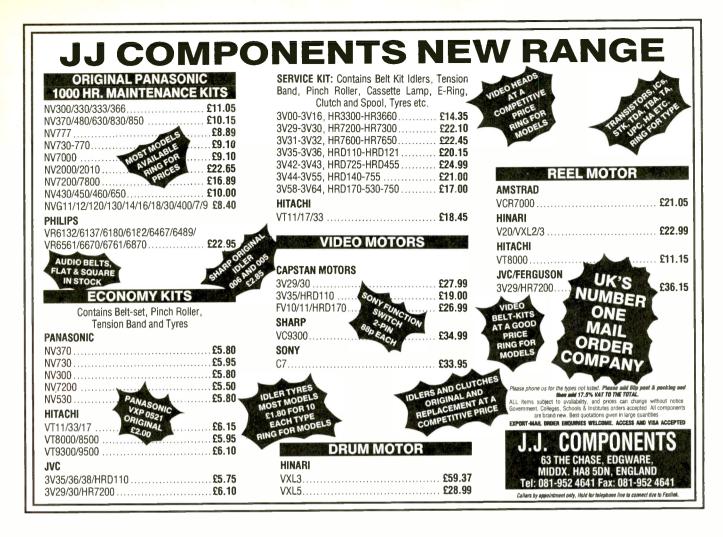
The field output chip is operated in the conventional manner, with bootstrapping to obtain a peak-to-peak output of nearly twice the supply voltage. This ensures a rapid flyback during the field blanking period.

Audio Output Stage

The TDA $\bar{2}006$ audio output chip provides surprisingly good results via the small, forward-facing 16Ω 2W elliptical speaker. A diode in the d.c. feedback circuit prevents excessive distortion on large output voltage excursions.

Microcomputer Control

In common with many other advanced small-screen receivers the TX80 uses a microcomputer chip, IR01, to



oversee the set's operation and provide a menu-driven remote control system that's easy to follow. The operations performed by this chip can be classed in four groups as follows: (1) it provides pulse-width modulated user control outputs that are integrated by external *RC* filters to produce d.c. voltages for the signal processing chip IL01; (2) it carries out the usual key scanning to detect front panel input commands; (3) it accepts the IR remote control input, provides an I2C bus that's used principally to control the tuner, and carries out sync kill, mute, hold and reset functions; (4) it contains the system and charactergenerator clocks and provides graphics sync and RGB outputs.

Some Pin Functions

As previously mentioned, pin 20 provides the standby signal to toggle the power supply on and off. As there's no front panel mains switch in the initial models, this is the principal method of switching the receiver on and off. 3V at pin 20 = on, 0V = standby.

Pin 37 provides the sync killer output. This is used to defeat the sync separator circuit in IL01 during tuning operations and at switch on, to prevent spurious signals from triggering the timebases incorrectly and causing possible damage.

The mute circuit input at pin 36 is used during sweep or search tuning to tell IR01 when a valid video signal has been received. Sweep tuning is halted when this occurs.

The hold pin 34 is held high momentarily at switch off to preserve the analogue control settings in memory. This ensures that the receiver powers up next time with the previously-used settings. The reset pin 33 is held low for a

short period at receiver power up to ensure that no spurious signals generated by the rising currents and voltages in the set are taken as valid commands by IR01.

The components connected to pins 28 and 29 tune the on-screen graphics read-out oscillator (pixel generator). Pin 27 takes in field sync for graphics while line sync is fed in at pin 26 (again from the heater circuit). The graphics outputs appear at pins 22-25, the latter being the blanking output that creates the black-box area in which the symbols or characters are displayed. The graphics blanking is mixed with line blanking from the heater supply then amplified, sharpened, clipped and sent to pin 22 of IL01.

Battery Converter

The 10in. model is ideal in size and performance for those on the move in caravans, coaches and lorries. It therefore has an integral battery converter to enable the receiver to be used away from mains supplies. The converter is set to operate with a 12V d.c. input and cannot be altered to work with any other voltage. The input can vary over the range 11·8 to 14·8V. It's a fairly basic d.c.-to-d.c. circuit, self-oscillating and running at about 17kHz.

In Conclusion

Although the TX80 is an intricate little receiver, packed with features, it has proved to be extremely reliable in service, not one being seen in the workshop since it started to be sold. It has but one minus point so far as the public is concerned, the rear-mounted mains switch on Models A10R and A14R. On the latest model to use the chassis, the A36R, the on-off switch is once again at the front.

Teletopics

EURO VIDEOPHONE STANDARD?

Marconi plans, by licensing its low-cost videotelephone technology to a number of international companies, including BT and Deutsche Bundespost Telekom, to establish a European standard for domestic videophones that work with existing telephone networks. Amstrad, which already has a licence, has previously announced that it will be launching a videophone that's expected to sell for under £500 later this year. Marconi has been collaborating with BT, which achieved a world lead in video compression technology during the Eighties. If the standard is accepted it will be the first international one for analogue system videophones, along the lines of the H261 standard for digital telephone systems. Both the video and the audio signals are compressed, the video to a 14.4Kbit/sec data stream and the speech to a 5.6Kbit/sec stream. The voice compression system was originally developed for military radio use. The camera section uses a Marconi CCD array that was originally developed for night sights. Seiko Epson is supplying the 4in. liquid-crystal display.

NOKIA BUYS FINLUX

Nokia, whose TV brands include ITT, Salora, Luxor, Schaub Lorenz and Oceanic, has bought fellow Finnish TV manufacturer Finlux from its parent company Metra for approximately £26m. Completion date for the takeover was March 15th. Nokia Consumer Electronics traded at a loss in 1991 and was only slightly profitable in 1990 while for the past three years Finlux has been making only marginal profits. The combined company will have a strong position in the Scandinavian and German markets in particular. There's to be some reorganisation, with main TV manufacture concentrated at Finlux's Turku plant and Nokia's German plant at Bochum, monitor manufacture at Salo, small-screen TV receiver production at the company's Portuguese plant while the main production centre for satellite TV equipment will be at Motala in Sweden. The company's French TV manufacturing plant is to be closed down.

RUMBELOWS TO GO RENTAL

As mentioned briefly on our leader page last month Thorn EMI has decided to switch its loss-making retail chain Rumbelows to a largely rental operation. It will continue to trade as Rumbelows, offering customers a choice of outright payment, rental or various arrangements in between, but will be run in harness with the company's rental chains. This is expected to produce considerable savings on the servicing, distribution and purchasing sides. Job losses of around 800 out of a total of 4,000 are likely. Rumbelows 450 high-street outlets and 41 out-of-town stores have about six per cent of the electrical retail market. The number of high-street shops is expected to be reduced to between 250 and 400 over the next two years.

SATELLITE TV

According to the *Financial Times* satellite TV monitor the number of dish installations in January declined substan-

tially, to some 70,000. December had been a particularly good month however. This could set BSkyB back a bit – it was expected that the venture would break even at the operational level (before interest charges) this month. News Corporation, which owns 50 per cent of BSkyB, hopes that it will show a profit by the end of the year.

BSkyB has issued a warning about buying the old BSB receiving systems and Squarials. It seems that Sky is determined to shut down the Marco Polo transmissions at the end of the year. While some retailers are clearing stocks of BSB equipment for as little as £12 others are thought to be charging unsuspecting customers anything up to £150.

Swift Television Publications (17 Pittsfield, Cricklade, Swindon, Wilts SN6 6AN – telephone/fax 0793 750 620) has introduced the Satmaster computer program, by D.J. Stephenson, as an aid for satellite TV installations. It's claimed to be suitable for both professionals and enthusiasts and requires the use of an IBM PC compatible with MS DOS 3·0 or higher. The program caters for just about every need from the installation of motorised systems to a printout of a full link-budget analysis for any satellite at any location anywhere in the world.

SERVICING "LEAD BODY"

A "lead body" for the domestic appliance and consumer electronics servicing industries has been set up to establish competence standards that will form the basis of National Vocational Qualifications (NVQs). The membership of the Electrical and Electronics Servicing Lead Body represents a wide cross-section of the servicing industry ranging from multinational manufacturers to small independent retailers/service agents. It includes all the major trade associations together with the relevant trade union. The main work of the body, writing the standards and producing the NVQs, is well under way. This will be followed by in-depth consultation with the industry as a whole. An ambitious target has been set – to have the first NVOs approved and ready for submission to the National Council for Vocational Qualifications for accreditation this autumn. Administration is being undertaken by the Electronics Examination Board, which has been involved with competence testing for the industry for over fifty years. Further details can be obtained from the EEB at Savoy Hill House, Savoy Hill, London WC2R 0BS (071 836 3357).

DEVELOPMENTS AT SHARP

Sharp and Apple Computer have been discussing a technology exchange that would enable Sharp to manufacture for the consumer electronics market multimedia products using Apple's computer technology such as Quicktime and its Macintosh user interface. As mentioned in the leader last month, Sharp has launched in Japan an HDTV receiver with a retail price of approximately £4,475, about a quarter of that of previous Japanese HDTV models. A survey carried out by Sharp indicates that up to sixteen per cent of Japanese households might be prepared to buy an HDTV receiver at this price.

VIDEO NEWS

Ferguson has announced four VCRs with built-in Video Plus programming systems. Model FV61LV is a budget machine at around £330; Model FV62LV at £360 is a four-head version; Model FV67HV at £430 includes a Nicam

decoder and hi-fi stereo sound; while top of the range Model FV68TX at £500 also has Startext and jog/shuttle dial.

Akai has announced that the Video Plus system is compatible with its current range of VCRs but not with those which are at least four generations old. Amongst the new products that Grundig will be launching at this year's Brown Goods Shows is a top of the range VCR, Model GV280, that incorporates a timebase corrector.

Philips has established a CD-I label with the US company Fathom Pictures for the issue of CD-I and Photo CD software. Leisure, sport and interactive entertainment titles will be included. The third international Multimedia and Conference on CD-I will be held in London on April 28-29th.

Commodore claims that the introduction of an Amiga CD-ROM drive will create a user base of 100,000 for its CDTV system, now named Amiga CDTV, in a short period of time. It has also announced that major software houses are backing the system with dual-format releases for the Amiga computer and CDTV systems.

PHOTO CD NEWS

Agfa-Gevaert is to license Photo CD technology from Kodak. It will use Photo CD as an additional source input for its Digital Print System, which enables photofinishers to produce prints from slides on regular colour negative paper. These prints are known as DigiPrints because the quality is improved by digital image enhancement systems. The system will make it easier to produce high-quality hard copy prints of Photo CD images.

Kodak demonstrated Photo CD imaging workstations at the Photo Marketing Association trade show in Las Vegas last February. The workstations will enable photofinishers to transfer 35mm film images on to compact discs. Kodak also demonstrated two Photo CD players. Model PCD870 will include a favourite picture selection system, a two times tele facility and panning effects. The PCD270 is a more basic version. The company also plans to launch a Photo CD jukebox that will store thousands of images. This will be aimed at professional users such as medical and photographic libraries.

DOLBY SURROUND SOUND AVAILABILITY

Toshiba point out that for the first time in the UK every film appearing in the annual top fifty video rental chart featured the enhanced sound performance provided by a Dolby Surround sound track. The company expects the demand for equipment featuring Dolby Surround sound to increase significantly since almost 4,000 films will have it by the end of 1992 and nearly every video software company in the UK will be branding its video sleeves with the Dolby Surround logo. The Toshiba CTV range currently includes three models with Nicam digital stereo and Dolby Surround sound. A hi-fi stereo VCR is required to obtain Dolby Surround sound when playing prerecorded cassettes.

NEW PHILIPS TV CHIPS

Details of several interesting new TV chips have been released by Philips Semiconductors. There are three teletext decoder chips that combine the video processing and the teletext decoding functions. The SAA5244P/A has an on-chip page memory, making it a genuine single-chip teletext decoder. The SAA5246P/E is for use with an

external SRAM to provide a four- or eight-page memory. The SAA5247P/B has an on-chip memory that stores a single page, extension arrangements for Fastext and in addition a background memory controller for four external DRAMs that can be rapidly scanned on each page request, giving near-instantaneous (200mS maximum) access to up to 512 pages. A new Nicam decoder chip, type SAA7282, replaces several chips in previous Philips designs, providing a two-chip decoder in conjunction with the established TDA8732 DQPSK demodulator chip.

UPCONVERTER

TW Electronics, Kennet Building, Woolton Hill, Newbury, Berks RG15 9UJ (0635 253 706, fax 0635 254 038) has introduced at only £15 a v.h.f./u.h.f. upconverter that enables a standard u.h.f. UK TV set to tune across the v.h.f. bands. Useful for DXing and for travellers to Continental Europe and Ireland. Installation is simple and the unit can be used with potentiometer or sweep-tuned TV sets.

LATEST PUBLICATIONS

Mauritron Technical Services, 8 Cherry Tree Road, Chinnor, Oxfordshire OX9 4QY (0844 51 694, fax 0844 52 554) has published a revised and updated edition of its Video Recorder and Camcorder Equivalents listing. Price is £5, order code MTP143. It's a very helpful item to have. Mauritron has a great deal more on offer: a catalogue is available under order code NC7.

ElectroValue's 1992 catalogue is now available from the company at 28 St. Jude's Road, Englefield Green, Egham, Surrey TW20 0HB (0784 433 603, fax 0784 435 216). It lists a wide range of components, accessories, test equipment etc.

Two new British Standards have been published. BS7429:1991 at £38 is a specification for television receivers and monitors for use in education and training. BS7536:1991 at £59 is a specification for the domestic digital bus (D2B) system. Prices are considerably less for members of the BSI. Copies can be obtained from BSI Sales, Linford Wood, Milton Keynes MK14 6LE (0908 220 022, fax 0908 320 856).

Butterworth-Heinemann Ltd., Linacre House, Jordan Hill, Oxford OX2 8DP has published at £10.95 a second edition of *Newnes Audio and Hi-Fi Engineer's Pocket Book* by Vivian Capel. It contains a great deal of reference data and general technical information on audio technology.

NOW AVAILABLE

Cirkit now stock the recently introduced Toko prewound balun transformers. There are three basic configurations, double balanced mixer, distributor and directional coupler, all wound with bifilar wire. The core material is chosen for wideband applications, typically 6-600MHz, with individual examples up to 1-3GHz. Each type is available in a range of turns ratios. For details apply to Cirkit Distribution Ltd., Park Lane, Broxbourne, Herts EN10 7NQ (0992 444 111 for sales, 0992 441 306 for enquiries, fax 0992 464 457).

The Unaohm EP737 panoramic field strength meter, covering the v.h.f./u.h.f., satellite and cable TV bands plus f.m. radio, is available from Satellite Solutions, Unit 35, Quarry Park Close, Moulton Park, Northampton NN3 1OB (0604 670 900).

VCR Clinic

Philips VR6462

There were E-E signals but when play or the test pattern was selected there was no output from the modulator. The +12b supply was disappearing – check it at R3160. By disconnecting PCBs I was able to establish that the fault was on the P302 signals panel where C2329 (220 μ F, 16V) was short-circuit.

Philips VR6180

This machine had a deck problem: when a cassette was inserted the deck couldn't find the stop position. The cassette would go in, the deck would start to lace up, then it would eject the cassette and switch off. Inspection showed that the cassette-down switch COD3 was working correctly. Deck state is also sensed by switch COD2 however—the one at the back by the threading motor. This one was sticking in the closed position. So it was just a question of fitting a new micro switch.

P.B.

Philips VR6468

There was a buzzing noise on the sound while a hot smell came from the inside. The hot smell was coming from Tr7108, which is one of the drum motor drive transistors. A check on this transistor's drive waveform (HMC2) showed that there was an oscillation on it. Replacing Tr7108 and its driver transistor Tr7107 made no difference, in fact the oscillation appeared to be coming from the P8051-C21D4 chip. A replacement cured the problem.

 $\mathbf{P}.\mathbb{B}.$

Grundig VS510

There was no teletext – when this mode was selected the page number appeared but there was no clock while the no teletext active message was present at the bottom of the screen. Tests around the SAA5231 chip on the DOS/TEXT board showed that there was no video input at pin 27. The BC848 transistor CT1655 was open-circuit.

P.B.

Philips VR6490

This machine kept stopping in play. The reel rotation signal was intermittent, though the reel was turning all right. On investigation we found that the ribbon cable to deck plug P1504 wasn't clamped into the connector. A press on the locking bar was all that was required. **P.B.**

Philips VR6460

This machine was dead – no clock, no deck activity, nothing. The AT supplies were present but there was no activity on the I2C bus data line. It was shorted to chassis (47Ω) , but the short cleared when the keyboard was unplugged. A new TMS3763ANL28 chip was required.

P.B.

Philips VR6462

The ticket said that the complaint was no sound – also that the machine had been to another repairer. Playback sound

Reports from Philip Blundell, AMIEIE, Eugene Trundle, Ian Bowden, John Edwards and R.J. Avis, AMIEIE

was o.k. but the E-to-E sound was weak with buzzing. A look at the sound subpanel showed that there had been a lot of soldering activity – also a new 5.5MHz sound filter had been fitted! Fitting the correct 6MHz type cut down the buzz while a tweak on coil S5 brought back the sound. Someone hadn't read the small print on the diagram – 6MHz for /05, i.e. for 6MHz UK use.

P.B.

JVC HRD520

The half-loading mechanism in this machine enables the counter and index functions to work in the fast-forward and rewind modes when the tape isn't wrapped around the drum. This machine's owner insisted that it sometimes failed to count in the fast tape transport modes. We found that the counting worked perfectly if fast forward or rewind was entered from stop after play, but if fast forward or rewind was selected immediately after tape insertion the guide pole failed to pull out a tape loop and there was no count. The mode switch was responsible. Since we had none in stock we dismantled and cleaned the original one, which had tiny black spots on its stator contact bars.

E.T.

JVC HRD580

This machine's recordings were marred by horizontal black flashes across the screen – the sort of interference you get from a latchety aerial plug or an intermittent tuner. The effect could be seen on the E-to-E pictures. Some heating and freezing on i.f. panel 07 revealed that one end of R38, the demodulated video feed, was dry-jointed.

Sanyo VTC5150

This old Betamax machine led me a dance. Whichever mode was selected it would stop after a few moments. Since the machine would sit there happily in the pause mode the reel sensor system was clearly implicated. There were pulses from the reel sensor optocoupler in the other modes. These pulses were being amplified sufficiently by Q3012 to keep the tape counter working but not sufficiently for the microcontroller chip IC3001. The optocoupler's output pulses were of low amplitude because the LED and photodiode beneath the take-up reel were thick with dust. A good blow-through cured the problem. Shades of Test Case 335!

Sanyo VHR4350

If eject is sometimes accompanied by tape looping, with consequent tape damage, remove the bottom cover and take a look at the reel drive system. There's a "switched clutch" that slides up and down the gear shaft between the spools. On several occasions we've found the clutch to be tight on the shaft.

E.T.

Sharp VC383

This machine wouldn't record in colour. Presented with a tape recorded elsewhere it would play this back with perfectly acceptable colour, which seemed to eliminate all the colour circuitry that's common to record and playback.

One of the exonerated components was the 5.06MHz chroma filter FL503 between the sub- and main colour signal converters though it had, maybe because of an internal open-circuit, become very lossy. The manual provides few clues to the colour-under subcarrier signal levels. The main one is the chroma record current which was found to be about 6dB down. The cause of the trouble was the HA1178NT chip.

Samsung SI1240

We've had the same fault with two brand new S11240s. The symptom is that the machine performs no functions and switches off after a few seconds, perhaps with the cassettein symbol showing even when the FL cradle is empty. The cause of the trouble is failure of the KA8301 loading-motor drive chip. An equivalent is the more common BA6209.

E.T.

Sony SLV474

This machine has digital video circuitry to produce picture-in-picture displays and a useful edit monitor screen that shows as small inset pictures the incoming video signal and the last off-tape image when going from play pause to record pause. The user employs this latter facility when copying from a camcorder, and the fault on this machine was particularly important to him. The fault symptom was as follows. In the edit monitor or picture-in-picture mode the inset display would be very dark at first. It would then lighten slowly until it was almost whited out.

Before being fed to pins 8, 7 and 6 respectively of the AD converter chip IC108 the video signal is split into its Y, R - Y and B - Y components. The chip also has a black-level clamp that operates prior to AD conversion, the clamp pulses being fed in at pin 15. The video signals, in component form, are fed into the chip via $1\mu F$ capacitors, so the d.c. voltages at the input pins must come from within the chip. The voltages at the two colour-difference signal input pins were correct at 3·4V. At the Y input pin 8 however the d.c. voltage fell dramatically when the high-impedance voltmeter was connected. As a result the digitised picture became very dark. Because of a fault within the chip the black level at this input wasn't being clamped.

Ferguson FV41

After playing back for a couple of hours a chroma fault would appear. The symptoms were as follows: on the left-hand side of the screen the colour remained correct but farther across to the right its phase changed, e.g. blue changed to orange. The fault would clear if the tape was stopped and then re-started or the cue and review functions were used. As the conditions around the chroma signal processing chip IC08 were correct we decided to swap it with one in another machine. The fault moved with the chip, proving that the latter was defective.

Panasonic NV-MS90

The reported fault was of a dark or no picture from the camera section of this camcorder. What was happening was that the luminance disappeared after a few minutes' use. When we dismantled the machine we found that the slightest pressure applied to the process PCB made the fault come and go. Checks showed that the luminance signal was always present at pin 7 of IC306, which is an

output to switching and one-line delay circuitry: when the fault was present the signal at pin 24, where it should return after the switching and delay operations, was missing. The cause of the problem was within the subpanel delay chip IC302 – the input at pin 11 was always present but the output at pin 22 disappeared in the fault condition.

I.B.

Mitsubishi HS306

If the machine stops intermittently during play or record check IC5A4 – it's mounted on the metal bracket along the front.

R.J.A.

Hitachi VTM622

This fairly new machine had no servo pulses on record only, being o.k. with prerecorded tapes. The cure was simply to clean the audio/control head. I wonder if this is going to become a problem, as with the VT410 series?

R.J.A.

Hitachi VT120

When a tape was inserted this machine would sometimes load it very slowly half way then just sit there and switch off, leaving the tape half laced. On one occasion the machine accepted the tape normally then switched off, again without ejecting the cassette. Suspecting a faulty loading motor, we applied an external 9V supply to its terminals. The carriage operated normally. As the M54649L carriage motor/loading chip IC902 has given trouble in the past we checked the voltages here while trying to load a tape. There was only 2-3V across the motor, measured at pin 10, so we checked the 12V supply at pin 9. This dropped to 2V when the chip was asked to drive the motor. As replacing the chip made no difference attention was turned to the source of the 12V supply, at pin 7 of the STK5471 regulator chip. A new chip restored normal operation.

Amstrad VCR4700

After about an hour in either the play or record mode this machine would give a quiet "squeak" then unlace and switch off. Using a dummy cassette we saw that the take-up spool carrier faltered and stopped: the capstan, belt and clutch drive wheel rotated normally until the system control went into the stop mode due to absence of the reel pulses. Fitting the clutch modification kit provided the cure. It's common for the clutch unit to be responsible for tape creasing: I'd not seen one seize before.

J.E.

Saisho VR705

The deck functions operated normally but there was no E-E or tape playback signal. The switched 9V supply was missing. It's produced by Q507 (2SD1266) which had 20V at its collector. Fitting a new transistor cured the problem.

J.E.

Matsui VX755A/Saisho VR3600

This machine wouldn't accept a tape. The standby indicator was on and the clock display was normal. When an attempt was made to insert a tape the standby indicator went off and the machine shut down. The cause of the fault was traced to the supply end sensor on the carriage.

J.E.

Obituary: Shizuo Takano, father of VHS

Shizuo Takano, known in the video industry as the father of VHS, died on Sunday January 19th. He was the man who sold JVC's VHS format to the world: legend has it that Takano toured the globe with a trunk full of VHS equipment, stopping at major electronics companies in an effort to gain support. The strategy worked, and VHS has long been the de facto world standard home video system.

Shizuo Takano was born in the Aichi Prefecture in 1923. He graduated from Hamamatsu Technical College in 1943, specialising in precision equipment. After a two-year spell in the navy he joined JVC in 1946, where he stayed for over 36 years. In 1955 he was a member of JVC's Video Development Team, which was headed by Kenjiro Takayanagi who was one of the founding fathers of television. The team's aim was to develop a VTR for the professional and broadcasting markets, but they were beaten by the Ampex Quadruplex system which was launched in 1956.

The JVC team subsequently developed, in 1959, the KV1. It was the world's first two-head, helical-scan VTR. They tried selling it to broadcasters, but by then the quadruplex recorder had become well established. During the Sixties video companies around the world began work on three-quarter inch video formats for the broadcast, industrial and educational markets. In 1969 Sony, JVC and Matsushita (parent company of JVC, Panasonic and Technics) joined forces to establish the U-Matic format, which was launched in 1971 and soon became the broadcasting standard.

The companies then turned their sights towards the nascent home video market. Sony began working on its Betamax system, Matsushita on a format known as VX and JVC on VHS. Takano became chief of JVC's Video



Shizuo Takano

Product Division in 1970, while the company's home video development team was headed by Yuma Shiraishi. It's hard to believe this now, but VHS was almost killed off before the first prototype VCR was even developed. JVC executives decided that home video wasn't going to be a big market after all. They reduced Shiraishi's team from ninety to ten and scrapped the budget. But thanks to the belief and support of Takayanagi and Takano, the home video team was able to work on in secret.

Konosuke Matsushita, then Matsushita's chairman, was shown the first VHS prototype and liked it so much that he decided to back VHS in preference to his own company's VX system. In 1974 Takano and JVC's home video team were invited to view Sony's prototype Betamax VCR and were asked to support the format. JVC declined and the video format war began. Sony gained the support of Sanyo and Toshiba, but JVC received backing from Matsushita, Hitachi, Sharp and Mitsubishi. Even so in the middle of 1976 the Japanese Ministry of Trade and Industry tried to persuade JVC to drop VHS and support Betamax. Once more the invitation was declined.

The first VHS VCR was launched on September 9th, 1976 at the Okura Hotel in Tokyo. Sales began well, but dropped sharply in 1977. A panicky sales team begged Takano to cut the prices. Furious at this suggestion, Takano threatened to add features and up the price instead. He then set out on his world sales tour. What won over the companies he visited was Takano's willingness to show VHS prototypes, discuss future VHS developments and offer to grant VHS licences to companies that wanted to make their own VCRs. He also offered badge engineered VCRs to companies that didn't wish to invest in the production technology. Takano's marketing strategy was superb – his methods are today studied in business school classes around the world.

In 1974 Takano became general manager of JVC's Video Products Division. He was appointed Director in 1976 and became Managing Director in 1980, while remaining general manager of the Video Products Division. He was appointed Senior Managing Director in 1983, Vice President in 1986 and Auditor in 1990.

I met Takano on my first ever visit to Japan, in 1988. I hadn't been in journalism long and was somewhat apprehensive. Takano's official JVC photograph had led me to expect a somewhat stern and reserved man, but I couldn't have been more wrong. What I found was an extremely open and warm person, with a great sense of humour. Takano made me feel very welcome. After a busy day of briefings and factory tours the press group joined Takano at a restaurant where there was much drinking and joking.

Takano died of a respiratory ailment at 2.43 a.m. The wake was held on the following day, January 20th, the funeral service being held on the 21st. Over two thousand people paid their respects. Takano is survived by a wife and two children. His legacy will live on through the hundreds of millions of VHS recorders in homes across the world.

In closing I'd like to thank Shuji Kurita, Deputy General Manager of JVC's Japan Public Relations Department, for providing me with many biographical details.

G. Cole

Letters

HD AND WIDESCREEN TV

In the January leader article you suggest that to drop MAC and go for a digital alternative, the next generation, would be to put HDTV in Europe back several years. I don't think that this is really the point. The factors that are holding up the introduction of broadcast HDTV services have much less to do with wrangling over transmission standards than with the state of the art in display devices. As the chairman of Sony Broadcast said recently, HDTV "is not about the number of lines or the aspect ratio but is all about sitting close to large screens". HDTV pictures that are displayed on screens similar in size to those now used for 625-line pictures don't look sufficiently different from present day TV pictures to justify a very significantly higher price tag.

At the moment, large screens mean big, expensive c.r.t.s that are no basis for a mass market product. If ordinary members of the viewing public can't afford sets fitted with these bulky and expensive devices, or don't want to accommodate them in their homes, then HDTV is a dead duck regardless of how little bandwidth the signals can be

squeezed into.

By the time that we get large, flat "hang-on-the-wall" screens of performance adequate for HDTV and at an affordable price, which means at least another ten years, HD-MAC will look as antiquated technologically as PAL does now. I believe that we should leave the choice of an HDTV transmission standard open until advances in display technology make domestic HDTV receivers viable and only then select the best transmission format from those available at the time, which will almost certainly mean a digital system.

In the same issue John Dagg argues that the aspect ratio for HDTV should be wider than 16:9. I feel that this is a related issue. Very wide (greater than 2:1) pictures look wonderful on really big screens but look just silly on a small screen. Hence the dislike for the "letterbox" format for showing Cinemascope films on TV. Perhaps we should

leave the choice of aspect ratio open as well.

Incidentally, Mr. Dagg is incorrect in saying that "almost every film made since 1952 has been made in Cinemascope/Panavision format. In fact only about twenty per cent of cinema features made in this period have used this format. The majority are shot "unsqueezed" with an aspect ratio of between 4:3 and 5:3. When they are shown in the cinema the top and bottom are cropped to provide a picture of between 1.66:1 (5:3) and 1.85:1 (5.55:3) aspect ratio. When shown on TV or transferred to video cassettes additional picture information above and below that shown in the cinema can often be seen. This sometimes results in microphone booms, lighting cables etc. making an unscheduled appearance!

David Looser, Ipswich.

WHAT A LIFE!

After reading Donald Bullock's reports over the last few months I can't see how he makes a reasonable living at the rates he charges. An example of this is the dead Fidelity CTV140 mentioned in the February issue. A realistic charge for this would have been something like £20-£30 labour plus £10 parts plus VAT. If Donald made his

customers wait several days for the repair they would be more likely to pay a sensible figure.

Let's have some examples on this page of what other dealers think the minimum charges should be, e.g. VCR minimum £20-£30, TV minimum £20-£25, Camcorder minimum £35.

John Read, Watford, Herts.

Perhaps like myself Donald Bullock bought several hundred BY127s from a well-known Midlands supplier a while ago when they were on special offer. But position D508 in the Matsui 1440A is not the place to dispose of them. The diode used here is of the zener type, its purpose being to conduct in the event of the h.t. voltage rising to an excessive figure due to a fault condition, thus protecting the line output stage and the remainder of the receiver. Some models from ITT and other manufacturers use a similar arrangement. Incidentally I don't know why they bother to put a fuse in the Matsui sets: R501 does the job admirably and F501 rarely blows! But keep the good work up Donald, I really look forward to your column.

Derek Farler, Keynsham, Bristol.

A WARNING

Part of my business is the sale of good and reliable colour sets with a guarantee. I've found the best sets to be the ITT ones fitted with the German made Pico chassis. But one drawback is the line output transformer, which develops a fault that the super chopper power supply circuit is able to

handle without blowing up.

Recently another well known wholesaler has started to supply the line output transformer at a much cheaper price than the manufacturer. So I bought a couple. One was needed urgently for an under-guarantee breakdown. I fitted the transformer, which dropped into place correctly, then switched the set on. The tube's heaters were brighter than a 100W bulb. Then, though I switched off immediately, a puff of smoke came from the c.r.t.'s base panel. On investigation I found that the c.r.t. had gone short-circuit between its first anode, cathode and focus electrodes. I'd the wrong LOPT of course, but was assured that I had the correct one. A few words with the supplier produced a return authorisation, but they've credited me with just the transformer. So I've lost the cost of the set and a replacement c.r.t.

Hugh MacMullen, Newquay, Cornwall.

MARCO POLO RECEPTION

Since BSkyB has undertaken to continue its Marco Polo transmissions until at least the end of 1992, there has been renewed interest in BSB receivers of late. BSB receivers and dishes are available from surplus dealers at very reasonable prices, and will provide Sky One, Sky News and Sky Sports all free of charge. In addition two film channels are available on subscription. Many people may feel that it would be worth buying a system for use this year. In fact the increasing number of Marco Polo installations could perhaps induce BSkyB to continue, and perhaps one day to expand, its services from this satellite. We can but hope, especially as the future of HDTV in Europe is linked to the success of D-MAC.

I picked up a Philips STU902 receiver and a Marconi Squarial for just £50. Installation was a simple matter of

setting up the declination, using the supplied template, mounting the bracket on a suitable wall (tricky in my case as there is no clear view of the Southern sky anywhere, so I fitted it as best I could to a garden wall) and then pointing the boom to the compass direction given in the instructions. As my compass took objection to being close to the LNB that I'd already assembled, I put a plumb line on each end of the boom and used these for alignment with the compass some inches below the dish. Cable and F connectors were easily obtained locally and, when fitted, the signal strength was found to be maximum first time. In fact I found that the dish is remarkably tolerant of direction error and obstructions.

A call to BSkyB immediately had the system authorised, the whole job taking less than two hours. Not only have I obtained some extra channels to watch (perhaps not exactly the best programming though) but in addition I've learnt something about satellite TV reception. Perhaps the experience alone makes it all worthwhile, and even if the service does come to an end in December the equipment will have a certain scrap value. If

PHOTOSTATS SERVICE

Newer readers may have missed important servicing features published in *Television* over the past few years. We have therefore started a photostat service to make this information readily available. Photostats of the following servicing features, listed in alphabetical order, can be supplied at the prices shown. Please send requests to: Television Editorial Department, Room L323, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Cheques/POs should be made payable to Reed Business Publishing Ltd. There are two standard prices, see below.

Feature	Price
B and O L/LK2500/2800 chassis	Α
Decca 80/100 chassis	A
Decca 120/130 chassis	Α
Ferguson FV31R VCR	Α
Ferguson TX10 chassis	Α
Ferguson TX100 chassis	Α
Finlux 1000 series chassis	Α
Fisher FVH-P520 VCR	Α
Mitsubishi CT2227	Α
Mitsubishi Euro-4 chassis	Α
Mitsubishi HS304 VCR	Α
Panasonic D1 VCR deck	Α
Panasonic G VCR deck	В
Panasonic NV333/366 VCRs	Α
Panasonic NV370/830/850 VCRs	Α
Panasonic NV730 VCR	Α
Panasonic NV777/788 VCRs	Α
Panasonic NV2000/2010/3000 VCRs	Α
Panasonic U3 chassis	Α
Panasonic U4 chassis	Α
Panasonic U5 chassis	Α
Salora F chassis	Α
Salora G and H chassis	В
Salora J chassis	Α
Salora K and L chassis	В
Sanyo CTP7130/1/2	Α
Sony KV2252/2256/2752/2762	В
Prices, $A = £2.50$, $B = £3.50$.	

you want to play with satellite TV cheaply, this is the way to do it.

Colin McCormick, Plymouth, Devon.

HELP WANTED

Can anyone supply any of the following: a tuning/timer preset door (front right) for the Saisho VR805 VCR; (2) a circuit diagram for the Pye T175 monochrome portable; (3) a circuit diagram for the Decca/Korting 82514 pattern generator? N. Brown, 27 Devonshire Park, Bideford, N. Devon EX39 5HZ (0237 479 732, evenings).

Can anyone supply h.t. transformers for a Philips T190 12in. monochrome portable and a Network NW1202 12in. monochrome portable? Michael J. Ladd, Ty'r Gwynt, Mountain Road, Pembrey, Dyfed SA16 0BX (055 464 418).

Could anyone supply me with some octal valve screening cans and nats if possible, also 6K8, 6Q7 and 6K7 valves? These are required for restoration work. Ken Jones, G3PS2, 24 Station Road, Okehampton, Devon EX20 1EA (083 753 021).

Can anyone sell me a Fisher FVH-P722 VCR for use for spares? B.D. Whellams, 17 Highbury Terrace, Halstead, Essex CO9 2EB (0787 477 368).

Can anyone supply a Sanyo luminance delay line, type L7127, as used in the TJ series chassis (Models CTP5101 etc.)? Roger Burchett, 12 Ormonde Road, Hythe, Kent CT21 6DN (0303 267 969).

Can anyone supply surplus, secondhand, complete or in part remote control adaptor kits for the Philips Model VR2020/22 VCR (V2000 format)? David Avery, 28 Gwydr Crescent, Uplands, Swansea (0792 475 904).

Can anyone supply an X and Y timebase for the Philips 7122-701-61012, EBMH1GRGT oscilloscope, or a 25-pin modem to plug in? I have the X and Y amplifiers. S. Orbell, 39 St. Andrews Road, Gorleston, Gt. Yarmouth NR31 6LT.

Can anyone supply details of the manufacturer and model number of the radiocassette marketed by Dixons as their Prinzsound CTA650? I cannot obtain a service sheet without this information. E.G. Kempshall, 109 Portland Road, Hove, East Sussex BN3 5DP.

I feel that I must write to acknowledge the kind and overwhelming response I received to my plea for help in the February issue. It's nice to know that in these difficult times such a large number of people in the trade are prepared to spend money and time for no reward to help others. It has certainly revived my faith in the trade.

Philip Pick, Sight and Sound, Caythorpe, Lincs.

VCR PATTERN PARTS

There's been debate in these pages in the past over the pros and cons of mechanical pattern parts for VCRs. I prefer to fit genuine originals but on occasions when parts are obsolete, out of stock or there's a large price differential I offer the customer the choice. It's my policy never to fit pattern parts without the customer being aware of the situation. Some pattern parts can be a bonus to the

user – MCES video heads for example provide quality equal to the originals, longevity of life that's often better and a twelve-month guarantee. But other pattern heads are not so good. We had a Panasonic NV333 in recently whose heads had been replaced by that famous dealer A.N. Other with a pattern version. Its owner complained that the quality had never been up to much but that now, some five months later, the picture was unbearable. It was, too: there was severe picture pulling, over-saturated chroma and peak white overshoot. It took me a little while to discover that the new heads were the cause because the symptoms were not consistent with normal head failure, and after all they had been fitted only recently. The owner was a little upset and scrapped the machine.

One practice that annoys me is when spares wholesalers supply pattern parts which are not listed as such in their catalogues. This is particularly annoying when the supplier in question is an "authorised distributor" and the order codes are for the genuine part. Here are two recent

examples.

The first concerned a Mitsubishi HS307 that needed a new pinch roller. We ordered the part from a supplier that had previously sent us genuine Mitsubishi parts without any problems, using the same order code group as before, but an anonymous one arrived in a bag. Its centre bearing was made extensively of plastic instead of the original bronze. When the pinch roller was placed on the shaft it spun for approximately one turn then stopped, whereas the original type would carry on spinning for countless times. I fitted it, along with a new audio-control head, and aligned the unit. On making a test recording I found that the sound level varied. The alignment was checked and found to be

o.k. Refitting the original roller cured the problem, but not before much head-scratching. An original type was then obtained from Mitsubishi. The second case was an Alba machine that suffered from severe tape riding, with consequent edge damage, after fitting a new pinch roller. This roller was again not of the same type as the original, and furthermore had another manufacturer's name on the bag.

I could go on giving such examples. How many readers suffered a couple of years ago with those pattern 3V35 idlers that were too small? Wholesalers should take greater care over what they supply, and should be accountable for the losses that occur when headaches such as these arise. I feel that the problem doesn't show up as much as it should because many engineers are not too fussy when working on VCR mechanics - torques aren't checked, lubrication isn't carried out, nor is tape path alignment when new heads are fitted. If the sound level varies slightly following a repair they don't worry. I've seen completed repairs where new heads have been fitted in high specification machines that previously gave perfect still pictures and noiseless slowmotion, but because alignment has not been carried out they no longer do despite the new heads! Also machines where no servo alignment has been carried out following drum replacement, with the result that the switching point obscures the bottom inch of the picture. For some inexplicable reason if the cowboys muck up a repair the owner will come to me to sort it out and will pay, but if the machine goes dead six months after I've cleaned the heads the owner comes back to me demanding a free repair! Nick Beer,

Bideford, N. Devon.

Microcomputer Notes

Commodore C64

After reading about Mr. Matthews' problems with one of these microcomputers (February issue, page 257) I thought that some comments on my own experiences with them might be of help. To recap, the problem reported by Mr. Matthews was a blank screen but no other results, the cause being failure of one of the regulators in the potted

power supply.

In one case I cut down the potting on the transformer as far as possible in order to expose the lead-out wires for the mains input and the 9V secondary. I ignored the 5V secondary as I don't trust the regulator used here. Instead, a good-quality switch-mode power supply was used to provide the 5V output. The unit to hand happened to be a 180W Gould unit. Obviously this power isn't required but, being an efficient power supply, the unit draws only sufficient current from the mains supply to provide 5·2V across its output terminals, and maintains this output with impressive accuracy over a load current range of zero to more than 30A.

The second repair along these lines was for a friend who wanted the system up and running to keep his children out of mischief. As a 9V transformer was on this occasion ready to hand no attempt was made to hack the old power supply apart, though the original power lead came in handy. The switch-mode power supply I used this time came from the monitor unit of a professional system that had been scrapped. The option now exists to provide -5V, -12V and +12V rails as well as the standard +5V and 9V a.c. supplies should these be required by another unit.

The biggest advantage of computer type switch-mode power supplies is that when they fail, which appears to be rare in comparison with three-terminal linear regulators, they usually cease to function and cut off the outputs. This is much preferable to a series element going short-circuit and dumping the unregulated secondary voltage on to the 5V output.

If a linear regulator is retained, a precaution I consider to be well worthwhile is to add a crowbar thyristor. Simply connect the thyristor between the 5V rail and chassis. Use a low-value resistor and capacitor from the gate to chassis. A simple transistor and potentiometer as a "variable zener" connected from the 5V line to the thyristor's gate allows precise setting of the trip voltage. This arrangement saves a fortune in expensive house-coded LSI chips.

I. Field

Amstrad PCW9512 Printer

This printer produced consistently faint printing and was much quieter than usual. A telephone enquiry to Amstrad produced the answer "replace the hammer armature". This is plastic with a ferrous insert, and can develop cracks. Like Donald Bullock, when I did this the result was that the printer ceased to produce any impression at all.

According to the gentleman on the phone, there should be a 2.4V pulse at the hammer current test connector. As this was the case I concluded that the fault was a mechanical one. I'd been warned that the position setting of the hammer electromagnet is very critical. The fixing screws were very hard to undo. Once they were loose the magnet could be repositioned and resecured, using Loctite on all the screws. Doing this provided a complete cure.

P.S. Wallis, G3YJI

TV Fault Finding

Reports from Steve Cannon, L.V. Cooper, Graham Rees, Liz Hopkins, John Edwards, Ed Rowland, Mick Dutton, Eugene Trundle, Michael Dranfield and Denis Foley

Panasonic TC1785

This set came in dead and quick checks showed that no voltages were being generated by the power supply. In the circumstances it's a good idea with these sets to remove Q806, the standby switch transistor, then wind the set up via the variac. This time the set started up, with all the voltages correct. Q806 was then checked and found to be open-circuit. A new 2SA683 transistor put matters right.

S.C

Hitachi CPT2658/Salora L Chassis

The symptoms were severe herringbone patterning, both with off-air and scart input signals, striations down the side of the picture and both the line phase and frequency were wrong. In cases like this it's usually a good idea to tie the faults down to one part of the chassis. But it was a bit difficult here because separate faults seemed to be present in the i.f./video, line oscillator and line output departments. The only thing in common of course is the 12V supply. A check was made for ripple but none could be detected. We decided to replace CB616, the 1,000µF reservoir capacitor for the 17V supply that feeds the 12V regulator, and as if by magic all the symptoms cleared. S.C.

Hitachi G8Q Chassis

This set was dead - no surprise here. Praying that the mains fuse hadn't been blasted, we removed the back. Thankfully the fuse was o.k., so a full power supply rebuild wouldn't be necessary. As the h.t. was present and correct we checked the supply to the timebase generator chip IC701. The 12V supply was present but line drive wasn't being generated. A check was then made on the standby line from the microcomputer panel. The voltage here is normally between 8-12V when the set is running, 0V in standby. It was found to be 3.5V. This led us to suspect a fault on the microcomputer panel, and sure enough when the standby line was disconnected the set started up. Before condemning the microcomputer chip we decided to check a few other components. This proved to be a fruitful approach as the 1N4148 diode D1504 in the standby circuit was faulty.

Philips 2A Chassis

The h.t. and e.h.t. came up for an instant at switch on, then the main h.t. decayed to a steady 30V with the other secondary power supply voltages low. It seemed certain that the cause of the trouble was in the line output stage because disconnecting the feed to the line output transformer brought all the supply lines back up. Checks showed that the output transistor, the EW modulator diodes, the secondary rectifiers fed from the transformer and the tuning capacitors were all o.k. The only thing left was the transformer. A new one restored normal operation.

Panasonic TX25W2 (Alpha 3 Chassis)

In our experience this very new chassis is not one of Panasonic's better ideas – the failure rate has been far too

high. The first fault with this particular set was that R555, the fusible safety resistor in the h.t. feed to the line output stage, was open-circuit. When it was replaced, the set was in a shut-down condition. A check showed that the line output transistor was o.k., but it seemed clear that something was wrong in the line output stage. We checked the EW modulator diodes as these can cause the same symptoms. Not this time however. So we began to suspect the line output transformer, a common cause of failure with modern sets. But this set had just been unboxed. It couldn't be faulty, could it? It was though.

Grundig CUC2400 Chassis

This set wouldn't come out of standby when the mains on/off switch was used. The circuit indicated that the power supply earth was not isolated from the main chassis earth. This was not true of the set we had. I eventually found the usual network that connects the two earth rails, i.e. the $4\cdot 7M\Omega$ resistor and its associated parallel capacitor. A check on the resistor showed that it was opencircuit, a replacement restoring normal operation of the on/off switch. The offending resistor is located near the front of the panel, on the right-hand side very close to the right-hand chassis rail. I forgot to make a note of its circuit reference number, but as it's not shown in the circuit diagram we used it probably wouldn't be much help anyway.

Samsung Cl3312Z

The complaint was of lack of height. The obvious thing to do was to check the d.c. voltages around the field output chip, IC901. These were all o.k., but a new chip was tried in case. This made no difference so I moved back to the TDA8305 chip IC101. The d.c. voltage at the ramp generator pin 2 was found to be low. Replacing R302 cured the problem. It had risen in value from $470 \mathrm{k}\Omega$ to about $1.5 \mathrm{M}\Omega$.

Rediffusion Mk 4 Chassis

This set was dead with the start-up resistor 4R2 getting very hot. A check on the start supply showed that it was correct at 14.5V, and no shorts could be found on the secondary side of the chopper transformer. A scope check at pin 15 of the TDA1060 chopper control chip showed that the drive output was at only about 0.1V peak-to-peak – the manual gives the correct amplitude as being 0.4V peak-to-peak. So we checked the supply voltage again: the reading was still 14.5V. When the supply was scoped however we found that a 60V peak-to-peak ripple was present on it. A check on 4C6 $(1,000\mu\text{F})$ showed that it had dried up, a replacement restoring the set to life. **M.Dr.**

Hitachi CPT1646R

The report with this set said that it was dead. When we switched it on the e.h.t. rustled up then very quickly died away. An LM317T three-terminal adjustable regulator is used in this chassis, with a large bypass resistor. A check

on the LM317T showed that all pins were at about 150V. We tried powering the set via a variac and found that at about 70 per cent of the full mains input everything worked all right. So no other damage had been done. A new LM317T was tried, on the assumption that the original one was short-circuit, but the fault condition remained the same. As the voltage at the adjustment pin couldn't be reduced using the set-h.t. control, the cause of the fault was likely to be in this area. Tracing back from the adjustment pin brought us to two resistors, R907 ($56k\Omega$) and R908 ($22k\Omega$). R908 turned out to be open-circuit.

M.Dr.

Philips 2A Chassis

This set was dead with a very black mains fuse. The obvious things to check were the chopper transistor and the mains bridge rectifier diodes. They were all o.k. In a situation like this, where no obvious short can be found, I usually remove the degaussing thermistor and try again this device can be responsible for violent fuse blowing. With the thermistor out the set remained dead, but this time the mains fuse remained intact. I then spotted a small blue capacitor, C2664 (1.5nF), with a split down the side. It turned out to be open-circuit. So did the associated BYD33J diode D6664. With replacements fitted the set remained dead. Checks showed that there was no output from the mains bridge rectifier – and no a.c. input either! Study of the circuit diagram soon showed what had happened – Philips dealers will be aware of this. I'd left the degaussing thermistor out, intending to replace it after finding the cause of the fault. In this chassis the thermistor is in series with the incoming mains feed to the bridge rectifier, acting as a surge limiter as well. Replacing this item restored the set to full working order. M.Dr.

Fidelity ZX3000 Chassis

There was a green cast on the picture, as if the tube had a slight heater-cathode leak. A check on the tube showed that it was o.k., so attention was turned to the RGB output stages on the c.r.t. base panel. Comparison voltage checks in the green and red stages brought us to TR10's base bias resistor R214 which had risen in value from $100 \mathrm{k}\Omega$ to $150 \mathrm{k}\Omega$. A replacement restored correct colour. M.Dr.

Amstrad CTV2000

This set had top field foldover. I'd had this fault before, so I went straight for C720 (4.7μ F, 160V) which decouples Q702's collector. As the set is now about nine years old we replaced C718 and C739 as well for good measure. **M.Dr.**

Hinari CT4

This set was dead and on inspection we found that a small hole had been burnt in the PCB around one leg of L406. Further investigation brought us to R406 (680 Ω) which was open-circuit. A replacement restored normal operation.

L.H.

Triumph CTV8000

We get quite a few of these Currys own brand sets in. Just when we think we've got it all sussed out along comes one like this. It was dead and on opening it up we found that there was a hairline crack on the bottom panel. Bridging it brought back a lot of voltages but nothing else. After disconnecting the final anode cap and finding only a weak spark we looked more closely at the tube base. A do-it-yourselfer had had a go and had put the tube base back upside down!

L.H.

Huanyu 37C-2

The problem with this set was line collapse. It was caused by dry-joints on transformer T782 in the scan circuit. **L.H.**

Matsui 2160/Saisho FST210R

There was a small, pulsating picture, the sound varied up and down and the brightness was low. We get quite a few of these sets so we went straight to the line output transformer-derived 180V rail where the reading was low at only 73V. Fitting a new STR58041 chopper chip (IC501) restored normal operation.

L.H.

Ferguson TX100 Chassis

If the standby light works but the set goes dead when a channel is selected and all the lights go out, check for a 12V drop across RL1. If this is absent replace TR9 (BC107).

L.H.

Saisho CT147R

A common cause of the dead set symptom, though with 229V at the collector of Q604, is R662 (180k Ω) being open-circuit. A replacement is normally all that's required to restore the set to life.

J.E.

Ferguson TX99 Chassis

When this set was switched on the e.h.t. came up but there was no picture, just the occasional flicker of flyback lines. There was no sound and it was impossible to change from channel one. R239 (100Ω) was open-circuit due to an internal short in the M494B1 tuning/standby chip IC241.

J.E.

Philips G11 Chassis

Dead except for a hum was the report with this set. When we switched on we found that the tube's heaters glowed and the e.h.t. rustled up, so the power supply and the line timebase were obviously o.k. A check on the 17V feed to the audio and i.f. panel showed that this voltage was missing. The 1A fuse was intact and the BY210-800 rectifier diode seemed to be o.k. when checked with an ohmmeter and the scope component tester. After a lot of other checks got us nowhere we decided to fit a new diode. Everything then burst into life. It all goes to show that there's still no trustworthy general-purpose component tester, the best advice being "if in doubt, whip it out". J.E.

Sony KV2062

This set was dead with a blown 3·15A mains fuse. A check on the bridge rectifier showed that D609 was short-circuit. Fitting a replacement and giving the set a long soak test proved that all was now well.

J.E.

Philips CTX-E Chassis

This set would sometimes fail to come on. We also noticed that the stations were not being memorised. As a result we replaced the back-up battery. There was no further trouble after we'd done that.

Ferguson TX90 Chassis

We've had two of these sets in recently. The problem with the first one was no colour. D103 (BAV20), which is in series with the sandcastle pulse feed to the colour decoder chip, was open-circuit. The second set wouldn't store channels. IC902 (M293B1) had failed.

E.R.

Some Quickies

Here are some quickies we've had recently:

Mitsubishi CT2027BM: Intermittently dead was the problem with this set. The cause was dry-joints on transformer T571.

Philips 14CF1014 (CF1 chassis): This set was dead with its line output transistor Tr7560 short-circuit. Dry-joints on the chopper transistor Tr7317 were the cause. E.R.

ITT CT3306 (Monoprint A Chassis)

The problem was no line sync. This set uses a TDA2579 sync/timebase generator chip. Our first suspicion was of missing line feedback pulses, especially when we found that they come via a high-value (680k Ω) resistor. A scope check showed that everything was in order here, also that the video input was correct at pin 5. Field lock was solid, and a new TDA2579 made no difference. The frequency could be set to drift through at the centre of the hold control's setting with the video input shorted, so we came to the conclusion that the cause of the problem must be one of the peripheral components associated with the line phase discriminator circuits. This brought us to pins 6, 7 and 8. After checking the three electrolytics we noticed the small disc ceramic capacitor (C609, 100pF) which is connected to pin 7. Perfect lock was obtained after replacing it. On test the capacitor was found to have slight leakage. M.D.

ITT CVC1215 Chassis

This set wore a Solavox badge – Model 22R09. The fault was distortion across the centre of the picture when the set had warmed up. Any disturbance to the chassis would clear the problem. We eventually found that the cause of the trouble was the line output transistor's heatsink. It completes the earth path from several print areas. Resoldering these cured the fault.

M.D.

Sharp C1421

This set was dead with the standby relay not energised. Linking across the relay produced a snowy raster with no tuning control. Checks around the microcomputer chip IC1002 showed that there was no voltage at the reset pin 11. This was due to operation of the overload protection transistor Q604. By isolating the various protected circuits we found that the basic cause of the trouble was zener diode D607, which was short-circuit.

M.D.

Harwood TS2604P

I'd never seen one of these sets before. It had been bought at a discount store and had gone wrong just out of guarantee. The shop had told the customer that it would be cheaper to buy a new set. When I switched the set on the mains input was present and there was 350V across the chopper transistor, as I found out all too soon (there's no discharge resistor across the reservoir capacitor!). The power supply is on a separate panel. When this was removed I found that R3 had sprung open. Resoldering it didn't get the set to run, and further investigation showed that the 400mA fuse B3 had blown. After fitting a replacement the set started up and a picture appeared. It was very defocused and dim however. I left the set on soak test for a while and noticed that the brightness level altered as it warmed up. Suddely the screen went to peak white, with flyback lines. I found that there was no supply to the RGB output transistors as the coil (L4) that's in series with the feed had gone open-circuit. Removing it and resoldering the coil ends to the pins cured the problem.

M.D.

Tatung 160 Chassis

The set of which this chassis formed a part had been well and truly blown up! The BU508 line output transistor and TDA3651 field output chip had both died and R411 was burnt. Using a mains light bulb as a dummy load we found that the power supply was churning out 285V instead of the correct 117V. The culprit was D808 in the set-h.t. sampling circuit: it read 380Ω both ways.

ITT CVC1203 Chassis

The power supply in this CT2612 receiver, which uses the CMP1204 power module, had gone into the superboost mode. The voltage on the h.t. line was over 200V. C733 ($10\mu F$), the h.t. reservoir capacitor, had been blown apart, scattering its wet, woolly and metallic entrails over much of the set's inside. The h.t. comparator stage functioned all right, or at least was trying to, but the 13V reservoir capacitor C703 ($10\mu F$) in the primary side of the chopper circuit was faulty in some way – its replacement restored normal operation.

Panasonic U3W Chassis

A few days after I'd replaced faulty field output transistors (Q402/3) this set came back with the complaint of no sound or vision: it was in permanent standby. Checks showed that the voltage at pin 5 of the AN5435 timebase generator chip IC501 was high, thus switching off the line drive. The h.t. was normal, and the set came to life when the service switch was on. This led to the discovery that Q403's emitter current was high. A fresh pair of field output transistors, plus a new AN5435 i.c., did no good at all. A phone call to Panasonic provided the necessary help. When the field output transistors are replaced, the associated bias diodes D406/7 should also be replaced.

Hitachi G8Q Chassis

We were unable to tune in any stations, obtaining only a blank raster with most programme numbers while the buttons at the front of the set operated incorrect functions. Replacing the tuner unit and the microcomputer chip got us nowhere. A call to Hitachi produced the advice that the memory chip IC502 should be reprogrammed. This is an involved process and the instructions that have to be followed are not listed in the manual. Details for some models were included in the August 1991 issue of *Television*, on page 732. This procedure does get one out of the trouble.

D.F.

Long-distance Television

Roger Bunney

Virtually static high-pressure systems over the UK during much of January resulted in extensive tropospheric reception, also serious fog. Three periods produced excellent tropospheric propagation – during the 11-16th, the 20-22nd and, the most intense period, the 27-31st. Together with a little Sporadic E and F2 layer reception this made January an unusually active month.

Tropospheric propagation over the 11-16th produced generally strong signals from France, Germany, Denmark and the Benelux countries in Band 3 and at u.h.f. Highlights were Poland ch. R36 on the 11th, Czechoslovakia ch. R10 on the 13th and Austria chs. E6 and 8, Czechoslovakia ch. R10 and various Swiss Band 3/u.h.f. stations on the 15/16th. Many DXers logged the new German network logos, e.g. "MDR 1 Programm", for the first time. The Luxembourg chs. E7/24/36 were also seen on several days. January 20-22nd produced a less active spell, with reception mainly from the east/north east – most signals came from Norway, Sweden, Germany and the Danish first and second networks.

The major event from the 27th onwards saw the month out. It was again accompanied by thick fog. Very strong German signals were seen on all days through to the 31st. The emphasis early in the period was towards reception from Scandinavia. On later days it tended to veer to the east/south east. Austria ch. E8 was seen on the 28th, along with the usual signals including RTE (Ireland). An unusual sighting on the 30th was Canal Plus on chs. E39 and 50 with PAL encoding. The peak day for reception was the 30th. Here at Romsey Band 3 was completely jammed with signals and the u.h.f. bands were in chaos. DXers logged signals from France, Germany, Switzerland, Denmark, Norway, Czechoslovakia and the Benelux countries in all bands. As a bonus there were several 435MHz amateur TV callsigns and even the American Forces' ch. E70 (A80) transmitter was logged at good strength.

SpE had its moments, in particular with a very intense opening on the 4th. The log is as follows:

4/1/92 RAI (Italy) ch. IA; +PTT (Switzerland) E2, 3; MTV (Hungary) R1, 2; CST (Czechoslovakia) R1, 2, 3; TVR (Romania) R2; TSS (Russia) R1, 3; ORF (Austria) E2a, 3, 4; ARD (Germany) E2, 3, 4; Canal Plus L3.

5/1/92 TVE (Spain) E3; RUV (Iceland) E4.

8/1/92 TSS R1.

11/1/92 TVE E2, 3, 4; +PTT E2, 3.

12/1/92 TVE E2, 3; +PTT E2.

19/1/92 DR (Denmark) E3; RAI IB.

21/1/92 RAI IB.

26/1/92 RTE (Ireland) ch. B.

There were several good days for F2-layer reception, with strong signals from the Middle East. Odd to report that on the 31st/Feb. 1st a very large sunspot group was visible in the centre of the Sun. This could be seen – through the fog – with the naked eye, a very unusual event. But despite careful tuning on the following evening no auroral activity was noted. (Never observe the Sun directly under normal conditions.) The F2 log is as follows:

9/1/92 Irib (Iran) E2; Dubai E2.

14/1/92 Irib E2; TSS R1.

17/1/92 Very weak unidentified signals on chs. E2/R1.

27/1/92 Irib E2.

28/1/92 TSS R1; evidence of Australia ch. A0; unidentified signals on chs. E2/R1/E3.

29/1/92 Irib E2; Dubai E2; TSS R1.

30/1/92 Dubai E2; TSS R1.

31/1/92 Irib E2; Dubai E2; Chinese caption writing seen on ch. C1/R1.

Our thanks to Roger Fussell (Torpoint), Peter Schubert (Rainham), Simon Hamer (Powys), Cyril Willis (King's Lynn), David Glenday (Arbroath), Tim Anderson (St. Leonards), Brian Renforth (Newcastle) and Ryn Muntjewerff (Holland) for sending in reception reports.

It's interesting that low-power signals can be received via SpE reflection amongst much higher power co-channel signals. The Australian bulletin *Yagi* reports that on December 31st one of its members received, with a scanner, New Zealand ch. 1 (45·28MHz vision carrier) from TV2 Wingagui: the unusual point is that the transmitter's output power is 1W!

George Gaskin reports from Gibraltar that RTM (Morocco) has changed its first network station identification logo to a conventional five-pointed star with the figure one in the centre.

News Items

Czechoslovakia: Andrew Emmerson reports that the Czech network has started on a programme to convert from SECAM to PAL colour. A Bratislava transmitter under construction will operate with PAL only. The phased changeover is expected to take ten years. Though modern Czech receivers can operate on the SECAM D and PAL B/G standards, there are still many traditional Russian-made single-standard SECAM D sets in use. These will have to be replaced over the next few years.

Poland: Permits are being issued for new f.m. transmitters operating in the 88-108MHz band, with services due to start next winter.

Ireland: The Irish government has promised to launch a predominantly Gaelic-language channel by next December. RTE Gaelic programmes will be supplemented by locally-produced material. The Broadcasting Bill is to be amended to provide RTE with more commercial air time to help fund the production of Gaelic-language programmes.

Holland: TROS plans to adopt cable-only distribution – cable now reaches almost 90 per cent of Dutch households. Germany: There have been fundamental changes in the broadcasting arrangements in the eastern part of the country with the establishment of the MDR (Mitteldeutcher Rundfunk) and ODR (Ostdeutcher Rundfunk) and the demise of the DFF. MDR and ODR took over from the DFF on January 1st. The MDR headquarters is at Leipzig while ODR is located at Babelsberg near Berlin.

50MHz Amateur band: The Polish authorities are to allow radio amateurs to use the 50MHz band in certain areas not served by Band 1 TV transmitters. Estonian authorities have given the 80-80-5MHz allocation to radio amateurs, with e.r.p.s limited to 50W in the Tallin region and 200W elsewhere. Other Russian republics are expected to follow suit. Maximum power for use by Swedish amateurs in the band has been increased to 200W, though with restrictions depending on the proximity and power of the nearest Band 1 TV transmitter. Our thanks to *Six News* for this information.



Satellite TV

Up to nine high-power transponders have been carrying Winter Olympics material via the French Telecom 2A satellite, which will be at 3°E for the duration of the Olympics.

Filmnet is reported to be phasing out PAL and is expected to go D2-MAC completely by the end of March, probably with Eurocrypt scrambling.

Eutelsat II F3 at 16°E has been carrying out tests by relaying much of Eutelsat I F4's cable TV output. So far there have been no reports of interference to Astra signals.

There seem to be quite a lot of new satellite TV channels. The Adult Channel is now carried on Astra while Free Choice TV is being promoted via the Dutch PTT leased 11-150GHz transponder on Eutelsat II F1 at 13°E, with a Dutch postbox address. Eutelsat II F2 at 10°E is carrying two new services on a test basis, Show TV with MTV relays and an inlaid test caption and an as yet unidentified service for cable distribution. Indianand Chinese-language services are expected shortly via Astra, on a shared transponder time basis.

MAXSAT continues despite problems elsewhere in the Maxwell Communication Group. A recent contract for this satellite linking company involves Westminster news circuit uplinks from the ITN studio via three Eutelsat transponders for ITV regional use.

Scientific Atlanta is to up-grade a number of European Earth stations in a move towards digital transmission via the new Eutelsat II satellites. Countries involved include the UK, Ireland, Italy, Greece, Cyprus and Tunisia.

The new Intelsat VII and VIIA series of satellites will be launched from 1993 onwards for service in the C and Ku bands and SNG operations. Five craft have been ordered

so far, with options on a further two. Each satellite will have three independently steerable Ku band spot beams and six steerable C band spot beams. Facilities to accept Ku band uplinks and translate them to C band (4GHz) downlinks will be included, basically for lower-powered SNG use. The Ku band downlink e.i.r.p. will be 47dBW, appropriately more with the C band links.

We have received a correction from the Bophuthstswana Broadcasting Corporation. Bop-TV is scrambled, using Videocrypt, and is uplinked from Bophuthatswana, not Botswana. Bop-TV and Mmabatho TV are both downlinked from Intelsat VI F4 at 27·5°E, the frequencies used being 3·884 and 3·926GHz respectively, with left-hand polarisation.

Equipment for TV-DXing

At this time of the year thoughts are turning to the forthcoming SpE season. In the 405-line era enthusiasts had to modify receivers to work with the Continental standards. The problem was eased with the start of 625-line transmissions in the UK, but the difficulty then arose that many receivers weren't equipped with a v.h.f. tuner. One approach to this problem is to use an upconverter to translate the v.h.f. TV bands to a section of the u.h.f. spectrum so that a u.h.f. tuner can be used to, in effect, give v.h.f. coverage. The alternative approach is to use a surplus v.h.f. tuner, building it into a suitable package with its i.f. output being fed to a convenient point in the main receiver.

The latter approach, using an outboard tuner, makes it possible to incorporate filtering to decrease the i.f. bandwidth and thus improve the noise performance. Several articles on this subject appeared in *Television* in the early Eighties. Fortunately the varicap tuner became commonplace, and in due course the improved MOSFET types gave greatly enhanced performance – low noise, freedom from overloading and, with some, quite incredible bandwidth coverage.

The HS Publications (Derby) D100 DX-TV converter combines these approaches, with a tuner and i.f. processing followed by upconversion to a single u.h.f. channel, all bandwidth filtering being carried out in the outboard tuner package.

Today, with the mass of imported TV equipment available from the Orient, many receivers come complete with a multiband tuner. Such receivers may therefore have a group of memory channels that can be used for the Band I DX favourites such as E2, R1 etc. With remote control, channel hopping is simplicity itself. Monochrome and colour sets are both available with a multiband tuner. I recently saw an advertisement for a Nikkai 14in. monochrome receiver with full v.h.f./u.h.f. tuning via separate knobs at just over £50. The Nikkai and other imported TV sets have full i.f. bandwidth operation of course, but it's possible to add simple filtering at the tuner's i.f. output. If this is done the sound signal will deteriorate or just not be heard of course.

A great many receivers that are suitable for DXing are available in both the retail and wholesale markets. Multistandard models are available in the Nikkai and Yoko ranges for example. Alternatively single-standard models with v.h.f./u.h.f. coverage can be used. Multistandard sets are likely to be able to handle system B/G/I/L transmissions with PAL/SECAM colour. The upconverter approach is still a useful way of obtaining inexpensive coverage of the v.h.f. bands, but for ease of tuning a fully variable u.h.f. knob is best, i.e. forget pushbutton tuning.

Band 1 coverage should include chs. E2/3/4, chs. IA/B (system B), chs. R1/2 (system D), ch. IB (system I, Ireland) and chs. L2/3/4 (system L, France). Very occasionally ch. A2/3/4 signals (system M) are received from North America. These channels all lie within the 45-70MHz Band 1 spectrum.

Satellite Notebook

Nick Beer

Here are some more of our experiences with satellite TV receiving equipment.

Mains Problems

We get a lot of calls from owners of various types of IRDs complaining that the decoder doesn't function, the clear channels being fine. This is generally found to be the case. All that's required to cure the problem is a hard reset, i.e. switch off at the mains, wait a couple of minutes then switch back on cleanly. The fault is characterised by the fact that there are no on-screen graphics, "please insert card" for example. It's as if a decoder wasn't there.

These calls come from areas where mains supply problems at irregular intervals are commonplace, or from anywhere after bad weather. We've not had this problem with the Ferguson SVA1 stand-alone decoder we supply. These lock-up problems are not restricted to satellite TV equipment of course, and seem to occur with some brands more than others. In our experience Ferguson seems to be particularly unlucky in this respect. The 3V55/57 VCRs were a major problem. So was the Pace manufactured SRA1S satellite TV receiver. The latter would go into the VCR lock mode in standby, necessitating a hard reset followed by SETUP 987 from the remote control handset. Initially, these problems produce a large number of service calls. Subsequently customers manage to carry out the "repair" themselves. It can do manufacturers' reputations no good. Contemporary Salora/Luxor receivers and Panasonic VCRs didn't suffer from the problem.

Outdoor Weaknesses

I'm sure that many readers will have come across the popular Maspro 65cm dish kits used by the Nokia group. The set-up is quite neat and the head-end small. I first encountered it when Salora dropped the use of the Fuba 55cm fibreglass dish a few years ago in the system with the 5902 receiver and started to supply the Maspro metal kit instead. Assembly was a bit more involved, but instead of a three-part head-end we now had a combined feedhorn and polariser with a very small LNB. Reception is very good: the 55cm dish had been rather on the borderline in parts of our area (N. Devon), the newer kit being more comfortable.

It was not long however before I began to find that the reliability is not so hot. At the time we'd commissioned Startrak to install much of our equipment, and their workmanship was less than ideal with the examples of this kit they installed. The polariser connections consist of a pair of tags with push-on spades. These in turn have plastic sleeves which are pushed over them. The design is poor, with little thought to longevity. Startrak gave no more thought to them and didn't waterproof the connections in any other way. Consequently we had a fair number of failures caused by the tags simply rusting away. The user

would complain of intermittent loss of half the channels followed by their permanent loss. Sometimes the user would complain that only one channel, say Screensport, had disappeared, but in fact they were watching only this horizontally polarised channel and hadn't noticed that MTV, Lifestyle etc. weren't there either!

With this fault the likelihood is that water will have permeated the cable, which will often have to be replaced as well. My predecessor in satellite TV maintenance used to solder the leads on to the tags, seal them in silicone rubber (the RS type, not bath sealer etc.) then wrap the entire neck of the polariser with self-amalgamating tape. I never had one re-offend after that treatment – they daren't!

A further problem associated with this fault is that if the equipment has been installed for any length of time it can be almost impossible to separate the LNB and the polariser. The screws corrode into place, and even after removing them parting the two units can be fun bimetallic reaction?

At one stage we had some complaints about variable reception: the signals would rise and fall in windy weather. On checking the installations concerned we found that the wall brackets were extremely flexible, to the extent that with only minimal force the whole assembly would move some way in the azimuth sense. A comparison between the brackets and earlier ones showed that the gauge of the steel legs was about half that previously used. When they were contacted, Salora/Luxor said that they knew all about the problem — they hadn't told anyone however! Apparently the brackets had been locally sourced and the wrong gauge of steel had been used for one batch.

Another weakness that is now showing up with these kits relates to the dish itself – it rusts badly. This usually starts around the edge, where the rust starts to blister the layers of steel apart. I've seen some really bad examples. Where this has happened Nokia has supplied a free replacement and paid the market rate for installing it. I suspect that this could be costing them a lot of money. The ironical thing is that the replacements supplied are of the same type – they come complete with polariser but not the LNB. One of our replacements is rusting again already – the customer complained within two weeks!

Receiver Problems

Compared with many designs the power supplies in the Pace-made Ferguson SRA1 and SRA1S receivers are a weak point. They are exceptionally hot in operation, which means that there's inherent unreliability. The later S version was improved in this respect, but both units suffer from similar problems. In early versions the heat soon discoloured the PCB: now the print itself in some receivers is disintegrating.

One problem that's becoming common is power supply hum, which causes bars on the vision. Bridge rectifier, reservoir capacitor and regulator failures are commonplace, also dry-joints and broken print. A good idea as to which component in which supply is in trouble can be gained from the symptoms – is the fault limited to one polarity and if so which one, how many bars are there, etc.?

More recent Pace-made units have been built to a better standard however: we still get complaints from new owners that they run hot, but the reliability seems to be much better. Early unreliability was due to poor design. The company seems to have learnt from its mistakes, though that connector for the Videocrypt PCB in the SS9000/SRA1 shows a lack of experience.

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1N4005 1N4005 1N4006	0.05	2SC2785 2SC2791 2SC3153	0.16 4.25 2.21	AN6310 AN6326 AN6341	4.55 3.50 2.23	BC327B BC328 BC337L	8.17 0.06 0.21	BF184 BF185 BF194	0.40 0.39 0.14	BUX85 BUZ71 BY127	0.74 0.50 0.05	LA4282 LA4400 LA4422	2.95 2.95 1.07	NE545B NE555 NE555N	3.10 0.21 0.23	STK5315 STK5322 STK5325	6.30 6.58 4.85	TA7769P TA8210H TA8215	1,39 4,93 3,99	TDA2170 TDA2270 TDA2522	1.61 1.98 14.78	TIC45 TIL100 TIP110	0.55 0.50 0.28
1N4007		2SC3156 2SC3182	3.61 1.73	AN6552 AN6610	0.61	BC338 BC368	0.05 0.08	BF195 BF196	0.07 0.14	BY133 BY164	0.06 8.49	LA4440 LA4445	1.52 0.94	NE556 NE646N	0.41 1.88	STK5326 STK5331	10.31 3.51	TA8691N TAA550	5.74 0.30	TDA2524 TDA2525	0.41 3.54	TIP112 TIP120	0.33 0.55
1N5404 1N5404 1N5408	0.07	2SC3225 2SC3715 2SC388A	0.33 3.79 0.66	AN7110 AN7156 AN7161	0.99 2.45 2.48	BC369 BC372 BC546A	0.21 0.43 0.05	BF197 BF198 BF199	0.24 0.08 0.03	BY176 BY179 BY184	0.93 0.77 0.29	LA4460 LA4461 LA4500	1.30 1.25 1.63	0A47 DA90 DA91	0.24 0.09 0.14	STK5332 STK5333 STK5372	2.38 2.88 3.71	TAA700 TAG626 TBA120	2.37 1.34 0.51	TDA2530 TDA2532 TDA2540	0.41 0.41 0.36	TIP121 TIP126 TIP132	0.40 0.51 0.41
1N914 1S1555	0.03	2SC458 2SC536	0.08	AN7171K AU107	3.74 7.72	BC546B BC547	0.05	BF200 BF245	0.37 0.50	BY199 BY206	0.18 0.12	LA4505 LA4508	1.73	PH425 PT8504	8.66 5.65	STK5421 STK5422	2.52 5.28	TBA120AS TBA120SB	0.85 0.26	TDA2541 TDA2560	1,46	TIP137 TIP29	0.96
1S2076 2N2219	A 0.26	2SC867A 2SC945	5.52 0.08	AU113 BA145	12.99	BC5478 BC549	0.10 0.05	BF245A BF2458	0.18 0.37	BY207 BY210-400	0.17 0.18	LA4520 LA4700	1.04 3.42	R2540 R2540X	1.00	STK5466 STK5471	5.38 4.64	TBA120T TBA120U	0.57 0.46	TDA2576A TDA2577	5.77 2.68	TIP2955 TIP290	0.79 0.29
2N2222 2N2905 2N3054	0.20	2SD1051 2SD1138 2SD1207	0.46 0.71 0.21	BA157 BA158 BA159	0.10 0.07 0.07	BC556 BC556B BC557	0.05 0.05 0.05	8F255 BF256 BF257	0.10 0.23 0.34	BY224-600 BY226 BY227	4.95 0.15 0.12	LA5112 LA5512 LA7042	3.30 0.46 2.48	R2M R4050 R4051	0.66 1.85 2.22	STK5476 STK5481 STK5482	4.85 4.37 4.08	TBA1440 TBA2800 TBA395	1.47 0.66 0.66	TDA2577A TDA2578A TDA2579	2.76 2.95 2.73	TIP290 TIP29E TIP3055	0.75 0.39 0. 69
2N3055 2N3442	0.57	2SD1265 2SD1273	0.71	BA317 BA5102A	0.05	BC557B BC558	0.05 0.05	BF258 BF259	0.02 0.30	BY228 BY229	0.36	LA7223 LA7520	2.46 2.00	RB156 RGP18	1.55	STK6962 STK7216	2.22 5.20	TBA396 TBA520	0.41 1.20	TDA2581 TDA2581Q	2.14	TIP30A TIP30C	0.24 0.16
2N3773 2N3819	0.41	2SD1275 2SD1308	0.66 0.69	BA536 BA6109	1.52	8C558A BC558A	0.05 0.05	BF324 BF337	0.10 0.36	BY229-600 BY229-800	1.18 0.88	LA7800 LA7801	1.24	RGP15 RGP30M	0.41	STK7226 STK7308	7.94 4.70	TBA530 TBA540	2.45 1.72	TDA2582 TDA2590	2.60 2.50	TIP31 TIP31A	0.25 0.31
2N3904 2N4444 2SA101		2SD1397 2SD1398 2SD1427	1.44 1.63 2.81	BA6209 BA6210 BA6222	1.27 1.48 1.16	BC560C BC637 BC639	0,20 0,14 0,17	9F338 9F355 BF362	0.38 0.46 0.99	BY255 BY298 BY299	0.12 0.12 0.12	LA7820 LA7830 LC7120	1.52 0.99 2.72	RM11C S2000AF S2055AF	0.29 1.16 2.14	STK7348 STK7356 STK7358	4.49 5.42 5.30	TBA540Q TBA560C TBA651	1.15 0.66 0.98	TDA2591 TDA2593 TDA2594	1.15 0.75 2.14	TIP31C TIP32A TIP32C	0.28 0.35 0.36
2SA102 2SA109	0Y 0.30	2SD1432 2SD1453	4.74 1.49	BA656N BAS11	0.81 0.28	BC640 BC879	0.05 0.37	BF392 BF422	0.15 0.13	BY476A BY713	0.66 0.74	LM1303N LM1877	0.85 1.40	\$2530A SAA1004	2.20 1.10	STR1096 STR40090	3,94 6.63	TBA750Q TBA800	4.95 0.49	TDA2595 TDA2600	2.06 3.05	TIP33 TIP33A	0.63 0.69
2SA110 2SA117 2SA118	5 0.49	2SD1497-02 2SD1497-06 2SD1541	6.85 6.85 3.30	BAV18 BAV21 BAW62	0.07 0.11 0.03	BC880 BD131 BD132	0. 36 0.26 0.20	BF423 BF450 BF458	0.09 0.18 0.30	BYD33G BYV95C BYV96D	0.34 1.13 0.05	LM1881N LM317T LM324N	6.80 0.46 0.29	SAA1174 SAA1250 SAA1251	3.95 1.45 3.20	STR4090 STR4211 STR440	0.00 4.20 6.19	TBA810P TBA810S TBA810SH	1.61 0.41 1.60	TDA2611A TDA2611AQ TDA2640	0.50 1.30 3.71	TIP33C TIP34 TIP34C	0.95 1.15 0.86
2SA120 2SA473	8 0.25	2SD1577 2SD1876	3.25 4.47	BAX14 BB105B	0.27 0.15	BD135 BD136	0.21 0.19	BF459 BF469	0.28 0.33	BYW19 BYW56	0.87 0.16	LM339N LM358	0.14 0.21	SAA1293 SAA1351	8.59 7.99	STR441 STR451	5.77 5.78	TBA820 TBA820M	0.53	TDA2652 TDA2653	9.53 0.00	TIP41A TIP41B	0.29
2SA562 2SA634	0.16 0.52	2SD1877 2SD234	1.90 0.91	BC107 BC107B	0.13 0.19	80137 80139	0.43	BF472 BF479	0.21	8YX55-600 8ZV85C68	0.20 0.41	LM358N LM380N	0.21	SAA3027P SAA5000A	5.19 2.48	STR50020 STR50103	7.55 5.77	TBA910 TBA920	0.49	TDA2653A TDA2655B	2,64 4,25	TIP41C TIP42A	0.26 0.29
2SA673 2SA684 2SA733	0.08 0.33 1.36	2SD313 2SD325D 2SD350A	0.41 0.50 3.71	BC108 BC108B BC108C	0.14 0.37 0.13	BD140 BD150 BD189	0,23 1,10 0,39	BF480 BF597 BF758	0.52 0.15 0.31	CA3094 CD4001	0.75 2.97 8.13	LM386 LM85608 M104	0.45 3.50 6.07	SAA5010 SAA5012 SAA5050	3.02 3.21 4.54	STR5412 STR58041 STR6020	5.78 5.78 5.77	TBA950 TBA970 TCA270S	1.63 4.00 1,00	TDA2680 TDA2841 TDA3100	4.95 2.97 2.68	TIP42C TIP47 TIPL791A	0.35 0.49 1.14
2SA769 2SA940	1.07	2SD401 2SD468C	0.94 0.41	BC109 BC117	0.11 0.13	80190 80201	0.29 0.38	BF759 BF762	0.33 0.33	CD4016 CD4017	0.13 0.18	M192B1 M21C	2.47 1.28	SAB3013 SAB3021	2.67 10.19	STR6020 Kit T6041V	5.77 0.92	TCA440 TCA800	1.89 1.60	TDA3190 TDA3190P	0.82 1.07	71S43 TIS91	1.02 1.20
2SA952 2SA966 2SA970		2SD476 2SD613 2SD621	0.94 0.61 5.37	BC140 BC141	0.31 0.20 0.25	80225 80232 80233	0.48 0.39 0.26	BF869 BF870 BF960	0.24 0.30 0.26	CD4021 CD4052 CD4053	0.41 0.21 0.19	M293 M490 M491	14.63 14.92 7.70	SAF1032P SAF1039	6.16 4.27 2.29	T6064V T6076V T9013V	2.55	TCA910 TCA940	1.60 1.17 3.30	TDA3300B TDA3330	5.96 4.47	TIS43 TLD11CP	1,32
2SA984 2SB101	0.20	2SD636 2SD637	0.13 0.12	BC142 BC147	0.26 0.04	BD234 BD237	0.43 0.29	BF966 BF970	0.56 0.68	CD4069 CD4070	0.17 0.13	M494 M50115AP	8.57 2.43	SDA2112 SG264A	12.96 9.37	T9034V T9035V	4.87 1.40 1.38	TD3F800R TD3F900H	4.12 6.37	TDA3505 TDA3541 TDA3560	3.04 0.92 5.83	TL071CP TL494 TMP47C432A	0.36 1.12
S8546 2S8616	0.51 3.00	2SD 66 7 2SD716	0.25 1.07	BC147A BC148	0.05 0.05	BD238 BD239	0.10 0.28	BFR91 BFW92A	0.58 0. 64	CD4528 CNX62A	0.37 0.84	M51102L M51231P	1.72 1.40	SG613 SG6533	13.50 16.46	T9038V T9053V	5.91 1.15	TDA1003A TDA1004A	1.34 3.30	TDA3561 TDA3561A	5.75 4.83	TMP47C434N	17.50
2SB643 2SB688 2SB772	1.24	2SD718 2SD725 2SD734	1.14 3.34 0.23	BC148A BC148B BC149	0.05 0.03 0.03	BD243 BD243A	0.39 0.42 0.41	BFX29 BFX85 BFY50	0.33 0.31 0.30	CR3CM CR02AM CV12E	2.40 1.78 2.44	M51393AP M51521L M5218L	4.50 0.54 0.36	SGS1F344 SKE2G202 SKE2G204	5.84 8.63 7.27	T9064 T9065V TA71228P	0.82 3.86 0.61	TDA1006A TDA1010 TDA1011	7.00 1.04 0.96	TDA3562A TDA3565 TDA3566	2.31 0.66 3.75	UC3844 UPA81C	11.74 4.62 0.69
2SB774 2S8819	0.44 0.46	2SD762 2SD774	0.62 0.23	BC149C BC154	0.03 0.14	B0243C BD244A	0.36 0.33	BFY51 BR100	0.33 0.23	CX109 DTA124EF	6.84 8.12	M5231L M53216P	0.53 1.28	SKE4F106 SKE4F210	0.30	TA7137P TA7146P	1.10 5.87	TDA1011A TDA1013A	1.28	TDA3571B TDA3576	2.99 11.55	UPC1181H UPC1182H	0.95
2SB861 2SC106 2SC109		2SD787E 2SD837 2SD841	0.25 1.80 1.24	BC157 BC159 BC160	0.12 0.05 0.40	BD244C BD245C BD246C	0.41 0.68 0.69	BR103 BR303 BRX44	1.03 1.20 0.99	DTA144EF ER1400 HA11235	0.41 2.08 1.73	M54532 M54543L M54544L	1,24 1,21 3,40	SKE4G104 SKE5F310 SL1430	0.51 1.63 1.36	TA7152P TA7176P TA7193AP	3.48 1.75 3.20	TDA1015 TDA1020 TDA1035T	0.96 1.50 2.19	TDA3590 TDA3640 TDA3650	1.61 5.77 8.64	UPC1185H UPC1188 UPC1225H	4.13 2.08
2SC111 2SC111	1.12	2SD856 2SD869	0.47	BC161 BC167	0.26 0.40	BD278A BD317	0.70 1.40	BRY56 BSS38	0.41 0.17	HA11244 HA1124A	3.71 0.70	M54548L M54648L	2.45 5.04	SL1431 SL1432	1.65	TA7193P TA7205	5.05 1.06	TDA1037 TDA1044	2.68	TDA3651A TDA3651AQ	1,81	UPC1228HA UPC1230	2.47 0.54 2.14
2SC116 2SC121	0.13	2SD870 2SD880	0.33	BC171 BC171B	0.07	8D318 8D379	1.12 0.54	BSX20 BT106	1.12	HA11423 HA11440	3.87 2.55	M54898AP M58485P	14.69 5.78	SL471 SL490	1.65	TA7205P TA7207P	1.00	TDA10598 TDA1060	0.44 2.39	TDA3652 TDA3653	0.00	UPC1230H UPC1238	2.15 1.39
2SC124 2SC131 2SC136		2SD882 2SD8988 2SD973	0.29 2.39 0.36	BC172 BC172C BC177	8.05 8.09 0.13	BD410 BD433 BD434	0.33 0.26 0.28	BT139600 BT151800 BU205	1.10 1.11 1.03	HA1166X HA11703 HA11713	6.73 3.37 1.31	MB3712 MB3730 MB3731	0.99 1.77 1.98	SN29764AN SN29770BN SN74141N	1.77 8.60 0.17	TA7210P TA7217AP TA7222	1.45 1.40 1.24	TDA1082 TDA1083 TDA1151	2.47 1.15 0.49	TDA3653AQ TDA3653B TDA3654	2.14 1.10 1.48	UPC1278H UPC1318 UPC1335V	2.06 2.48 2.72
2SC138 2SC139	0.41	74LS00 7805-T022	0.20 0.23	BC178 BC182	0.10 0.05	BD436 BD437	0.31 0.30	BU208 BU208A	1.14 0.90	HA11741 HA13001	6.86 1.30	MB3732 MC13002	2.16 3.71	SN7474N SN76013ND	0.44 7.75	TA7222AP TA7227P	1.23 1.90	TDA1170 TDA1170S	0.96 0.85	TDA3810 TDA4420	2,47 1.23	UPC1351C UPC1353	1.65 1.30
2SC141 2SC150 2SC157	0.37	7808 7812-T022 7815	0.29 0.26 0.24	BC182A BC182L BC182LB	0.12 0.05 0.05	BD438 BD441 BD442	0.16 0.89 0.40	BU208D BU326A BU406	1.39 0.87 0.43	HA13108 HA13118 HA13403	2.67 2.06 3.96	MC13002P MC1310P MC1327P	3.53 0.82 0.41	SN76227N SN76666N SN76705AN	1.03 1.20 2.97	TA7230P TA7233P TA7240AP	1.30 1.72 2.15	TDA1180 TDA1270 TDA1412	1.24 1.50 0.74	TDA4427 TDA4442 TDA4500	2.65 3.19 2.97	UPC1362C UPC1363 UPC1365C	2.34 1.02 1.65
2SC174 2SC174	0,11	7818 7912	0.39 0.33	BC183 BC183L	0.05	B0510 B0519	1.30 0.78	BU406D BU407	1.24	HA1374A HA1377	2.89	MC1330A1P MC1350P	1.22	SR2M STA401	0.66	TA7240P TA7241	2.15	TDA1420 TDA1470	1.52	TDA4501 TDA4503	5.20 2.39	UPC1366 UPC1378H	1.49
2SC181: 2SC182: 2SC182:	0.69	AA119 AC176K AC187	0.34	BC184 BC184L	0.04	BD529 BD530	0.93 1.01	BU426A BU426E	2.06	HA1388 HA1389	1.87	MC1358P MC1377P MC14493P	1.23	STA441C STA471C	2.39	TA7243P TA7250	3.28	TDA1470P TDA1506	0.00 4.45	TDA4505E TDA4600	1.43	UPC1391H UPC1394	0.50 1.23
2SC192 2SC194	0.13	AC187K AC188	0.15 0.31 0.29	8C184LC 8C204 BC207B	0.09 0.35 0.22	BD535 BD536 BD537	0.38 0.46 0.40	BU500 BU508A BU508AF	1.06 9.75 1.06	HA1392 HA1397 HA1398	1.84 2.56 2.56	MCR1065 MDA2062	3.64 1.56 2.14	STK0029 STK0039 STK0040	5.71 5.21 7.18	TA7267P TA7270 TA7271P	1.96 1.50 1.90	TDA1510 TDA1512 TDA1515A	2.06 2.48 1.93	TDA4600/2 TDA4600/2D TDA4600F	1.92 2.88 1.55	UPC1420CA UPC1458C UPC1488H	5.13 0.66 0.99
2SC195	0.10	AC188K AD149	0.65 0.50	BC212B BC212L	0.05 0.05	BD538 BD677	0.37 0.29	BU508D BU508V	1.24 1.65	HA1452 HM6231	0.85 12.30	MJ2955 MJ802	0.94 3.06	STK0059 STK025	9.46 9.37	TA7273 TA7274P	3.22 2.15	TDA1518Q TDA1522	3.05 1.24	TDA4601 TDA4601D	1.65 2.34	UPC2002 UPC3240	1.09 0.37
2SC200 2SC207 2SC207	0.49	AD161 AD162 AF124	0.99 0.92 0.74	BC214 BC214L BC237	0.05 0.08 0.05	8D679 8D707 8D710	0.43 0.49 0.80	BU526 BU536 BU608	1.36 1.53 1.54	HM6232 HM6251 HM7103	5.77 5.69 2.97	MJE13005 MJE2955 MJE3055	0.79 0.66 0.49	STK043 STK2129 STK3042	10.72 9.82 4.82	TA7280 TA7281 TA7299	2.11 2.29 2.34	TDA1670A TDA1701 TDA1770	2.02 4.71 2.49	TDA4610 TDA4950 TDA7240	4.95 1.57 2.29	UPC4558C UPC574 UPC580C	0.41 0.99
2SC214 2SC216	1.23 0.92	AF127 AF139	0.58	BC237A BC237B	8.07 0.04	BD809 BD810	0.52 0.45	8U705 BU806	1.56	KA2101 KBL08	0.58 0.45	MJE340 ML237B	0.49 0.38 1.95	STK4131 STK4141	7.56 8.80	TA7313AP TA7325P	0.60	TDA1870 TDA1904	2.45	TDA7270S TDA8140	0.00	UPD1937C XOO35TA	2.47 2.81 7.27
2SC216	0.21	AF279 AL102	0.33 2.48	BC2388 BC239	0.05	BD839 BD901	0.49	BU806A BU807	0.78	L200CV LA1201	1.35 0.54	ML923 MN1405VKF	4.95 11.41	STK4142 STK4162M	7.97 9.22	TA7343AP TA7361P	0.69 2.11	TDA1905 TDA1908	0.91 4.63	TDA8180 TDA8190	5.19 2.78	X0065CE X0109CE	6.35 13.61
2SC231 2SC232 2SC233	0.18	AN245 AN318 AN3821K	5.78 7.42 12.70	BC251 BC252 BC2528	0.31 0.69 0.16	BD902 BDV658 BDW83	0.58 1.12 1.15	BU826A BU908 BUT11	2.31 1.13 0.71	LA1230 LA1357N LA1385	1.28 2.77 1.40	MN1435VX MN1435VXB MN6168	12.75 9.98 4.13	STK4171 STK4181II STK433	10.56 12.47 6.19	TA75358P TA7607AP TA7609	0.66 1.89 1.90	TDA1908A TDA1940 TDA1950	0.99 3.89 2.34	TDA9403 TDA9503 TEA1002	1.50 1.56 5.14	X2402	4.93
2SC2483 2SC2568	0.25 3.67	AN3991K AN5111	3.26 3.56	BC300 BC301	0.38 0.23	BDW84C BDW93C	0.94 1.06	BUT11A BUT11AF	1. 0 1 0.75	LA3161 LA4112	0.37 0.94	MN650 MPSA42	2.27 0.22	STK4332 STK4352	5.38 1.65	TA7628P TA7630	1.45 0.95	TDA2002 TDA2003V	0.82 0.63	TEA1009 TEA1014	1,48 1,49		
2SC2570		AN5265	1,30 ACV E(BC303	0.26	BDX32	1.65	BUT12A	1.07 DCD TO	LA4140	0.35 OCT 9 L	MPSA56	0.11	STK437	7.96	TA7640AP	1.04	TDA2004	1.24	TEA1039	1,60	MAT TO TO	
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AIWA AV-66 Video Head Pinch Roller Bet Kit I dier Replacement Set Idler Capstan Motor Tenson Band Reel Table Rubber Tyre CTL Unit	Part No. Price VID 2546 £16.95 VID 1755 £3.87 VID 7519 £1.32 VID 1005 £1.81 VID 2100 £24.27 VID 1420 £3.54 e VID 1335 £0.90 VID 2637 £59.75	3-V-36 Video Head Princh Roller Beit Kit Take Up Clutch Take Up Idler Reel Idler Brake Pad Capstan Motor Loading Motor Front Loading Motor Cassette LED Tension Band	Part No. Price VID 2647 99.81 VID 1813 62.95 VID 7543 09.99 VID 1031 62.21 VID 1039 62.56 VID 1039 62.30 VID 166 92.67 VID 2166 93.30 VID 1961 61.48 VID 1981 61.48 VID 1981 61.48	FVH-P722725 Video Head Princh Roller Belt Kit Gear Idler Idler Loading Gear Set Casserte LED Tension Band Take Up Reel Table FVH-P860K-KV	Part No. Price VID 2501 221.95 VID 1810 23.63 VID 1813 21.05 VID 1013 24.95 VID 1014 22.80 VID 1230 21.65 VID 1981 21.48 VID 1376 22.10 VID 1294 57.83 VID 1294 57.77 VID 2501 224.43	VT-16 S Video Head Pinch Roller Bert Kif FFAEW Idler Arm Cuttch Plate Capstan Motor Cassette LED Tension Band Repair Kit VT-33/330	Part No. Price VID 2505 224.87 VID 1788 23.05 VID 2758 21.23 VID 1020 21.73 VID 2147 218.02 VID 1379 22.31 VID 7922 216.50	HR-D1101111201 Video Head Pinch Roller Belt Kit Take Up Clutch Take Up Idler Reel Idler Brake Pad Capstan Motor Loading Motor Front Loading Motor Cassette LED	VID 2647	NV-300333 Video Head Pinch Roller Belt Kit Play Idler Idler Idler Idler Arm Cear Intermediate Gear Dirving Gear Reef Motor Capstan Motor Cassette LED	Part No. Price VID 2520 99.95 13.63 VID 17521 41.48 VID 1048 62.58 VID 1220 64.20 VID 12216 51.08 VID 1216 51.08 VID 1217 50.99 VID 1218 51.09 51.02 VID 1218 51.09 51.02 VID 1218 51.09 51.02 VID 1221 51.09 51.02 VID 1221 51.09 51.02 VID 1221 51.0
AV-77 Video Head Pinch Roller Bert Kit Ider Replacement Set FWD Limiter Ider Capstan Motor Tension Band CTL Unit	VID 2546 E16.95 VID 1755 23.87 VID 7509 E1.95 VID 1000 25.62 VID 1002 23.37 VID 1004 E1.40 VID 1005 E1.81 VID 2118 E28.50 VID 1423 23.54 VID 2567 246.43	Remote Control Repair Kit Mains Transformer Take Up Reel Table Rubber Tyre Supply Reel Table Rubber Tyre Casserte Housing 3-V-57	IR 9100 E11.92 VID 7918 E18.09 VID 2223 E21.61 VID 1080 E0.66 VID 1080 E0.66 VID 1099 E20.81 VID 2573 E17.29	Video Head Pinch Roller Belt Kit Idder Clutch Cassette LED Tension Band Supphy Reel Table FUNAI VCR-4600 Video Head	VID 2501 524, 43 VID 1818 53.05 VID 7568 52, 40 VID 1093 54, 20 VID 1094 F13.52 VID 1981 51, 48 VID 1377 52, 10 VID 1296 510.97	Video Head Pinch Roller Belt Kif FF:REW Idler Arm Clutch Plate Capstan Motor Cassette LED Tension Band Repair Kit	VID 2504 E19.94 VID 1788 E3.05 VID 7538 E1.23 VID 1020 E1.73 VID 1211 E9.81 VID 2148 E18.02 VID 1981 E1.48 VID 1379 E2.31 VID 7922 E18.50	Tension Band Repair Kit Mains Transformer Take Up Reel Table Rubber Tyre Supply Reel Table Rubber Tyre Cassette Housing	VID 1389 E1.73 VID 7918 £18.09 VID 2223 £21.61 VID 1080 £0.56 VID 1080 £0.56 VID 1099 £20.61	Tension Band Repair Kit Take Up Reel Table PHILIPS Video Head Pinch Roller Betr Kit Idler Loading Gear	VID 1399
AKAI VS-9800 Video Head Pinch Roller Bett Kit	VID 25111 29.95 VID 1756 22.95 VID 7506 £1.56	Video Head Pinch Roller Belt Kit Clutch Mechanism Capstan Motor Loading Motor Front Loading Motor Cassette LEO	VID 1813 £3.05 VID 7540 £0.66 VID 1083 £14.56 VID 2188 £44.62 VID 2167 £13.69 VID 2168 £9.30 VID 1981 £1.48	Pinch Roller Belt Kit Clutch Gear Holder RF Clutch Cassatte LED VCR-5843	VID 1758 C3.05 VID 7593 E1.73 VID 1226 E4.32 VID 1227 E11.70 VID 1231 E6.52 VID 1981 E1.48	VT-61/62/63/64 Video Head Pinch Roller Beit Kit FFREW Idler Arm Clutch Plate Capstan Motor	VID 2628 £24.25 VID 1618 £3.05 VID 7583 £3.87 VID 1020 £1.73 VID 1211 £9.81 VID 2154 £18.02	VX-850 Princh Roller Belt Kit Clutch Idler Cassette LED	VID 1815	Idler Idler Limiter Roller Cassette LED Tension Band Repair IKit VR-6540	VID 1371 E5.94 VID 1440 E1.32 VID 1981 E1.48 VID 1400 E2.55 VID 7906 E8.92
Take Up Idler REW Idler Unloading Idler FF Rubber Tyre FF Rubber Tyre Unloading Idler Rubber Tyre Capstan Motor	VID 1025	Tension Band Repair Kit Cassette Housing FV-10B Video Head Pinch Roller Bett Kit	VID 1388 £2.06 VID 7920 £17.58 VID 1315 £20.81 VID 2580 £25.68 VID 1817 £11.25 VID 7564 £2.72	Video Head Pinch Roller Belt Kit Idler Cassette LED GEC V-4004	VID 2708 £24.31 VID 1758 £3.05 VID 7615 £3.67 VID 1364 £2.25 VID 1981 £1.48	Cassette LED Tension Band Repair Kit VT-80004500 Video Head Pinch Roller	VID 1981 £1.48 VID 1379 £2.31 VID 7924 £16.55 VID 2509 £15.96 VID 1788 £3.05	MITSUBISHI HS-307 Video Head Pinch Roller Beit Kit Reel Idler Unit FF Idler Rubber Tyre	VID 2606 £71.56 VID 1808 £3.05 VID 7542 £1.58 VID 1040 £8.48 VID 1081 £0.74 VID 1264 £1.32	Video Head Pinch Roller Belt Kit Idler Master Cam Reel Motor Loading Motor Cassette LED	VID 2537 £19.61 VID 1815 £5.19 VID 7547 £0.90 VID 1060 £1.69 VID 1265 £6.52 VID 2127 £26.06 VID 2142 £14.35 VID 1981 £1.48
Drum Motor Cassette Lamp Tension Band Repair Kit Take Up Rubber Tyre	VID 2120 £18,73 VID 1943 £0,35 VID 1391 £3.54 VID 7911 £15,45 VID 1028 £0,75	Idler Arm Reel Motor Capstan Motor Loading Motor Front Loading Motor Cassette LED Tension Band	VID 1091 E2.31 VID 2193 E15.04 VID 2190 E25.53 VID 2412 E6.18 VID 2412 E5.18 VID 1981 E1.48 VID 1386 £1.65	Video Head Pinch Roller Belt Kit FE-REW Arm Clutch Plate Capstan Motor Cassette LED	VID 2506 £16.08 VID 1788 £3.05 VID 7538 £1.23 VID 1020 £1.73 VID 1211 £9.61 VID 2148 £18.02 VID 1981 £1.48	Bett Kit Take Up Idler Wind Roller FFREW Idler Capstan Motor Tension Band Remote Control Repair Kit	VID 7803 £0.99 VID 1015 £3.36 VID 1016 £0.85 VID 1023 £2.88 VID 2155 £50.50 VID 1381 £1.98 IR 9097 £12.63 VID 7928 £15.49	Capstan Rubber Tyre Cam Gear A Gear 2 Cam Gear B Gear 1 Cassette LED Tension Band Take Up Reel Table	VID 1274 £1.20 VID 1275 £1.20 VID 1276 £1.27 VID 1277 £1.27 VID 1981 £1.48 VID 1393 £2.55 VID 1307 £2.92	Tension Band PYE DV-761 Video Head Pinch Roller Belt Kit	VID 1420 £5.10 VID 2621 £82.18 VID 1827 £7.00 VID 7588 £1.56
VCR-4000 Video Head Pinch Roller Belt Kit Idler Cassette LED Tension Band	VID 2713 £23.74 VID 1787 £3.63 VID 7596 £3.63 VID 1049 £4.05 VID 1981 £1.48 VID 1399 £2.64	Repair Kit FV-12L Video Head Pinch Roller Beit Kit Idler Arm Reel Motor	VID 7921 £14.16 VID 2581 £37.81 VID 1817 £11.25 VID 7564 £2.72 VID 1091 £2.31 VID 2193 £15.04	Tension Band Repair Kit GOLDSTAR GHY-8000820082 Pinch Roller Bett Kit Idler Bracket Centre	VID 1379 22.31 VID 7922 £18.50 2108215 VID 1815 £5.19 VID 7585 £1.32 VID 1052 £1.98 VID 1023 £25.81	Take up Reel Table Supply Reel Rubber Tyre VT-9300-9500-9700 VIdeo Head Pinch Roller	VID 1302 £11.47 VID 1300 £0.74	Supply Real Table HS-318 Video Head Pinch Roller Belt Kit Reel Idler Unit	VID 1299 \$2.70 VID 2607 \$42.37 VID 1808 \$23.05 VID 7559 \$2.85 VID 1040 \$8.48	Ider Loading Gear Modification Set Tension Band SAISHO VR-2000/3800 Pinch Roller	VID 1252 £3.97 VID 1253 £6.37 VID 1254 £10.35 VID 1431 £4.27
AMSTRAD VCR-4600 Video Head Pinch Roller Belt Kit Clutch Gear Holder	VID 2676 £20.94 VID 1758 £3.05 VID 7593 £1.73 VID 1226 £4.32 VID 1227 £11.70	Capstan Motor Loading Motor Front Loading Motor Cassette LED Tension Band Repair Kit FIDELITY	VID 2190 £25.53 VID 2412 £6.18 VID 2412 £6.18 VID 1981 £1.48 VID 1386 £1.65 VID 7921 £14.16	Clutch Gear Limiter Roffer Cassette LED Tension Band VCP-41004130 Video Head Pinch Roffer	VID 1228	Belt Kit FF/REW Idler Arm Play Idler FS Brake Capstan Motor Cassette Lamp Tension Band	VID 7802 £0.90 VID 1019 £2.88 VID 1075 £3.79 VID 1212 £1.73 VID 2156 £57.81 VID 1951 £0.90 VID 1382 £1.80	FF Idler Rubber Tyre Capstan Rubber Tyre Cam Gear A Gear 2 Cam Gear B Gear 1 Cassette LED Tension Band	VID 1081	Belt Kit Idler Reel Motor Cassette LED SALORA SV-9620 Pinch Roller	VID 1815 £5.19 VID 7565 £1.07 VID 1060 £1.89 VID 2121 £14.24 VID 1961 £1.48 VID 1808 £3.05
RF Clutch Cassette LED VCR-9000 Video Head Pinch Roller Bet Kit	VID 1231 05.52 VID 1981 £1.48 VID 2502 £15.45 VID 1758 £3.05 VID 7592 £1.15	VCR-100 Video Head Pinch Roller Belt Kit Clutch Gear Holder RF Clutch Cassette LED	VID 2502 E14.72 VID 1758 C3.05 VID 7593 E1.73 VID 1226 E4.32 VID 1227 E11.70 VID 1231 C5.52 VID 1981 E1.48	Belt Kit Idler Bracket Centre Clutch Gear Limiter Roller Cassette LED Tension Band VCP-42004326	VID 7585	Remote Control Repair Kit Take Up Reel Table ITT VR-3913 Video Head Pinch Roller	IR 9096 £14.92 VID 7927 £15.49 VID 1303 £8.32 VID 2511 £9.95 VID 1814 £3.05	Take Up Reel Table Supply Reel Table NEC N-830 EG-8318324 Video Head Pinch Roller	VID 2647 £9.81 VID 1813 £3.05	Belt Kit FF:REW idler Arm FF:REW idler Arm FF:REW idler Cassette LED Tension Band Take Up Reel Table Supply Reel Table	VID 7600 \$3.13 VID 1233 \$2.97 VID 1234 \$2.85 VID 1235 \$1.12 VID 1981 \$1.48 VID 1394 \$2.92 VID 1308 \$4.72 VID 1305 \$4.12
RF Clutch Clutch Clutch Gear Holder Cassette LED BANG & OLUFSEN VHS-65	VID 1225 £3.82 VID 1226 £4.32 VID 1227 £11.70 VID 1981 £1.48	FINLUX VR-1030 Video Head Pinch Roller Idler Tension Band Remote Control	VID 2558 £42.99 VID 1803 £4.12 VID 1006 £2.80 VID 1432 £5.17 IR 9034 £13.46	Video Head Pinch Roller REW Belt Cassette LED GRANADA VHS-EY1/EY2 Video Head	VID 2645 £53.81 VID 1815 £5.19 VID 7234 £0.37 VID 1981 £1.48	Belt Kit Reel Idler Take Up Clutch Take Up Idler Brake Pad Reel Motor Capstan Motor	VID 7812 £1.07 VID 1036 £2.80 VID 1037 £3.05 VID 1038 £1.56 VID 1361 £0.36 VID 2169 £28.12 VID 2164 £37.18	Belt Kit Take Up Clutch Take Up Idler Reel Idler Brake Pad Capstan Motor Loading Motor Front Loading Motor	VID 7543	SAMSUNG VI-510520611/616 Video Head Pinch Roller Belt Kit idler	6621 VID 2648 £23.80 VID 1815 £5.19 VID 7598 £1.73 VID 1232 £1.48
Video Head Pinch Boller Bett Kit FEREW Idler Arm Clutch Plate Capstan Motor Cassette LED	VID 2506 £16.08 VID 1788 £3.05 VID 7538 £1.23 VID 1020 £1.73 VID 1211 £9.81 VID 2147 £18.02 VID 1981 £1.48	Repair Kit VR-2010 Video Head Pinch Roller Belt Kit Idler Loading Gear	VID 7930 £12.76 VID 2578 £56.31 VID 1827 £7.00 VID 7588 £1.56 VID 1252 £3.97 VID 1253 £8.37	Pinch Roller Bett Kit Reel Drive Unit Loading Gear A Loading Gear B Capstan Motor Cassette LED Tension Band	VID 1822	Loading Motor Cassette Lamp Tension Band Repair Kit Take Up Reel Table Rubber Tyre Supply Reel Table Rubber Tyre	VID 2168 £9.30 VID 1947 £0.42 VID 1389 £1.73 VID 7913 £18.95 VID 1080 £0.86 VID 1080 £0.66	Cassette LEO Tension Band Repair Kit Mains Transformer Take Up Reel Table Rubber Tyre Supply Reel Table Rubber Tyre	VID 1981 £1.48 VID 1389 £1.73 VID 7918 £18.09 VID 2223 £21.61 VID 1080 £0.66 VID 1080 £0.66	Idler Reel Motor Capstan Motor Loading Motor Cassette LED VX-710/720/730 Video Head	VID 1346 53.37 VID 2407 £15.40 VID 2409 £25.06 VID 2142 £14.35 VID 1981 £1.48 VID 2648 £23.80
DECCA VRIH-8300 Video Head Pinch Roller Beit Kit Reel Idler Take Up Clutch	VID 2511	Modification Set Tension Band Remote Control FISHER FVH-P520 Video Head Pinch Roller	VID 1253	GRUNDIG MVS-400 Video Head Pinch Roller Bett Kit Idler Loading Gear	VID 2596 £16.62 VID 1757 £3.21 VID 7567 £1.87 VID 1052 £1.98 VID 1222 £2.25	VR-3993 Video Head Pinch Roller Belf Kit Reel idler Take Up Clutch	VID 2647 \$9.81 VID 1814 \$3.05 VID 7523 £1.32 VID 1036 \$2.80 VID 1037 \$3.05	Cassette Housing N-895 Video Head Pinch Roller Belt Kit Clutch Mechanism	VID 1099 £26,61 VID 2514 £49,58 VID 1813 £3.05 VID 7540 £0.66 VID 1082 £15,37	Pinch Roller Belt Kit Cassette LED SANYO VMR-1100 EX/EE/ Video Head Pinch Roller	VID 2583 £25.68
Take Up Idler Brake Pad Reel Motor Capstan Motor Loading Motor Cassette Lamp Tension Band	VID 1038 E1.56 VID 1361 ED.36 VID 2169 E28.12 VID 2164 E37.18 VID 2168 £9.30 VID 1947 ED.42 VID 1389 E1.73	Belt Kit Take Up Idler FF.REW Pulley Idler Tension Band Take Up Reel Table Rubber Tyre Supply Reel Table	VID 7532 £1.89 VID 1015 £5.36 VID 1016 £0.85 VID 1023 £2.88 VID 1378 £2.31 VID 1293 £0.66	Clutch Gear Limiter Roller Cassette LED Tension Band Remote Control VS-520 GB Video Head	VID 1228	Take Up Idler Roller Bar Brake Pad Reel Motor Capstan Motor Loading Motor Front Loading Motor	VID 1038 £1.56 VID 1363 £3.86 VID 1361 £0.36 VID 2169 £28.12 VID 2168 £9.30 VID 2168 £9.30 VID 2168 £9.30	Capstan Motor Loading Motor Front Loading Motor Cassette LED Tension Band Remote Control Repair Kit	VID 2166 £50.43 VID 2167 £13.69 VID 2168 £9.36 VID 1981 £1.48 VID 1387 £2.25 IR 8947 £20.37 VID 7919 £22.18	Belt Kit Reel Drive Roller Reef Motor Cassette LED Tension Band VHR-1500 EX/G	VID 7558 £2.49 VID 1076 £6.27 VID 2196 £13.04 VID 1981 £1.48 VID 1411 £2.40
Repair Kit Take Up Reel Table Rubber Tyre Supply Reel Table Rubber Tyre	VID 7913 £18.95 VID 1080 £0.66 VID 1080 £0.66	Rubber Tyre FVH-P530 Video Head Pinch Roller Belt Kit Take Up Idler FFREW Pulley	VID 1293	Pinch Roller Timing Bett Centre Pulley Cassette LED Tension Band HINARI VXL-30/35/4 Video Head	VID 1821 £12.12 VID 1482 £7.20 VID 1482 £7.20 VID 1981 £1.48 VID 1401 £3.37	Cassette Lamp Tension Band Repair Kit Take Up Reel Table Rubber Tyre Supply Reel Table Rubber Tyre	VID 1946	Cassette Housing N-9013-9014-9033- 9053-9054-9055 Video Head Pinch Rotler Belt Kitl Reel Drive Pulley	VID 1315 £26.61 9034/ VID 2695 £21.34 VID 1828 £8.00 VID 7601 £3.13 VID 1265 £6.52	Video Head Pinch Roller Belt Kit Reel Drive Roller Reel Motor Cassette LED Tension: Band	VID 2585 £46.87 VID 1787 53.63 VID 7558 £2.49 VID 1076 £6.27 VID 2198 £13.04 VID 1981 £1.48 VID 1411 £2.40
3-V-30 Video Head Pinch Roller Bett Kit Ree! Idler Take Up Clutch Take Up Idler Brake Pad	VID 2647	idler Tension Band Take Up Reel Table Rubber Tyre Supply Reel Table Rubber Tyre FVH-P720720K/73	VID 1023	Pinch Roller Belt Kit Clutch Idier Loading Motor Cassette LED HITACHI	VID 2518 £21.00 VID 1815 £5.19 VID 7566 £2.31 VID 1316 £5.47 VID 1317 £3.54 VID 2167 £13.69 VID 1981 £1.48	JVC HR-3300 Video Head Pinch Roller Belt Kit Take Up Idler Large REW Idler	VID 2511 £9.95 VID 1756 £2.95 VID 7506 £1.56 VID 1025 £4.65 VID 1025 £4.65	Cassette LED PANASONIC NV-2000-2010 Video Head Pinch Roller Belt Kit	VID 1981 E1.48 VID 2520 E9.81 VID 1757 E3.21 VID 7800 E1.73	VTC-M1011/20/21 Video Head Pinch Roller Belt Kit Reel Drive Pulley Idler Reel Motor Tension Band	VID 2530 \$23.75 VID 1758 \$3.95 VID 7809 \$0.45 VID 1079 \$5.94 VID 1219 \$1.90 VID 2179 \$17.39 VID 1408 \$1.87
Reel Motor Capstan Motor Loading Motor Cassette Lamp Tension Band Repair Kit Take Up Reel Table Rubber Tyre Supply Reel Table Rubber Tyre	VID 2169 228.12 VID 2164 627.18 VID 2168 59.30 VID 1947 50.42 VID 1389 51.73 VID 7913 618.95 VID 1080 60.66 VID 1080 60.66	Video Head Princh Roller Beh Küt Gear Idher Idher Loading Gear Set Cassefte LED Tension Band Take Up Reel Table Supply Reel Table	VID 2500 £21.95 VID 1810 £3.63 VID 752 £1.89 VID 1013 £4.95 VID 1014 £2.80 VID 1290 £1.48 VID 1376 £2.10 VID 1295 £5.77	VT-11 Video Head Pinch Roller Belt Kit FF/REW Idler Arm Clutch Plate Capstan Motor Cassette LED Tension Band Repair Kit	VID 2504 E19.94 VID 1788 £3.05 VID 7538 £1.23 VID 1020 £1.73 VID 1211 £9.81 VID 2147 £18.02 VID 1981 £1.48 VID 1379 £2.31 VID 1379 £2.51 VID 7922 £16.50	Unloading idler FF Rubber Tyre Unloading idler Rubber Tyre Capstan Motor Drum Motor Cassette Lamp Tension Band Repair Kit Take Up Rubber Tyre	VID 1027 E9.30 VID 1029 E0.78 VID 1207 E9.90 VID 2119 E42.31 VID 2120 E18.73 VID 1943 E0.35 VID 1391 E3.54 VID 7911 E15.45	fdler idler cam Gear Intermediate Gear Orwing Gear Casseffe Lamp Tension Band Repair Kit Take Up Reel Table Supply Reel Table	VID 1054 00.85 VID 1055 00.85 VID 1216 £1.23 VID 1217 00.99 VID 1948 60.24 VID 1397 £3.38 VID 7901 £19.35 VID 1312 £10.12 VID 1310 £8.62	Supply Red Table SENT RA VX-5000-8000 Video Head Pinch Roller Belt Kit Idler Cassette LED Tension Band	VID 1319 \$8.62 VID 2713 \$23.74 VID 1787 \$3.83 VID 1049 \$4.05 VID 1049 \$4.05 VID 1399 \$2.64
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What a Life!

Donald Bullock

Steve Beeching and his charming wife popped in the other day. They came in a station wagon that made our Ford look a bit utility. "Some car!" I said. "It's the wife's" Steve replied. Seeing that Greeneyes was paying careful attention I changed the subject.

We had a pleasant hour's chat in the bar, much of it spent in mutual sympathy over the lives we lead. Then Steve told us about the items of electronic wizardry that he and his son service as a matter of course. Things that I've heard about though scarcely seen, let alone tackled. Steve has a decided advantage over lesser mortals like me – an extremely fine brain. He also has an enthusiasm that's good to see, dedication to his work and a fine sense of humour. He needs all these in dealing with things like camcorders. I'm reasonably certain that I never want to have to open one of them up!

Thanks for calling in, Steve. We had a good hour or two. Call again sometime – I forgot to tell you how big I am on G11s!

Mrs Whelp's Panasonic NV370

During Steve's visit Mrs. Whelp called with a Panasonic NV370. Next day I put it on the bench. When I switched on there was no channel number display and no LED was alight but the clock flashed merrily and the idler quivered a bit before losing interest. I decided to take a look at the power supply and soon found an open-circuit fusible resistor – R1101. Not a bad start I thought: maybe I'm about to get a run of easy little moneyspinners.

Saisho CT142RX

The next job was a Saisho CT142RX colour portable. I seem to get a lot of Saisho/Matsui sets. This one was dead though the channel 1 LED was alight. The mains fuse F501 (2·5AT) and the $5\cdot6\Omega$, 5W surge limiter resistor R501 were both open-circuit while the STR50103 chopper chip IC501 had expired. I replaced these three items then checked the line output transistor, which was o.k. So I switched on. No difference!

There was plenty of h.t. at the mains bridge rectifier's output, but no 103V output from the chopper chip. A further check showed that there was no start-up voltage at pin 2. A check on the two feed resistors R502/3 indicated that they were o.k., but how did I know whether they were up to passing current? I've been had before with that one. So I fitted replacements. Still no start-up voltage. My earlier hopes about a run of moneyspinners were fast evaporating. Could the two transistors Q107/8 in the power switching circuit be faulty? In went two new ones, again to no effect. Perhaps the line output transformer, which is also linked to this point, was damping things? The connection is made via the RH1 diode D508 which turned out to be dead short. Why hadn't I tried that first?

A Luxor SX9

The next patient was a 26in. Luxor set, Model 18067349 (SX9 chassis) which was also dead. It's not a set I know, and I didn't have a circuit diagram. There was h.t. about,

and the two BU208A transistors in the line output stage and the power supply were all right. Bearing in mind the last set, I decided to go round the diodes with a component tester. No luck this time however. Then, while examining the print side of the board, I saw that some of the joints looked less than healthy. So I went round those on the line linearity coil and the line driver transformer. This brought results, though of an intermittent nature. I then found that the two large copper heatsinks that bridge parts of the copper print were dry-jointed. Resoldering these cured the trouble.

Philips CTX-E Chassis

As I was refitting the back a bearded fellow pulled into the drive. There was a Philips 20CT2026/05 colour set (CTX-E chassis) on the back seat of his car.

"I've brought this set all the way from Lancashire" he said. "Well over a hundred miles. It belongs to my mother who's down here on a visit. Thought I'd bring it along as well as it's intermittent and you did my own set recently."

I plugged it in, took the back off and gazed at the print under the line output transformer. What I expected to see was there – dry-joints. Attention to these and, a few minutes later, all was well.

"Marvellous" he said, "too good to be true!"

"S'nothing" I said, blowing on my nails.

Egbert's Alba VCR6000X

Just then Egbert Crust bowled into the drive, as though he was pedalling an invisible bicycle up a steep hill against a headwind. He was carrying an Alba VCR6000X video recorder.

"Don, for heaven's sake fix this recorder by tonight" he gasped, "otherwise Marina will pack me in."

After he'd bolted I plugged his machine in. It was haywire, like Egbert. On opening it up I found that the loading belt was badly distended. While fitting a new one I saw why. The mechanism had jammed and the belt was fighting it. I removed all the belts and judiciously applied some WD40 to the mechanism. Then I cleaned the pulleys carefully and refitted the belts. This restored perfect operation.

Decca 140 Series Chassis

My next caller brought in a 16in. Decca set, Model DP1473 (140 series chassis). "The picture's unstable and goes off after a minute" she said. I removed the back and switched the set on. Up came an unstable picture with clattering sound, and after a minute the set went dead. As I turned it on to its side it came on again, and I found that I could make the fault come and go by tapping the chassis. So I switched off and busied myself resoldering some drylooking joints in the power supply. Suddenly something dropped out and rolled on to the floor. It was a large, heavy ferrite bead. I then found a small loop of wire that had obviously been threaded through it and soldered to the chassis. After putting this right (the circuit designation was L803) I tried the set again.

This time there was no picture and sound disturbance at all, but the set went off after a minute as before. Tapping around plug and socket MC01 brought the set to life briefly, but resoldering it didn't help. I then found that flexing the centre front of the panel controlled the fault. Out came the magnifier and I saw that one of the pins of the TDA4600-2 chopper control chip had never been

Mrs Rabble's Toshiba VCR

Then Mrs. Rabble brought a Toshiba V309 video recorder along in a pushchair. With her was her precocious little daughter, who immediately went around the room twiddling the controls of every set she saw.

"Do you think you could, er, ask the little girl to stand by the door with you" I asked. "She might get hurt, and we

wouldn't want that would we?'

"Oh don't worry about that" snorted Mrs. Rabble. "The point is that you mended this video for us a few months ago and it's never been right since. We haven't had time to bring it back before. My husband says you didn't do it properly. His workmate said you don't know anything about videos. Said we should have took it to Snoddies.'

I looked at her and her protege and nodded sympathetically. "They do seem to have all the answers" I replied.'

"I'll wait while you do it" she said, adjusting her stance

to permanent stay.

I opened the machine and looked inside. A powder compact and a partly nibbled Mars bar were caught up in the mechanism. I took them out and handed the bar to the child and the compact to Mrs. Rabble. "One each" I said. Then I tried the machine, replaced its cover and handed it back. "I haven't the time to do you a bill now" I said, scribbling a few details on my pad. "It'll be only nominal, fifteen pounds or so. I'll drop it in the post to you.'

Mrs. Rabble breathed in sharply, smiled weakly and

stalked out.

The HRD230 and the Curate's GEC TV

Just as I pulled a JVC HRD230 VCR on to the bench the door opened and the Reverend Goode beamed in. "I know you don't do house calls" he said, "but if you find yourself in my parish sometime do pop in and look at the curate's massive TV set. The tuning buttons don't work."

Off he went and I concentrated on the JVC video. It was all right in the fast forward and rewind modes, but play was fickle. I turned it upside down, removed the base then took out, cleaned and retightened the screw that earths the mechanism control board print. This didn't help. I noticed an evil-looking STK5481 power supply chip and changed it at once, but again there was no difference. So I fitted an idler. Play seemed to be better, but the take-up spool faltered now and again. Then I saw that the tape was also faltering at the pinch wheel. Cleaning it made no difference, and I noticed that the capstan was stopping. So I took out the motor and treated it with WD40. The machine worked well for over an hour on soak test and I was about to pronounce it fit when it stopped again. There was nothing for it but fit a new motor, and they're not cheap. The replacement restored the machine to normal

A couple of hours later I had to take Greeneyes into town. I decided to drop in on the curate on the way back. The set was a huge GEC model. I switched it on and, as its lazy tube warmed up, I instinctively took out my handkerchief and gave the buttons a brisk rub. By then the picture had come up and the tuning was perfect.

"Oh" said the curate, "your very presence has made it work. How clever! Thank you, thank you." He opened the door and I walked out. "God be with you" he cooed.

As I walked back to the car I thought there really must be a better way.

next month in

SERVICING THE PHILIPS CD104 CD PLAYER

This popular model has been around in various guises since the mid-Eighties. Amstrad for example used the basic machine in some midi systems while Mission put it in a smarter looking box. In addition to machines that come into the workshop with specific faults, some come in because they have been part-exchanged for a more recent model and require certain checks and adjustments to ensure reliable operation before being resold. Mike Leach provides guidance on all aspects of servicing.

MASTER-SLAVE SWITCH-MODE POWER SUPPLIES
 A number of TV chassis use a switch-mode power supply arrangement that's known as the master-slave system because the line oscillator chip, which contains

the pulse-width modulator, is the master and is mains isolated from the power supply control/driver chip which operates as its slave. Ray Porter describes the circuit operation and fault-finding procedures.

TELEPHONE TEST SET

To make ends meet lan Rees is willing to tackle in his workshop almost anything that runs on electricity. Nowadays cordless telephones, ordinary phones and answerphones arrive in a steady trickle, also the occasional modem and fax machine. They don't present any great difficulties but it helps to have a source of signal apart from the BT line for both monitoring and calling. Hence the test set described next month.

REBUILDING THE 1590's POWER SUPPLY

The Thorn 1590 and 1591 series chassis were the basis of a very popular range of monochrome portables. Power supply failure is a recurrent problem and unfortunately the series regulator transistors used are now hard to obtain. So J. LeJeune set about designing an updated version of the power supply. It works well and doesn't get too hot.

● TEST REPORT: TANDY 22-167 DMM Tandy's new 22-167 Micronta autoranging multimeter is a high-speed sampling bar-graph instru-ment that has the look of a meter you'd expect to cost far more. David Botto gave it a thorough test and found it good value for money.

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Solders, Fluxes and Solder Creams

Eugene Trundle

Soldering is such an everyday job that we give it little thought. All you need is a reel of flux-cored solder, a hot clean iron and the sense to apply them to the joint simultaneously. This is only a very small aspect of the subject however. When we have to deal with metals other than copper; when, as in certain Sony TV sets, hot-running resistors have to be replaced; when we want to plumb our own satellite waveguide splitters; when we're confronted with surface-mounted assemblies; in these and many other circumstances there's much else we should know about solder, fluxes and their forms, applications and properties. Time to take a closer look then!

Types of Solder

All solders contain tin, an expensive silvery-white metallic element that melts at 232°C. Pure tin can be used as a solder, but it's costly and relatively weak. For use in virtually all applications it's mixed with one or more other metals to form an alloy. Every characteristic of a solder depends on the composition of the alloy. Many different basic metals are alloyed with tin to make the various types of solder available. In order of importance, they are lead, silver, copper, cadmium, antimony, bismuth and indium.

The most common combination is tin with lead, in the proportions 60/40. This alloy has a melting point of 183°C and good "wetting" quality, which means that it runs readily and coats the surface of the work. With each combination of metals used to make solder there's a certain percentage ratio that gives the lowest melting point. It's known as the eutectic alloy, and gives the quickest transition between the solid and liquid states as the melting point is passed in either direction. Fig. 1 shows this graphically for tin-lead alloys, whose eutectic combination is 63/37. An instant change from the liquid to the solid state is undesirable in many applications, because the slightest movement or vibration at the transition point can cause joint fissures that can lead to trouble later. 60/40 solder has a plastic range of 5°C: the higher the proportion of lead used, the greater the plastic range but the lesser the wetting ability – and the cheaper the solder.

A common additive in solder is copper, typically as a 1.5 per cent proportion of the alloy, an amount calculated precisely to prevent any copper absorption from the soldering iron bit during the soldering operation. It also prevents erosion of PCB print and fine copper wires by absorption into the solder.

The next main group of solder alloys are the HMP (high-melting point) types which have a typical transition temperature of 300°C due to their very high lead content of over 90 per cent. Silver, at about 1.5 per cent, is normally added to the HMP alloy to improve its strength and wetting power. In addition to being used to make joints that are expected to get hot in use, this type of solder has excellent low-temperature characteristics in service. Solder that contains silver also has the important property of preventing *leaching*, i.e. absorption of the silver content of the workpiece, which is important in some applications.

The main applications for low-melting point solders are in work with gold and silver, heat-sensitive devices and flexible printed circuits. The lowest melting point alloy that can be drawn into conventional wire is made of a 50/32/18

tin-lead-cadmium alloy. It liquifies at 145°C. A 15/33/52 tin-lead-bismuth alloy with a melting point as low as 96°C is available in paste form. A 43/57 alloy of tin and bismuth turns liquid at 139°C.

Lead-free solders are sometimes required – lead is a very toxic material. They are expensive, containing over 95 per cent tin with the balance made up of antimony (high-melting point alloy) or copper. There's also a 96/4 tin-silver alloy, a bright, strong solder for use with stainless steel.

A special alloy is required to solder aluminium, which is not the metal most amenable to this operation. It consists of a tin-lead-cadmium alloy in the proportions 18/80/2. The other main requirement when soldering aluminium is a very strong and active flux. We'll come to fluxes and their characteristics later.

Apart from this and the other special cases mentioned above, in general virtually any solder alloy will work with any metal that's solderable – which is most of them! Non-solderable metals are chromium, pure beryllium, magnesium and titanium, which are not the ones you bump into every day. Apart from aluminium, which has already been mentioned, the more difficult metals to solder are steel, nichrome and cast iron (the latter must be machined before attempting to solder it), all of which require the use of very strong fluxes. The most readily solderable metals are copper, silver, tin and lead.

Thus the large number of solder alloys available – see Table 1 – is accounted for not only because of the variety of metals that may have to be bonded but also because of the vast range of soldering methods in use and the subsequent conditions of service. Factors like physical strength, toxicity, operating temperature, corrosion resistance and, much more rarely, electrical or thermal conductivity have to be taken into account. Cost is a large factor of course: the more tin and exotic metals in the mix, the more expensive the solder.

In general, it's necessary to raise any solder about 60°C above its melting point the ensure a good, strong joint.

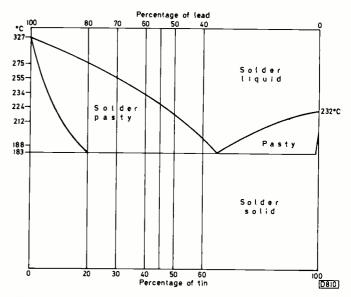


Fig. 1: Characteristics of tin/lead solder alloys. Most alloys have a plastic range which increases as the eutectic combination is departed from. Alloys of other metals have similar characteristics.

Table 1: The Multicore range of tin/lead alloy soldiers.

Alloy	Multicore Colour Code		iting erature	Recommended Minimum	
Tin/Lead	(Reel and Case Labels)	Solidus °C	Liquidus	Bit Temperature* °C	Uses
Sn63 60/40, Sn60	Blue Red	183 183	183 188	243 248	High quality work requiring low melting point alloy
Savbit 1 50/50 45/55 40/60	Green/Red Yellow Crimson/Buff Green	183 183 183 183	215 212 224 234	275 272 284 294	Hand soldering radio, telephone and electrical equipment; batteries
30/70	White	183	255	315	Fuses, motors, radiators, lamps
20/80	Purple	183	275	335	Lamps
15/85	Orange	227	288	348	Lamps
T.L.C. (Tin/Lead/Cadmium)	Pink	145	145	205	Specially low melting point solder. Soldering on Gold
L.M.P. with 2% silver content (and Sn62 alloy)	Red/Blue	179	179	239	Particularly useful when soldering ceramics or other silver-coated surfaces
P.T. Pure Tin	Light Blue	232	232	292	Used when a lead-free solder is required
High Melting Point (H.M.P.)	Dark Blue	296	301	361	Special high melting point solder to B.S.219 Grade 5S
95A	. –	236	243	303	High melting lead-free alloy
96S (Sn96)	_	221	221	281	Bright strong non-toxic solder.

^{*}Soldering iron bit (tip). Solder baths can operate 10°C lower.

Thus the recommended bit temperature for the most common type of solder (60/40 tin-lead) is about 250°C. For HMP solder it's about 360°C. In service it's necessary to ensure that the soldered joint always remains at least 40°C below its *solidus* temperature, i.e. the point of transition from the liquid or plastic to the solid state. This safety margin is particularly important when the joint is subject to any physical stress or vibration.

Since all solders are conductive there's no need for the two metals to be joined together to be in contact: indeed the best physical joint strength is achieved when the two surfaces to be joined are about 0-1mm apart. All types of solder have good capillary properties and will flow into gaps and crevices spontaneously to seal and bond them — so long as there's an exit at the end or side to release air and flux.

Physical Forms

Solder is manufactured in many physical forms. Trapezium-shaped bars are available for use in equipment manufacturers' solder baths. Other bulk forms are oval and round sticks, solid wire and pellets. To avoid the contamination and oxidation inherent in casting ingots of solder, the better manufacturers use an extrusion process to produce bulk forms of solder. Mainly outside the consumer electronics industry *preforms* are used, in the form of rings, gaskets or any other shape of flat insert, for use between two surfaces which are subsequently bulk heated. They can even be made with flux inserts, but are now being superseded by solder pastes and creams, which can be painted on as a "liquid preform". Solder cream is an increasingly important product to which we'll return later.

The most familiar form of solder to those of us at the bench is of course flux-cored wire. It's available in about twenty different alloys, for different purposes: the ones we use are the general-purpose 60/40 or 63/37 tin-lead alloys,

ideally with some copper content, and the HMP type. Solder wire comes in 10-24 SWG, of which the most useful for general purpose and conventional PCB work is 18 SWG and for surface-mount and similar fine work is 22 SWG.

Flux is a vital agent in any soldering operation. Its incorporation in solder wire is the key to easy, reliable jointing. Continuity of the flux is important: if it's missing, joints made with the "bare" solder will not flow and run properly and won't bond as they should. Maybe this is not such a problem if you can see what's happening while you are soldering: but it can happen that a flux-starved joint looks acceptable and has electrical continuity but, remaining dry inside, it's likely to lead to trouble later.

Especially in natural rosin form (see later) flux is a crystalline and physically rather unpredictable substance in that it's difficult to ensure consistency and continuity in a core. Like seaside rock, solder starts in a very 'fat' form and is progressively reduced in diameter, not by rolling as with candy at Brighton but by being drawn through progressively smaller dies. It's easy to appreciate that a very small void in the flux at the extrusion stage will result in a very long discontinuity in the drawn-down wire.

Hence the need for several cores of flux in the wire. Provided that each core is extruded from a separate nozzle, the chances of a complete loss of flux at any point are very small. As far as I know, the only manufacturer who makes solder wire with truly separate flux cores is Multicore Solders Ltd. The Ersin type is the best known of these. Other manufacturers' products have a single thread of flux or a pseudo-multicore structure in which the flux cores (which sometimes collapse together at the centre, see Fig. 2) are injected through a single nozzle with five holes in it. From the reliability point of view this process is little different from single-core injection. The other advantage of multicored solder wire is that there's only a thin wall to melt before flux is struck and released, enhancing heat







Fig. 2: Cored solder: (a) shows the genuine five-core type with completely separate flux channels, (b) shows a single flux core while (c) shows an imitation multi-cored solder in which the flux cores are not truly separate.

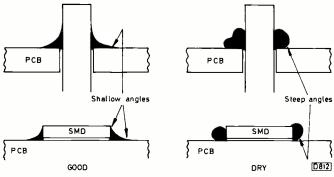


Fig. 3: Judging the goodness of a solder joint. If the solder 'blobs up' around the joint it's likely to be dry – good joints have a lean profile.

transfer and the melting of more solder. This speeds up the hand soldering process.

When using flux-cored solder wire it's essential that the solder is applied directly to the joint, so that the flux isn't burnt and de-activated before it can act. Ideally the joint should be above the solder's melting point before the solder is applied. This is easy with a blow-torch on a copper pipe, rather more difficult with a soldering iron and an electrical joint. Hold the solder wire on the joint, then apply the iron to both. If more solder is needed, feed it in between the iron and the workpiece. Most defective joints are caused by: dirt/oxides on the workpiece, allied to which is the use of an insufficiently active flux; the flux burning out before it contacts the joint; an insufficient heat supply, for example when the heat is sapped by thermal conduction of the workpiece; and inadequate temperature.

Whatever the heating method used the quality of a soldered joint can be judged by the angle between the surfaces of the workpiece and the solder. A good joint has a contact angle of 45° or less, while poor wetting is betrayed by an angle of 90° or more, see Fig. 3. This applies to all types of joints, whether you're plumbing in a sink or an aerial socket, soldering a mains transformer to a PCB or dealing with a pinhead-sized surface-mounted device. We don't propose to go into the techniques used when soldering SM assemblies here, since they were covered in pages 482-3 of the May 1987 issue and 202-5 of the January 1991 issue.

Fluxes

The subject of flux has been touched on several times already. When it's in the form of a core in solder wire we don't have to think much about it. If however we have to solder a dirty or difficult metal, rework SM assemblies or cobble up a waveguide or a car radiator, a knowledge of fluxes and their properties is useful.

Soldering is possible only when the surfaces to be joined are clean and free of oxides. The surfaces of all metals oxidise quickly – almost instantaneously when hot. The job done by the flux is to remove the oxides and other

contaminants chemically at the instant of soldering, thus facilitating the intermetallic bond between the solder and the workpiece. Flux is also a conductor of heat and a wetting agent – to prove the point, try making a joint with pure solder and a bare iron!

The most common flux base material is rosin, the gummy or crystalline yellow secretion of pine trees. When molten, pure rosin has the ability to wet both metals and metal oxides, but it's not sufficiently acid to dissolve oxides. Thus it's a very mild flux, suitable only for use when soldering clean copper, silver or tin. It leaves a hard, protective non-corrosive residue on the joint.

For a more effective fluxing action activators are added to the rosin. They have a corrosive action only at high temperatures. During the soldering operation the reagent is destroyed by combination with the oxide or driven off by the heat. Any that remains recombines with the flux on cooling, leaving a non-corrosive residue. Activators are often made of halides – compounds of bromine, chlorine, iodine and ammonia. Other activators are zinc and ammonium chloride, ammonium hydroxide and various organic and inorganic acids. It's important to use the mildest flux that can do the job reliably. There are many grades of flux: R, non-activated; RMA, mildly activated; RA, fully activated – up to very corrosive acid and special types whose residues must be cleaned from the work afterwards and which are not suitable for electrical or electronic applications.

Natural rosin is not a very stable material. Synthetic substitutes, based mainly on benzine-type compounds, are available. This synthetic resin has better stability during reflow and leaves a paler and very inert residue that in most cases doesn't have to be removed from the work. Like rosin flux, the synthetic type is available in several levels of activation. Water-washable fluxes have been developed to avoid the need for CFC solvents where residues must be removed.

The flux is already present in the solder wires and creams we use, but a pot of general-purpose flux paste is useful to have available for such jobs as soldering aerial sockets to tuners and VCR modulators/boosters etc. A useful liquid flux for use with SM boards is type MB045 from OK Industries (0703 619 841). It's specially designed for SM rework purposes, both component removal and replacement, helping to inhibit and remove oxide growth, facilitating heat transfer to the joint and preventing the solder from "stringing" when a component is removed from the board. Another application of liquid or paste flux in repair work is the realignment of skewed SM components. All the joints are generously anointed with flux and the component is heated to the reflow temperature: it will tend to realign itself with the PCB lands due to surface tension in the molten solder.

Solder Cream

Solder cream is a coarse grey paste (see Fig. 4) which consists of three ingredients: atomised solder particles, a liquid flux and a vehicle in the form of a waxy, oily or jelly-like compound. It's been around since the early Seventies and is now a highly-developed product. Virtually all the alloys previously discussed are available in paste or cream form. In fact the permutations of solder-particle size, flux type and vehicle characteristics in production runs to scores. For SM assembly use the most popular alloy is again 60/40 or 63/37 tin-lead, with a liquidus point of around 187°C. The mix very often contains very small amounts of silver (two per cent) and perhaps antimony (0·3)

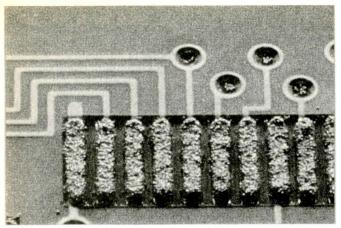


Fig. 4: Solder paste in place: the photograph clearly shows its grainy texture.

per cent).

The grains of flux powder in solder paste are usually spherical, with diameters ranging from 25 to 100 microns. The finer grains are used with fine-pitch PCBs that have component leg spacing as close as 0·015in./0·4mm – as with the small 100-leg packages now in use. The particle diameter in a typical general-purpose solder paste is screened to 45-75 micron size. In the manufacture and storage of solder cream it's important that the solder powder acquires as little oxide content as possible, so that the flux action can be concentrated on the work rather than the solder itself. An oxide content of 0·5 per cent is acceptable: 2 per cent is bad.

The flux used in a solder cream can be of any of the types described so far. For SM use it's generally a rosin-based RMA type or a mildly-activated synthetic substitute that may be water soluble.

The vehicle, in which the solder powder and flux are suspended, largely determines the physical properties of the cream – viscosity, tackiness and slump. Solder creams have a metal content of between 75 and 90 per cent, the rest consisting of flux and vehicle, both of which are driven out of the joint during the soldering (*reflow*) process. For dispensing from a syringe, an 85 per cent metal content cream with a more runny consistency (lower viscosity) than that used in manufacturing is generally specified.

During factory production of SM boards the solder cream is placed on the panel precisely, using a stencil or a screen-printing technique, see Fig. 5. A flexible squeegee is passed over the surface, pushing the solder cream into

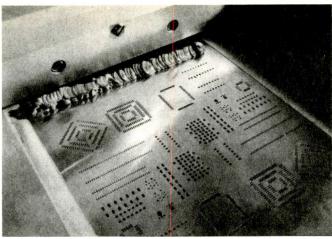


Fig. 5: A brass stencil for the precision application of solder cream during SM assembly manufacture. The cream, at the top, is ready to be wiped across the stencil, which is precision aligned with the PCB beneath it.

the holes: cream used with stencils has to have a higher viscosity and metal content. The SM board is then heated by one of several methods to reflow the solder and connect and fix the components.

There are several thermal phases in the reflow process, see Fig. 6. The assembly is first brought up from room temperature smoothly to drive off moisture and solvents and prevent thermal shock. Next the temperature is taken above the solder liquidus for about thirty seconds to ensure full and even reflow. The assembly is then allowed to cool fairly rapidly, assisted by fans. The whole process takes about six minutes in an infra-red furnace, which is the most common arrangement. Other methods are vapour phase reflow, in which the SM assembly passes through the hot vapours above a vat of boiling fluorinated hydrocarbon, using the latent heat of condensation to reflow the solder; and finally hot bar and laser heating, with each component dealt with separately.

One disadvantage of solder cream is its tendency to deteriorate with time, especially at high temperatures. Always keep the container sealed to prevent evaporation: storage should be in a refrigerator, at 5-10°C. Kept in this way the shelf life of a large pack is about twelve months while that of a small pack, e.g. a 25g syringe, is around six months. The problem is that after being removed from the fridge the cream needs about 24 hours to acclimatise to room temperature, which is hardly convenient for the sort

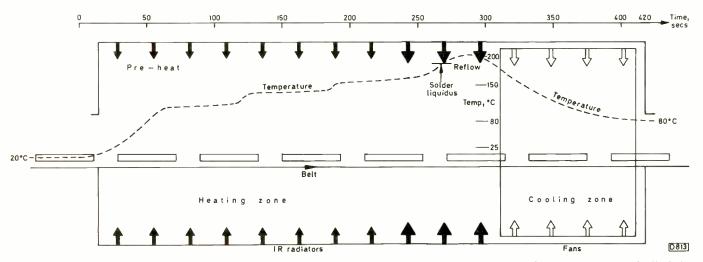


Fig. 6: Infra-red reflow furnace operation. The time scale is shown at the top and a graph of the temperature (called the thermal profile) is drawn across the centre.

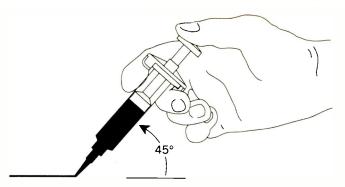


Fig. 7: Dispensing solder cream from a syringe during an SM rework operation. There are several types of syringe dispenser, operated by muscle power as here, from air pressure or on a 'popgun' principle. To provide a smooth flow some needles and flow tips are Teflon lined.

of use it gets in a repair workshop!

Shelf life and storage temperature requirements depend very much on the vehicle/binder used. That adopted by ESP (0234 211 582) permits storage at room temperature for a shelf life of one year. So this is the most practical type for service departments and rework stations. It comes in 35 and 70g syringes, which are ideal for hand dispensing. ESP

also markets dot-maker dispensers and complete rework/repair kits. Another company that markets dispensers, syringes, barrels and needle-tips for use with solder cream is EFD (0582 29 444).

Correct dispensing of cream on to a PCB requires practice and the right needle diameter. For fine work the narrower the needle the better, but the internal diameter must be at least three times the particle diameter, i.e. no smaller than 0.016in. For best control the dispenser should be held at an angle of about 45°, see Fig. 7.

Jargon

Many terms that may be new to the service technician are encountered in the realm of soldering. To help with this a glossary of terms, listing those most applicable to our field of operations, accompanies this article.

Acknowledgements

My sincere thanks are due to ESP, Multicore Solders Ltd., OK Industries, RS Components and the Technical Support department of Sanyo UK Sales Ltd. for help in the preparation of this article.

Glossary of terms.

Alloy: A combination of two or more metals to obtain specific properties.

Creep: Deformation of a solder joint, especially under mechanical load.

Curing: Preheating of solder cream to drive off evaporants.

Dispensing: Deposition of solder cream in lines or dots, using a syringe.

Eutectic: The proportion of the metals in an alloy that produces the lowest melting point of which the combination is capable.

Fine line cream: Small-particle (less than 75 microns) solder paste for fine-pitch applications.

Flux: Material used to dissolve surface oxides, improving the flow and wetting of solder.

Flux residues: Material left on and around soldered joints after the reflow.

Leaching: Absorption by solder of metal, e.g. copper or silver, from the joint material, workpiece or soldering iron.

Liquidus: Temperature at which an alloy becomes wholly liquid.

Low residue: Term applied to fluxes that leave little or no deposit after the soldering or reflow operation.

Medium: The non-metallic content of a solder cream, including flux, solvent and a vehicle.

Metal content: Quantity of alloy in a solder cream, expressed as a percentage of weight.

Preforms: Flat shapes cut from solder tape to fit specific locations.

R: A pure rosin flux.

RA: A rosin flux containing activators for use on difficult, dirty or oxidised metals.

RMA: Mildly activated rosin flux.

Reflow: The process of melting solder creams or preforms.

Resin: Flux based on synthetic compounds rather than natural rosin.

Rheology: The physical/flow properties of a solder cream.

Rosin: A secretion of pine trees.

Sequential soldering: The use of solders with different melting points and progressively cooler soldering/reflow temperatures.

Slump: Tendency of a solder cream to spread from the shape and position in which it was dispensed or printed.

Solder balls: Discrete balls of solder that separate from the main mass during reflow.

Solidus: Temperature at which an alloy becomes wholly solid.

Tackiness: Adhesive property of a solder cream or flux: useful for holding components in position before reflow.

Temperature gradient: The rate of change of temperature across a surface or in time.

Thermal shock: Effect on components and joints of rapid heating or cooling. Thermal gradients of more than 2°C/sec can be harmful, especially to multilayer ceramic structures.

Tombstoning: Graphic description of the way in which small SM components, e.g. resistors and capacitors, jump up when one end reaches the reflow temperature before the other one does during soldering.

Thixotropic: A solder cream whose viscosity changes according to the rate at which it is disturbed.

Viscosity: A measure of the resistance of a cream to shear or flow, i.e. stiffness or runnyness.

Wetting: The spreading ability of molten solder over a joint or workpiece.

Wicking: Flow of solder away from a joint up a lead or leg, usually due to a temperature differential.

Fault Notes on the JVC HRD110/Ferguson 3V38

John Coombes

The JVC HRD110 was on sale during the period 1984-5. It appeared in various guises including the Ferguson 3V38/39/49, the ITT VR3605 and the Toshiba V55. The following fault notes summarise our experiences of these machines.

No results: First check the 500mA fuse F1 which may simply have gone open-circuit. If a replacement blows check for shorted turns in the mains transformer. The next item to check is the 2.5A fuse F2 which again may simply be open-circuit. If this fuse has blown check for shorts in the 0.0lμF filter capacitors C1-5 and the bridge rectifier diodes D3-6 (two type 30D2, two type 10E2). Next ensure that relay RY1 is operating and is not open-circuit. Q2 (2SD637) and/or Q3 (2SD880) could be short-circuit. If the power regulator appears to be working correctly check whether CP2 on the servo/logic/audio panel is open-circuit.

No clock display: Check the 315mA fuse F3. If a replacement blows check for shorts in D11 (11E2), Q8 (2SA1020), C20 (33 μ F) and/or D12 (HZ30-2L). Alternatively C18 (100 μ F) could be leaky.

If the l.t. supply to the clock display is present the display itself (FDP) could be faulty. Check the voltages around the UPD7538C chip IC1 very carefully: if necessary check the chip by replacement. Other possibilities here are absence of the reset pulse at pin 1 or the voltage at pin 41. If the latter is missing, suspect IC2 (TL077P) and/or Q1 (DTC114). Check these items by replacement. As Q1 is a digital transistor the resistance readings you obtain will not be what you might expect.

Will not take tape into the cassette housing: Ensure that the l.t. supply is present at pins 1/2 and 8/9 of the M54544L chip IC204. If not, check whether circuit protector CP1 is open-circuit then if necessary check IC204 by replacement. Alternatively the up/down detector switch could be faulty.

Cassette housing moves in and out: First check the voltage at pin 39 of the M50740-602SP chip IC201. If this is unstable the resistive network RA204 could be faulty or dry-jointed. Don't confuse this fault with intermittent loading of the tape into the cassette housing due to a faulty front loading motor or broken or damaged cogs on the cassette housing unit.

Tape loads but no capstan rotation: Check the loading belt which may be stretched and/or the loading switches which may be faulty.

Intermittent stopping in play/record: This is usually due to a faulty take-up reel sensor or coupler. Check by replacement.

No fast forward/rewind: The usual cause is a worn reel idler. Alternatively the reel belt may be stretched or cracked and thus slipping.

No play/intermittent play: The usual cause is a worn rubber drive wheel on the idler arm, the result being no tape take up. If necessary check the take-up spool and the capstan belt which may be stretched or cracked, causing slipping

and tape looping around the capstan flywheel spindle. If the tape is creased in pleats and looping, check the pinch roller by replacement.

Sound Faults

Intermittent sound on record: If you get this fault accompanied by coloured patterns on the picture ensure that C27 has been increased in value from $0.0015\mu\text{F}$ to $0.0082\mu\text{F}$ – this value can vary with model. Alternatively the cause of the fault could be broken leads at the full erase head.

Intermittent record sound: If this fault occurs along with no picture, check the plugs and sockets associated with the audio/control head. Things to look for here are poor connections, dry-joints or even high-resistance connections. Alternatively the cause of the intermittent sound could be a worn audio head.

Recorded sound at low level, possibly with excessive treble: Check the audio record signal at pin 1 of connector CN1. If incorrect, L4 could be open-circuit or there could be dryjoints or cracks on the PCB.

Electronic Faults

Bent verticals/poor sync with E-E signals: Check the a.g.c. voltage at pin 3 of the M51316P chip IC1 very carefully. If it's incorrect C7 (0·047 μ F) is probably faulty. Alternatively you may have to check IC1 by replacement.

Noise bars on playback: The capstan servo is unlocked. Check for a trapezoidal waveform at TP403. If this is missing, check crystal X401 by replacement. Otherwise replace IC403 (HA11751NT).

Playback o.k. but no fast forward or reverse search capstan drive: You may have to trace through the whole of the capstan servo drive circuit to find an open-circuit component. $R605 (100k\Omega)$ is a possibility.

Capstan motor stops intermittently in reverse search: Check the voltages around IC206 (M54544L) very carefully, especially at pin 6 which should go to zero in the reverse search mode. If this voltage docsn't fall to zero, check Q218 (DTA144F) and/or D229 (1SS133), by replacement if necessary.

No playback luminance: Check the voltages around IC101 (M51454L) and/or IC102 (HA11738). If an incorrect voltage is found, check the chip by replacement. Alternatively you may find that R111 ($22k\Omega$) is opencircuit. In this event there may be no luminance with chroma flashing.

No record luminance: Check the voltages around IC102 (HA11738) and/or IC103 (HA11724). If an incorrect voltage is present check the chip by replacement. An alternative is leakage in D104 (MA27). You may have to check this on the high ohms range.

CD Player Casebook

Rotel RCD865

This player uses the later type of Philips laser assembly, similar to that employed in the Philips CD371. The reported fault was very poor sound from cold and very bad background crackling. We found that the sound returned to normal, with no crackling, when the machine had been on for approximately five minutes. Once the sound had returned, no amount of provocation would make it go away again. So fault finding was limited to only a few minutes at a time. As this few minutes wasn't long enough I gave in and spoke to Rotel about the matter. An extremely helpful chap advised me to check the state of the printed circuit under the PDM board, where the connections from the main board are soldered on to the PDM board. I was surprised to find several pieces of very fine print all cracked around the plug connections, as described on the phone. After carefully repairing all the print and resoldering the PDM board back into place we soak tested the machine for several days. All was well. Thank you Rotel, you saved us a great deal of time. M.L.

Sharp DX450EM

The complaint with this machine was no results. One of the power supply fuses, F202 (500mAT), had blown. When I replaced it and switched on the machine read the TOC all right but when play was pressed nothing happened. This was due to the fact that the sled motor had jammed, so the laser wasn't able to move towards track one. I gave the top bearing a very small drop of thin oil. This released the bearings and the laser was now able to move across the disc. Track one played o.k., but when I selected say track five or six the sled started to move and the fuse blew again. The motor had to be replaced. When I'd done this the machine still blew the fuse when the sled started to move, but this time it was because I'd used a 400mA instead of a 500mA fuse. The new motor and a correctly rated fuse cured the problem and the machine once again produced good results.

Philips CD104

No sound was the problem with this machine. It read the TOC all right and would go into the play mode, but there was no output. Checks showed that the supply lines were all o.k., and the earth feed-through connections had all been resoldered on a previous occasion. When I applied a small amount of freezer to the SAA7000 interpolator chip IC6514 normal sound was restored. A new chip put matters right.

M.L.

Sony CDP-M35

This machine came in with the two circuit protectors PS901 and PS902 open-circuit. After replacing them and switching on they again blew. A look at the circuit diagram showed that these protectors are in the +12 and -13 supplies to the various motor drive circuits. Cold checks then showed that there was a short-circuit in the sled motor drive circuit. I removed the two transistors, Q605 (2SC3666) and Q606 (2SA1426), then replaced the circuit protectors (type N15) and switched on. As expected the machine powered up and read the TOC. Obviously it wouldn't play because there was no sled drive, but I'd proved the point. Fitting new transistors restored normal operation. After completing the electrical repair I checked the mechanics thoroughly in case an obstruction in the sled

mechanism could have caused the motor to stall, damaging the transistors. As all was well here and the motor itself appeared to be o.k. the machine was returned to the customer.

M.L.

Pioneer XRP500

The ticket attached to this midi system said "no CD". It didn't read the TOC with any disc. In fact it was obvious when listening to the machine that the turntable motor was struggling to achieve the correct speed. I was surprised by this as it's a much later model than the Pioneer range that's now giving turntable motor problems, but after stripping the CD mechanism down I saw that the motor is of a similar type to that used in earlier machines. Fitting a new motor, part number PYY1109, once again produced good results.

M.L.

Rotel RCD865

Intermittent output from the left-hand channel was the complaint with this machine. It had apparently given trouble for some time. When the fault was present there was no sound whatsoever from the left-hand channel. The cause of the problem turned out to be poor connections to the audio leads on the right-hand side of the PDM board. The cure is to remove the audio plug from the board and hard wire it. I understand that this is becoming a common fault with these machines.

M.L.

Pioneer PD5010

This player would sometimes fail to read the TOC: when it finally did and started to play it would skip. As you will probably know by now, there's at present a high failure rate with spindle motors (PYY1109) in Pioneer players. This player uses a different type however and I didn't suspect it. What I did suspect at this stage was the little brown plastic bearing on the clamper holder (receptacle). On inspecting this I found that a large pit had worn away at the centre, applying friction to the disc clamper and thus preventing smooth rotation of the disc. With a new receptacle (part number VNL268), lubricated and fitted in the clamper holder, normal operation was restored – the machine played the test disc with no difficulty.

P.J.R.

Philips CD150

This player was included as part of a midi system (FCD565/35). The symptom was no sound from the left-hand channel. Scope checks showed that the signals in both channels were present at the output from the DACs, also at pin 2 of the LM833N chips 6308 and 6309. But there was no output at pins 1 and 7 of IC6308. I then noticed that R3362 (100 Ω) had burnt up and, with the power off, a cold check showed that there was a short-circuit at pin 4 of IC6308. Another cold check was made after removing the chip. As the short-circuit was still present the chip was cleared of suspicion. On tracing back we found that C2382 (47 μ F) was short-circuit.

Pioneer PDM700

The original fault symptoms – failure to read discs, not even the TOC, with the disc not reaching full speed (approximately 500 r.p.m.) – were indicative of a faulty spindle motor. But the customer had taken the top off to

see if he could fix the unit himself and in doing so had created another fault – a very dim display. A few quick checks around the display showed that there was no –26V supply at pin 57 of the display driver chip IC201. This supply was traced back to Q18 (2SA933S) which had –32V at its collector, –26V at its base and +3V at its emitter. When Q18 was removed it was found to be opencircuit between its emitter and base. I used a BC640 as a replacement. With this fitted and a new PYY1109 spindle motor installed the display lit and the unit played discs without difficulty.

P.J.R.

TEST CASE

352

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.

Late winter is traditionally a quiet time, in the Test Case workshop anyway. So on this Saturday various workshop worthies had taken the day off. Sage was in Wales, getting to grips with the technology of his beloved steam railways; Television Ted was decorating his living room; while Service Manager – well, no one seems to know where he gets to most of the time... Thus it was that Dylan found himself in sole charge of the service department, a situation that can lead to much material for this column! Cherrypicking at the items on the repairs-inwards shelf, he settled for a middle-aged, VHS top-loader VCR whose job card accused it of poor sound. Probably wants its head cleaning thought Dylan. Stuffing himself with bacon-flavoured crisps, Dylan hooked it up and removed the top cover.

He fed in a prerecorded tape, *The Search for Spock*, and found that the voices of Captain Kirk, Scottie and the others fluctuated somewhat in volume. There was also a hiss that was not all due to the motion of Starship Enterprise. Going boldly where many men had gone before, Dylan cleaned the audio head with surgical spirit. This did little for the audio reproduction from the tape, which Dylan knew had a good sound track. Looking for further clues, he recorded the workshop test card and test tone while finishing his crisps. Playback of the newlyrecorded sound was even worse than that from the Star Trek tape: the volume level fluctuated between low and almost absent. To get a normal sound level, he had to advance the setting of the monitor TV set's volume control quite a lot. This led to the intrusion of hiss and buzz, especially when the off-tape sound waned. Dylan turned the TV set's volume down, switched the VCR off and went to look for a service manual.

Following the instructions it gave, Dylan carefully set up the audio record signal and bias levels, using an oscilloscope. The same scope, hooked to the VCR's audio output socket, showed that doing this had little effect on the sound output with the machine's own recordings and absolutely none with tapes recorded in other ways. Think again, boyo, Sage's voice seemed to echo from the far land of Gwynedd.

Dylan thought again, got out his dental mirror and studied the path of the tape past the audio head stack. He saw that while the tape started off in perfect alignment with the audio and control track heads within a few seconds it moved down a fraction of a millimetre. The pinch roller was very shiny and quite worn. So he replaced it with a new one. The tape no longer moved downwards during its passage past the head stack, but with both library and self-recorded tapes the results were still far from being right.

The sound waxed and waned over a period of one or two seconds. Because of this, Dylan was reluctant to suspect the electronic circuitry which, so far as he could make out, differed in the record and playback modes. What mechanical problem, he wondered, could cause this fault? Dylan wished he'd picked up the next VCR on the shelf – it had ruined a *Keep Fit with Jane Fonda* tape. Instead, he picked up the phone and called Ray Ripoff, a rather shady ex-workshop staff member who now runs his own servicing outfit next to the Tandoori Takeaway in King's Road.

Ray had problems of his own – a bounced bodge job had been occupying him all morning. He advised Dylan to wind the grubscrew at the back of the audio/control head so that the head tilted outwards slightly "to get a good grip on the sound". Dylan did this – to the point where servo lock was lost as there was no control head contact with the tape – but still failed to get adequate sound. What was the real cause of the problem? Was it mechanical or electronic? For the answer and a further item in the Test Case series, see next month's issue.

ANSWER TO TEST CASE 351 - page 363 last month -

Brightness faults are usually easy to deal with. Last month however Sherlock was having difficulty with a TV set fitted with the Ferguson TX99 chassis (20in. version). There seemed to be no logical cause for its excessively bright picture: the tube's first anode voltage was correct, and the brightness control voltage applied to the colour decoder chip was also correct. The symptoms didn't change when a new decoder chip was fitted, and instead of being high the d.c. levels at the bases of the RGB output transistors were low. It was this latter anomaly that provided the clue to the cause of the fault.

The RGB output transistors were clearly passing excessive current. If the base voltages were low, something was amiss in the emitter circuits. The emitters of the three RGB output transistors are connected together and taken to chassis via the pnp transistor TR20, which normally provides a stable bias. It had become leaky between its emitter and collector, a replacement providing a complete cure. Sherlock's mistake was to overlook the biasing of the RGB output stages and rush straight back to the colour decoder chip when he discovered that the voltages at the picture tube's cathodes were all low.

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N5015 £3.30	BA5204	£2.75	L7915£0.80	M50127AP £6.00	MPD5521066 f		STK5315	£6.50	TA7280P	£3.00	TDA1063	£1.50	TDA3540£4.		£2.10	2SC458	02
N5033	BA524	£3.00	L7918£0.80	M50431-101SP	MSL9378RS	£3.50	STK5322	£6.50	TA7281	£2.75			TDA3541 £2.		Σ2.20	2SC789	£2
N5132 £3.95	BA5402	£2.40	L7924£0.80	€6.50	MSM5840H-84	IKS FO	STK5325	£5.50	TA7281P	.£2.75	TDA1154	£2.70	TDA3560 £3. TDA3561 £2.		£2.95	2SD1047	62
N5265£1.35	BA5406	£2.50	LA1180 £2.60	M50453-012P £6.20		£14.50 £2.50	STK5331	£3.50	TA7299P	£1.30	TDA1170S	£1.20	TDA3562A £5.		£3.90 £4.50	2SD1051	02
N5510£4.50	BA6104	£2.50	LA1185 £2.60	M50560-01P£2.70	SAA1006 SAA1025	25.80	STK5332 STK5333	£12.00	TA7303	£1.10	TDA1180P	£3.00	TDA3565	00 UPC1363	£1.90	2SD1128	
\$5512£1.95	BA6109	£1.80	LA1201 £0.95	M51014L £1.95 M51164 £1.40	SAA1124	£3.95	STK5338	6.00	TA7310	£1.75	TDA1190	£1.90	TDA3571BQ £5.	50 UPC1365	£3.50	2SD1138	02
15521	BA6124	£2.75	LA1235 £2.50	M51356P £5.00	SAA1174	£6.50	STK5361	£6.25	TA7312	£1.75	TDA127DM.	£4.10	TDA3590 £3.		£2.20	2SD1159	Ω
15730 £3.20	BA6154	£2.50 £2.75	LA1260 £1.75	M51381P £1.50	SAA1250	£2.60	STK5421	£6.50	TA7313		TDA1365	£4.90	TDA3651 £3.		£2.00	2SD1207	Ω
15750	8A6208	£3.20	LA1403 £3.75 LA3160 £1.90	M51393 £4.25	SAA1251	€8.50	STK5422	£5.00	TA7313AP	£1.40	TDA1412	£1.00	TDA3651AQ £6.		€2.20	2SD1273	£
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6341 £2.75	BA6238A	£1.95	LA3361 £1.50	M51903L £3.50	SAA3027	.6.00	STK5476	00.62	TA7325P	£1.50	TDA1510	£3.20	TDA3810 £2.		£1.95	2SD1391 SDC1397	1
344 £6.50	BA6239	£3.75	LA3600 £3.50	M5213L £3.10	SAA5000	.C3.00	STK5481	£5.00	TA7328	£2.00	TDA1510A	€3.20	TDA3950£3.			2SD1398	
346 £4.50	BA6259	23.00	LA3700 £2.50	M52184 £1.00	SAA5010	.25.80	STK5482	£5.20	TA7335	£1.50	TDA1512	£1.00	TDA440£2.			2SD1426	
346 £4.50	BA6301	£2.00	LA4100 £1.90	M52314 £1.10	SAA5012	.£6.60	STK5720	27 - 00	TA7335P	£4.20	TDA1515A	£2.50	TDA4420 £2.		£0,70	2SD1453	5
359 £5.50	8A6302A	£1.80	LA4102 £1.20	M54519P£1.00	SAA5020	.25.80	STK5730	£5.25	TA7342	£2.10	TDA1520	£3.95	TDA4422 £3.		£1.75	2SD1455-2SI	D17
360 £3.7 5	BA6304	£1.70	LA4125 £2.00	M54543 £1.75	SAA5030	.00.02	STK6962	£3.20	TA7343	£1.75	TDA1670A	£2.60 £3.00	TDA4500 £3. TDA4501 £4.		£1.95		1
362 £4.25	BA6305	£1.75	LA4140 £0.70	M54544L £1.85	SAA5040A SAA5040B	09.63	STK6972	00.83	TA7350	£2.10 £1.50	TDA1701	£3.00	TDA4503 £4.		TORE	2SD1496	
387£5.50	BA681	00.00	LA4160 £1.25	M54548L £4.50	SAA5040B	. 29.50	STK7216	£6.10 £5.75	TA7358	£1.50	TDA1870A	12.60	TDA4505 £6.		£1.90	2SD1496 2SD1497	!
612 £2.20	BA7001	£1.90	LA4182 £2.10	M58478P£4.75		£14.00	STK7308 STK7309	£7.00	TA7607AP	£2.40	TDA1905	£1.40	TDA4510£4		£5.50	2SD1497-02	
6651£0.60	BA718	£1.80	LA4183 £2.75	M58655P£6.50 M58839 £8.00	SAA5231	.00.02	STK7348		TA7609P	£2.70	TDA1908A	£1.75	TDA4600		£1.90	2SD1497-06	i!
6671K £5.50	BA728	£1.10 £5.00	LA4192 £1.70 LA4422 £1.30	M708 £5.50	SAB3013	£4.50	STK7356	€6.50	TA7614	€2.50	TDA1940	£1.80	TDA4600-2£2		£0.95	2SD1650	
6677£5.25 6884£2.75	BA7767S BTT6018	£3.50	LA4422 £1.30	M709 £4.75		£11.00	STK7358	£6.50	TA7628P	£2.40	TDA1950	£2.50	TDA4601 £2.	10 2SA1124	£0.35	2SD1877	
6884 £2.75 6912 £2.00	HA11215A	€3.50	LA4445 £2.50	MA150-E £2.20	SAF1032P	00.02	STK772B	£4.75	TA7629	£4.00	TDA2002	£1.40	TDA4610 £4.	50 2SA1220	£1.10	2SD639	!
7111 £1.50	HA11223	£3.75	LA4460 £1.70	MB3106 £1.00	SAF1039P	£2.00	STR1096	£3.60	TA7629P	£2.75	TDA2003	£1.30	TDA5101 £2	00 2SA1386	£4.70	2SD667	
7112 £3.00	HA11225	£2.10	LA4461 £1.80	M83730 £2.75	SAS560	.£3.50	STR3125	£5.50	TA7630P	£2.00	TDA2004	£1.70	TDA7250 £5.		£0.40	2SD725 2SD787E	
7116 £1.20	HA11226	£3.75	LA4500 £2.70	MB3731 £3.25	SAS570	.23.00	STR40090 .	00.83	TA7640	£2.00	TDA2005	£1.70	TDA7607AP £2.		£0.20	2SD811	- 5
7143£1.65	HA11235	€3.10	LA4570 £2.20	MC13002P £5.00	SAS580	.£3.50	STR4211	25.95	TA7658	£2.00	TDA2005S	£2.95	TDA8180£6.		£0.35	2SD836	- 5
7148£1.70	HA1124A	£1.75	LA5522 £2.20	MC1310 £1.25	SAS590	.£3.50	STR440	£5.00	TA7668	£2.00	TDA2006V	£1.95	TDA8190£3.		£0.95	2SD837	-
7158 £4.00	HA11414	£2.50	LA5527 £1.95	MC1330P£2.95	SL1430	£2.80	STR441	£5.00	TA7680	£4.80	TDA2020 TDA2030	£3.50	TDA8341 £3.		£1.50	2SD837 2SD845	
7160 £6.00	HA11701	£3.10	LA6358 £5.00	MC14001BCP £1.10	SL1431	€2.80	STR451	£4.95	TA7681AP	£5.75	TDA2030	£1.10	TDA9503 £2 TDA9513 £2		£0.40	2SD868	
7169 £3.50	HA11713	28.90	LA7016 £2.50	MC14093B £1.50	SL1432	£1.10	STR454	£4.85	TA7687	£2.00	TDA2030H .	£2.00	TEA1009 £2		£1.60	2SD869	5
7171K £8.00	HA11714	£3.50	LA7096 £4.00	MC14426P Σ2.20	SL471DP	£2.20	STR50020	£7.90	TA7698A	£6.85	TDA2030V	£1.75	TEA1014 £2		£0.55	2SD870	
7205£1.95	HA11715	£3.20	LA7210 £3.10	MC14429P Σ2.20	SL480 SL490	£3.30 £3.00	STR50103A	£5.50	TA7698AP	£7.50	TDA2151	£3.00	TEA1039 52		£2.30 £2.50	2SD871	
7213£1.10	HA11747A	£12.75	LA7305 £6.90	MC14497P £5.50 MC14511BCP £2.00	SL901B	£3.00	STR5412 STR58041 .	£5.95 £6.75	TA7709	£2.50	TDA2161	£1.75	TEA2018 £2	10 2SC1826	£1.80	2SD895	
7218 £1.20	HA11749	£7.00 £3.50	LA7309 £3.75	MC14511BCP £2.00 MC14516BCP £2.00	SL917B	£2.50	STR6020	£4.90	TA7738	€2.50	TDA2170	£3.00	TEA2018A £2	10 2SC1942	£2.10	2SD898	
220	HA12005	£3.80	LA7507 £4.00 LA7520 £3.25	MC1458/UPC1458	SN76670N	£1.25	STR8050	£14.15	TA78L010P	£1.75	TDA2270	£2.20	TEA5101 £6		£1.30	2SD898B	
222£2.10 223£7.60	HA12017	£2.00	LA7520 £3.25 LA7800 £1.50	£1.95	SSA1075	.25.90	SVM993C	£2.00	TA8101N	€4.25	TDA2320	£0.90	TLD11CP 52	DO 2SC2003	£0.25	2SD9008	
224 £1.40	HA12026	£2.00	LA7801 £1.25	MC3359 £1.10	SSA1250	£3.50	TA4180	£3.00	TA8102P	£4.25	TDA2510	€4.30	TL072CP £2	00 2SC2027	£4.50	BC107B	
225 £1.90	HA2413	£1.20	LA7820 £1.90	MCU2632 £1.90		£12.00	TA4193	25.00	TA8644	£5.50	TDA2521/3 .	£9.75	TMM 2114AP £5	75 2SC2230	€0.50	BC108 BC108B	
273 £2.00	HA13001	€1.80	LA7830 £2.50	MDA2061 £7.00	ST1195	£5.50	TA4194	25.50	TAA310A	£2.00	TDA25220	£10.75	TMS1944AN2L £2	00 2SC2238.	£0.75	BC115	
310£1.10	HA13402	€8.20	LA7913 £1.30	MDA2062 £3.50	STA401A	£3.75	TA4301	£4.50	TAA550	£2.10	TDA2530Q .	£4.25	TMS1952 £2	.50 2SC2331	21.00	BC118	
311 £1.75	HA13403	£4.00	LM1011N £3.00	MEA2050 £4.60	STA441C	£3.00	TA4345	£3.40	TBA120S	20.50	TDA2532	£3.00	TMS1956£2		£1.50	BC147A	
7315 £1.75	HA1350	£9.00	LM1017/M192B1	MEA2901 £3.00	STK0029	£4.30	TA4350	26.00	TBA530	£1.00	TDA25320 .	£3.00	TMS1965NL £2		£0.26	BC159	
324£4.50	HA1368R	£2.55	£2.30	MH27316 £3.00		£10.00	TA7120	£1.25	TBA560	£1.00	TDA2540	£2.75	TMS3450 £2		£3.04	BC171	
410£2.10	HA1374	26.00	LM1035 25.75	ML232B £4.50		£12.00	TA7137	£1.25	TBA750Q	£4.20	TDA2541	£2.00	TMS3615£1		£0.55	BC172	
415£1.40	HA1377	£2.00	LM1036N £3.70	ML237 (BTT6018)	STK2029	.28.50	TA7176	£2.50	TBA800	£0.85	TDA2543	£5.25	U410B £1		£1.50	BC172C	
420 £3.20	HA1388	£4.00	LM1112CN £3.30	€3.50		£12.00	TA7176AP	. £2.40	TBA820M	£0.45	TDA2560	£3.75	U416B£1		20.95	BC182L	
818F£1.60	HA1392	£3.00	LM13600 £5.00	ML238B £7.50	STK2250	£9.20	TA7193AP	£4.00	TBA920S	£1.00	TDA25600 . TDA2576A .	£1.10	UA767PC£1		£1.25	BC183	
03	HA1394	£4.00	LM1868N£1.50	M293£4.00	STK3041	.£5.70	TA7193P	26.00	TCA640	£3.75	TDA2576A .	£2.80	UA/0/10	.00 2SC2631	20.30	1	
320 £1.50	HA1397	€5.40	LM1894N £5.75	ML923 £4.50	STK40090	£8.00 £8.75	TA7205	£1.75 £1.25	TCA660B	£3.95	TDA2578	£3.00	-	-		A	_
332 £1.00	HA1398	£3.50	LM317T £1.00	ML923DP £4.50	STK4121 II	.18.75	TA7205AP .	£2.25	TDA1005	£2.50	TDA2578A	£2.80	TO STATE OF STATE	1000			
01B £1.50	HA1406 HA1457	£2.00 £2.10	LM324 £0.80 LM339 £0.80	ML926 £4.20 MM314APL £1.75		£10.00	TA7222	£2.25	TDA1010A	£1.10	TDA2579	£3.50	A	EL.	3 848	H : 1 [64	Ľ
18 £2.50	HA4219	£2.70	LM339 £0.80	MM314APL £1.75 MM53108N £1.25		£11.50	TA7227P	£2.30	TDA1011	£1.20	TDA2581Q	£2.50			22	ш	×
28 £1.10 308 £2.10	HD14081	έ0.25	LM339N E0.75	MM53108N £1.25 MM5387 £2.90	STK4171 II	£9.00	TA7230P	£1.65	TDA1013	£2.75	TDA2582	£2,55	THE RESERVE OF THE PARTY.				
33 £1.40	HD4539	£0.70	LM386N £0.80	MM5402 £1.50	STK430	00.02	TA7232P	£1.50	TDA1013A	£1.90	TDA2590	£2.00	SEE	ADDRE	SS D	FIAILS	1
333 £1.40	KA2210	£2.70	1 M556CN8 C2 50	MM5405N £3.50		£10.20	TA7233P	£2.10	TDA1015	£1.20	TDA2591	£2.70	Maria Allegan		The Real Property lies	ALC: UNKNOWN	

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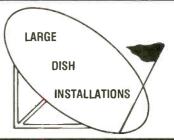
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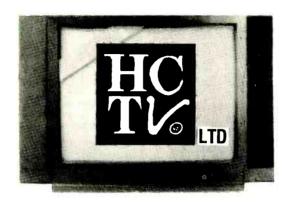
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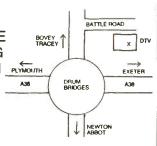


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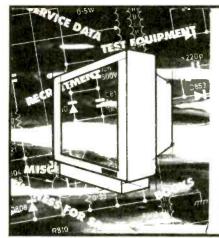
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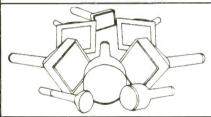
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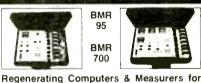
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MS044/1550 £1.00	K4 Focus Pot	U 19885 40p U 3832 15p U 3845 15p MR 501 10p MR 501 10p MR 902 10p MR 902 10p MR 901 10p MR 902 10p MR 901 10p MR 902 10p MR 902 10p MR 901 10p MR 901 10p MR 902 10p MR 901 10p MR 901 10p MR 902 10p MR 901 10p	R 2210 R 2265 R 2265 R 2305 R 2305 R 2305 R 2305 R 2305 R 2305 R 2306 R 232233. p. R 2323 R 2396 R 2433=BD124 R 2433=BD124 R 2540 R 2433=BD124 R 2540 R 2737 R 2738=T1P41 R 2775=T1P41 R 3129=T1P47 T 6068V R 4050 S 20005 S 2	60p 60p 60p 50p 50p 50p 30p 30p 15p 50p 50p 80p 50p 40p 40p 40p 51.00 £1.00	Pye 725 LOPTs £6.00
Receiver TX IIII Panel LC. No. SAB3035 —MAB8440P D066 —SAA IIIMO —PCF8571P New Model Philips Meter £20.00 4 Types Fidelity front panels with i.c. & pats B1 IIIS Meter £12.00 4 Types Fidelity front panels with i.c. & pats B1 IIIS Meter £12.00 4 Types Fidelity front panels with i.c. & pats B1 IIIS Meter £12.00 4 Types Fidelity front panels with i.c. & pats B1 IIIS Meter £12.00 4 Types Fidelity front panels with i.c. & pats B1 IIIS Meter £12.00 4 Types Fidelity front panels with i.c. & pats B1 IIIS Meter £12.00 4 Types Fidelity front panels with i.c. & pats B1 IIIS Meter £12.00 4 Types Fidelity front panels with i.c. & pats B1 IIIS Meter £12.00 4 Types Fidelity front panels with i.c. & pats B1 IIIS Meter £12.00 4 Types Fidelity front panels with i.c. & pats B1 IIIS Meter £12.00 4 Types Fidelity front panels with i.c. & pats £10.00 E2.00 E2.00 E3.00 E3	Bush Tube Base on panel £1.50	U 3832	R 2265 R 2305 R 2306 R 2306 R 2306 R 2306 R 2306 R 2322333. p R 2323 R 2396 R 2461 R 2433 = BD124 R 2433 = BD124 R 2540 R 2737 R 2738 = T1P41 R 3129 = T1P47 T 6068V R 4050 S 20080 S	50p 50p 50p 50p 50p 30p 1.5p 50p 50p 50p 50p 50p 50p 50p 60p 61.00	Thorn SSU-SSULOPTS
I.C. No. SAB3035	TX ID Tube Base on Panel £3.00 1100 L.O.P.T. Green Spot TX IDU Thorn Comparison	U 3832	R 2306 R 2322333. p R 2323 R 2323 R 2323 R 2323 R 2326 R 2461 R 2030 R 2461 R 2030 R 2433=BD124 R 2540 R 2433=BD124 R 2540 R 2775=T1P41 R 2775=T1P41 R 3129=T1P47 T 6068V R 4050 S 2088b 2SD898B 2SC1942 Hittechisels etc. STR454 STR454 STR454 STR4621 BU 10501 BU 2050 BU	air 80p 15p 15p 15p 15p 80p 80p 22.00 40p 40p 40p 40p 50p £1.00	CMC 302 Punel with TC mains switch etc £5.00 CMD 800 Decoder £8.00 C7 Hand Set £6.00 A L.C. Power Supply G11 Full Remote Receiver Panel £3.00 Meters Hills 520 Meters Hills 520 Meters Hills 420 Hills HD5900 Digital Meter 1000 DC TSUAC HI Anny 20 MRG Rangers £28.00 HT100 Multimeter £7.75 TSUAC HI Anny 20 MRG Rangers £28.00 HT7100 Digital Hills F15.00 HT7100 Digital Low Cost Digital £15.00 HD5900 Digital £25.00 HD5900 Digital £25.00 HD9900 Digital £25.00 HD9900 Digital £25.00 HD9900 Digital £35.00 HILDS00 Digital £35.00 HD9900 Digital £35.00 HILDS00 Digital £35.00 HILDS00 Digital £35.00 HD9900 Digital £35.00 HILDS00 Digital £35.00 H
	TX IDU Thorn	U 3832	R 2323 R 2323 R 2396 R 2461 R 2433 = BD124 R 2433 = BD124 R 2530 R 2737 = T1P41 R 2738 = T1P41 R 3129 = T1P47 T 6068V R 4050 S 2080b 25C040 Hitachi sels etc. STR454 STR6120 K 2800AF line o.p. 25C040 BU 1050M BU 1050M BU 1184 BU 126 BU 1184 BU 216 BU 217 BU 3184 BU 2186 BU 217 BU 3180 BU 2186 BU 3180 BU 3180 BU 3180 BU 3180 BU 3180 BU 3180	15p 50p 80p 50p 30p 30p 40p 40p 50p \$1.00	cic £5.00 CMD 800 Decoder £8.00 C7 Hand Set £6.00 3.1.C. Power Supply G11 Full Remoue £3.00 Meters Hills 520 Meters Hills 520 Mills HD5000 Digital Meter 1000 DC F150AC 10 Anny 20 MRG Rangers £28.00 HT7100 Multimeter £6.75 F1750A Will Anny 20 MRG Rangers £28.00 HT7100 Multimeter £7.75 F1750A Will Multimeter £7.75 HT300 Multimeter £20.00 HT7100 Digital £15.00 HD100 Low Cost Digital £15.00 HD500 Digital £15.00 HD500 Digital £22.00 HD500 Digital £25.00 HD900 Digital
PCF8571P New Model Philips Meter £20.00 4 Types Fidelity front panels with i.e. & pats £2.00 each BB 105A×12 £1.00 BB 105A×12 £1.00 BB 105G×12 £1.00 BB 105G×12 £1.00 BB 105G×12 £1.00 Comp bridge rec. wire end skew end ske	TX IIVI Thorn G9 Lopt G9 Lopt 6 Diode Tripler. Mullard 75p Line O P Trans. Mono T.X. 12"-14" Philips G8 2832 210.00 2733 210.00 2733 210.00 2737 210.00 2737 210.00 2737 210.00 2738 210.00 2739 210.00 2739 210.00 2739 210.00 2739 210.00 2739 210.00 2739 210.00 2739 210.00 2739 210.00 2739 210.00 2739 210.00 2739 210.00 2739 210.00 2739 210.00 2739 210.00 2739 210.00 2739 2739 2739 2739 2739 2739 2739 2739	MR 508 109 MR 501 109 MR 501 109 MR 502 109 MR 502 109 BCW 71R 309 BYF 1202 109 BYF 1204 109 BYF 3126 409 BYY 30600 359 BYX 30600 359 BYX 30600 759 BYX 35600 109 BYX 30600 759 BYX 40600R 759 BYX 55610 109 BYX 2050 159 BYX 2050	R 2461 R 2030 R 2433 = BD124 R 2540 R 2433 = BD124 R 2540 R 2737 R 2738 = T1P41 R 2775 = T1P41 R 3129 = T1P47 T 6066V R 4050 S 2088b 2SD898B 2SC1942 Hitachi sets etc. STR454 STR6020 K S 2080 = EC. STR454 BU 1050	50p 50p 50p 50p 50p £2.00 40p 40p 40p 40p £1.00	CMD 800 Decoder
701 Hills Meter £12.00 4 Types Fidelity front panels with i.e. £2.00 each £1.00 BB 105 £2.00 each £1.00 BB 105 £1.2 £1.00 BB 105G×1.2 £1.00 Composition of the c	Color	BCW 71R 30p BYF 1202 10p BYF 1204 10p BYF 1204 10p BYF 3126 40p BYX 300 10p BYX 30600 35p BYX 30600 35p BYX 30600 50p BYX 35600 50p BYX 555600 (Bead) 10p BYX 556600 (Bead) 10p BYX 30600 50p BYY 95C 12p BYY 96D 10p BYV 95C 12p BYY 96D 10p BYV 106 10p BYV 116 10p BYV 31600 10p BYV 305 10p BYV 307 10p BYV 307 10p BYV 307 10p BYV 307 10p	R 2433=BD124 R 2540 R 2737 R 2738=T1P41 R 2775=T1P41c R 3129=T1P47 T 6068V R 4050 S 2008b 2SD898B 2SC1942 Hitachi sels etc. STR454 STR6120 K 2SD84B BU 1050M BU 1050M BU 1050M BU 1184 BU 126 BU 1084 BU 207 BU 3080 BU 207 BU 3080 BU 2080	30p £2.00 40p 30p 40p 50p £1.00 £1.00 £1.00 £1.00 £1.00 £1.00 £1.00 80p £1.00 80p £1.00 80p £1.00 80p £1.00 80p £1.00 80p £1.00	3 I.C. Power Supply G11 Full Remote Receiver Panel E2.00 Meters Hills 520 Meters Hills 520 Mils HD59MD Digital Meter 1000 DC 110.00 Hills HD59MD Digital Meter 1000 DC 150.00 HTH0 Multimeter E2.00 HD100 Digital E2.00 HD100 Digital E1.00 HD260 Digital E2.00 HD59MD Digital E2.00 HD89MD Digital With capacity Temp Truns Volts Ohms and Amps ranges (60.00 Harts Red Handset Tester With LED E4.50 Repaired Handsets
701 Hills Meter £12.00 4 Types Fidelity front panels with i.e. £2.00 each £1.00 BB 105 £2.00 each £1.00 BB 105 £1.2 £1.00 BB 105G×1.2 £1.00 Composition of the c	GP Lopt 54.00	BYF 1204 BYF 3126 BYF 3126 BYF 3126 BYF 3126 BYX 10 100 BYX 10 BYX 10 BYX 10 BYX 10 BYX 10 BYX 30600 S5p BYX 38/300 S5p BYX 38/300 S5p BYX 58/300 S5p BYX 58/300 S5p BYX 55/600(Bead) BYV 55 BYX 55/600(Bead) BYV 55C BYX 106 BYV 95C BYV 96D BYV 106 BYV 96D BYV 106 BYV 96D BYV 106 BYV 95C BYV 15/18 BYW 15	R 2737 R 2738—TIP41 R 2775—TIP41c R 3129—TIP47 T 6068V R 4050 S 20080b 28D898B 28C1942 Hitachi sels etc. STR454 STR4120 K 320040 Filico.p. 28C940 BU 1050M BU 1050M BU 1050M BU 1184 BU 126 BU 1014 BU 205 BU 2014 BU 207 BU 308 BU 207 BU 308 BU 208 BU 208 BU 208 BU 208 BU 208 BU 208 BU 308	40p 30p 40p 50p £1.00 80p £1.00 £1.00 £1.00 £1.00 £1.00 £1.00 £1.00 £1.00 £1.00 80p £1.00 £1.00 80p £1.00 80p £1.00 80p £1.00 80p £1.00 80p £1.00 80p £1.00 80p £1.00 80p £1.00 £1.00 80p £1.00 £1.00 80p £1.00 £1.00	Receiver Panel £3.00
4 Types Fidelity front panels with i.e. & pais B 105	Line O.P. Trans, Mono T.X. 12"-14" Philips G8 27482 4822 £10.00 10273 10273 10701500 LOPT 21/pots 3.500 Loff each type G8 Trans, Philips G1 Spili Diode CVC®D Spili Diode ITT Thom BW AD530RF + Stik + Lead GEC 2040 GEC 2110 Mullard AT 2036 F1.50 GEC 2040 GEC 2110 Mullard AT 2036 F1.50 Spili Diode ITT Spili Diode CVC®D Spili Diode F1.50 GEC 2040 GEC 2100 Mullard AT 2036 F1.50 GEC 2040 GEC	BYF 31.20 40p BYF 3214 40p BYX 10 10p BYX 30700 35p BYX 38700 35p BYX 38700 75p BYX 38700 75p BYX 38700 75p BYX 38700 10p BYX 38	R 2775=TIP41c R 3129=TIP47 T 6688V R 4050 S 2008b 2SD898B 2SC1942 Hitachi sels etc. STR454 STR6120 S 2008AF fine o.p. 2SC940 BU 105/14 BU 1184 BU 126 BU 1081 BU 207 BU 208 BU 207 BU 208	40p 40p 50p £1.00 80p £1.00 £1.00 £1.00 £1.00 80p £1.00 80p £1.00 50p £1.00 £1.00 80p £1.00 \$1.0	Meters Hills 52
& paits BB 103	2/48/2	BVX 55/380 10p BVX 55/600(Bead) 10p BVX 55/600(Bead) 10p BVX 55/600(Bead) 10p BVX 55/600(Bead) 10p BVX 95C 12p BVY 95C 12p BVX 95C 10p BVX 106 10p BVX 106 10p BVX 106 15p BVW 95C 15p BVW 95C 10p BVW 2950 15p BVW 2950 25p BVW 2	T 60/68V R 40/50 S 20/08b S 20/08b S 25/08b B 25	50p £1.00 80p £1.00 £1.00 £1.00 £1.00 £1.00 \$0p £1.00 \$0p £1.00 \$0p \$1.00 \$0p \$75p \$0p \$1.00 £1.00 \$1.00 \$1.00 \$1.00 \$1.00 \$1.00 \$0p \$1.00 \$1.00 \$0p \$1.00 \$	Hills HD5900 Digital Meter IDMOV DC 750AC III Anny 20 MRG Rangers £28.00 HT100 Multimeter £27.75 HT500 Multimeter £7.75 HT500 Multimeter £7.75 HT500 Multimeter £7.76 HT500 Multimeter £7.76 HT500 Multimeter £7.76 HT500 Multimeter £7.70 HT500 Multimeter £7.00 HT500 MILTO £15.00 HT500 Digital £15.00 HD5500 Digital £25.00 HD500 Digital £25.00 HD500 Digital £25.00 HD500 Digital With capacity Temp Truns Volts Ohms and Amps ranges 660.00 HD500 Amps and Education HD500 Digital With capacity Temp Truns Volts Ohms and Amps ranges 660.00 HD500 Digital With capacity Temp Truns Volts Ohms and Amps ranges 660.00 Hanset Tester Works of 49 volt battery £8.00 Fits in top pocket.
& paits BB 103	Thom 1690 LOPT	BVX 55/380 10p BVX 55/600(Bead) 10p BVX 55/600(Bead) 10p BVX 55/600(Bead) 10p BVX 55/600(Bead) 10p BVX 95C 12p BVY 95C 12p BVX 95C 10p BVX 106 10p BVX 106 10p BVX 106 15p BVW 95C 15p BVW 95C 10p BVW 2950 15p BVW 2950 25p BVW 2	S 2018b 2SD898B 2SC1942 Hitachi sels etc. STR454 STR4620 K S 2010AF line o.p. 2SC940 BU 11551A BU 124 BU 124 BU 124 BU 126 BU 181 BU 281 BU 281 BU 281 BU 380 BU 381 BU 380 BU 381 BU 380 BU 381 BU 381 BU 381 BU 381 BU 381	80p £1.00 £1.00 £1.00 £1.00 £1.00 £1.00 \$0p £65p 64p 75p £1.00 £1.00 £1.00 £1.00 £1.00 £1.00	117100 Multimeter
BB 115 BX 12 B1.00 BB 115 CX 12 B1.00 BB 115 CX 12 B1.00 BB 115 CX 10 BB 115 CX 10 The part 10 A A	GITSpitt Dode CVCX20 Spit Diode ITT Thorn B/W AD5308F + Stik + Lead GEC 2040 GEC 2040 GEC 2110 ST.00 Mullard AT 2036 Pye 160 Line Trans Pye 160 Line Trans St.00 Pye mono Rank mono 1704A St.50 Spitt Diode Trans GEC 20 AX Rank Z522 Rank L.O.P.T. 2970 CVCX00 Line Trans CVCX80 Line Trans CVCX80 Line Trans GEC 20 AX Rank Z522 Spitt Diode CVCX 5 Spitt Diode CVC 45 GEC Portable G10712041 GEC Po	BYX 55600 (Bead) 10p BYX 36600 50p BYX 958 10p BYX 95C 12p BYV 96C 12p BYV 96D 10p BPW 41 15p BYW 52 106 10p BPW 41 15p BYW 55C 10p BYW 95C 10p BYW 95C 10p BYW 95C 10p BZU 15/4 54p BZY 93C75 50p BZW 15/18 30p BZW 15/18 30p BZW 79.3v 10p BZW 79.3v 10p	2SC1942 Hitachi sels etc. STR454 STR6120 S 2000AF line o.p. 2SC940 BU 1050M BU 1050M BU 1180 BU 124 BU 124 BU 124 BU 128 BU 128 BU 281 BU 281 BU 281 BU 281 BU 380 BU 380 BU 380 BU 380 BU 380 BU 380	£2.00 it £6.00 £1.00 £1.00 80p £1.00 50p 965p 60p 75p £1.00 80p 75p £1.00	ID 1000 Digital 13.00 102.00 11.50 1
BB121a 10p each	CVC&D Spili Diode ITT Thorn B/W AD5308F + Suk + Lead GEC 2040 GEC 2110 GEC	BYV 95B 10p BYV 95C 12p BYV 96D 10p BYZ 106 10p BPW 41 15p BYW 52 2A/1000v G11 8p BYW 95C 10p BYW 95C 10p BZU 15/24 54p BZY 950** BZY 950** BZY 950** BZY 950** BZY 950** BZY 950** BZW 15/30 30p BZW 15/30 30p BZW 79.3v 10p BZW 79.3v 10p BZW 79.3v 10p	STR454 STR4120 K S 2000AF fine o. p. 25C940 BU 11550A BU 1150A BU 124 BU 125 BU 126 BU 181 BU 281 BU 281 BU 281 BU 281 BU 281 BU 281 BU 281 BU 381 BU 381 BU 382 BU 382 BU 382 BU 382 BU 382 BU 382 BU 382 BU 382 BU 382 BU 382	£2.00 it £6.00 £1.00 £1.00 80p £1.00 50p 965p 60p 75p £1.00 80p 75p £1.00	ID 1000 Digital 13.00 102.00 11.50 1
A/I/M/W/ 10p	Lead £1.50	BVZ 106 10p BPW 41 15p BPW 41 15p BFW 85 2A/1000v G11 8p BVW 2995 15p BVW 2995 15p BVW 95C 10p BZU 1524 54p BZY 93c75 50p BZW 15/18 30p BZW 15/18 30p BZW 15/20 10p BZW 79.3v 10p BZW 79.3v 15p BZW 70.5v 2 10p BZW 70.5v 2 15p BZW 70.5v 2 15p BZW 70.5v 30p	STR454 STR4120 K S 2000AF fine o. p. 25C940 BU 11550A BU 1150A BU 124 BU 125 BU 126 BU 181 BU 281 BU 281 BU 281 BU 281 BU 281 BU 281 BU 281 BU 381 BU 381 BU 382 BU 382 BU 382 BU 382 BU 382 BU 382 BU 382 BU 382 BU 382 BU 382	80p £1.00 50p 80p £65p 60p 75p £1.00 £1.00 80p 75p 90p £1.00	ID2500
DG3F EQV-BY228 10 for £1.00 SFE4G202 15p Eqv. BYX71/r/still) 5/8/10. 15p Eqv. BXX71/r/still) 5	GEC 2110 Mullard AT 2036 Pye 160 Line Trans 53.00 Pye 160 Line Trans 53.00 Rank mono 1704A 53.50 Spilt Diode Trans GEC 20 AX Rank Z522 Rank L. O. P. T. Z970 CVC800 Line Trans 66.00 CVC425 Spilt Diode CVC45 GEC Portable G1072046 GEC Portable G1072046 GET Portable G1072046 GET Spilt Diode Leads ITT 3800 L. O. P. T. & HT Trans LOPT Rank Z763 Universal Tripler with small focus pot. Green type 57.00	BYW 3950 15p BYW 3950 15p BYW 3950 15p BYW 3950 15p BZU 15/24 54p BZY 193c75 50p BZW 15/18 30p BZW 15/30 30p BZW 7066v2 10p BZW 79.3v 10p	S 2000AF line o.p. 35C940 BU 11850A BU 11850A BU 124 BU 125 BU 126 BU 181 BU 281 BU 281 BU 281 BU 281 BU 380 BU 381 BU 380 BU 381 BU 385	80p £1.00 50p 80p £65p 60p 75p £1.00 £1.00 80p 75p 90p £1.00	Trans Volts Ohms and Amps ranges (60.00 Infra Red Hanset Tester Works at 24 feet - Sound repeater. Works of 9 volt battery Fits in top pocket. Handset Tester with LED £4.50 Repaired Handsets
2 amp bridge rec. wire end SKE-4G/2U2 15p Eqv. BY X71/6(0) 5(0)ns. Thorn Spares 9(0)0 Frame panel 28,00 9(0)0 Cyclops panel 21.50 3 Way regulated adaptor 24/0 6V/7.55V/3/0/mA 23.50 4 Push button unit preh 6 6 Push button VHF/UH for Vicap, GEC-Decea type 7 Push button for CVCS ITT 8,00	Pye 160 Line Trans £3.00 Rank mono 1704A £3.50 £3.00 Rank mono 1704A £3.50 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £4.75 £3.00 £5.	BVW 95C 10p BZU 15/24 54p BZY 15/25 50p BZW 15/18 30p BZW 15/30 30p BZW 15/30 10p BZW 79.3v 10p BUN 7066v2 10p BUN 70,3v 10p Bush Thyristor RCA 76122 £1.00 Transformer 24Mv/2hv-540M/a 75p Chassis type Transformer 24Mv/2hv-540M/a 75p CVC 20 tube base £2.00	BU UISANA BU UISA BU UISA	80p £1.00 50p 80p £65p 60p 75p £1.00 £1.00 80p 75p 90p £1.00	Trans Volts Ohms and Amps ranges (60.00 Infra Red Hanset Tester Works at 24 feet - Sound repeater. Works of 9 volt battery Fits in top pocket. Handset Tester with LED £4.50 Repaired Handsets
Eqv. BYX71800 500ns.	Spit Diode Trans \$7.00 GEC 20 AX Rank Z522 \$3.00 Rank L.O.P.T. 2970 \$3.00 CVC 800 Line Trans \$6.00 CVC 255 Spit Diode \$10.00 GEC Portable G10712041 \$3.00 GEC Portable G10712041 \$3.00 GEC Portable G10712041 \$3.00 GEC Portable G10712041 \$3.00 GET Optrable G10712041 \$3.00	BZW 15/18 30p BZW 15/30 30p BZW 70c6v2 10p BZW 70.5v 10p BZW 79.3v 10p Bush Thyristor RCA 76122 £1.00 Transformer 240v/20v.5400Ma 75p Chassis type Transformer 240v/20v.5400Ma 75p CVC 20 tube base £2.00	BU 124 BU 116 BU 118b BU 284 BU 285 BU 286 BU 387 BU 387 BU 38A BU 318D BU 222	50p 80p 605p 60p 75p £1.00 £1.00 80p 75p 90p £1.00	Hardset Tester Works off 9 voil battery Fish in top pocket. Handset Tester with LED £4.50 Repaired Handsets
9.00 Frame panel £8.00 £1.50 £1.50 \$	Rank L.O.P.T. 2970 \$3.00	BZW 70-6v2 10p BZW 79.3v 10p Bush Thyristor RCA 76122 £1.00 Transformer 2480/281v.5400Ma 75p Chassis type Transformer 2480/281v.5400Ma 75p CVC 20 tube base £2.00	BU I/Nb BU 20/4 BU 20/6 BU 20/6 BU 20/7 BU 20/8 BU 20/8A BU 20/8A BU 20/8A	665p 60p 75p £1.00 £1.00 80p 75p 90p £1.00	Works at 24 feet - Sound repeater. Works off 9 volt battery Fits in top pocket. Handset Tester with LED £4.50 Repaired Handsets
9.00 Frame panel £8.00 £1.50 £1.50 \$	CVC225 Spiti Diode CVC 45 GEC Portable G10/T2041 GEC Portable G10/T2046 GEC Portable G10/T2	Bush Thyristor RCA 76122 E1.00 Transformer 240v/20v.5400Mu 75p Chassis type Transformer 240v1/2 Volts 500mm 75p CVC 20 tube base 22.00	BU 205 BU 206 BU 207 BU 207 BU 208A BU 208A BU 208A BU 222	75p £1.00 £1.00 80p 75p 90p £1.00	Works off 9 volt battery Fits in top pocket. Handset Tester with LED Repaired Handsets \$4.50
3 Way regulated adaptor 240V 6V/ 7.59V/30WmA Rank/Toshiba preh unit 0354 4 Push button unit preh 6 Push button VHF/UHF for v/cap. GEC-Decca type 7 Push button for CVC5 ITT \$8.00	GEC Portable G10T2041 £3.00 GEC Portable G10T2046 £3.00 EHT Split Diode Leads ITT 3500 L.O.P.T. & HTT Trans each £2.00 LOPT Rank Z763 £5.00 Universal Tripler with smull focus pot. Green type £7.00	Transformer 240\/2(N-500\)Mu 75p Chassis lype Transformer 240\/12 Volts 500\)m/a 75p CVC 20 tube base £2.00	BU 207 BU 208 BU 208A BU 208A BU 208D BU 222	£1.00 30p 75p 90p £1.00	Handset Tester with LED £4.50 Repaired Handsets
4 Push button unit preh 6 Push button VHF/UHF for y/cap. GEC-Decca type 7 Push button for CVC5 ITT £8.00	EHT Split Diode Leads ITT 3500 L.O.P.T. & HTTrans each £2.00 LOPT Rank Z763 £5.00 Universal Tripler with small focus pot. Green type £7.00	Transformer 240\/2(N-500\)Mu 75p Chassis lype Transformer 240\/12 Volts 500\)m/a 75p CVC 20 tube base £2.00	BU 208A BU 208D BU 222	75p 90p £1.00	
v/cap. GEC-Decca type £7.00 7 Push button for CVC5 ITT £8.00	Universal Tripler with small focus pot. Green type £7.00	CVC 20 tube base £2.00	BU 222	£1.00	Philips K4-K35, RC5350-RC5300.
KT3 17 Push button unit	with small focus pot. Green type £7.00	Tube Base Rank & G11 £1.20	1 RH 376		PC5370 PC5375 required same day
KT3 (Export) 12 P.B.u £2.00			BU 407	00.12 q06	RC4001 Full Remote KT3 K30 Teletext
6 Push button Unit Thorn £1.00 6 Push button GRC £6.00		BRIDGES KBL-005 30p	BU 426A BU 500	45p £1.10	Handsets exchanged £15.00
6 Push button PYE 731 £6.00 Hearing aid unit £3.00	KT3 Triplers £6.00 S.T.C. Universal Tripler £6.00	KBL 02 KBP 04 30p	BU SIOD BU SONA	£1,00 90p	GEC Full Remote Infra-red, 1983 models £15.00
Rank Z7184 P/B/Unit MECH 54.00 7 Button Unit GEC with Lamps 57.00	ITT CVC 5-8-9	W02 15p W004 15p	BU SINAF BU SIND	£1.00 -	TOSHIBA HAND SETS
697 Push Button Unit £6.00 Z916B panel £5.00 T513AP panel £5.00	Rank 11TCP A-823 £3.50 TU 25 30K Rank £3.00	W005 800V Bridges 21/2 Amp 30p	BU 50kV BU 705	00.13	CT9185 CT9176 CT9133 CT938 CT9144 CT9185 CT9193 CT9393 CT9384 £4.00 each
T513AP panel £5.00	11 TEZ Rank £3.00 G9 Philips £4.00 £4.00 £4.00	G11 Drawer ASS 3 pots Mans Switch	BU 806A BU 807	£1.00	Rediffusion MK3 £5.00
TT14 GEC TEX-DECODER 13 IC Panel with cable form £9.50	3500 Thorn £3.00 8500 Thorn £4.00	and Lend £2.00	BU ×24 BUT 11	50p 50p	TOSHIRA
13 IC Panel with cable form 29.50	9000 Thorn £7.00 - 9500 Thorn £4.50	K30 Drawer Ass with pots cable forme	BUT 13 600V-28A BUW 11	£1.00 50p	HAND SETS 24 Button CT938 Fuliremote
PHILIPS Decoder SAA IC 5020-5030	9600 Thorn £4.00 2040 GEC £3.50	£1.00	BUW 84 BYW 20408-9	£1,00	THORN
5(40)B-5050 K40 Text Panel £8.00	GEC TVM25 Tripler £2.00 Universal Tripler £5.00	TX10 Drawer with 8 way pots, ass £2.50	BYW 95 BUX 39 25A-150V	£1.00	VCR Front Display Panel £7.00
TOTAL CALL CALL	G8 Tripler £5.00 . CVC20-32 £5.00 . Decca 80 100 £4.50	Hills 9 piece tool kit in case £5.00	BUX 84 BUX 85	50p 50p	Large type ITT TV and V.C.R. Handset £15.00
OF-425	Grundig TVK 52 £2.50 11TBQ Pye 731 £3.00	Philips Coaxial Cable Stripper SBC325	BUY 49 TIC 106a	20p 30p	GEC Ultrasonic 8CH Full Remote £10.00
OF-555 E.W. 50p OF-513 correction 10p	D22 for Pye 18" colour portable £4.00 £4.00	£7.50	TIC 116m TIC 116n/Y 1003	30p 30p	G11 Full Remote Ultrasonic £10.00 G13 Ultrasonic Teletext Handset £10.00 8 C.H. Ultrasonic GEC Full Remote
OF-557 50p	LP 1193/63 £4.00 BG 100/41 £3.25	Self adjusting cutter stripper £5.00	TIC 126N TIC 225S	30p 30p	New Replacement for G11 Ultrasonic
DIODES	ERO Tripler print type with foacs PO7 BG20M7 £5.00	10 mixed tube bars £4.00	TIC 226E TIC 226nt	30p 30µ	Thorn 4000 insert with 7 buttons £5.00
Bridge KBF-08 40p BY 126 10p	T/text ultrasonic rec'r panel	5000 Diodes-Resistors £3.00 pack	TIC 236m TAG 226/600	30p 30p	Decca RC 11 £14.00 Decca RC 12 £14.00 G11 Infra-red full teletext £20,00
BY 127 10n 1	GEC 8 touch unti assy complete with all I.C.'s + pots £4.00 G11 E.W. Transformer 50p G11 E.W. coils £1.00		(T092 case 2A/400V)	10p	Dynatron-Full remote CTV 62, 63, 64 £19.00
BY 133 10p BY 134 10p BY 176 25p BY 179 40p	G11 Transient Suppressors 245V 20p	*D/P push mains switch 20p each	TIP 29 TIP 30	25p 25p	Hitachi infra red handset £18.00 Philips full remote KT3, 16C928/20C934; 7228/7324; K12 26C 797/IST 66K
BY 184 25p BY 187 10p	G11 Sean Coils £5.00 G11 100K tuner pots 12 for £1.00	Mains lead & two pin socket for radio cassette 35p	TIP 30B	25p 25p	GEC infra red full remote 8 channel
BY 190 BY 196 30p	KT3 1F panel £6.00 LT3 line OSc transformer £1.00	T/V loop aerial 75p	TIP.30C TIP.31	25p 25p	Philips infra red full remote 9 channel for
BY 204/4 Kp	KT3/K30 infra-red receiver head £1.00 K30Drawer unit with IC's (home) £10.00		TIP 32 TIP 33B	25p 50p	Philips infra red full remote 12 channel
By 206 – BY 407-Eqv. 8p BY 208/800 8p BY 210/400 5p	KT3 AE Sockets 50p	Radio Telescopic Aerial £1,00	TIP 33C TIP 34A	70p 50p	N.35 N.35 N.35 N.35 N.35 N.35 N.35 N.35
BY 210300 10n	KT3 receiver panel £8.00 KT3 line driver transformer 50p	Philips Silicon Grease £1.50 each	TIP.34B TIP.34C	60p 70p	KT3 Power supply £4.00 GEC infra-red 2236-2026 £4.00
BY 224/600): 4.8A/6000 bridge 50p BY 226 15p	Oye, K30, GEC, etc. Pre-mains stand-by	Freeze Philips £1.50 each	TIP 35B TIP 35C		and
BY 228 1500v 20p	Decca 80/100 IF panel £5.00 NPN PNP 80V 6 Amp TO66 O.P.	Foam Cleaner Philips £1.50 each	TIP 35D TIP 36	80p 50p	Pye & Philips handset KT3-K30 chassis. No RC5150-RC5176-RC5171-RC5177.
Flat BY 229 black 15p BY 279 Red 20n	Trans. pair 25p 5 button touch tuner BBC1/2 ITV I/2 video with ic SAS 560T/570T £7.00	Contact Cleaner Philips £1.50 each	TIP36C TIP41	70p 15p	RC4001 KT3 and Teletex £13.00
BY 229 60p Tag BY 237 5p	Control panel 5 sliders + mains lead £1.50 G11 8 touch button unit replaces old 6	* *	TIP4IB TIP4ID	40p 70p	CVC 45 3 and 2 Pin
BY 255 £30n 1	P.B.U. Tube base + base unit for 820 Euro	100 Coax Plugs EACH 14p	TIP 42 TIP 42/BRC 6109	10p	1 A 9 WITH TEXT £12.50
BY 298 10p BY 299 10p	chassis £4.00 CEC Line O/P Trans. & Rec Stick for	Dc-solder pump + 2 nozzies Philips £4.00	TIP 48 TIP 49	30p	TX9 & TX10 button print £2.00 TX10 Focus Pots £5.50
BY 41h 8p 20m	Portable £3.00 CVC 20/25/30/35/40 decoder panel £10.00 CVC 20/25/30/35/40 decoder panel	Flat Red LED and Green 5p	TIP 57 TIP 100 TIP 102	30p 30p 30p	T/V & Video Processor, 1200 Type £10.00
BY 407a 10p BY 448 10p BY 500/200 5 amp 8p	(untested) £5.00 CVC 40/45 IF panel £5.00	500gm 60/40 Solder reel £6.00	TIP 110		PHILIPS UNIVERSAL HAND SET £12.00 RC5
BY 527 10p BY 602 10p	40K Transducer 50p		TIP 117 TIP 125	20p 50p 50p 35p	KT3 – K45
BYV 26C 10p F247 10p	LM337M Reg. 30p 20 GEC Black Spark Gaps £1.00	Dual v/u meter -20 + 10db £1.00	TIP 126 TIP 127	40p 40p	We have all parts for Philips Handsets RC5353 £15.00
GP20G 5p GRP80G (TX10) 30p	Assy. £2.50	K30 Thermistor 232266298009 75p	TIP 130 TIP 131 TIP 136	.50p	RC5300 £12.00 Philips RC5 £15.00
BYV 28/200 20p	BTW 30/50 50p	De-solder Pump £2.50	TIP 136 TIP 140 TIP 142	30p 50p 80p	TEXT-TYPE
Bridge TX 10 801/3 amps		Portasol Flameless Gas Soldering Iron	T1P 640 T1P 2955	50p	Replace Hand Set for Philips KT3-K30, K4 etc £12.30
Bridge Rec, D35B10 40p		££16.00	TIP L761 A-1000V/4Amp T6032	35p 75p 30p	THORN HAND SETS 9000 - 9600 - TX9 - TX10 - TX100
Internal of the second of the	2001124 (121	Green and Red LED pack mixed 100 for £1.00	T6036 T6040	40p 40p	Text and Non-Text £10.00 PHILIPS
International Rectifier EHT Diodes G7: 6A/600V Stud Diodes 20p	BTW 92/800R £3.00	Hill Meter Leads, S/Rubber and	TriH7 TriH9	40p	RC5171 £12.00
6A/1000V Stud Diodes 20p	25A473 PNP C/P 10p	Probes £4.00	T6051	40p	K35-K4 HAND SET Repaired for £5.00

ELC21013 GEC Tuner V/Cap Hitachi After 1979 ETSA, ETSA, ETSA IB ETSA6 Moultor Asec WH1233 Stp V1874 HIT Amstrad UHF Tuner V1874 HIT HIT GE.00 U321 GE.00 U322 GE.00 U322 GE.00 U323 HIT GE.00 U324 GE.00 U325 GE.00 U326 GE.00 U327 GE.00 U327 GE.00 U328 GE.00 U328 GE.00 U329 GE.00 U329 GE.00 U320 GE.00 U321 UHF GE.00 U324 (UHF) GE.00 U324 GE.00 U324 GE.00 U324 GE.00 U324 GE.00 U324 GE.00 U325 GE.00 U326 GE.00 U327 GE.00 U327 GE.00 U328 GE.00 U329 GE.00 U329 GE.00 U320 GE.00 U321 UHF GE.00 U721 UHF GE.00 U721 UHF GE.00 U722 GE.00 U723 Tuner Fortiable & rotary Tuners Sanyo & Missanii UHF III GE.00 U723 Tuner Fortiable & rotary Tuners Sanyo & Missanii UHF III GE.00 U182 UHF ETSORP Tuner Fortiable & rotary Tuners Sanyo & Missanii UHF III GE.00 U182 UHF GE.00 U182 UHF ETSORP Tuner Fortiable & rotary Tuners Sanyo & Missanii UHF III GE.00 U182 UHF GE.00 U182 UHF ETSORP Tuner V183 HIT GE.00 U182 UHF ETSORP Tuner U182 UHF ETSORP Tuner U182 UHF ETSORP Tuner U182 UHF ETSORP Tuner U182 UHF GE.00	15p BC4113 10p DM/1492 30p 140 161 160 BC416 10p 140 136 30p 140 137 22.00 30p BC454 30p 140 137 23.00 30p BC455 10p 141 137 23.00 30p BC455 10p 141 1323 40p 141 1323 40p 141 137 23.00 30p BC455 10p 141 1423 1.00 1423 142	THORN ML926 MAB840B-C MAB8	TBA625	TDA2578A £2.00 TDA2579A £2.00 TDA2591 £1.00 TDA2591 £1.00 TDA2591 £1.00 TDA2591 £1.00 TDA2591 £1.00 TDA2591 £1.00 TDA2560 £1.00 TDA2560 £1.00 TDA2611A £1.00 TDA2611A £1.00 TDA2611A £1.00 TDA2611A £1.00 TDA2611A £1.00 TDA261A £1.00 TDA
2SC1756 50p BC328/338 pai 2SC1942 £1.00 BC328/338 pai 2SC2027 £1.00 BC338	iir 15p B551/ 36p Charles 200	CSA 3.97M 15p CSA 3.97M 15p CM 6M14z SFE 12p SFE 5.5MHz 20p SFD 46/JB 15p CSB455A 15p	M50430-R505P £1.00 TD6359P £1.00	MN1250BJC £1.00 M50441-5505P £1.00