

AUGUST 1994

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# TELEVISION

SERVICING·VIDEO·SATELLITE·DEVELOPMENT

A REED BUSINESS PUBLICATION

## Servicing PC Monitors

Satellite  
Fault  
Notes

Servicing the  
Philips CTX  
Chassis

Sony  
CCDF350  
Fault  
Report



*Pace MSS1000 Review*



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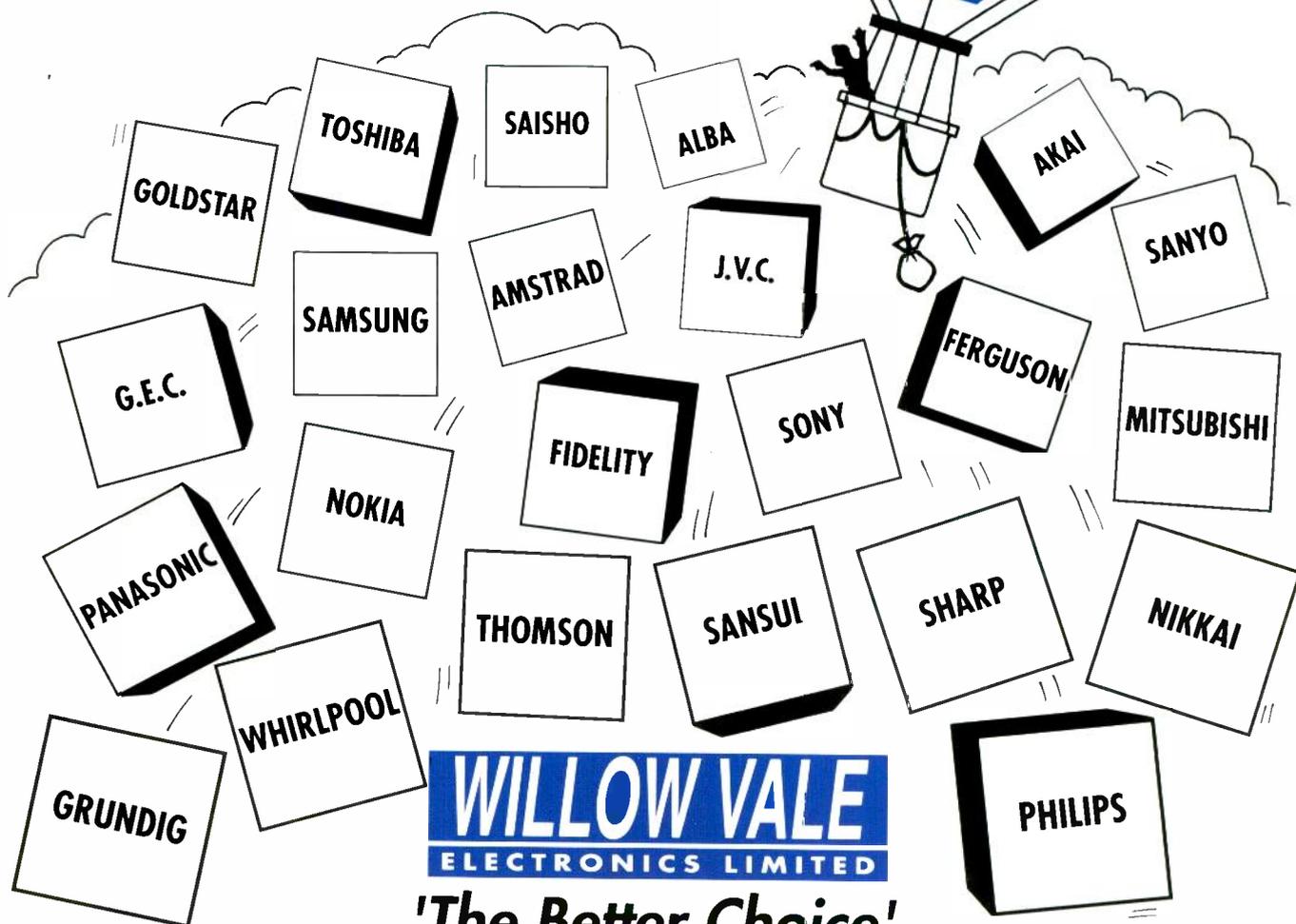
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# TELEVISION

AUGUST  
1994  
On Sale  
July

Vol. 44, No. 10

Issue 526

## 700 Servicing PC Monitors

*Ken Taylor*

Personal computer monitors may use a lot of the same technology as a TV set but to be able to service them you must appreciate the differences, which include the scanning standards. An account of PC monitor standards, the servicing equipment required and some hints and tips.

## 710 Astra 1D - Trouble Ahead?

*J. LeJeune*

In extending the Astra frequency spectrum the 1D satellite will create a number of problems with satellite receiving installations. An account of the complications that will arise and suggestions for overcoming them.

## 714 Substitute for the TDA3652

## 715 CD Player Casebook

## 718 Servicing the Philips CTX-E Chassis

*John Coombes*

Fault-finding notes on this popular small-screen chassis and a look at the power supply circuitry. The information is also generally applicable to the CTX-S chassis.

## 720 Building a Personal Computer, Part 2

*David Botto*

How to set up the computer once you've assembled it, and guidance on suitable software for service department use.

## 723 Review: The HS Test Card C Generator

*Roger Bunney*

An assessment of this test card generator, which stores the pattern in an EPROM.

## 728 Test Report: The F4 Service Department Program

*David Botto*

How this user-friendly program makes life easier in the service department.

## 730 Book Reviews

## 731 Satellite Fault Reports

## 735 Service Notes on the Sony CCDF350

**Camcorder**

*Keith T. Keeton*

## 736 Review: The Pace MSS1000 Satellite

**Receiver**

*Ian Martin*

How this top-of-the-range model, which features Dolby Pro Logic Surround sound, performed on test - excellently.

## 741 Camcorder Casualties

*Brian Storm*

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**The September issue will be published on August 17th**

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All correspondence regarding advertisements should be addressed to the Advertisement Manager, "Television", Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Editorial correspondence should be addressed to "Television" Editorial Department, Reed Business Publishing, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

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Model	Price	Model	Price	Model	Price	Model	Price	Model	Price																																												
<b>AIWA</b> AV66AV77 C700 G900	1200p 1100p 1500p	VCR8103, VCR8107 VIP300A MKII	2200p 1900p	VR3833, 3912, 3913, 3914, 3963, 3975 4913, VPR3833 VR3926	6500p 2000p	NVM11, NVM3, NVM5 V210, AG2200 NV430 NV730, NV770 4 HEAD NV366 NV180, NVD48 NV788 NV810, NV830 NV850, NV950 NV870, NV890, NV970 NVG33, NVG46, NVL23, NVL25, NVL28 NVG10, 11, 12, 14, 16, 120, NV250, 280, 450, 465 NVG18 NVG20, 21, 22, 25, 28, 200, NVD48 NVG50, NVG300 NVG45 VH70 NV688 NV600 AG6800, AH6810 AG6100, AG6200, AG6300 NVG7, NVG9, NV230 NV780 NVG15, NVG400 NV67, NVMC20 NVMT0	4200p 700p 1100p 1550p 1850p 2300p 2900p 2600p 2750p 3600p 2000p 1650p 2000p 2250p 2000p 3600p 2400p 1600p 2600p 2800p 1200p 2800p 2600p 3800p 5200p	VHR1100, VHR1200 VHR1500, VHR2500 VHR2700 VHR7900	1500p 2100p 2450p 3000p																																												
<b>AKAI</b> VS105, 112, 115, 116, 125, 126, 201, 202, 205, 220, 240, 244, 245, 247, 248, 250, 301, 303, 304, VSP8, VSP82 VP7100, VSP900, VSP9500, VSP9800 VP77, VPS8, VP7100, VP7200, VSP9700 VSP9800 VS1, VS2, VS3, VS4, VS5, VS10, VSP1 VS33, VS35, VS37, VS38, VS53, VS55, VS66, VS765, VS767, VS768 VS512, VS515, VS516 VS465 VS11, VS12 VS6, VS8, VS9 VXS9 VSF600, VSF650 VS155, VS165 VS20, 22, 24, 25, 26, 27, 422, 426, 427, VSF10, VSP9 VSR9 VS109, VS603, VS606, VS607 VS75	1350p 2400p 2800p 1400p 2600p 1400p 3500p 2500p 2500p 1400p 1500p 2500p	<b>FISHER</b> FVHP420, 510, 520, 530, 615, 618, 620, 622, 710, 711, 715, 720, 721, 722, 730, 830, 905, 906, 908, 910, 911, 915, 916, 918, 5000, 5001, 5005, 5050, 5075 VBS3500, 7100, 7500, 7600, 9900, VBR330 VBS7000, VBS7100, VBS9000 VHP5500, 711, 715, 721, 722, 730, 830, 5100, FVHD720 FVHP725, 830, 980 FVHP990 FVHP975 FVHD40, FVHD140, FVHP1, FVHP10, FVHP20	1150p 2000p 2000p 1100p 2500p 2700p 2400p 1150p	VR3833, 3912, 3913, 3914, 3963, 3975 4913, VPR3833 VR3926 VP3826, 3906, 3916, 3926, 3946, 3948 VR3927 VR3976 VR3977 VR3978 VR3984, VR3994 VR3995, 3997 VR3915 VR3730, VR3731, VR3749 VR3918, VR3919, VR3938 VR3520, 3701, 3719, 3720, 3721, 3759, 9720 VR3907, VR3908 VR3968	1550p 1400p 2300p 2700p 2300p 1800p 1400p 2500p 1500p 2000p 1600p 700p	<b>J. V. C. &amp; FERGUSON</b> HR2200, 3300, 3320, 3330, 3350, 3360, 3650, 3750, 3860, 4100, 3292, 8900, 8901, 8902, 8903, 8906, 8922, 8928, 3V01, 3V06, 3V22 HR3660, 7600, 7610, 7650, 7700, HRD110, 111, 120, 121, 220, 225, HR5100, 8904, 8923, 8924, 8925, 8929, 8935, 8941, 8943, 8944, 3V16, 3V23, 3V24, 3V31, 3V35, 3V36, 3V38, 3V39, 3V49 BR1600, HRD140, 141, 142, 143, 150, 152, 156, 157, 158, 160, 5101, HR510, 8947, 8948, 3V42, 3V44, 3V45, 3V46, 3V47, 3V52, 3V54, 3V55, 3V56, 3V57 HRD154, 170, 171, 210, 211, 217, 320, 321, 330, 521, 522, 525, 526, 527, 550, 8950, 8951, 3V64, 3V65, FV10, FV11, FV20, FV21, FV25 HRD556, HRD566, 3V48 HRD725, HRD755, 3V43, 3V53 8930, 8931, 8933, 8940, 3V29, 3V30 8945 3V00, 8902, 8903, 8909, 8912, 8922 FV31 FV37, FV43H, HRD860 BR7000E, BR7000S HRD720, 7300, 7350, 2650, BR6200 HRD455 HRD520 HRD300, 400, 580, 600, 620, 650 HRA100 HRD750, HRD830 HRD250, HRD257 3V32, 8942, HR7655 HRD180, 190, 230, 610, 3V59, FV12, FV208, 26, 30, 32, 33, VC141L HRD370, HRD430, HRD470, 3V58, FV13H HRD530, HRD700, FV14T GRC1, GRC2, 3V41 HRD330, 337, 440, 637, 641, 660, HRFC100, FV44L	6500p 2000p 2000p 600p 2000p 1400p 2450p 3150p 700p 1000p 1500p 3500p 2800p 2000p 2300p 1000p 2450p 3100p 2800p 2100p	<b>N.E.C.</b> N9011, 9012, 9013E, 9014E, 9014G, 9015, 9016, 901A, 902A, 9033, 9034, 9040, 9053, 9054, 9055, 9063, 9065, 9066, 906, DX1000, 1600 N911A, 914C, 915A, 916A, 917, 9110, 3120 PVC600, 740, 744, 754, 763E, 764, PV2300, 2400, 760, 790, 770, 774 N380, N381, N383, N331, N332, N333, N834, N835, N836 8261, AH1 (for model DX3000), DX4000, N9610 N895 N9052, N9530, DX2000 VPC2300, 2400, 740, 744, 760, 764 DS6000	1400p 1300p 2000p 1650p 1500p 700p 1250p 1200p 700p 1400p 2450p 3150p 3400p 1700p 1400p	<b>SIEMENS</b> FM350, FM352, FM355, FM361, FM362, FM363 FM364 FM391, FM392, FM461 FM394, FM464 FM462, FM561 FM468 FM484, FM485, FM602, FM604, FM622, FM624 FM585 FM600	2750p 4200p 1800p 2900p 2800p 2000p 3900p 2800p																																										
<b>ALBA</b> VCR4000, VCR5000, VCR6000	1650p	<b>GOLDSTAR</b> 8000 3HSSDB GVH51, GVH122, VCP4000, VCP4100, VCP4200 GHV1232, 1233, 1241, 1242, 1243, 1244, 1245, 1246, 1290, 1291, 1295, 1296, 1891, 8210, 8215, GVHP1240, 1241, 1247, 1248, VCP400, VCP4130, 4300, 4301, 4305, 4306, 4310, 4311, 4315, 4316, 4320, 4321, 4326	1900p 1300p 1300p	<b>G.E.C.</b> 4000H, 4001H, 4002H V4000H, V4004 V4005H	1200p 1200p 1500p	<b>GRANADA</b> CS1, DS2 VHSAH1 VHSAN3 VHSAN3 VHSAY3 VHSBH1, VHSCH1 VHSBP1 VHSBY3 VHSD52 VHSEH2 VHSEY1, VHSEY2 VHSF22, VHSFG4 VHFS1, VHSF52 VHSTJ1, VHSJT2, VHSJT3, VHSWJ3, VHSYJ2 VHSVH4, VHSWH1, VHSXH1, VHSYH2 VHSWJ1, VHSXJ3	1600p 1100p 2400p 800p 1200p 2100p 2600p 1600p 1600p 1400p 1300p 1300p 700p 700p 1600p 700p	<b>GRATZ</b> 4312, 4605, 4905, 4912, 4913, P4833, TR4605, TR4812, TR4905, TR4912, TR4913, TR4914, TR4943 4935, 4943, 4963, 4985, 4993, TR4833, TR4935, TR4965, TR4993 4920, 4927, 4930 4946, TR4906, TR4916 TR4954 TR4995	650p 650p 1700p 1600p 2300p 3300p	<b>GRUNDIG</b> VS410, 440, 450, 460, 500, 505, 510, 520, 521, 530, 546 BARCELONA, MVS400, 440, 500, 600, SE5100, 6100, 6110, 9100, TVR4500, 4510, 5610, VS400, 440, 500, 505, 510, 518, 600, 610, 5180, VS6190, 700, 900 MADRID SE5140, VS540, VS5480 MVS550, 620, VS550, 620, 630, 640, 790, 930, 940 VS120 VS680 VS160, VS740 VS170 MVS660, SE6180, VERONA, VS660, VS6690	1600p 1600p 1600p 1400p 1400p 3000p 3000p 2400p 2400p 4600p 4400p 4600p 3500p	<b>HINARI</b> VXL2, 2, 4, 20, 35 VXL6, V20H VXL7 VXL8, 9, 10, 11, 90, VCR34H, VTV200	1150p 1300p 1500p 2200p 1300p	<b>HITACHI</b> VT11, 14, 15, 16, 30, 33, 34, 330, 340, 503, 640, 5030, VPT10, 30 VT7, VT17, VT18, VT19 VT35, VT38, VT39 VT100, 110, 111, 112, 113, 115, 118, 120, 125, 128, 220, 225, 400, 405, 410, 413, 414, 415, 418, 510, 518, 520, 525, 526, VTM625, 626, 726, 728, 728 VT3000 VT4000, 4200, 5000, 5500, 5600 VT77, 680, 6500, 6700, 6800, 7000, 8000, 8030, 8040, 8100, 8300, 8500, 8700, 9000, 9300, 9500, 9700, 9900 VT8, 9, 56, 57, 570, 575, 576, 580, 585, 588 VT65 VT130, 135, 138, 145, 250, 255, 258, 420, 426, 428, 428, 430, 431, 435, 438, 535, 536, VTL30, 301, VTM630, 635, 636 VT52, VT60, VT61E, VT62E, VT63, VT64, VT640 VT168, VT150, VT260, VT498 (4 HEAD) VT530 VT522, VTM620, VTM622, VTM720, VT722, VTM822 VT680E	1400p 800p 2200p 2400p 2200p 1100p 1100p 1000p 1000p 3400p 2400p 2500p 2600p 2500p 1900p 2600p	<b>H.M.V.</b> HV1000, HV2000, HV3000 HV4000, HV7000, HV8000p	650p	<b>I.T.T.</b> VR3605, 3905, 3935, 3943, 3954, 3958, 3985, 3993, 4993	650p	<b>KENWOOD</b> KV901, KV903, KV905 KV917	650p 2450p	<b>LOGIK</b> VR960 VR950	1500p 1400p	<b>LOEWE</b> OC410, OC420, OC440 OC50, OC55, OC60, OC65	2400p 1500p	<b>LUXOR</b> 9225, 9256 9245, 9251, 9254 9270, 9271, 9273 9272, 928217 928017, 928077, 928097, 929107, 928117 92851 92852 9284, 9295, VR3701, VR3721, VR3731, VR3761	1800p 1225p 1800p 2700p 2500p 1700p 2500p 2700p 2100p	<b>MATSUJI</b> VX500E, 800A, 810A, 820, 80A, 770B, 773B VXRL3, VX730, VX750 VX735, VX755, VX990 VX735A, VX765, VX850 VX600	1200p 1450p 1500p 1750p 1100p	<b>MITSUBISHI</b> HS303, HS304, HS320, HS700 HS306, HS318, HS710 HS307 HS319 HS320 HS400 HS349, HSE31, HSE32, HSB31 HSE411 HSE30, HSB30 HS338 HSE10, HSE11, HSE20, HSE21, HSE41, HSB10, HSB20 HS300, HS301, HS302, HS310, HS273 HS200 HS337, HS347 HSE12, HSE22, MX1 HS411EZ, HS411GZ HSB11, HSB21 HSE50	1500p 1600p 2600p 2500p 2600p 2800p 2400p 2900p 2400p 2200p 2200p 1550p 650p 1500p 2200p 2900p 2200p 3300p	<b>NATIONAL PANASONIC</b> NV300, 322, 333, 390, 2000, 2010, 3000, 7000, 7500, 7800, 7850, 8170, 8200, 8400, 8600, 8610, 8620 NV777, NV330 NV8050, NV8051 AG1000, AG1050, NV260, NV280, NV460, NV470, NV480 AG6010, AG6015 AG6840 NV100, NV200, NV370, NV380, NV630 NVD80, NVH65 NVF65, NVH75 NVF5 NVR11G19 NVJ30, NVHJ33, NVL20, NVL21, NVG30, 31, 40, 130 NVJ35, NVG46	625p 1500p 2800p 1500p 1600p 2500p 2400p 725p 3900p 3200p 4200p 2300p 1800p 1800p 2500p	<b>NORDMENDE</b> 460, 9-460, V100, 140, 200, 250, 304, 341, 450, 550 V1001, 1005, 1015, 1025, 1035, 1041, 1055, 1065, 1105, 2005 V110, V333 V101, 102, 103, 112, 141, 142, 200, 300, 301, 302, 350, 500, 3005 V1205, V1215, V1235, V1245 V1305 V380 V502, V503, V5005	700p 1250p 1200p 700p 1400p 2450p 3150p	<b>PHILIPS</b> VR6460, VR6520, 64VR60, VR6420 VR6711 4 HEAD 6620, VR6440 VR6441, VR6540, VR6541, VR6640, VR6642	725p 1800p 2500p 1300p	<b>RANK</b> BV600AS N830EA, RV300, RV310, RV320, RV330, RV340, RV350, RV380	1800p 700p	<b>REDSON</b> MR100	1700p	<b>SABA</b> 2A10, 2A70, 2B20 4A10, 4B20 6A10, 6A70 8A10, VR6038 CVR6083, VR600, 66007, 6008, 6009, 7006, 7007 PVR6068, 6070, 8070, VR2000, 6000, 6010, 6012, 7000, 9010 VHR7000, VR5005 VR6004, 6005, 6011, 6013, 6014, 6020, 6022, 6023, 6024, 7004, 7011, 7014, 7220, 7730, 8011, 8014 VR8018, VR7018 VR8028 VR7016	1400p 2450p 2300p 2000p	<b>SAISHO</b> VR100, 605, 705, 805, 905, 1000, 1100, 1200, 1600 VR3300X, VR3600X, VR3650, VR3800 VR3200, VR3500 VR2000, VR3300, VR3600	1200p 1400p 1400p	<b>SALORA</b> 5000, 6600 SV7300, SV8200, SV8300, SV9200 SV7400, 8400 SV8100	1500p 1600p 1600p 1200p	<b>SAMSUNG</b> SVX301, VB900, 910, VVT510, VT320, 5600, VX510, 511, 520, 616, 626, 627, 717, 614, 619, 629, 710, 712, 720, 730, 970, 971, 972, SV716, 717, SVX303, 305, 9B510, 520, 610, 616, 617, 619, 620, 626, 627, 629, 710, 971, V1520, 616, 621, 626, 900, 910 VB770, V1730, V1770, VK8220, VK750, VK770, VK8225 VM1560, VN1561	1400p 1200p 1400p 1400p 1900p 2200p	<b>SANYO</b> VTC5000, 5400, 6000, 6500, VPR5000, VTC1500, VTCM10, 11, 20, 21, 25, VTC2000, 5100, 5150, 5300, 5400, 5350, 5370, VTCNX10, VTCNX15, 20, 30, VPR5800 VTC5500, 5550, 9100, 9300, 9350, 9355, 9455, 9500 VHR1100, VHR1150, VHR1300, VHR1700, VHR2300 VHR3200, 3270, 3100, 3150, 3300, 3400, 3120, VHRD500	1800p 2000p 1900p 1300p 1300p 1500p	<b>SHARP</b> VC390, VC393, VC496 VC488 VC779 VC789, VC790 VC200, 220, 300, 381, 383, 384, 385, 386, 387, 388, 471, 477, 481, 482, 483, 486, 3300, 8381, 9100, 9300, 9400, 9500, 9600, 9700 VC582, 583, 651, 681, 750, 780, 781, 683, 684, 402, 500, 571, 573, 580, 584, 600, 682, 683, 700, 772, 7810, 782, 7822, 783, 8481 VC6000, 6200, 6300, 7300, 7700, 7750, 8000, 8300 VC793 VC473, 785, 786 VC699, VCA501, VCA602 VC585, VC685 VC90ET VFH815	2750p 4200p 1800p 2900p 1100p 1800p 3000p 2200p 2800p 2000p 3900p 2800p
<b>SIEMENS</b> FM350, FM352, FM355, FM361, FM362, FM363 FM364 FM391, FM392, FM461 FM394, FM464 FM462, FM561 FM468 FM484, FM485, FM602, FM604, FM622, FM624 FM585 FM600	2750p 4200p 1800p 2900p 2800p 2000p 3900p 2800p	<b>SONY</b> DSR-19R (FOR SL-T9ME) DSR-21R (FOR SLC-B-C9) DSR-35R (FOR C20, C30, C40, SLF1UB, SLF1E) 2 PIN SLC24PS, SLC33E, SLC44PS, SLF30FP, SLF60PS, SLK85, SLT20ME, SLT30ME, SL5000, DSR-43R (FOR SCL1 PIN RANGE, SL5000, SL1600, SL3000) 1 PIN SLC6E, SL36E5, SL37E SLT7000, 8000, 8080, SLC5E, SLT7ME SLV201, 202 SLK95, SLT50ME SLV373VB	3100p 2800p 1300p 1600p 2000p 2900p 2600p	<b>TOSHIBA</b> RV63 V9680 VB800, VB700 V21, V31, V33, V50, V51, V53, V9600 V55, V57 V71, V73, V74, V75, V77, V80, V81, V82, V83, V84, V85, V86, V87 V80, V93 V5470, V5480 V600 V680MS V700G V500G, V509G V9680 V300G, V301, V305, V309G V61, V63 V110, V120, V130, V140, V210, V220	1500p 3400p 3000p 1450p 700p 1200p 1450p 1300p 2350p 3700p 2500p 2900p 2550p 1700p 1800p	<b>TRIUMPH</b> VR9500, VR9501, VR9526	1100p	<b>TELEFUNKEN</b> A890 A920, VR1970, 2920, 2925, 2930, 410, 7921, 7926, 7931, 7970, 970 VR400, 410, 450, 510, 519, 520, 529, 540, 610, 620, 640, 920, 1920 A830, 932, 935, VR2931, 2935, 2941, 3935, 4935, 4940, 4942, 4945, 5935, 7932 A835, VR3945, VR3960, VR7959 A840, VR1925, 1930, 1940, 1950, 2960, 440, 449, 530, 535, 539, 549, 550, 630, 650, 925, 930, 940, 950 VR1980, VR7980, VR980 VR2915 VR2970, VR7971, VR975 VR7979	2700p 1250p 1250p 700p 1400p 2450p 2550p 1700p 1800p	<b>THOMSON</b> TX8000, V309, 316, 320, 321, 323, 326, 4100, 4200, 4300, VX305T, 306T, 309BL, 3301, 312T, 410T, 411T TX8500, V318, 342, 343, 351, 352, 353, 4210, 4230, 4260 V333 V340 V357, VK309LP V360, V5500 V364, V4400 V368, V6000, V8540 V410, 510, 610, 630, 715, 4240 V430, 530, 4340 V450 VK300T, VK301T, VK302T, VK303T, VK308P VM10, VM20	650p 1250p 1100p 2300p 2450p 2000p 2450p 2300p 650p 2700p																																										

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# VCR BELT KITS / REPLACEMENT VIDEO LAMPS

Model	Price	Model	Price	Model	Price	Model	Price
HRD520, 600, 620, 637, 641, 650, 830	95p	VR6010, VR9010	70p	<b>Models &amp; Description</b>	<b>Order Code</b>	<b>Price</b>	
HRD540, 550, 580, 660, 860, 960,	130p	VR6020, VR8022, VR6023, VR6028,	75p	UNIVERSAL VIDEO LAMP 9V	VL01	25p	
<b>KENWOOD</b>		VR7700, VR6024	75p	80mV (310mm WIRES)			
KV901	70p	VR6520, VR6540, VR6560	90p				
KV903	90p	VR6710, VR6720, VR6735, VR8720	130p				
<b>LOEWE</b>		VR6720, VR6730, VR6760, VR6775,	160p				
OC11, OC40	95p	<b>SAISHO</b>					
OC410, OC420, OC440, OC460	130p	VR2000, VH13	90p	PANASONIC VIDEO LAMPS	VL02	35p	
OC50, OC55, OC60, OC65, OC70,	120p	VR3800	75p				
OC75		<b>SALORA</b>					
<b>LOGIK</b>		SV6500	100p	SHARP VIDEO LAMPS	VL02	35p	
VR955	180p	SV6600	150p				
<b>LUXOR</b>		SV8000	120p				
9245, 9251	130p	SV8100	60p	HITACHI 5381682 (VT63, VT64)	VL04	135p	
9252	140p	SV8500, SV8620, SV9500	150p	VIDEO LAMPS			
9253	140p	SV7400, SV8400, SV8420, SV8550	120p				
9254	100p	SV6700, SV8710, SV8750, SV9700	120p				
9255	130p	SV6800, 6900, 8910, 8820, 8870, 8910,	95p				
9256	130p	8920, 8970	95p				
9270, 9271, 9273, 9274	115p	SV8600, 8620, 8700, 8720, 8830, 9600,	130p				
9272, 9280	140p	8910	130p				
9281, 9284, 9285, 9292, VR3701, 3721,	95p	<b>SAMSUNG</b>					
3731, 3761, 3781		SV716, 717, V1616, V1621, V1626, VX616,		AIWA, AKAI, ALBA, AMSTRAD,	VL05	150p	
<b>MATSUI</b>		VX617, VX619, VX626, VX627, VX629, 85p		BLAUPUNKT, FERGUSON,			
VX850	75p	VR520, 510, 610, 616, 617, 619, 620, 626,		FUNAI, G.E.C., GOLDSTAR,			
<b>MITSUBISHI</b>		627, 629, V1610, 520, 611, 616, 621, 626,		GRANADA, GRUNDIG, HINARI,			
HS200	200p	VX510, 520	100	HITACHI, ITT, JVC (HRD			
HS300, 301, 302, 307, 310, 337, 338, 347,	140p	VR800, VR910, V1900, V1910	110	SERIES), MATSUI, MITSUBISHI,			
349, 411, 412, 421, HS810, 20, 30, HSE10,	150p	FX980, 981, 982, SE9001, SV9001,		NEC, ORION, NATIONAL,			
20, 30, 70	150p	SVX307, 319, 322, VB770, 8220, 8225,		PHILIPS, SAISHO, SALORA,			
HS303, HS304, HS306, HS307, HS330,	150p	V1770, 790, 8220, 8225, VK8220, VPX31,		SAMSUNG, SANYO, SHARP,			
HS400, HS700	150p	VX750, VX790, 8220, 8225	135p	SIEMEN, SONY, TELEFUNKEN,			
HS318, HS319, HS410	130p	SVX301, 303, 305, SX7301, VB710, 971,		THOMSON, TOSHIBA			
<b>N.E.C.</b>		V1730, 710, VX712, VX720, 730, 970, 971,					
N830, N831, N832, N833	100p	972	230p				
N895	80p	VX9800	110p				
PVC2300, PVC2400	180p	<b>SANYO</b>					
DX1000, 1600, 2000, 3000, N9012, 9013,	95p	VTC5000, 5150, 6000, 6500, VTCM10, 11,		AKAI, GRANADA (VHSTJ2),	VL01	25p	
9014, 9016, 9033, 9034, 9053, 9054, 9055,		20, 21, 30, 31, 50	75p	HITACHI (VT3000), ITT (VR3912,			
9066, 9110, 9120, 9510, 9520, 9530,		VTC5300, VTC5350, VTC5400,		VRP3833), JVC (HR2200, 3300,			
9610	95p	VPR5800	100p	3330, 3660), MITSUBISHI			
<b>NATIONAL PANASONIC</b>		VTC5900, VTC9300	220p	(HS200), TELEFUNKEN (VR510,			
NV300, NV332, NV333, NV340,		VTC1100, 1300, 1500, 1100, 1150, 1200,		519, 610), THOMSON (VK300,			
NV366	125p	1300, 1500	90p	305, 306, 3301), FERGUSON			
NV777, NV788	100p	VHR2100, VHR2300, VHR2500,		(3V00, 16, 22, 24, 3292, 8900,			
NV2000, NV2010, NV3000	130p	VHR2700	150p	8901, 8902, 8903, 8909, 8912,			
NV7000, NV7200, NV7800	95p	VHR3100, 3300, 3310, 3400, 3700, 3800,		8922, 8925)			
NV8600, NV8610, NV8620	145p	VHRD500, 700	110p				
NV230, 250, 280, 430, 431, 433, 450, 460,		VHR4100, 4150, 4200, 4300, 4350, 4770,					
465, 470, 730, 770, 810, 870, 890, A6130,		5100, 5200, 5300, 5350, 5700, 7100, 7200,					
1050	125p	7500, 7530, 7540, 7800, 7810, 8100, 8200,					
NV370, NV380, NV480, NV630, NV780,		8250, 8500, VHRD4400, 4410, 4500, 4600,					
NV830, NV850	100p	4610, 4710, 4890, 8700	90p				
NV600, NV688, AG6010, AG6015	110p	<b>SHARP</b>					
NV670, 10, 12, 14, 15, 18, 30, 130, 400,		VC2700, 384, 385, 386, 388, 390, 9300,					
NVH70	70p	3500, 9700	100p				
<b>NORDMENDE</b>		VC7300, VC7700, VC7750, VC7800,					
V100, V140	70p	VC8000	150p				
V1000M, 1005M, 1205, 1215, 1235, 1245,		VC8300	150p				
1305, 1403, 1405, V1500P, 1503, 1505K,		VC9000, 387, 471, 473, 481, 482, 483, 486,					
1805K, 2000D, 2405, 2500H, 3000H,		485, 496, 5481	80p				
V3405H, 3105, 4405H, 5000, 8005, 900,		VC9200, 571, 573, 581, 582, 583, 584	80p				
905	65p	585, VCSF3	80p				
V1001, 1005, 1015, 1025, 1035, 1041,		VC6000, 651, 682, 684, 685, 693, 783,					
1055, 1065, 1105, 3005, 304, 5005, 502,		VC6F3, VC6V3	70p				
503	80p	VC772, 779, 781, 782, 785, 786, 793, 800,					
V101, V102, V103, V112, V141, V142,		7810, 7822, VCA100, VCA102, 104, 131,					
V301, V302	90p	140, 170, 202, 203, 234, 501, 602, 5011,					
V110, V333	110p	VCD806, 810, 815, VCH80, 865, 910,					
V1500T, V2000B, V2000P, V400H	95p	VC51000, VCT310, 410, VCT1314,					
V250, V450, V9460, V20035542	130p	VCTS312	115p				
V20035543	130p	<b>SIEMENS</b>					
V300, V303, V380	75p	FM350, FM352, FM355	60p				
V500	75p	FM484, FM485	55p				
<b>ORION</b>		FM391, FM392, FM394, FM462	100p				
COMB15000, 16000, NEVHM, TYP230RC,		FM461, FM464, FM468, FM561	150p				
900MVH012, VH1030, 1040, 1060, 1070,		FM361, FM362, FM363, FM364	120p				
1100, 1120, 1440, 1500, 1560, 1800, 2150,		<b>SONY</b>					
2308, 2400, 2500, 2600, 2700, 2960, 300,		SLC8, SLJ10, SLT6ME	140p				
358, 360, 362, 4010, 4015, 4016, 4020,		SLC5, SLJ7, SLJ9	140p				
4300, 5010, 5015, 530, 535, 536, 630, 635,		SLC9, SL8000, SL8080, SLT50	165p				
640, 730, 735, VP220, 225, 245, VR1032,		SL8080E, SL8080E, SL8200, SL8600	175p				
2966, 2980, 821, 925, VXL25	30p	SLV255	95p				
NEVHL, VCP, VH104, 2004, 2204, 3050,		<b>TELEFUNKEN</b>					
3060, 4008, 400, 4012, 412, 512, 600, 866,		VR400, VR410, VR440, VR449	130p				
744, 774, 7905, 800, 820, 900, 974, VP200,		VR450, VR540, VR549, VR640	70p				
VR2949, 2956, 2957, VXL20	90p	VR520, VR529, VR620, VR920	70p				
VC150, 180, VH1000, 200, 201, 205, 212,		VR530, VR535, VR539, VR550, VR630,					
250, 254, 288, 300, 303, 3030, 312, 33,		VR60	75p				
3312, 404, 555, 700, 704, 708, 712, 770,		A940, VR1925, 1930, 1940, 1950, 2960,					
780, 844, 900, VHF2, VH3	80p	925, 930, 940, 950	90p				
VH1, VHZ2	150p	A920, VR1970, 1980, 2920, 2925, 2930,					
<b>PHILIPS</b>		2970, 7921, 7926, 7931, 7970, 7971, 7980,					
VR6460, VR6920	170p	970, 7981, 975, 980	65p				
VR6540	100	A1300, 930, 932, 935, 960, 980, 990,					
DV186, 286, 291, 292, 468, 471, 562, 571,		VR2931, 2935, 2941, 2971, 3935, 3945,					
761, VR201, 202, VR200V1, 200V2,		3950, 3966, 3975, 4935, 4940, 4942, 4945,					
20R07, 25B01, 25B02, 302, 303, 305,		496, 5VR4970, 6000, 7932, 7959, 7979	65p				
VR30DV2, 35B02, 35B03, 635B7, 715B4,		VR1935	100p				
715B5, 715B8, VR865B2, 915B2, 925B3,		VR2915	90p				
VR6180, 6185, 6285, 6290, 6291, 6293,		<b>THOMSON</b>					
6387, 6390, 6391, 6393, 6467, 9468, 6470,		SV1000, V410, 430, 450, 510, 520, 530,					
6561, 6570, 6581, 6670, 6676, 6760,		540, 620, 630, 640, 4240, SV5540	65p				
VR685B4, 86S81, 925B3	85p	TX8000, V309, V357, VK411	75p				
VR6442, VR6542	70p	TX8500, V342, 343, 351, 352, 353, 360,					
VR2025, VR2580	100p	364, 368, 4210, 4230, 4260, 4400, 5500,					
VR445B9, BR445B920, VR445B922,		6000, 8564	90p				
BR6843	100p	V320, V321, V323, V326, V4200,					
VR6548, VR6648, VR495B20,	110p	V4300	90p				
VR644869S		V333	100p				
<b>SABA</b>		V340	120p				
VR6420, 6435, 6440, 6460, 6480, 6620,		V4100, VK308, VK309, VK410					
6770, 7200, 8420, 2A10, 70, 2B20, 3B20,		VK300, VK301, VK302, VK303, VK306,					
4A10, 4B20, 6A10, 6A70, 6B20, 8B20	65p	VK3301	135p				
VR6004, 6005, 6011, 6014, 7004, 7011,		VK312	65p				
7014, 8011, 8014, BERLIN	90p	<b>TOSHIBA</b>					
VR2000, VR6000, VR6012, VR7000,		V55, V57	85p				
VR7720, VPR6058	130p	V33, V51, V51, V53, V9600, V9680	150p				
VR5005, VHR7000	135p	V61, V63, V65, V66, V67	85p				
VR6006, 6007, 6008, 6009, 6015, 9016,		DV80B, DV80D, V71, 73, 74, 75, 81, 83, 85,					
9018, 6038, 7006, 7007, 7016, 7018,		86	120p				
9006	65p	V108, V109, V199, V209, V609	120p				
		V91G, V95G	115p				

## ON/OFF MAIN SWITCHES

**GRUNDIG**  
PART NO: 29703, 29102  
USED ON: C7500, C7500TT, C8500, C8502, C8712, C8714, C8894, M68-190, M68-190/99, M70-195, P40-345, ST66-1602, T55-340, V7722

PRICE: £3.00

**ITT**  
PART NO: 13/1074  
USED ON: CP0200, 0211F, 0323, 0323/1, 0341/14, 0345F, 03

## VIDEO SERVICE KITS

<b>AMSTRAD</b>			
VC700			
<i>Contents</i>			
BELT SET, PINCH ROLLER, REEL IDLER, VIDEO LAMP			
<b>Order Code: SK41</b>		<b>£5.50</b>	
<b>FERGUSON &amp; JVC</b>			
3V42/43			
HRD455/HRD725			
<i>Contents</i>			
BELT SET, PINCH ROLLER			
CLUTCH MECHANISM, TENSION BAND			
<b>Order Code: SK37</b>	<b>£17.50</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER	
		SUPPLY CLUTCH, TAKE UP CLUTCH	
<b>Order Code: SK38</b>	<b>£9.50</b>		
3V58/59/64/65			
HRD170/180/210/230/300/320/370/400/430/530/700/750			
HRS5000			
<i>Contents</i>			
BELT SET, PINCH ROLLER, IDLER ARM, TENSION BAND			
<b>Order Code: SK44</b>	<b>£8.50</b>		
3V29/3V30			
HR7200/7300/7350			
<i>Contents</i>			
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES			
<b>Order Code: SK05</b>	<b>£6.00</b>		
3V35/36/38/39/49			
HRD110/111/120/225			
<i>Contents</i>			
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES			
<b>Order Code: SK04</b>	<b>£5.50</b>		
3V31/3V42			
HR7600/7610/7650/7655			
<i>Contents</i>			
BELT SET, T/U REEL TABLE TYRE, PINCH ROLLER, REEL IDLER, T/U CLUTCH, T/U IDLER, TENSION BAND, VIDEO LAMP			
<b>Order Code: SK33</b>	<b>£12.00</b>	<b>Economy Kit Contents</b>	
		BELT SET, T/U REEL TABLE TYRE, PINCH ROLLER, REEL IDLER TYRE, T/U IDLER TYRE, T/U CLUTCH	
<b>Order Code: SK34</b>	<b>£5.50</b>		
3V35/36/38/39/49			
HRD110/111/120/121/225			
<i>Contents</i>			
BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, T/U CLUTCH, T/U IDLER, REEL IDLER, TENSION BAND			
<b>Order Code: SK35</b>	<b>£10.50</b>	<b>Economy Kit Contents</b>	
		BELT SET, T/U REEL TABLE TYRE, PINCH ROLLER, T/U CLUTCH, T/U IDLER TYRE, REEL IDLER TYRE	
<b>Order Code: SK36</b>	<b>£5.80</b>		
3V29/3V30			
HR7200/7300/7350			
<i>Contents</i>			
BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, REEL IDLER, T/U CLUTCH, T/U IDLER, TENSION BAND, VIDEO LAMP			
<b>Order Code: SK31</b>	<b>£11.00</b>	<b>Economy Kit Contents</b>	
		BELT SET, T/U REEL IDLER TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, REEL IDLER TYRE, T/U IDLER TYRE, T/U CLUTCH	
<b>Order Code: SK32</b>	<b>£5.10</b>		
3V44/45/48/53/54/55/57			
HRP50/HRD140/150/158/160			
HRD250/257/565/566/755			
<i>Contents</i>			
BELT SET, PINCH ROLLER, CLUTCH MECHANISM, TENSION BAND			
<b>Order Code: SK39</b>	<b>£15.00</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER	
<b>Order Code: SK40</b>	<b>£9.50</b>		
<b>FISHER</b>			
FVHP905/906/907/908/910/911/916/918			
<i>Contents</i>			
BELT SET, PINCH ROLLER, IDLER, GEAR IDLER UNIT, TENSION BAND			
<b>Order Code: SK57</b>	<b>£13.00</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, IDLER TYRE	
<b>Order Code: SK58</b>	<b>£5.00</b>		
FVHP615/618/620/622/710/711/715/716/720/721/722/725/730/830/840			
<i>Contents</i>			
BELT SET, PINCH ROLLER, IDLER, GEAR IDLER UNIT, TENSION BAND			
<b>Order Code: SK68</b>	<b>£12.50</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, IDLER TYRE	
<b>Order Code: SK69</b>	<b>£3.60</b>		
<b>HITACHI</b>			
VT11/V733			
<i>Contents</i>			
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES			
<b>Order Code: SK08</b>	<b>£6.00</b>		

## VIDEO SERVICE KITS (Cont.)

VT11/V733			
<i>Contents</i>			
BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, FF/REW IDLER, CLUTCH PLATE, TENSION BAND			
<b>Order Code: SK45</b>	<b>£14.00</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, FF/REW IDLER TYRE, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE	
<b>Order Code: SK46</b>	<b>£4.50</b>		
VT52/61/62/63/64/65/85/86/640			
<i>Contents</i>			
BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLATE, TENSION BAND			
<b>Order Code: SK49</b>	<b>£14.00</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, FF/REW IDLER	
<b>Order Code: SK50</b>	<b>£3.25</b>		
VT400/405/410/13/14/15/18/420/25/26/28/430/31/35/48/450/498/510/520/25/26/530/35/36/540/545/46/48/570/75/76/580/85/88			
<i>Contents</i>			
TIMING BELT, PINCH ROLLER, FF/REW ARM, CLUTCH BASE, TENSION BAND			
<b>Order Code: SK52</b>	<b>£11.50</b>		
VT100/110/111/113/115/118/120/125/128/130/135/138/145/150/175/220/225/250/255/258/260/VTL30			
<i>Contents</i>			
BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLATE, TENSION BAND			
<b>Order Code: SK51</b>	<b>£14.00</b>		
<b>PANASONIC</b>			
NV2000/NV2010			
<i>Contents</i>			
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES			
<b>Order Code: SK03</b>	<b>£6.25</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES	
<b>Order Code: SK02</b>	<b>£5.50</b>		
NV300/NV330/NV333/NV340/NV366			
<i>Contents</i>			
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRE			
<b>Order Code: SK01</b>	<b>£5.50</b>		
NV2000/NV2010			
<i>Contents</i>			
BELT SET, PINCH ROLLER, FF IDLER, PLAY IDLER, TENSION BAND, VIDEO LAMP			
<b>Order Code: SK13</b>	<b>£8.00</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, IDLER TYRE, PULLEY TYRE	
<b>Order Code: SK14</b>	<b>£4.50</b>		
NV7000/NV7200/NV7800			
<i>Contents</i>			
BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND			
<b>Order Code: SK11</b>	<b>£8.50</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, IDLER TYRE, CLUTCH TYRE	
<b>Order Code: SK12</b>	<b>£4.20</b>		
NV300/NV330/NV333/NV340/NV366			
<i>Contents</i>			
BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND			
<b>Order Code: SK15</b>	<b>£7.50</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, IDLER TYRE, PLAY IDLER TYRE	
<b>Order Code: SK16</b>	<b>£4.00</b>		
NVG7/NVG9/NVG10/NVG11/NVG12/NVG14/NVG15/NVG16/NVG18/NVG30/NVG120/NVG130/NVG400/NVH65 (PX/AC)/AG1810 (P/K)			
<i>Contents</i>			
LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLER TENSION BAND			
<b>Order Code: SK27</b>	<b>£8.00</b>	<b>Economy Kit Contents</b>	
		LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLER TYRE	
<b>Order Code: SK28</b>	<b>£4.00</b>		
NV332			
<i>Contents</i>			
BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND, FF/REW TYRE			
<b>Order Code: SK29</b>	<b>£12.00</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, IDLER TYRE	
<b>Order Code: SK30</b>	<b>£5.10</b>		
NV230/250/260/280/430/450/460/470/650/810/890/AG1200PK/AG1500PK			
<i>Contents</i>			
BELT SET, PINCH ROLLER, IDLER, TENSION BAND			
<b>Order Code: SK23</b>	<b>£6.00</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, IDLER TYRE	
<b>Order Code: SK24</b>	<b>£3.50</b>		
NV600/NV688			
<i>Contents</i>			
BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND			
<b>Order Code: SK25</b>	<b>£12.00</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, PLAY IDLER TYRE, FF/REW IDLER TYRE	
<b>Order Code: SK26</b>	<b>£6.00</b>		
NV730/NV770			
<i>Contents</i>			
SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER UNIT, TENSION BAND			
<b>Order Code: SK19</b>	<b>£6.50</b>	<b>Economy Kit Contents</b>	
		SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER TYRE	
<b>Order Code: SK20</b>	<b>£4.00</b>		
NV370/NV380/480/630/780/830/850/AG2100PK/AG2200PK			
<i>Contents</i>			
BELT SET, PINCH ROLLER, IDLER, TENSION BAND			
<b>Order Code: SK21</b>	<b>£6.00</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, IDLER TYRE	
<b>Order Code: SK22</b>	<b>£3.00</b>		
NV777/NV788			
<i>Contents</i>			
BELT SET, PINCH ROLLER, IDLER UNIT, TENSION BAND			
<b>Order Code: SK17</b>	<b>£7.00</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, IDLER TYRE	
<b>Order Code: SK18</b>	<b>£4.00</b>		

## VIDEO SERVICE KITS (Cont.)

<b>SHARP</b>			
VC381			
<i>Contents</i>			
BELT SET, PINCH ROLLER, REEL IDLER, TENSION BAND, VIDEO LAMP			
<b>Order Code: SK47</b>	<b>£9.00</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, REEL IDLER TYRE	
<b>Order Code: SK48</b>	<b>£4.75</b>		
VC500/VC571/VC581/VC582/VC583/VC584/VC5F3			
<i>Contents</i>			
BELT SET, PINCH ROLLER, REEL IDLER, TENSION BAND			
<b>Order Code: SK60</b>	<b>£9.50</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, REEL IDLER	
<b>Order Code: SK61</b>	<b>£6.50</b>		
VC781/VC7810/VC7822/VC785/VC786/VC793/VC800/ VCA100/VCA102/VCA104/VCA202			
<i>Contents</i>			
BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND			
<b>Order Code: SK64</b>	<b>£13.50</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, REEL DRIVE UNIT TYRE	
<b>Order Code: SK65</b>	<b>£6.25</b>		
VC681/VC682/VC684/VC685/VC693/VC699/VC6F3/VC700			
<i>Contents</i>			
BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND			
<b>Order Code: SK62</b>	<b>£13.50</b>	<b>Economy Kit Contents</b>	
		BELT SET, PINCH ROLLER, REEL DRIVE UNIT TYRE	
<b>Order Code: SK63</b>	<b>£6.00</b>		

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

## BACKUP BATTERIES

<b>REPLACEMENT PHILIPS NI-CAD BACKUP BATTERIES</b>		
Replaces Ferguson Part No: 00E6-067-001, used on TX10, L2V		
150p		
Replaces Philips Part No's: 138-10138, 138-10313, 1.2V - 90mAh		
120p		
Replaces Philips Part No's: 138-10229, 2.4V - 90mAh		
200p		
<b>REPLACEMENT FERGUSON NI-CAD BACKUP BATTERIES</b>		
Replaces Ferguson Part Nos: 00E6-066-001, 2.4V		
200p		
Used on: 3V35, 3V56, 3V58, 3V65		

## REPLACEMENT LINE OUTPUT TRANSFORMERS

Description	Price	Order Code
HITACHI 2433752	1500p	LOT01
ORION 3714002	1500p	LOT02
FIDELITY ZK300	1500p	LOT03
FE TX100 90 DEG	1500p	LOT04
SABA 490007182	1500p	LOT05
FE TX90 WHITE	1650p	LOT06
ITT D30737 EQ	1600p	LOT07
BLAUPUNKT 210	1600p	LOT08
GRUNDIG 2922010	1600p	LOT09
ITT CVC800/173	1500p	LOT10
ITTD18/37 EQ	1600p	LOT11
NORMENDE 5255	1600p	LOT12
SABA 81000 200	1600p	LOT13
SALORA T236 EQ	1650p	LOT14
SABA 811-50-24	1600p	LOT15
SABA 770223500	1600p	LOT16
TELEFUNKEN AT1	1450p	LOT17
TELEFUNKEN EQ	1400p	LOT18
SALORA FM0218B	1600p	LOT19
NORMENDE 5255	1600p	LOT20
ITT CVC 1150/1	1500p	LOT21
ITT COMPACT 80	1500p	LOT22
FE TX100 GREEN	1450p	LOT23
HINARI CT4/5 5113	1500p	LOT24
SELECO 6320410	1600p	LOT25
BLAUPUNKT 8667	1600p	LOT26
ITT COMPACT B1	1450p	LOT27
ITT CT3326 MUL	1500p	LOT28
ITT D066/37 EQ	1600p	LOT29
ITT 3546 EQ	1500p	LOT30
LUXOR 5810110	1600p	LOT31
SABA 849380920	1600p	LOT32
HITACHI 2434141 CP	1450p	LOT33
FE TX100 110 D	1700p	LOT34
HANTAREX 28021	1600p	LOT35
SHARP C3700 EQ	1600p	LOT36
HITACHI 2432981 CP	1500p	LOT37
FERGUSON 00D3-508-002	1650p	LOT38
Fits Chassis TX99 41cm + 51cm		
Used On: 51K2, 51J8, 51J7, 41H3, 41H3, 41H2, 51K3		
PANASONIC TLF14567F	1850p	LOT39
Used On: TC2043, TC2243, TX300		
PANASONIC TLF14568F	1850p	LOT40
Used On: TX2231, TX2244		
PANASONIC TLF14584F	2350p	LOT41
Used On: TC2210, TC2160, TX1752, TX2112		
TX2112, TX2162, TXC22		
PANASONIC TLF14586F	2350p	LOT42
TC1651, TC2051, TC2061, TC2253, TC2263, TX5500		
HINARI	1600p	LOT43
Used On: CT15		
HITACHI 2434274</		



# REMOTE CONTROLS

Description	Order Code	Price	Description	Order Code	Price	Description	Order Code	Price
<b>GRUNDIG</b>			<b>PHILCO</b>			TX9-90-100	RC 740	750p
TP160E	RC 107	900p	CARVEL, CONCORDE,	RC 108	850p	3V55, FV11	RC 783	900p
TP200, TP300	RC 380	800p	MERCURY, TELESTAR			TX100 FASTTEXT	RC 785	800p
TP400	RC 401	800p	TC10	RC 152	900p	TX100 STEREO FASTTEXT	RC 789	800p
TP590-600	RC 600	850p	<b>PHILIPS</b>			PROFESSIONAL	RC 790	800p
TP390, TP610	RC 610	850p	RC5002,5154	RC 134	850p	<b>TOSHIBA</b>		
TP621	RC 621	850p	KT3 NON TEXT	RC 135	825p	CT937	RC 950	850p
TP630, TP650	RC 650	850p	69117032	RC 178	875p	CT9117	RC 951	850p
TP660	RC 660	850p	69117194	RC 180	875p	201R4B	RC 952	850p
TP661	RC 661	850p	RC5991-UNIV	RC 300	850p			
<b>HITACHI</b>			RC38	RC 301	875p			
CLE800-CLE830	RC 140M	850p	KT3 TEXT	RC 5301	800p			
A617402/655602	RC 192	875p	RC5352	RC 5352	800p			
A512120/230	RC 900	800p	RC5375	RC 5375	850p			
A514790	RC 901	850p	RC5 STANDARD	RC 5534	850p			
A5088470	RC 902	800p	RC5901	RC 5901	850p			
A518612	RC903	900p	RC5903	RC 5903	800p			
SCL002	RC904	850p	<b>SABA</b>					
C2096	RC 905	850p	T6772	RC 149	900p			
A511940	RC 906	800p	TC319-320	RC 328	875p			
655602H	RC 907	850p	TC356	RC 356	875p			
<b>ITT</b>			TC358	RC 358	850p			
IFB13, 14, 15	RC 143	875p	TC360	RC 360	800p			
FS4	RC 148	850p	TC365	RC 365	800p			
RG305	RC 305	825p	<b>SALORA</b>					
RG306	RC 306	825p	SERIES L	RC 190	875p			
FS9/1-10/1	RC 307	850p	86173	RC 882	850p			
VS5 RUK	RC 308	825p	<b>SANYO</b>					
VS4-1	RC 310	850p	RC218, RC222, RC228, RC238	RC 140M	850p			
MULTICONTROL (17C20)	RC 311	800p	JXGE	RC 878	850p			
<b>KORTING</b>			JXDE	RC 884	850p			
18279, 18396, 18460, 18521 SE	RC 108	850p	VHR2300	RC 890	850p			
40540 VTS	RC 108	900p	RC628	RC 865	900p			
<b>LOEWE</b>			<b>SHARP</b>					
DC11	RC 146	850p	G0121CESA, 123CESA, 204, 251	RC 140M	850p			
<b>MATSUI</b>			<b>SIEMENS</b>					
010270601	RC 889	850p	FC616	RC 130	850p			
VX770	RC 892	850p	FC631	RC 132	850p			
<b>METZ</b>			FC742	RC 164	900p			
JAVA COLOR (6890)	RC 166	850p	<b>SONY</b>					
COLOR (7156)	RC 183	850p	RM604, RM605, RM606	RC 140	850p			
JAVA (7180)	RC 184	850p	32 CHANNEL	RC 140M	850p			
<b>MITSUBISHI</b>			RM613	RC 141	850p			
939P/03607, 939P/03609	RC 140M	850p	RM632, RM636	RC 160	850p			
<b>NOKIA</b>			<b>TATUNG</b>					
SATELLITE	RC 550	850p	FXA	RC 877	850p			
<b>NORDMENDE</b>			RC70	RC 883	750p			
TC2336	RC 351N	850p	FX70 FASTTEXT	RC 894	850p			
CMC1, TC3519	RC 356	875p	<b>TELEFUNKEN</b>					
<b>OCEANIC</b>			FB632	RC 632 ST	850p			
390C9500	RC 339	900p	FB639	RC 639 ST	850p			
<b>ORION</b>			<b>THORN/FERGUSON</b>					
RC53	RC 892	850p	3V35-42	RC 342	850p			
<b>PANASONIC</b>			3V31-32	RC 344	850p			
EUR51200	RC 200	850p	3V57-58	RC 628	900p			
TC2200	RC 201	850p	TX10 TEXT	RC 732	750p			
VSQ0357/NV730	RC 202	875p	TX10 STEREO TEXT	RC 738	750p			
TNQ1621	RC 203	900p						

**UNIVERSAL PROGRAMMABLE REMOTE CONTROL**  
 Controls up to 4 different devices which use infra red remote controls including TV, audio, VCR and satellite.  
 (need original remote control TC program)  
 Order code: IR100R Price: 1950p  
**We stock Remote Controls for over 5000 different models. Ring for further details on 081-900-2329.**

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

CERAMIC PLUG TOP		
3A	FUSE33	100P
5A	FUSE34	100P
13A	FUSE35	100P

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

**I.C. PROTECTOR**

ICPF10	ICPF38	ICPN10	ICPN38
ICPF15	ICPF50	ICPN15	ICPN50
ICPF20	ICPF75	ICPN20	ICPN75
ICPF25	ICPN5	ICPN25	

Price: Only 30p each

**AUDIO CONTROL HEAD**  
 Amstrad Original No: 150751  
 Used on Amstrad TVR1.2.3, VCR4600, 4600MII, 4700 Funai V2S, VCR4600, 4800, 5200, 5600, 6600, VIP3000, 5000  
 Also fits: Fidelity, Funai, Hinari, Proline, Schneider, Towada, Ultravox  
 Order Code: AH01 Price: £13.50

**Amstrad Original No: 153154**  
 Used on Amstrad 008900, 8904, VCR2000, 6000, 8600, 8602, 8603, VCR8604, 8700, 8704, 8714, 8800, 9005, 9244  
 Also fits: Antitech, Boadstec, Casio, Crown, Fidelity, Goldhead, Granada, Hinari, Marguant, Omega, Protex, Schneider, SEG, Sentra, Shiptom, Tashiko, Tatung, Towada, Universum  
 Order Code: AH02 Price: £14.50

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COAX PLUG.....18
F CONNECTOR.....20
FLY LEAD 2M.....75
VIDEO LEAD 2M.....75
4 WAY DISTRIBUTION.....18.50
AMPLIFIER MAINS.....20.25
8 WAY DISTRIBUTION.....18.50
AMPLIFIER MAINS.....20.25

**BATTERIES**

AA (pkt of 4).....1.20
AAA (pkt of 4).....1.20
FERGUSON 3V55.....4.95
PHILIPS MEMORY 1V2.....1.70
PHILIPS MEMORY 2V4.....2.50

**CAPACITORS**

0.1f 5.5v (back-up).....2.50
63v.....1.20
47uf at 63v.....18
100uf at 63v.....22
220uf at 63v.....35
250v.....1.20
1uf at 250v.....20
4.7uf at 250v.....25
10uf at 250v.....35
22uf at 250v.....40
47uf at 250v.....65
100uf at 250v.....1.25
400v.....2.50
1uf at 400v.....20
4.7uf at 400v.....35
10uf at 400v.....70
22uf at 400v.....70
100uf at 400v.....85
(ALL PCB MOUNTING).....85

**DIODES**

R2M.....95
BY133.....9
BY227.....20
BY259/800.....10
IN4007.....35
IN5408.....20
BZX61C (pkt of 5) 6v8 7v5 12v 15v 24v 33v 68v 120v 130v 1.00

**EHT TRAYS**

CONTINENTAL 30AX FOCUS 8.95
DECCA 120/130.....13.70
GRUNDIG CUC2410 14".....13.70
GRUNDIG CUC2410 22".....13.70
PHILIPS KT3.....7.95
UNIVERSAL.....5.95

**CATALOGUE/LISTS AVAILABLE LATE JULY**

**ALBA VIDEO SPARES**

VCR4000
BELT KIT.....1.95
CAPACITOR BACK-UP.....1.85
PINCH ROLLER.....3.95
REEL IDLER.....3.95
REEL PULLEY.....1.95

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GEAR ASSEMBLY.....9.95
MODIFICATION KIT.....5.50
PINCH ROLLER.....3.50
VCR4600
BELT KIT.....1.95
GEAR ASSEMBLY.....9.95
MODIFICATION KIT.....5.50
PINCH ROLLER.....3.50
VCR6000
BELT KIT.....1.95
PINCH ROLLER.....3.95
CLUTCH.....3.95

**FERGUSON VIDEO SPARES**

3V29/30
BELT KIT.....1.95
CAPSTAN MOTOR.....29.50
CASSETTE LAMP.....70
LOADING BELTS (5).....1.95
PINCH ROLLER.....3.95
REEL IDLER.....2.95
TAKE UP CLUTCH.....2.95
TAKE UP IDLER.....1.95
3V35/39
BELT KIT.....1.95
CAPSTAN MOTOR.....21.50
CASSETTE HOUSING.....28.95
LOADING BELTS (5).....1.95
MAINS TRANSFORMER.....23.95
PINCH ROLLER.....3.95
REEL IDLER.....2.95
TAKE UP IDLER.....1.95
TAKE UP CLUTCH.....2.95
3V44/45
BELT KIT.....1.50
CASSETTE HOUSING.....28.95
PINCH ROLLER.....3.95
3V65/FV11
BELT KIT.....1.75
CAPSTAN MOTOR.....27.50
CASSETTE HOUSING.....27.50
PINCH ROLLER.....3.95
REEL IDLER.....2.75

**FUSES**

20mm A/S (PKTS OF 10)
250MA, 315MA, 500MA, 630MA...1.00
800MA, 1A, 1.6A, 2A, 2.5A, 3.15A
20mm Q/B (PKTS OF 10)
500MA, 630MA, 800MA, 1A, 1.6A, 2A, 2.5A, 3.15A.....80

**I.C's**

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SA11293-02.....5.95
SA11293-03.....7.25
SA11293A-03.....8.35
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STR5412.....4.95
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STR50103A.....5.95
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TD2577A.....3.50
TD2578A.....2.95
TD2579.....3.95
TD2581.....4.50
TD2582.....2.50
TD2653AQ.....2.95
TD3330.....8.50
TD3560.....4.95
TD3561A.....4.95
TD3562A (TFK).....4.65
TD3565.....3.95
TD3571BQ.....8.95
TD3576B.....10.25
TD3650.....8.95
TD3651/3.....2.95
TD3651AQ.....4.75
TD3653AQ.....3.50
TD3654A.....2.95
TD4500.....4.50
TD4501.....5.25

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FERGUSON TX100 90D.....16.95
FERGUSON TX100 110D.....13.80
FERGUSON TX100 FST.....17.25
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FIDELITY ZX3000.....12.95
HINARI CT4/5.....15.95
HITACHI CPT1474/1476.....17.75
HITACHI CPT2174/76/78.....15.58
HITACHI CPT2276/2278.....16.45
HITACHI CPT2476/2478.....17.95
ITT COMPACT 80R/110.....14.95
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ITT PICO 1/1A/S.....17.75
MATSUI 1410/20/40.....18.95
PHILIPS CP90.....17.95
PHILIPS CTX147/20".....20.35
PHILIPS ZA.....18.50

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AMSTRAD 4600.....9.95
AMSTRAD 6000.....9.95
FERGUSON TX85.....9.95
FERGUSON 3V59.....13.95
FERGUSON 3V65.....13.95
FERGUSON FV11.....13.95

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GRUNDIG CUC731.....3.50
ITT TX SERIES.....4.95
KT4/CTX REMOTE.....1.75
TX9/10 STANDARD.....1.00
TX9/10 REMOTE.....1.75
TX90/100 STANDARD.....1.50
TX90/100 REMOTE.....1.75

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BC640.....20
BF460.....95
BU208D.....1.95
BU426A.....1.45
BU500.....2.00
BU508A.....1.50
BU508AF.....1.60
BU508D.....1.60
BU508DF.....1.95
BU508V.....1.90
BU807.....1.75
BUT11AF.....1.90
BUT56A.....2.25
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RO450.....2.95
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T9064V.....1.95
TIP29E (TO168V).....75
TIP41C.....50
TIP42C.....50
TIP112H (TO167V).....75
TIP1791A.....1.95
2SD1497.....3.95
2SD1497/02.....4.25
2SD1497/02.....4.25
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TATUNG RC40/45.....9.25
TATUNG RC70.....9.25
TATUNG RC90.....11.95
TOP TEL.....24.95

**CIRCUIT PROTECTORS**

N10.N20.N25 (each).....50
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**NEW LOWER REMOTE PRICES**

AMSTRAD 4600.....9.95
AMSTRAD 6000.....9.95
FERGUSON TX85.....9.95
FERGUSON 3V59.....13.95
FERGUSON 3V65.....13.95
FERGUSON FV11.....13.95

**PHILIPS VIDEO SPARES**

VR6460/6520
BELT KIT.....1.95
PINCH ROLLER.....3.95
REEL IDLER.....3.30
REEL MOTOR GENUINE.....16.95
TENSION BAND.....2.95
VCR481/482
BELT KIT.....2.50
PINCH ROLLER.....3.95
REEL IDLER GENUINE.....3.95
REEL MOTOR GENUINE.....17.95
TENSION BAND.....2.95
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BELT KIT.....2.50
REEL IDLER GENUINE.....3.95
PINCH ROLLER.....3.95
V681
BELT KIT.....2.50
PINCH ROLLER.....3.95
REEL PULLEY GENUINE.....7.95
VCR410/VCT72
BELT KIT.....2.95
PINCH ROLLER.....3.95
REEL PULLEY GENUINE.....7.95

**SONY VIDEO SPARES**

C5/6/7
BELT KIT C5/7.....2.50
BELT KIT C6.....1.95
PINCH ROLLER.....4.50
REWIND KIT C5/7.....4.95
REWIND KIT C6.....3.95

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UNIVERSAL.....50

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SCART LEAD FULLY WIRED.....4.95
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SCART TO 2 SCART SKT.....5.95
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ALBA 4000.....11.50
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FERGUSON 3V35/39.....12.95
FERGUSON 3V44/45.....14.95
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FISHER FVH615/715.....12.75
FISHER FVH605.....12.95
HITACHI V8800.....12.95
HITACHI V9300.....12.95
HITACHI VT11/33E.....16.95

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PANASONIC TLF 14567F.....19.50
PANASONIC TLF 14586F.....19.50

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FERGUSON T742.....8.95
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FERGUSON T789 FAST TEXT.....9.75
FERGUSON TX10 NON TEXT.....11.50
FERGUSON TX13 TEXT.....8.95
FERGUSON TX100 STEREO.....11.95
FERGUSON TX100 TEXT.....9.75
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GRUNDIG TP650 TEXT.....11.45
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FERGUSON FV42L.....48.05
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GOLDSTAR V1221/1290.....13.95
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HITACHI VT11/33.....14.30
HITACHI VT17/19.....24.50
HITACHI VT63/64.....19.25
HITACHI VT65.....28.50
HITACHI VT120E/220E.....21.25
HITACHI VT130E.....25.30

**SHARP VIDEO SPARES**

VC9300/381
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PINCH ROLLER.....3.95
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REEL MOTOR GENUINE.....16.95
TENSION BAND.....2.95

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MOTOROLA 8500X 1500MAH/29.50
MOTOROLA 8800X 1000MAH/23.95
MOTOROLA 8800X 1500MAH/29.50
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MOTOROLA PSNL SLIM.....39.50
MOTOROLA 9600X 600MAH.....19.50
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MOTOROLA 9800X SLIM.....39.50
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NEC P4 700MAH.....23.50
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SONY CMH1.....24.95
SONY CMH-333.....24.50
TECHNOPHONE TP2.....27.50
TECHNOPHONE TP3.....24.50
TECHNOPHONE TP405 700MAH.....23.50

**NEW EASY TOP TEL NOW AVAILABLE £16.95 CONTROLS UP TO 5 UNITS**

**HITACHI CPT2246.....12.75**

**HITACHI VT150E.....36.50**

**JVC HRD250.....23.50**

**LOGIK VR955.....21.70**

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**MITSUBISHI HS18.....21.00**

**NEC 9034/9053.....19.75**

**PANASONIC NV230.....16.95**

**PANASONIC NV333.....8.50**

**PANASONIC NV366.....19.50**

**PANASONIC NV370.....9.50**

**PANASONIC NV430.....13.95**

**PANASONIC NV688.....27.70**

**PANASONIC NV730.....18.50**

**PANASONIC NV777.....18.95**

**PANASONIC NV788.....25.95**

**PANASONIC NV2000/7000.....8.50**

**PANASONIC NV2000.....15.95**

**PANASONIC NVG10/12.....16.25**

**PANASONIC NVG18.....29.50**

**PANASONIC NVG21/25.....29.50**

**PANASONIC NVG30/40.....21.95**

**PANASONIC NVG45.....27.80**

**PHILIPS 6460/6520.....9.50**

**PHILIPS 6462/6560 GENUINE/43.50**

**PHILIPS 6467/6468 GENUINE/38.75**

**SAMSUNG V1730.....19.65**

**SAMSUNG VX510/970.....17.00**

**SANYO VHR 1100/1300.....18.50**

**SANYO VHR 2300/3200.....18.50**

**SENTRA 8000/8400.....16.75**

**SHARP VC9300/381/481.....14.95**

**SHARP VCA11/681.....14.00**

**SHARP VCA140.....14.75**

**SONY C5/6/7.....14.75**

**TOSHIBA V55/557.....8.50**

**TOSHIBA V73/83B.....14.25**

**TOSHIBA V93B.....17.50**

**VIDEO HEADS ARE OF THE BEST QUALITY AND ARE BRANDED OR MANUFACTURERS OWN**

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ANTEX 17W IRON.....8.50
ANTEX 25W IRON.....8.75
CLEAR TEST TAPE.....7.95
FIBRE CLEANING PEN.....3.50
HEATSHINK COMPOUND.....1.55
ONYX SOLDER PUMP.....9.95
ONYX TIPS.....1.50
SILICON GREASE.....1.85
SOLDA MOP.....80
SOLDER O 5KG 18SWG.....8.50
SOLDER O 5KG 22SWG.....8.75
WELLER GUN TIPS (2).....1.65

**BATTERY CHARGERS DESK TOP TRICKLE**

MOTOROLA T/P ORT.....38.95
MOTOROLA 8000/8800X.....23.95
MOTOROLA MICROTAC.....24.50
NEC P3.....24.95
NOKIA 101.....24.95
PANASONIC F SERIES.....39.95
PANASONIC F.....24.50
SONY CMH-333.....24.95

**DESK TOP RAPID/COND.**

MOTOROLA 8000 SERIES.....42.50
MOTOROLA 9800X.....42.50
NEC P3.....42.95
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## Converging Technologies?

The personal computer (PC) industry has been highly successful. But there's a slight problem. Its traditional, mainly business, markets are about saturated. The development of the PC market has been helped by the tendency of its technology to keep on advancing. Thus users have been willing to replace their equipment periodically. There must however come a time when most users feel that the equipment they have is perfectly adequate for their needs. If this is how the business market now feels, where are the PC manufacturers to look next? It seems that many of them now feel that the domestic market is the one to go for – or rather the traditional TV/video side of the domestic electronics market. For there has been no lack of consumer interest in computers, fuelled by games and the increasing tendency for the home and work environments to overlap. In the USA, about 30 per cent of households now have a PC. This is expected to rise to 50 per cent within two-four years. There is certainly a lot more you can do with a PC than with that other hope for increased sales of domestic electronic equipment, the camcorder.

To what extent could the TV and PC fields integrate? It would certainly be convenient to use a single screen for all purposes, linking it to an array of boxes that do whatever electronic signal/data/information processing is required. But to date the TV/video and computer worlds have developed side-

by-side with little interest or thought for each others' needs. The PC industry has the great advantage that it isn't constrained by the traditional limitations and compromises associated with broadcasting (limited bandwidth) and video tape storage (even more limited bandwidth). In fact for a PC workstation to be a viable tool for the user it has been essential to adopt higher scan rates and definition. Jitter is not too noticeable with picture displays – the eyes/brain will tolerate a lot, as colour systems have shown – but for anyone to be able to sit and manipulate figures and text for hours on end something better is required.

What then might the PC industry have in mind as it eyes the domestic scene? The answer seems to be cable. We've heard a lot about the advantages of cable as a means of delivering video services, and how the system can be developed to encompass telecommunications and various data/information services – home shopping and so on. A lot of this could probably be handled better, with much improved presentation, by PCs. After all the PC, unlike the traditional TV set, is essentially an interactive device.

Major PC firms, including IBM, Hewlett-Packard and Apple Computer, are developing set-top boxes to integrate PC and TV systems. It's unlikely that these will be able to link the PC to any great extent with the traditional relatively

simple TV/video installation. But technical developments could lead to closer integration. It's already common to convert video signals to digital form. Once this has been done they can be manipulated to any extent required. Say take an off-air transmission then convert it to a form suitable for display on a high-resolution monitor. It could be much enhanced in the process – it's amazing what a computer scanner can do with a photograph. Maybe we don't need HDTV to get the same result!

This is something that ought to be a major concern of those working on prospective digital TV standards. But it seems that for the present anyway the TV authorities are not too interested in how new TV standards could be made readily compatible with PC software. This is perhaps unfortunate, an opportunity that could be missed. As far as the next generation of domestic TV/video and computer equipment is concerned, we'll probably stay with our separate screens. Maybe there's social logic in this. People want to be able to do their own thing: why limit the household to a single, composite installation? Apart from the convenience of avoiding a multitude of screens, there's no great advantage in having total compatibility between video and computer technology. There could however be a great deal of debate over what is the best way, technically, to provide interactive services for the domestic market.

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**EDITOR**

John A. Reddihough

**PRODUCTION EDITOR**

Tessa Winford

**EDITORIAL OFFICE**

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**COVER PHOTO**

This month's cover photograph shows a Philips computer monitor in the workshop. See article on pages 700-702.

# Camcorner

Reports from Brian Storm, Keith T. Keeton  
and David C. Woodnott

## Panasonic NVMS2

This camcorder had an unnerving habit of powering up on its own. Inevitably, removing the side cover provided a temporary cure. I was presently aware of being watched, as the autofocus lens followed by every move. Creeping up on the machine, I started to check the power supply switching. But any work done on the camcorder would make the fault lie low for hours at a time. It was a great relief when, a few weeks later, D6004 in the elaborate power on/off circuitry was found to be leaky. It's part of a six-pin diode combination, part no. MA141WA. When this had been replaced the machine would power up only when asked. **B.S.**

## JVC GRAX2

A fault you sometimes get is E03 appearing in the EVF intermittently. The usual cause is that the take-up sensor is spaced too far from the reel. Fit a new sensor flexi connector or a new sensor slightly raised to provide better pick-up. Alternatively the take-up reel may be slipping. In this case the cure is to replace the guide pin.

For failure to record the sound (previous sound not being erased), with the playback and E-E sound o.k., check whether L401 in the oscillator stage is open-circuit.

The cause of no E-E picture was the fact that connector CN33 was broken. The camera may have taken a knock.

Failure to eject, with no power to the heads/capstan and CP1 blowing repeatedly, was caused by the fact that Q11 on the main board was short-circuit. **K.T.K.**

## Sanyo VMD3P

A number of faults on this model have been reported in Camcorner. Most have been caused by various electrolytic capacitors being leaky or of low value. Here are some more! For smeary playback pictures, check C1038 and C1107. If the recorded luminance is poor, with poor playback field sync, but the E-E pictures are o.k. change C1100, C1115 and C1166. These capacitors are all on the VD1 PCB. C1166 is 22 $\mu$ F, 6.3V. The others are all 10 $\mu$ F, 16V electrolytics. **D.C.W.**

## Ferguson FC37

The presence of stationary vertical lines on the E-E picture, playback being o.k., suggested that the CCD imager had failed. Fortunately dry-joints on the SSG PCB proved to be the rather less expensive cause of the fault. **D.C.W.**

## JVC GR65E

Incorrect back-tension setting can be the cause of various effects with camcorders that have a small head drum. This camcorder would play tapes with no noticeable horizontal jitter, usually the most obvious effect with back-tension related problems. When the machine played back one of its own recordings however the picture would roll a few frames at the start of each recorded sequence, then be o.k. until the

next 'pause'. Replacing the supply spool and tension belt cured the problem. **D.C.W.**

## Sony CCDF330E

No functions, not even eject, were available though the E-E pictures were o.k. The cause of the fault was a damaged flexicable, FP124. It had been punctured by the viewfinder bracket assembly. **D.C.W.**

## Sanyo VEMS1P

This camcorder arrived with the cassette housing half way out and no functions selectable. The E-E pictures were o.k. however. We've had this type of fault with the VMES88P, which uses the same mechanism. The cause of the problem was broken guide rails that attach the LS assembly to the main deck (bracket 636 019 3758, cam 636 019 4311). Deck timing has to be carried out after replacing these items. This can be a tricky operation to get right – having the service manual helps. **D.C.W.**

## Sony CCDTR705E

The problem with this Hi8 Handicam was intermittent loss of both the left and right audio channels. When a faulty recording was played back there would be only a noisy 'scratching' which varied in level. Fortunately the fault was also present in the E-E mode, which made fault-finding considerably easier. The fault couldn't be instigated by carrying out disturbance tests on the AFM stereo PCB (AU121), but a dry-joint still seemed to be a likely cause. After a long session of inconclusive checking around the matrix chip IC803 we decided to reflow the connections in this area. This put an end to the trouble. Problems of this type seem to be getting more common – or is it just me? **D.C.W.**

## Panasonic NVM7B

There was no E-E colour with this full-sized oldie – playback colour was o.k. When we carried out checks on the encoder subassembly on the main camera signals processing PCB we found that there were no R – Y and B – Y subcarrier inputs at pins 13 and 14. We traced back to the subcarrier generator chip IC309 and found that its supply was missing at pin 6. L313, which provides the 5V feed, was open-circuit. **D.C.W.**

## Canon E6E (Sony Q deck)

This stereo camcorder suffered from the same fault as other models that use the Sony Q deck mechanism – noises from the deck in all modes, especially rewind and fast forward. The cause is damaged teeth on the conversion gear which mates with the capstan motor's outer edge gear. Be careful to ensure that no small pieces of teeth are left stuck to the capstan motor gear when you replace the conversion gear. It's best to remove the capstan motor to check – even a small piece of tooth can cause knocking noises. **D.C.W.**



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# Servicing PC Monitors

Ken Taylor

You've been asked, say by a friend/son/daughter/boss, to have a look at a computer monitor that's suddenly gone blank. Well, a monitor is only a simplified television receiver, isn't it? You work on complex electronic equipment all day. So no problem: wheel it in.

But stop! Maybe it's not a simple fault. Perhaps you should read and get up on these items before adding another string to your bow. At present the repair of monitors is regarded as a specialised operation: but all that's needed is the right equipment and an extra bit of know-how. This article will provide a start, introducing you to a new field of servicing.

## First the Definition

It's generally accepted that a 'PC' computer is one manufactured by IBM or a compatible one – that is, it will work with the same software and operates to the same standards. The monitors we'll consider here will be ones that are designed for use with this type of computer, not those for Amstrad or Tandy computers – though, along with many others, these manufacturers make PCs as well as their own designs.

## Evolution

The history of the PC goes back some fifteen years. So you would expect that there has been considerable change in design over that time. In addition displays extend from mono to high-definition colour. Fortunately IBM at an early stage adopted plug-in boards. One of these can be the video driver. This makes upgrading a simple matter: provided the correct video driver board is fitted, a PC can be used with any monitor.

A corollary of this is that it's no use trying to test a monitor with another PC unless the latter has the appropriate driver board. We'll deal with the differences later, but it's worth mentioning at this point that it is nowadays possible to fit switchable drivers which can be set to operate with any monitor.

Another aspect of the development saga was the change from digital to analogue. That's right – digital to analogue! We tend to assume that everything will eventually operate using digital techniques, yet the all-digital PC changed its output from digital to analogue form. This was done to increase the range of colours in the



Fig. 1: 9-pin and 15-pin monitor connector plug configurations. See Table 1 for standard pin connections.

display. It's a further complication that has to be taken into account when setting up a servicing system. A consolation is that the change made some of the later circuitry much more like that used in modern TV sets.

What we have been considering so far has been the

signal side of the system. There have also of course been design advances in the other parts of monitor circuitry. Every PC monitor has its own power supply, and a

**Table 1: Standard monitor connector plug pin connections.**

### MDA and HGA (mono)

1 Earth	4 Not used	7 Video signal
2 Earth	5 Not used	8 Line sync
3 Not used	6 Intensity	9 Frame sync

### CGA and EGA (TTL colour)

1 Earth	4 Green video	7 Not used
2 Earth	5 Blue video	8 Line sync
3 Red video	6 Intensity	9 Frame sync

### VGA and SVGA (analogue colour)

1 Red video	6 Red return	11 Mon ID (0)
2 Green video	7 Green return	12 Mon ID (1)
3 Blue video	8 Blue return	13 Line sync
4 Mon ID (2)	9 Not used	14 Frame sync
5 Earth	10 Sync return	15 Reserved

failure here will naturally shut down the system. But as power supplies are common to all mains-operated electronic equipment, we'll not go into this side of the subject in detail.

## Types of Monitors

Monitors are classified by the type of display. There are basically five types, though there are alternatives to some of them. The types are as follows:

**Mono:** MDA (Mono Display Adaptor)  
HGA (Hercules Graphics Adaptor)

**Colour:** CGA (Colour Graphics Adaptor)  
EGA (Enhanced Graphics Adaptor)  
VGA (Video Graphics Array)  
XGA or SVGA (Extended or Super VGA).

There are in addition IBM classifications that use different names but generally fall into the same groups as above.

This list is virtually in date order. The earlier types of monitor are naturally the ones most likely to require repair: the modern standard is confined to VGA and SVGA types.

As a quick method of identification, VGA and SVGA monitors generally have a 15-pin D-type 'high-density' plug in a 9-pin shell (see Fig. 1) whereas earlier monitors are generally fitted with a standard 9-pin D plug. The word 'generally' has to be used here because there

are still a few composite connectors: these have audio-type coaxial plugs at the end of a coaxial cable and operate at a 60Hz frame rate. In addition very modern monitors have red/green/blue coaxial inputs with BNC connectors, often in addition to the standard 15-pin plug. Table 1 lists standard 9- and 15-pin plug connections.

The above list implies that all monitors fall into one of six groups. But there are multi-sync autoscanning monitors that adapt to suit the computer's output, also mono monitors that operate at up to the latest (SVGA) standards. Most of the latter are rather special, expensive monitors, but many mono EGA and VGA monitors have been supplied for use where a cheap graphic-quality mono display was required. These will certainly crop up from time to time.

## Display Standards

Standard is perhaps a bad word to use in view of the mixture of specifications for the various display systems. In addition to three main frame and four main line frequencies, the sync pulses are sometimes positive- and sometimes negative-going. Table 2 lists the more common combinations: but, as in so many areas of electronics, it cannot be up-to-date. The multisync monitors mentioned above now have circuits that can synchronise automatically at line frequencies from 30kHz to 85kHz

**Table 2: Standard monitor parameters.**

Display	Line freq.	Frame freq.	Sync polarity
MDA	18.43kHz	50Hz	Line +, frame -
HGA	31.46kHz	60/70Hz	-
CGA	15.7kHz	60Hz	Line +, frame +
EGA	21.85kHz	60Hz	Line +, frame +
VGA	31.46kHz	70Hz	Line -, frame +
SVGA	31.46/ 35.16kHz	70/ 43Hz	Line -, frame +

Sync pulse polarity: + = positive-going, - = negative-going.

and frame frequencies from 45Hz to 120Hz. Models with microcomputer control are already on the market, and no doubt even more complex models are in the pipeline.

The frequencies and sync-pulse polarities listed in Table 2 for the HGA, EGA, VGA and SVGA types of display can alter with changes in the display mode: there is often a difference when operating in a graphics mode or when a program with a graphics content is being used. The details given are those most likely to be in use when the machine is first powered.

## Drives

I mentioned earlier that analogue drive has overtaken digital drive. This is the reason for the use of 15-pin plugs with VGA and SVGA monitors. 9- and 15-pin plugs can both provide three colour-drive signals but the 15-pin plug has an earth return pin for each drive. In more expensive monitors these returns are used for differential-input amplifier drive to reduce interference pick-up via the cable leads: normally however they are earthed in the monitor near the colour input amplifiers.

The TTL (digital) colour signals provided by a

computer via a 9-pin connector vary between 0V and a nominally constant 5V: by mixing these RGB signals, eight colours (including black and white) can be produced on the screen. By means of the signal at pin 6 the intensity of the signals can be doubled to produce fifteen colours (not sixteen, because black cannot be

**Table 3: Ident pin connections (15-pin plug).**

Type of monitor	Bit 0	Bit 1	Bit 2
Mono	NC	0V	NC
Non-interlaced colour	0V	NC	NC
Interlaced colour	0V	NC	0V

NC = no connection (open-circuit); 0V = connected to chassis.

intensified!). The analogue RGB signals provided by a 15-pin connector are usually of about 1V maximum amplitude. A TV chip of the M51387 type is often used to buffer and condition them. It drives the three output stages that control the tube's three guns. With both systems the sync signals are nominally 0-5V p-p (TTL).

Pins 4, 11 and 12 of the 15-pin plug are the IBM ID (identification) pins: when connected, they indicate to the video drive board in the computer what type of monitor is being used. The pins are either earthed or left open-circuit to provide this information. Table 3 shows the code.

## Servicing Equipment

The above information should have made it clear that if repairs other than very simple ones are to be carried out with PC monitors equipment additional to that used for TV/video work will be required. You can't assume that the computer will be brought along with the faulty monitor, so this is the first requirement. As a minimum, a 286 PC is required, preferably with a VGA monitor as this is likely to be the most useful. If a multi-frequency system can be afforded this would be ideal - but it would be rather expensive. A 3.5in. floppy disc drive and a monitor driver board that can be set to any standard are essential. The hard disc capacity should not be less than 40Mbytes. This lot could cost as little as £250 second-hand: but nowadays you should perhaps consider getting a modern 486 set-up and make use of all the other computer facilities.

Some simple DIY monitor extension leads can be very useful. They can be made up for both 9- and 15-pin connections and should be about a metre long. A terminal strip at the monitor end will enable a scope to be connected to check that the frequencies and signals are correct. An extra output socket attached to the terminal strip will enable your own monitor to be connected as well - most video output boards can drive two monitors, with only a slight drop in the brightness level. With this set-up you can see the computer's output on its own screen, and select test programs, while viewing the faulty monitor. But don't forget that the system will work only when a similar type of monitor is being tested. It does however avoid the problem of having to change the plugs at the back of the computer constantly. Without this ability to check, it's very easy to corrupt the computer's output accidentally and not

know that the signal is missing.

Another useful DIY item is a frequency-check coil, which can be made out of an old degaussing coil connected to a digital multimeter that has a frequency range. It enables the presence and frequency of the line scanning to be checked without any connections to the circuit – often outside the monitor's case. This gives you a quick check of an unknown monitor's type, also on whether the line output stage is working.

You'll also need some software programs to provide a working signal so that the convergence can be checked and the height-width ratio set. If you are into program writing these can easily be produced in BASIC form: some useful ones will be provided in a subsequent article.

## Servicing Procedures

If you've never opened a monitor before you'll probably be surprised by the amount of screening provided. The circuitry in monitors built during the last five-six years is almost fully enclosed in a metal box. This is to prevent internal signals being radiated and to avoid pick-up from adjacent units. It does present a problem however, and many models are very difficult to work on. It's often next to impossible to set up PCBs so that you have access to both sides while the monitor is working.

The layout is often fairly obvious once you've removed enough metalwork to see the circuitry. The power supply, which is usually fully enclosed, is likely to be of the switch-mode variety. If you are lucky it will use the TDA4600 type control chip familiar from its use in so many TV chassis. In the better models you'll find that the voltages are marked on the PCB. In almost every case the connections are made via a plug and socket. This provides an easy check point and enables each supply line to be isolated in turn when a short-circuit is suspected. You'll usually find that there are one or more l.t. lines (5V, 12V and/or 18V) and higher ones of between 70V and 150V to supply the line output stage and the RGB output amplifiers.

The screened input lead from the computer is generally terminated with a multi-pin plug and socket which, in later models, may be mounted directly on the tube base PCB. This would provide an easy point at which to check that the signals are reaching the unit – were it not for the soldered-on screening cover that often fully encloses the rear of the board. Nevertheless the widespread convention of mounting all the colour drive circuitry on this board makes it easier to follow through and check this section of the monitor.

The video circuitry shouldn't present any problems to anyone familiar with TV practice. With a suitable input, the signals can be traced through from the computer input to the tube. The voltages and waveforms at the guns follow TV practice. For tests here a program that highlights each colour in turn is a great help. It makes following the relevant path easier and makes it simple to compare the voltages at each gun – check when each is displaying a peak signal. Tube voltages are all similar to those with a TV set. Though these are special tubes with a finer dot pattern the base pin connections are conventional.

The sync and timebase circuits however can differ in a number of ways from those used in a TV set. As Table 2 showed, the frequency and polarity of the signals differ greatly. Single-standard monitors have straightforward circuitry that can often be followed using TV prac-

tice as a guide. But multi-standard models, which are becoming increasingly more common, often have confusing details. They may have to cater for both positive- and negative-going sync pulses as well as different scan rates. If a dedicated chip is used as the sync separator and timebase generator testing can be rather difficult. Without a knowledge of the chip's internal operation, something that's seldom obtainable, it's impossible to be sure at which pins signals should be present and whether the chip or its supplies are faulty. The need for correction of the line output transformer's tuning adds further complication in some cases. Additional tuning capacitors may be selected and switched by signals from the sync circuit. With this type of circuit fault diagnosis without a manual is almost impossible. More on this is a later article.

Although only one set of parameters was shown for the EGA standard in Table 2, an EGA monitor should also be capable of MDA and CGA operation, enabling it to display three different pixel modes. There are sometimes separate height controls for each or for two of these modes. To set up the monitor correctly the computer must be switched to each mode in turn. Adjustment is not as easy as it might seem, since the settings depend on the computer's display mode. A display program in each mode is required for these settings.

One point worth remembering is that with some earlier colour monitors which have only one height control the height tends to change when the program changes the display mode. This can be frustrating if you don't appreciate what's happening – especially if you use a test pattern that produces an exaggerated change. The height may be adjusted to provide too small a normal display or, worse, the normal display overscans. Check whether there's a separate control hiding somewhere on the PCB.

The line output stage is much the same as that in a TV set. With earlier models there are often separate first anode (screen) and focus controls. Later models have the more usual arrangement, with the controls incorporated into the transformer's moulding. They also use diode-wound LOPT construction. A faulty focus or first anode supply seems to be more common than with TV sets, the symptom being poor focus or brightness when the monitor is first switched on, with a gradual improvement as the transformer warms up. The only remedy is a new LOPT, which is an expensive item with most types of monitor. Since there are generally fewer windings on the LOPT than with a TV set the unit should theoretically be less expensive. This is not so, perhaps because of the smaller numbers produced – and even obtaining a replacement can be difficult.

The number of external controls provided varies from model to model. It's worth checking the front panel, as there can be some unexpected ones beneath a cover. While some monitors have just a contrast and brightness control, others may have a comprehensive selection that includes height, width and shift, pincushion correction and even degaussing.

## In Conclusion

The present article has highlighted some of the problems and requirements with PC monitor servicing. A future article will provide help with some useful servicing programs and information on monitor manufacturers and spares.

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# Teletopics

## **Nokia to Launch PALplus Sets**

Nokia has announced that it will launch the first PALplus receiver in the UK this autumn. PALplus is the enhanced version of PAL that includes 16:9 widescreen pictures, CD-quality sound and improved picture quality through the elimination of cross-colour and cross-luminance effects. Model 7296 will have a 28in. tube, Dolby Pro Logic Surround sound, digital picture effects including PIP, POP and freeze frame and of course teletext. To keep the price of the set down Nokia will not include the ColourPlus circuitry that removes the cross-colour and luminance effects. The 7296 will cost around £1,500. A 32in. version is promised next year, and Nokia also plans to market an add-on PALplus decoder for use with existing widescreen TV sets. It's understood that several UK broadcasters will start PALplus transmissions this autumn, though no one will definitely confirm this at present. The PAL and PALplus systems are compatible.

Nokia has also developed a digital signal decoder for reception of the satellite digital TV broadcasts due to start next year. It will go on sale in 1995.

## **Broadcast Scene**

A powerful case against starting an analogue TV Channel 5 service has been presented to the 10 Downing Street Policy Unit by consultants CDG (Convergent Decisions Group). In the same way that the transition from 405- to 625-lines was made relatively painless by transmitting programmes in both forms at v.h.f. and u.h.f. respectively, a switch to terrestrial digital TV would be helped by using the spare u.h.f. channels to duplicate the existing programme services in digital form. With currently available technology, channels 35 and 37 could provide eight digital channels, giving four for simulcasting (transmitting the analogue channels in digital form) and four for new services, with a coverage of 95 per cent of the population. CDG points out that no other European country has nationally-available spare u.h.f. channels to enable this to be done, and that adopting this course in the UK would give the UK's electronics industry a head start in developing the new generation of TV technology.

Japan has finally decided to drop its analogue HDTV system (Hi-Vision). A digital system is expected to be ready by 1996. To placate those who have bought expensive Hi-Vision receivers NHK is to develop an adaptor. It will require a lot of memory and high-performance graphics processors.

A system called EMC3 has been developed to provide VOD (video on demand) programmes via satellite transmission. An owner of the special EMC3 VCR required will be able to phone for a wanted film or programme. A header note will then appear on the TV screen to say when the programme will be transmitted. The system has been made possible by the use of time compression in addition to digital video compression: it will take five minutes to transmit 100 minutes of programming. There is also a new copy protection system. Final agreement of the standard has still to be reached. Firms that have either joined the consortium promoting the system or expressed an interest in doing so include Canon, Daewoo, Funai, GoldStar, Hitachi, JVC,

Mitsubishi, Samsung and Sharp. It's expected that the system will initially be launched in the USA.

Philips Research at Redhill is working with local cable TV operator Eurobell on the development of a microwave video distribution system that will use radio links in the 40GHz band. The system could be brought into use for some 30,000 subscribers in Eurobell's West Kent franchise area within eighteen months. Initially the system will be used for TV programming, but telephony could be added.

## **Video News**

Philips has launched its first CD film titles that conform to the White Book Video CD format, which was agreed by Philips, Sony, JVC and Matsushita last year. Earlier film titles conformed to the Green Book CDi format. The three titles are from Paramount and Polygram and are available at £18 each. They can be played by CDi or dedicated Video CD players, by some games consoles and by PCs fitted with adaptor boards. Texas Instruments has announced a three-chip decoder set for use with the White Book CD format. It's available to manufacturers at \$40 and produces an output in NTSC form – a PAL version is expected early next year.

The European Laser Disc Association (ELDA), which was formed in 1990 to promote the Laser Disc system, has changed its name to the European Platform for Optical Discs (EPOD). The organisation will in future be promoting all optical disc systems, including CD-ROM, CDi, Video CD and Laser Disc, and is open to all companies active in these markets.

Camcorder sales continue to decline – down 42 per cent year-on-year in February and 50 per cent in March according to one industry monitoring source (GfK). It seems that the boom in this market has ended and that sales will in future be mainly to video enthusiasts. According to research carried out by JVC, a third of owners never use their camcorders while another third do so only rarely.

The National Captioning Institute Inc. has introduced a closed-caption system that enables the deaf and hard-of-hearing to see the dialogue recorded on video cassettes displayed on the screen as subtitles. A VideoCaption Reader, which is connected to the VCR and TV receiver, is required. Some 225 titles now have closed captioning – this is included on all copies of the cassettes, so it's not necessary to buy or rent special ones. The small VideoCaption Reader is priced at about £99 plus VAT and can be obtained from Blockbuster, Global Video (Scotland), Ritz, Radio Rentals and Sound Advantage outlets. It has been accepted as eligible for relief from VAT: those eligible should ask the retailer for a VAT exemption form. For further details contact the National Captioning Institute, Thurston House, 80 Lincoln Road, Peterborough PE1 2SN (0733 891 391).

Sharp has introduced a combined 14in. colour TV receiver/VHS VCR, Model VT3700H, at a suggested price of about £350. It's called the Televideo and is particularly useful as a programme presenter. Features include a digital search system.

## **Sanyo's DVS System**

Sanyo has released further information on its DVS (Digital View Scan) system, which enables the user to hear the sound track in the picture search modes. The system converts the off-tape analogue audio signal into an 8-bit digital signal which, after parallel-to-serial processing, is stored in a DRAM chip. The speed at which the data enters this chip is determined by the tape speed. A microprocessor

checks on the tape speed, using this information to control the speed of the output from the DRAM. If the tape is travelling at nine times the normal speed for example, the digital signal is expanded by a factor of nine, producing normal sound. Some sound is lost however: at nine times normal speed you hear short sections that last for three-four seconds. Since the audio information is digitally encoded, it doesn't matter if the sound signal is from tape that is running backwards or forwards: the microprocessor determines the tape direction, reversing the output from the DRAM when the tape is running backwards.

### Business News

Willow Vale Electronics has signed a service and spares distribution agreement with Pace Micro Technology. In future Willow Vale, which has branches at Reading, Manchester and Nottingham, will provide spares for the full range of Pace equipment. In addition technical support will be provided via its Techline service, which is run by Alan Dyson at Manchester.

Willow Vale has also teamed up with Visions Video Productions to supply training videos. They will be on offer to the trade at £19.95 each. The first title is a 71 minute film on Akai VCRs. It has been produced by Keith White, a Visions partner and a former Akai technical manager.

Electrue Sales of Birmingham has bought a 75 per cent interest in HRS Electronics. The remaining 25 per cent stake will be retained by the present owner, the Ring Group.

### Video Games

The problem of holding stocks of video games cartridges could be simplified by a system being tried out in the USA by Blockbuster in conjunction with IBM and Sega. Games will be stored in computers at video outlets, being downloaded as required on to special programmable cartridges. These will use flash memory chips, have a storage capacity of about 2Mbytes and be reprogrammable an unlimited number of times. It will take less than twenty seconds to download a game. Initial tests are being carried out this summer at fifteen Blockbuster stores in Florida and other south east states. The system could be extended to CD-based software.

The US company Creative Labs is developing a computer board that will enable 3DO interactive programmes to be used with a PC. Philips says that a CDi PC board is also being developed. Toshiba is the latest company to announce that it will be making 3DO players. The company plans to develop a portable model.

NEC's consumer electronics division has developed a 32-bit multimedia games machine that can also send and receive faxes and display them on a TV screen. It is to be introduced in Japan this autumn at the equivalent of around £300. The machine is capable of full-screen motion video with sixteen million colour shades.

Magic Media plans to introduce a virtual reality headset that will sell for less than £100. It will be compatible with PCs, games consoles, video and TV equipment and is expected to be available by next Christmas.

### Shows

This year's Photokina World Fair will be held at Cologne on September 22nd-27th. There are expected to be around 1,500 exhibitors from some forty countries.

The 1995 hotel trade shows will be held on April 2nd-4th, overlapping with the Cable and Satellite Show.

# Next Month in TELEVISION

## FREE CONNECTOR REFERENCE GUIDE

Next month's issue comes with a free reference card giving pin connection details for the scart and other standard plug/socket systems.

### THE PANASONIC Z4 CHASSIS

The Z4 chassis was introduced in 1991 as the basis for a range of high-quality, feature-rich, smaller-screen models. Ian Meadows starts on an investigation of its technical aspects.

### LNB SUPPLY TESTER

Intermittent loss of satellite channels of one polarisation can be a tricky problem to sort out. As an aid, Ian Rees built this tester which enables both the receiver's output and the LNB's power consumption to be checked.

### WHAT GOES WRONG?

Knowing which items cause most faults helps with diagnosis, stock control and deciding about what test equipment to buy. Ray Porter analysed the TV Fault Finding and VCR Clinic notes published over a period of time and reports on the conclusions that can be drawn.

### CD PLAYER SERVICING

When testing a faulty CD player, much can be learnt by checking whether the machine is correctly set up. Les Austin tells you how to go about it.

### TEST REPORT: THE H-P HP54600A SCOPE

This powerful 100MHz dual-trace storage scope is suitable for all types of TV, video, digital and computer servicing work, being especially helpful when dealing with intermittent faults. It's capable of a vast range of measurements, which are carried out at impressive speed. David Botto has had one on extended test.

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# TV Fault Finding

*Reports from Philip Blundell, AMIEE, Chris Watton, Michael Dranfield, John Edwards, Nick Beer, M. Stansfield, Mike Leach, Gerald White, Edward Joyce, Joe Cieszynski and J.K. Potts*

## Philips G110 Chassis

If you encounter a G110 that blows the chopper transistor at switch on, even when all the bits in the repair kit have been fitted, but the power supply works all right if brought on slowly by use of a variac, change the on/off switch and the posistor in the degaussing circuit. **P.B.**

## Panasonic TC1485T (Z3 Chassis)

For a dead set with D816 (R2G) short-circuit, suspect that the STR50103 chopper i.c. is producing a high output voltage intermittently and needs replacement. The h.t. voltage at TPE1 should be 103V  $\pm$ 1.5V. A faulty STR50103 chip can result in the voltage rising to 150V or more. **P.B.**

## Mitsubishi CT2528/Finlux 9000 Chassis

The set that came in was a Mitsubishi model but we found that it was a Finlux 9000 chassis in disguise. Anyway the set was dead with all the outputs from the power supply at a low level. A check for shorts across the outputs brought us to the audio supply, where C689 (2,200 $\mu$ F) had gone short-circuit. **P.B.**

## Panasonic TC1485T (Z3 Chassis)

This set was stuck in standby. We found that the microcontroller chip IC1101 didn't produce the power-on command (pin 6 high) because the chip was not being reset. IC1104 produces the reset action when its supply reaches 5V, but the latter was low at 4V. On checking back to the 5V regulator transistor Q804 I found that the reference zener diode D810 was leaky. **P.B.**

## Fidelity CTV1404

The complaint was that the button would come out while viewing. This remote-control set uses the solenoid-latch type switch. What was happening was that the 12V supply would be lost intermittently, the switch then being released. The cause of the trouble was the LM317T 12V regulator chip, a replacement curing the fault. It's mounted on the line output transistor heatsink. **C.W.**

## Samsung Voyager 10

This set was stuck in standby because there was no drive to the relay. The cause turned out to be the tuner/timer chip. It had on it a few numbers that didn't correspond with any information in the manual. The Samsung part code is 32-213-257 SIP. **C.W.**

## Philips 2B Chassis

All the power supplies were present and correct, including the e.h.t., but the picture was being blanked by incorrect pulses from the field output stage. If the set was left on for a long time the picture would begin to appear, about two

inches from the bottom of the screen. It would reveal itself one line a second, until the screen was full. The cause of the fault was C2571 (100 $\mu$ F, 25) in the field flyback boost circuit (note that the value is 68 $\mu$ F with 90° sets). **C.W.**

## Decca 120 Chassis

The audio output was all right with no signal present, but as soon as an aerial was connected there was only muted sound. The sound detector coil L601 was open-circuit. Fortunately it could be repaired, by resoldering the legs inside. **C.W.**

## Bush 2114T

Sometimes this set wouldn't come on when asked, with no output from the power supply. Replacing C801 (47 $\mu$ F) and C802 (100 $\mu$ F) cured the trouble. We uprated them both to 63V. **C.W.**

## Sony KV2212

This set had a narrow picture with crinkle-cut edges. When the set had warmed up a bit the edges of the picture straightened and then the width popped out. Application of freezer to the SG246A SCS on the scan board proved its guilt. **C.W.**

## Grundig CUC120 Chassis

If there's a blank raster, all the supplies are present and correct and the tube's heaters are alright, check whether the TDA1770 field timebase chip IC2775 on the deflection panel is faulty. The blank screen is caused by the c.r.t. protection system coming into operation when no field scan is being generated. **C.W.**

## Loewe Classic M124 (C8001)

The picture was narrow and the tube looked as flat as a pancake. There was also a slight whistle from the power supply. A check at U142 (142V line) produced a reading of only 129V at the maximum setting of the h.t. preset potentiometer. When this was returned to its original position the h.t. fell to 112V. As the power supply's 27V and 8V outputs were correct, the cause of the fault lay in the 142V part, where the 47 $\mu$ F, 250V reservoir capacitor C652 was found to have gone low in value. We also replaced the smoothing capacitor C653 (again 47 $\mu$ F, 250V). Resetting the h.t. potentiometer then restored correct operation. **C.W.**

## Ferguson ICC5 Chassis

This Nicam set (Model 51K5) had a sound fault. After two-three hours the sound would crackle very loudly, so loudly in fact that the set had to be switched off. This also made fault finding more difficult. On top of this the fault would show up only every few days. To cut a very long story short, the cause of the fault was traced to the smaller of the two

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## Audio Signal



1KHz Sine Wave

## Outputs

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**Composite Video**

Phono socket:  
**Line out Audio**

Co-Axial socket:  
**Video & Audio**  
**Ch 36 UHF PAL I**  
PAL BG version also available

## Power

9V PP3 battery (not inc)  
or External PSU  
included with TELETEST



## Technical Specification

**Composite video out:** PAL 4.433MHz, 95% chroma (bars), 1Vpp 75Ω  
**Audio output:** 1KHz sine wave, 1Vpp 1KΩ (nominal)  
**RF output:** UHF Ch36 PAL I 6MHz 75Ω (or PAL BG 5.5MHz)  
**Synchronisation:** Fully interlaced, 15,625Hz line frequency  
50Hz field rate, all broadcast spec pulses

**TELETEST**  
**Size:** 155x75x40mm  
**Weight:** 265g  
**Accessories included:**  
External PSU  
Instructions

# TELETEST from OZAN

screening cans on the Nicam PCB. Pin 24 of the main edge connector is linked to one of the screening can's legs. This then distributes the D earth line to various points around the panel. In order to avoid future problems we resoldered all the screening can's connections.  
**M.Dr.**

## Sharp C3720H

The symptom with this set was weak blue drive. We found that D807 on the small subpanel connected to the tube's base panel was leaky. A 1N4148 diode fitted the bill, but the fault remained as before. The TDA3566 decoder chip had to be replaced as well. Perhaps a c.r.t. flashover had been responsible for the failures.  
**M.Dr.**

## Ferguson TX90 Chassis

We all know by now that when C189 (22μF) in the 20in. version of this chassis dries up the result is ragged verticals at high contrast levels. In 14in. sets however it causes a vertical herringbone patterning that's most noticeable at very low contrast settings.  
**M.Dr.**

## Philips K30 Chassis

This was a new fault to us. The top part of the screen was blanked out, only the bottom three inches having a picture. The cause of the fault was traced to C1586, the 100μF reservoir capacitor in the -20V supply. This supply is used for various purposes: one is as the source of collector voltage for Tr1514 in the field driver circuit. We found that the lower

C1586's value, the less picture we got. With C1586 open-circuit or removed there was no picture at all.  
**M.Dr.**

## Philips CP110 Chassis

The front pushbutton control panel would change channels upwards but not downwards. All the other functions, i.e. tuning, volume, brightness etc. worked normally. We've had front control panel problems before with these sets, only some functions working and others not etc. The cause of the trouble is the keyboard foil, where it slots into the socket on the main board. This set was no exception. Re-seating into the socket doesn't always work: renewing the foil provides a permanent cure. The replacement foil assembly is much better than the original, because the foil solders directly on to the main board. This could become a 'stock problem'.  
**J.E.**

## Hitachi CPT1471

The problem with one of these sets was partial field collapse. The cause was dry-joints at the legs of the STA441C field output chip.  
**J.E.**

## Aiwa VXT1000 Mk. 2

The TV section of this TV/video combination was dead – and we didn't have the manual. Fortunately the power supply is similar to that in the Amstrad TVR3, using the STK7348 chopper chip. In this case the power supply was working, producing the correct 120V h.t. output. This passes via L16, circuit protector ICPI and R8 to the line timebase.

We found that the ICP was open-circuit. As there didn't seem to be any shorts we renewed the ICP and switched on. Thankfully everything now worked. **J.E.**

### **Ferguson TX10 Chassis**

There was just snow on the screen. Checks proved that the tuning system was working correctly. A finger test at the output of the SL1430 i.f. preamplifier chip (SAWF driver) produced an impression but there was no response when the test was carried out at the input. Replacing the SL1430 chip restored the signals.

Another of these sets produced a very pale, dull picture. Checks showed that there was insufficient first anode voltage at the c.r.t.: the supply and the potentiometer were all right, but it was impossible to get more than 285V at the relevant c.r.t. socket pin. The cause of this was spillage across the socket's spark ring. A clean up proved the point, while a new socket resulted in a repair that could be given a guarantee. **N.B.**

### **Hitachi CPT2074 (NP83CQ Mk II Chassis)**

This completely dead, silent set produced a resistance reading of 5Ω when a check was made between the h.t. line and chassis. I disconnected various items in turn in order of likelihood and soon found that the line output transformer was responsible – the same resistance reading was produced when a check was made between its h.t. feed pin and chassis. A new transformer and a new STR6020 chopper chip restored normal operation. **N.B.**

### **B and O MX5500 (326X Chassis)**

This huge set would intermittently produce a strange noise from its left-hand speaker: after this the speaker would remain silent for anything from ten seconds to almost eternity. The fault started two days after we'd installed a Beosat LM internal satellite receiver. Bearing this in mind I looked for mislocated plugs etc. and soon saw that there were dry-joints on most of the legs of the two TDA2040 audio output chips 10IC3/4. This is becoming a common fault with all chassis in this range, e.g. the 39XX. **N.B.**

### **Ferguson TX90 Chassis**

This portable was now totally dead: previously there had been severe hum. The 1A fuses associated with the mains transformer were both open-circuit and one of the BYD33G mains rectifier diodes was short-circuit – so the final fault could have occurred when the set was switched off. **N.B.**

### **Finlux 5810**

This 10in. colour set can be used with an a.c. or d.c. power supply. An attempt at the latter use had resulted in the 4A fuse FU65 going open-circuit and the reverse-polarity protection diode D652 (type S5566B) short-circuit. The customer's d.c. lead had an internal short of course. **N.B.**

### **Panasonic TC21M1R (Z4 Chassis)**

This set had been brought in because of tuning drift, a fairly common fault. As usual the cause was the tuner unit. When using the portable appliance tester to carry out the insulation resistance test for the final safety check however the reading I obtained was infinity – you would normally expect to get a reading of around 9.5MΩ. The resistor

between the live and isolated sections of the chassis was open-circuit. It's R814, an 8.2MΩ safety component. **N.B.**

### **Ferguson B14R (TX90E Chassis)**

This set was stuck in the standby mode. On discovering that the S2000A3 line output transistor TP10 was short-circuit I assumed that the repair would be a very simple one, but the set remained in the same state when a replacement had been fitted. Further checks showed that the BA157 diode DP08 was short-circuit. **N.B.**

### **Sony KVX2521U**

Intermittent sound in one or both channels is quite common with these sets. The usual cause is dry-joints around the audio output chip IC251. **N.B.**

### **Samsung CI3351A (P68SC Chassis)**

This set was dead. A check on the start-up voltage at pin 4 of the power supply chip IC801 produced a very low reading (0.6V). The feed resistors were o.k. and there were no shorts, the fault being within the chip itself. It's a special hybrid device, type SDH209B. **N.B.**

### **Philips CTX Chassis**

I've had a number of these portable sets in which dry-joints around the line output transformer have been allowed to arc and the set has become quite dead. Resoldering still leaves you with no 12V supply because you'll find that the 2.2Ω fusible resistor R3585 has gone open-circuit. **N.B.**

### **Goodmans 147TT**

This 14in. colour set was brought to me by a friend who had been told by a high street shop that it couldn't be repaired because the spares required were not available. On initial investigation I found that the line output stage derived 12V supply was missing because zener diode ZD402 (12V, 1W) was short-circuit while R425 (5.6Ω, 3W) in the supply to it was open-circuit. The faulty components had been lovingly soldered back into position by the previous investigator!

When these two items had been replaced the set worked and produced a good picture. But at switch on the h.t. rose rapidly to 140V before settling back, after about two minutes, to the correct 112.5V. In addition the chopper transistor and transformer were both running hot. There was a very limited range of h.t. adjustment, and the response could only be described as sluggish. Checks in the discrete-component chopper control circuitry indicated that the system was struggling to hold the h.t. voltage down. I then found that the chopper transistor's base coupling capacitor C911 (47μF, 50V) had dried out – possibly because of its proximity to the chopper transistor's heatsink. For good measure the 8.2V reference zener diode DZ901 and C909 (47μF, 50V) were also replaced. After this the h.t. voltage could be set accurately and remained stable under hot and cold conditions. The set then produced good results.

I'm still wondering what tree the previous repairer was barking up?!

**M.S.**

### **Hitachi C2862TN**

This 28in. Nicam set gave us some problems before we eventually traced the cause of the fault. The symptoms were no EW drive and a slight lack of width. The copper heatsink

that supports the line output transistor and the EW driver transistor was getting very hot, but neither transistor had failed. During the course of our checks we replaced the BD241 EW transistor TH03 and various diodes in the modulator circuit, all to no avail. It was the first fault I've had with one of these sets, so experience wasn't much help. Eventually the cause was traced to CH09 (150nF) which was open-circuit. **M.L.**

### **Panasonic TX21T1 (Alpha 2 Chassis)**

The customer complained that the colour picture produced by this 21in. FST set was poor. On test we found that the blue component disappeared from the picture after half an hour, the grey scale being o.k. There was a B – Y waveform at pin 2 of the TDA4510 colour decoder chip IC601, but it was of low amplitude. The relevant d.c. voltages were also slightly wrong. We tried replacing the chip and the chroma delay line, to no avail. Many small components were then tried before the cause of the fault was finally found. The culprit turned out to be C612 (0.01 $\mu$ F) which is connected between pin 5 of the TDA4510 chip and the 12V supply. A replacement restored correct colour. **M.L.**

### **Mitsubishi CT29645TX**

This model is fitted with a Videocolor tube that has anti-glare characteristics. Unfortunately it produces a flat-looking picture. There's a modification to improve the picture quality, as follows. Change the value of R557 from 120k $\Omega$  to 150k $\Omega$  (cut the track on the copper side of the main PCB to isolate the 120k $\Omega$  resistor originally fitted, then solder the new 150k $\Omega$  resistor underneath to replace the original component). Solder a wire link across R298 on the copper side of the the Vc/RGB PCB – this disables the peak-white limiting circuit. Finally remove C259. **G.W.**

### **Mitsubishi CT2533**

You sometimes find that the 2SD1877 line output transistor has gone short-circuit. To prevent further failure, remove the line driver transformer T551 from the PCB then carefully clean off the excess grease (like candle wax) from its legs. Clean the legs with emery cloth, re-tin them then refit the transformer. It's also good practice to replace IC901 (STR59041) as this device can produce spikes that destroy the line output transistor. When you replace IC901 make sure that you remove all the old compound from the heatsink and mica washer thoroughly, then apply fresh compound before fitting the new device. **G.W.**

### **Sony AE1 Chassis**

For lack of height, top foldover and severe cramping at the centre of the picture replace R802 (0.47 $\Omega$ ).

If there's no sound or vision check for 12V at L606 in the power supply. If the reading is low, disconnect L606. If the 12V output from the regulator Q608 then appears check for h.t. at the collector of the line driver transistor Q805. No voltage here means that R822 (1k $\Omega$ , 1W, 5%) is open-circuit.

For various symptoms – drifting off tune, white streaks on the picture, will search tune up but not down, will not visually lock on a channel – find board A, remove the screening can and inspect the soldered

connections on the can mounting on the PCB. These connections form an earthing band and are usually cracked. Also check and resolder as necessary the connections to T101 and T102. **G.W.**

### **Sony KVM2131U**

This set wouldn't tune though the on-screen display indicated that tuning took place. As a first step the 33V output from regulator IC004 was checked. It was o.k., and was also present at the collector of Q004. At the other end of resistor R013, which is connected to Q004's collector, the voltage was very low. It turned out that D156 (1SS133) was leaky. **E.J.**

### **Mitsubishi CT2155**

If patterning is present for the first five minutes or so after switching the set on, replace the 470 $\mu$ F, 25V electrolytic capacitor C920. **E.J.**

### **Philips CP110 Chassis**

According to the customer this set would become dead intermittently. We'd had it in the workshop on a couple of occasions before without the fault showing up. This time however the set failed after being soak tested for four and a half hours. We removed the back and checked the h.t. voltage, which was high at 156V. Next we checked for line drive. It was missing at the collector of the BC337 line driver transistor TR7630 because this nice little device was now open-circuit. A new transistor restored normal operation, with the h.t. correct at 140V. **E.J.**

### **Bush 2820T (11AK03 Chassis)**

Excessive line pulling and tearing, or bent verticals with lack of width, can be caused by the 112V h.t. supply's 47 $\mu$ F, 160V reservoir capacitor C827 being open-circuit. Visual examination usually reveals the cause of the fault as the capacitor is often burnt up and slightly swollen. **J.C.**

### **Sharp C3703H (7PS Chassis)**

The mains fuse was intact but there was no output from the power supply. The STR40090 chopper chip had failed, probably due to the absence of any heatsink compound. **J.K.P.**

### **Akai CT2579**

There was a two-inch gap at the right-hand side, as if the picture had shifted. The cause of the fault was eventually traced to C516 (470pF, 1.6kV) which is next to the line output transformer. **J.K.P.**

### **Amstrad TVR3**

A loud whine came from the power supply and there was no picture or sound. No shorts were present on the supply lines but a visual inspection showed that C310 (3,300pF, 1kV) had cracked, going short-circuit. **J.K.P.**

### **Hitachi C2118R/C2118T**

For no start-up look no farther than the front, right-hand side of the chassis where you will find R902 and R903, both 82k $\Omega$ . One or other or maybe both of them will be open-circuit. **J.K.P.**

# Astra 1D - Trouble Ahead?

J. Lejeune

With the launch of the 1D satellite due this autumn and services expected to start next March the number of channels available from the Astra orbital slot could rise to 64. The 1D satellite will extend the Astra frequency spectrum down to 10.7GHz, see Fig. 1.

## Basics

This use of the 10.7-10.95GHz spectrum will give rise to some problems for owners of older satellite systems that don't have an 'enhanced' LNB or a wideband receiver. Wideband models include the Pace PRD800+, PRD900+, MSS1000 and the Amstrad SRD360/540/545/550/650. Put simply, the older 10.95-11.7GHz receiving systems won't receive Astra 1D because a 'standard' LNB has a local oscillator that operates at 10GHz. Use of an 'enhanced' LNB (one with a 9.75GHz local oscillator) will give reception from Astra 1D, but with loss of reception from Astra 1B at the other end of the band. Narrowband receivers produce a 950-1,750MHz i.f. output while wideband

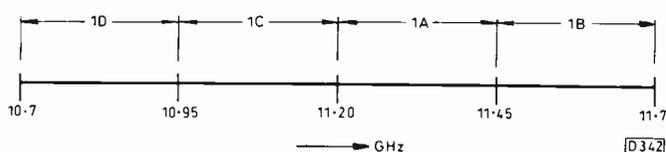


Fig. 1: The Astra frequency spectrum.

receivers produce an i.f. output of 700-1,750MHz or 950-2,050MHz. The chances of receiving 1D successfully with a new wideband receiver and the original 'blue-cap' LNB could be remote. This is because, good and reliable as these LNBs are with 1A, 1B and 1C, they are not optimised for frequencies below 10.95GHz: below this frequency the gain falls rapidly and the noise figure rises. In some cases the original LNB used in an installation may work successfully, but this would be a matter of luck. The smaller, black successors to the old white-bodied blue-cap LNB do however have a substantially better performance below 10.95GHz. The point to remember is that while a wideband receiver will tune across the 10.7-11.7GHz spectrum with any LNB, reception of Astra 1D is likely to be impaired when a 'standard' LNB is used.

## Diplexing and Signal Distribution

If an old LNB with a 10GHz local oscillator does work with Astra 1D, an important point is that the i.f. output produced with this satellite will be 700-950MHz, i.e. the top end of the u.h.f. TV band into the mobile phone band. Although few or no problems are expected with the latter, the overlap with the u.h.f. broadcasting band could produce problems where the satellite i.f. and u.h.f. TV signals are diplexed and fed down a single coaxial cable. A diplexer at each end of the cable run should enable this system to work but there could still be one or two problems.

The first is where a poor-quality diplexer is used, i.e. one that doesn't provide adequate out-of-band attenuation. As a

result, a substantial amount of satellite i.f. signal could reach the TV set's u.h.f. aerial socket while terrestrial u.h.f. signals could be fed to the satellite receiver's tuner. Patterning would be likely with group C and D u.h.f. transmissions. Interference to Astra 1D signals from u.h.f. stations is less likely, because f.m. is used for the satellite transmissions and the receiver's a.m. rejection should be good.

Use of a good diplexer that blocks the 700-950MHz band will mean that signals from Astra 1D cannot be tuned in. One solution here would be to use a wideband receiver and a block converter that moves the 700-1,800MHz band to the 1,800-2,050MHz spectrum. A converter of this type could be permanently wired in.

Suppose that a standard LNB is replaced with an enhanced one in a small, wideband MATV system where u.h.f. signals are also present. To bring in 1D's signals, all the satellite channel i.f.s are raised by 250MHz. The result will be the need for retuning with wideband receivers connected to the system and the prospect of losing the 1B signals altogether with older 950-1,750MHz i.f. satellite receivers. There may also be problems where distribution amplifiers in older systems have a 1,750MHz upper frequency limit. It would be advisable to check on this – even where the label on the amplifier states that the upper limit is 2GHz.

## Options

What are the options then for those who wish to receive 1D signals with existing narrowband equipment? Simply changing the LNB to an enhanced one will mean sacrifice of the 1B signals since these are now out-of-range above the receiver's top frequency limit. Services such as The Movie Channel, Sky Movies, Sky Sports and UK Gold would be lost.

Possibly the neatest solution would be to use an 'extender'. This is basically another block converter. It's fitted between the LNB and the receiver, converting the 700-950MHz 1D i.f. to a block within the receiver's tuning range. Several types of block converter are available to suit particular situations. The converter can be switched in to convert the 1D signals and switched out for 1B reception. It should however be pointed out that in some instances the use of a block converter will degrade a marginal satellite signal, producing something that's unacceptable. The existing LNB may not perform very well at the 1D frequencies and the addition of a converter will further degrade the signal-to-noise ratio. All may be well on a clear day, but come the winter and peak viewing season, with a greater likelihood of overcast skies and rain, and trouble can be expected.

Changing to an enhanced LNB and retaining the narrowband receiver will give reception of 1D while pushing the 1B signals outside the tuning range. Retaining the standard LNB and installing a wideband receiver will enable 1D signals to be received, provided the LNB is up to the task and the installation is a straightforward one with the LNB feeding the receiver directly, i.e. no diplexers. Some manufacturers, notably Pace and Amstrad, will be offering

upgrade kits for some of their recent narrowband products.

Changing the LNB and receiver to wideband types provides a 'future-proof' solution: where the money is available, a receiver that offers the greatest range of opportunities for upgrading to the use of dish-positioners and D2MAC reception should be considered. At present we don't know what services will be provided by the 1D satellite, but there's a strong possibility of yet more films. With this in mind, a receiver that has Dolby Pro Logic Surround sound can offer a real improvement.

### Future Developments

Future developments in satellite reception are likely to involve the use of LNBs that have more comprehensive features than present ones. Some receivers already incorporate 22kHz tone switching that can be selected via the set-up

menu. Tone switching enables a dual-LNB of the appropriate type to be connected to a receiver via a single coaxial cable, or external switchers can be automatically controlled by the receiver. Use of tone switching expands the software-selectable options available to the user.

Increased use of dish-positioners is likely once the advantages of satellite broadcasting are appreciated by a greater percentage of the viewing population. The thirst for more and more channels can be met only by providing access to more satellites. Recent advances in positioners include the use of more efficient d.c. motors to drive the mount, and the use of higher-definition feedback from the mount to the control circuit to give more accurate positioning. Look for a satellite receiver that incorporates or can be upgraded to provide a dish-positioner.

The future of satellite broadcasting will present exciting prospects – one step nearer to the 'global village'.

## Test Case 380

Summer has finally arrived, and with it a new recruit to the Test Case workshop. He's replaced Dylan, who has left us for pastures new. Ray, our new man, is young, keen and has come with a brand-new driving licence and a subscription to the local Technical College. We'll call him Cathode Ray, and shorten that to CR. Certainly he's got quite a long time-constant, but hopefully he'll get quicker with experience and the good guidance of his teachers.

A recent encounter with his ten-year old Mitsubishi TV set didn't do much for his ego or confidence! It's a CT2227BM, and stood accused of producing a jittery picture. Once on the bench it was tuned to the output from a pattern generator. Sure enough the picture had rather watery verticals, sometimes breaking into horizontal jitter that affected the whole picture or segments of it. The effect gradually lessened with time: when the set had been running for five or six hours the picture had steadied to the point where it was quite viewable.

The following morning CR went into that set with a will. The Mitsubishi manual's circuit diagram is clear and helpful, and since they were 'doing' timebases at the college at the time Ray's confidence was high. He started by making an oscilloscope check on the line-drive output from the LA7800 timebase generator chip IC401. Little jitter was visible here but, as Television Ted pointed out, this wasn't an ideal test situation as the scope was being triggered by the waveform it was displaying. So they switched on both beams, with one scope input from pin 3 of IC401 as before and the other from the emitter of the video buffer transistor Q103, triggering the sweep from the latter. This showed up the jitter well, especially when the waveform display was expanded horizontally. Plainly the cause of the trouble was in or around the timebase generator ship: Ted said that a peripheral component was more likely to be the cause than the chip itself.

So that's where CR got going. He checked the line hold and phase preset potentiometers carefully but could find nothing wrong with them. The capacitors in the line oscillator and flywheel line sync filter circuits were, in Ray's view, the next suspects. He heated and cooled them, but this had little effect on the jittering picture. Even so, he checked them all (C502/3/4 and C506/7/8) by substitution. They all proved to be innocent, the jitter continuing unabated. New hold and phase potentiometers were then fitted. Once again this failed to improve the display. As the pile of bits on the bench grew, CR's morale shrank. A couple of hours later he

was no nearer to finding the cause of the trouble, and the picture was beginning to settle down. By now most of the components in the flywheel sync, oscillator and sync separator circuits had been replaced.

The upshot was that Ray ordered a new LA7800 chip and put the set to one side to await the component he was now sure would restore a steady display. Meanwhile he put all the original components back, ready for a triumphant switch-on when the new i.c. had been fitted.

Regular readers of the Test Case feature could write this paragraph by themselves! When it arrived, CR carefully fitted the new chip. He then switched on and, to his amazement and disappointed, up came a picture with the same old jitter. TV Ted had been right when he said that the chip was unlikely to be the cause of the problem. The cause wasn't far away however, and its replacement cost a lot less than the chip which is now languishing in the stores. Can you suggest a diagnosis? Whether or not, you can find the solution by turning to page 742. But think about it first!

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# Long-distance Television

Roger Bunney

The Sporadic E (SpE) season started late this year: as I write, in early June, there are still few signals. But we can hope for an improvement through June and into July, with more exotic signals putting in an appearance. The SpE log for May is given below. As in previous years, the sources of the signals received are indicated by the abbreviations used by the relevant broadcasting organisation. Because of the complicated situation in what was Yugoslavia however, with various initials – HTV, DLOI, JRT, etc. – seen, I will for this season simply use the initials YUG for signals from this area. Likewise reception from Russia will appear as CIS, unless clearly from independent states – Latvia (LAT), Estonia (EST) etc. On to the log then:

6/5/94	TVE (Spain) ch. E3; DR (Denmark) ch. E3.
12/5/94	TVE E3.
14/5/94	TVE E2, 3, 4.
15/5/94	TVE E3, 4; RTP (Portugal) E3; ORF (Austria) E2a, 3, 4; TVP (Poland) R1, 2; TVR (Romania) R2.
16/5/94	TVE E2, 3, 4; RAI (Italy) IA; MTV (Hungary) R2; YUG E3.
17/5/94	TVE E2, 3, 4; RAI IA; RTP E3; YUG E3.
19/5/94	YUG E3.
21/5/94	TVE E2, 3, 4; TVE-2 E2; RTP E3; RAI IA; TVA (Italy) IA.
22/5/94	TVE E2, 3, 4; RAI IA, B; TVA IA; YUG E3; SVT (Sweden) E2; NRK (Norway) E2.
29/5/94	TVE E2, 3, 4; TDF (France) L2.
30/5/94	RAI IA; TVE E2; SVT E2.
31/5/94	RAI IA, B; TVA IA; TVE E2, 3; TDF L2; YUG E3; DR E3; ARD (Germany) E2.
1/6/94	CIS (Russia) R1.

On the evening of May 22nd Cyril Willis in King's Lynn received two unidentified signals thought to be from Central Africa. At 1840 BST he noticed, from a southerly direction, smeary signals in ch. E3. At 1923 there were more smeary signals, this time colour bars in ch. E2, moving on to a programme at 1930 then fading out. It's perhaps too late in the solar cycle for this to have been F2 or even transequatorial skip propagation: thoughts are that it was multiple or

extended-hop SpE propagation, maybe from Nigeria – Sokoto ch. E3 has been received on several occasions – or even GBC (Ghana). Can any of our readers in Africa provide details of relevant test transmission and programme start times?

My thanks to Cyril Willis (King's Lynn), Peter Schubert (Rainham), Brian Williams (Penarth), Iain Menzies (Aberdeen) and Roger Fussell (Torpoint) for sending in reception reports.

## Satellite Sightings

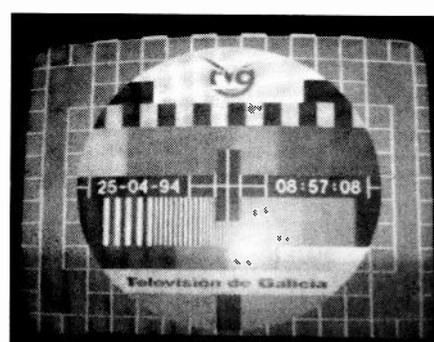
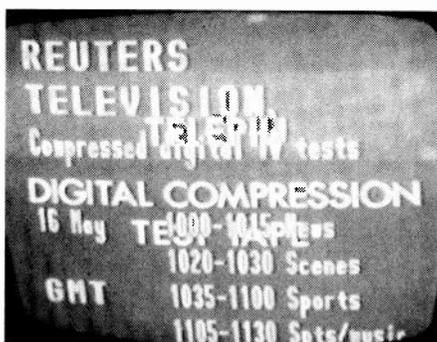
The opening of the Channel Tunnel on May 6th came just too late for our last column. Much SNG activity accompanied the event, with most of the Eutelsat transponder capacity available taken up for programme and news feeds. Even the Telecom IC bird at 3° was in use, with the BBC Good Morning programme being shown from Boulogne.

The next big event was the Monaco Formula One Grand Prix on the 15th. Several Eutelsat transponders were again fired up, though the best coverage seemed to be that destined for the French TF1 network, via Telecom IC (the 12-6GHz vertical transponder). I didn't find any English subcarrier during my scan across the sky – even the Intelsat K feeds were in Spanish/Italian. Eutelsat II F4 at 7°E ran the Grand Prix during the day with SIS (sound-in-sync) – this must have carried an English commentary. Two days before the race I came across audio only feeds for Sky via Intelsat K (at 11-497GHz), with sound bites for various future news broadcasts. The caption 'RTI MONACO' was superimposed upon colour bars during this transmission.

John Locker (Wirral) has confirmed his reception from the new Russian GALS-1 satellite at 44°E – though on carrier rather than video. He monitored strong signals – possibly +55dBW – at several frequencies between 11-8-12-2GHz. Check this slot for video activity if you have a clear view to the sound east. A less dramatic but curious way of filling time during the TVE Internacional breakfast show via Eutelsat II F2 (10°E, at 11-149GHz horizontal) is to use traffic cameras: there are, for considerable periods, shots of the main routes into Madrid. Check this one out if you are a Madrid traffic fan!

Aidan Murphy (Ireland) monitored the university feeds (Leeds, Brussels, Nottingham and Ulster) during a recent satellite conference relayed via Eutelsat II F3 (16°E). He is using a Manhattan 9000 receiver, 1-2m offset dish and an LNB with a noise figure of 0-7dB. This equipment is installed at his place of work, so during lulls he can zap across the belt.

I came across an Esso corporate presentation via Eutelsat II F4 (7°E) a few weeks ago. It consisted of a quiz between staff members across the UK, with inserts from various



Left: Reuters testing with digital video compression: the digital signal is behind this analogue one (see text above). Centre: The Telekom SNG truck has been in the Ukraine recently – and offered special uplinking deals! Right: Galicia Television, received by George Gaskin in Gibraltar.

remote sites. The purpose of the event, 'Superfest 94', is something I never found out.

On the 16th there appeared, on a leased transponder at 21.5°W, "Reuters Television - Compressed Digital TV Test", with the timetable 1000-1145 GMT. Come the hour and sure enough visible tests were being carried out. But could this be digital video? - the pictures were very clear. It transpired that the digital signals were indeed there - behind the analogue ones! John Locker tells me that, on the basis of his experience with the Jason Project, digitally compressed video appears as a dark screen with a series of white dots when seen on an analogue TV set.

The opening of the new Glyndebourne Opera facility was featured via Eutelsat II F4 on the 28th as a relay for the French La Sept/Arte networks - but in PAL rather than SECAM and with normal audio rather than SIS. The transmission was at 10.989GHz (vertical).

There's much to be seen when monitoring the satellite arc: let us know of any unusual sightings and the equipment you are using.

### News Items

**Sweden:** There are to be two new national commercial TV networks, M4 and M5, and up to sixty new local TV stations - a maximum of three per area. M4 and M5 services are expected to start in late 1997. Experimental DAB (digital audio broadcasting) is being tested north of Stockholm, using ch. E12 with 2kW maximum output. Regular DAB transmissions are expected to start this autumn, using the same channel.

**Canada:** DAB tests in the 1.45-1.49GHz band are taking place in the Montreal region. Tests are also being carried out in Toronto - existing local f.m./a.m. programmes are being relayed in both cities. The aim is to introduce DAB gradually on a replacement basis: it has been predicted that by the year 2010 all analogue stations will have closed!

**Malta:** Super One Television is now transmitting from Gharghur in ch. E29, at 100W. The broadcaster is to be allowed to expand its coverage by using relays that also operate in ch. E29.

**Estonia:** The transmitters that formerly relayed the Ostankino OK-1 service have been handed over to commercial operators RTV and EVTV.

**Lithuania:** The OK-1 service is now being transmitted throughout the country. Lithuanian State TV carries the logo 'LTV' in the top left-hand corner of the picture. The text service is called Teleteksto Tarnyba.

**Latvia:** An English alphabet text service, Text Inform, is now in use.

**Australia:** The slow transfer of low-band v.h.f. services to u.h.f. continues: ABNT-0 (ch. A0) has now moved to u.h.f., another loss for the next sunspot cycle maximum!

**EBU news:** Dudelange ch. E24 (Luxembourg) has closed down. There are two new French allocations: Bordeaux ch. E65 150kW (TDF-5) and Aurillac ch. E67 80kW (TDF-6). Powers e.r.p. and polarisation horizontal in both cases.

**France:** The Nicam subcarrier will be at 5.85MHz with both satellite and terrestrial transmissions - not 5.58MHz as previously mentioned.

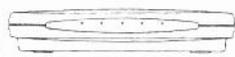
### Satellite News

The English/international edition of the German magazine *Tele-satellit* is no longer being published - instead there will be an increased number of English pages in the German edition.

RTL-TV via Telecom 2B (5°W) is using both 6.6MHz

## NEW PRODUCTS

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(50µsec) and 5.8MHz (J17) audio: no video scrambling yet, though VideoCrypt is favourite.

The Parliamentary, Learning and Wire TV channels are now being downlinked via a single Intelsat 601 (27°W) transponder, using digital compression. BT is to use Intelsat 602 (63°E) for C band digital SNG operation to facilitate inputs from the Middle East and Africa.

Saudi based Arabsat is considering the purchase of a fifth satellite. All India Radio (AIR) is planning a twenty radio channel service via Insat 2a.

The UK based Chinese Channel, at present transmitted in the clear via Astra, is expected to start using Cryptovision scrambling shortly.

### Sync-lock Problems

Some signals just won't lock: they are either scrambled or too weak. When it comes to weak and/or unstable signals, the problem is to enhance the sync locking within the receiver or improve the signal before it gets there.

Very simple encryption was used in the early days of scrambled satellite signals. The Premiere film channel used the SAVE system initially, with inverted video. Subsequently more subtle techniques were used, including variable video levels and the addition of a 100kHz sinewave that called for the use of a notch filter. Another approach is to suppress the sync information or vary the sync level, a reference signal being required to sort things out in the official decoder.

For many years the EBU news feeds have used SIS (sound in sync) to economise on the number of circuits required. As a result the downlinks via Eutelsat II F4 at 7°E

Aerial Techniques

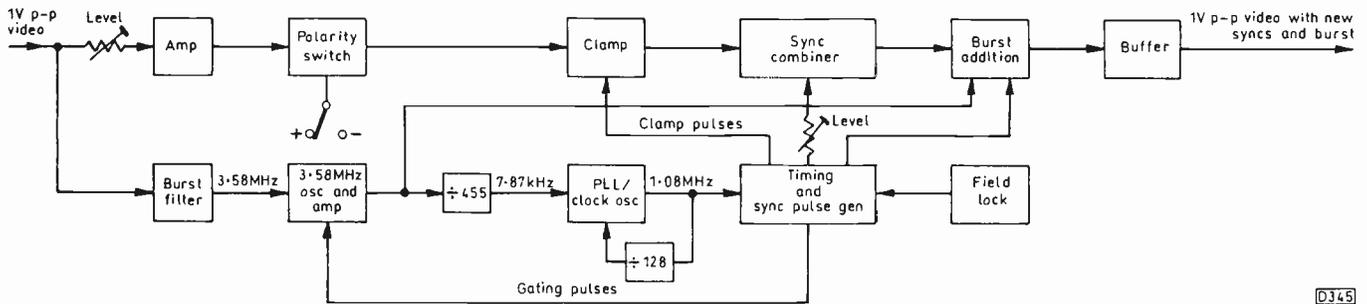


Fig. 1: Block diagram of an NTSC 'universal descrambler'.

produce unstable pictures that jump about in accordance with the accompanying audio signal.

Another problem for the satellite band enthusiast trying to resolve signals below ambient noise levels/the receiver threshold is actually locking that vague video information. An example is the Israeli spot beam from Intelsat 1°W – the signal is barely present in the UK.

Several manufacturers have in the past produced sync inserters. These accept a baseband video signal from the receiver, strip off the corrupted sync signals and insert new, locally-generated ones. From time to time such units appear in electronic jumble sales. Maybe some lie dormant, unused and unwanted, in TV workshops. Such units are invaluable for the satellite enthusiast. If any reader comes across one of the PDS Universal Sync Generators, let us know!

Premier Video Products of Wolverhampton has, at under £100, an SIS inserter. This otherwise unmarked plastic box has an input for 15V d.c. and a D socket for video input/output. It gives instant auto locking with strong SIS signals such as the EBU feed (for which it is intended). But it doesn't like weak signals, producing jittery syncs. The German firm NKM Electronics produces an upmarket SIS inserter which is also suitable for use with weak terrestrial signals. I intend to test one of these shortly. It's expensive, at over £200. And since the EBU will be moving from SIS to digital compression, such a unit could have a short life.

Various circuits have been published in the past. John McCormac's *Black Book* contains a simple circuit that consists of a sync stripper, a monostable switching circuit to remove SIS digital data and insert stable sync tips, and a section for video signal correction. Back in 1985 the BATC publication *CQ-TV* (No. 129) provided constructional details of a fairly complex sync inserter. Fig. 1 shows a simplified block diagram of a sync regenerator that was originally featured in the US magazine *Radio-Electronics*. Its use of a 3.58MHz crystal means that PAL/Secam signals will be given little help.

As a footnote, while attempting reception of a remote African C-band signal using a small dish I found that my UK sync inserter, which is crystal controlled and had helped with all signals up to then, refused to provide line lock. Despite the distant country that in theory used system B, the line frequency was higher than 15.625kHz. They obviously had their own slightly-adrift sync standard!

### Obituary: Simon Hamer

Over the years it has been my sad duty to report the death of several notable TV enthusiasts: it is with particular regret that I record the death of Simon Hamer on May 26th, since he was only in his late thirties.

Simon, the son of a Welsh farmer, grew up and continued in the hard life of farming in the Welsh mountains. He loved the animals and worked long hours during the all-important lambing season in the snows of winter. He

was truly concerned when any of the flock were ill.

Simon was well-known for his enthusiasm for all signals, be they radio, TV or satellite. The old Land Rover would often be driven to local mountain summits where Simon would assemble his Yagis, connect his TV set and receive many distant signals – he was an expert in signal propagation and knew just when to drive out of the valley up to the hills. He was also interested in vintage motoring and railways and was an avid stamp collector.

I corresponded with Simon over many years and he paid us a number of visits here at Romsey. He was a decent, determined person, with a subtle sense of humour and a wonderful Welsh accent. His love of animals extended to domestic pets – he had a guinea pig that used to run up and down the piano keyboard, playing 'music'.

Simon will be missed by all those who knew him. A gap has been left in our lives. In extending my sympathy to his family at this sad time, I thank Simon for touching me with his spirit and friendship.

## SUBSTITUTE FOR THE TDA3652

The TDA3652 9-pin flatpack chip was used in several TV chassis a few years ago as the field driver/output device. Now that it is no longer in production the question of a suitable replacement may arise. The TDA3654 can be used, but it's usually necessary to carry out one or two modifications in the peripheral circuitry to ensure correct operation. In all cases ensure that pin 7 is isolated.

In the Ferguson TX10 (PC1560 main board) and TX100 chassis R771 (TX10) or R96 (TX100) in the drive feed must be changed from 6.8kΩ to 3.3kΩ.

The same modification is required in the Sony PE3 chassis, which was used in a wide range of 22 and 27in. models. In this case the resistor is R518 on board D. Its new value should be 1.5kΩ.

A more extensive modification is required with the Amstrad Models CTV2200/CTV2210. Add a 1.8kΩ resistor in series between pin 6 of the LA7800 chip and pins 1 and 3 of the TDA3654 chip. Connect a 10kΩ resistor and 47kΩ preset in series between pin 9 (10kΩ resistor) and pin 4 (47kΩ preset) of the TDA3654: connect the preset's slider to pins 1 and 3. Adjust the added preset, in conjunction with the existing height and linearity controls, for optimum picture geometry.

These suggestions are based on information provided by SEME Ltd., whose help we gratefully acknowledge.

# CD Player Casebook

*Reports from Mike Leach, Terry Lamoan, David Belmont, Andrew J. Finn and Nick Beer*

## **Crown CD85R**

This player wouldn't focus properly. When a disc was inserted the turntable would start to rotate and the laser would whistle loudly; it would then drop out, having not read the disc. A check showed that the eye pattern appeared briefly. It looked as if the turntable might be failing to reach the correct speed. Various dry-joints were visible on the main panel, but resoldering them made no difference. Now this player uses a KSS150 type laser, and as we had one in stock we decided to try it. A good start we thought. No, it wasn't! The laser still chirped and then dropped out.

We didn't have the circuit diagram for this particular model, only one for a similar machine that uses a similar set of chips. U101 was a likely candidate since it controls the r.f. amplifier and focusing circuits. It's a miniature version of the larger CXA1081 that's used in various Pioneer etc. models. We found one in a scrap machine and fitted it as a replacement. Lo and behold the fault condition had been cured, the player now functioning normally. **M.L.**

## **Sanyo DCX802**

The complaint with this midi machine was of a "drawer fault". Actually the CD section wouldn't work at all. Everything else in the machine worked perfectly, but even the CD unit's display wouldn't light. There was obviously a power supply fault, and the CD board would have to come out – unfortunately. . .

When the board had been removed dry-joints around the regulators were evident. A good solder up here produced a light in the CD display, and we thought that the player would now be all right. But the drawer wouldn't open. So out came the CD assembly. We found that the teeth had been stripped from both the loading cam and the slide gear. Presumably the customer had caused this damage while trying to load a CD, when dry-joints had been to blame all along. **M.L.**

## **Sharp CWS370**

When a disc was inserted and the play button was pushed there was a perfect display – but no sound at all. Scope checks brought me to IC3, which wasn't producing any output. A replacement restored normal operation. **T.L.**

## **Sanyo DCX900**

This multi-CD player was brought in by a field engineer. It wouldn't read the TOC. I took it apart but before doing anything else I cleaned the lens. Hey presto! the player now worked. I wonder why technicians don't try the obvious first before giving up the fight? **T.L.**

## **Sony MHC2600**

This new CD hi-fi system would start to skip when a disc had been playing for approximately fifteen minutes. The

cause of the problem was the fact that the optical unit's PCB assembly caught on a capacitor on the main board. The cure was to reposition the PCB assembly slightly so that the sled movement was completely free. After that we could hear Ravel's Bolero without interruption! **D.B.**

## **Matsui CD550**

This machine read the TOC and played but the audio output was intermittent. We soon discovered that there was no input to the 18V regulator on the front edge of the PCB, because a previous repairer had pulled the orange lead from the mains transformer out of its plug. The orange lead is the shortest one from the transformer and is therefore subject to greater stress when the PCB is turned over. **A.J.F.**

## **Pioneer PDZ72T**

After rebuilding this twin-disc mechanism, because the customer had smashed a door into the unit's tray two, I found that a cyclic rumbling came from the mechanism when the loading motor turned clockwise. This meant that the machine was noisy when one drawer opened or the other one closed. The cause of the problem was the fact that a pulley, part no. PNW1487, was warped. It's the large one around which the other end of the belt fits. **N.B.**

## **Technics SLPG520A**

This pleasant looking CD player was dead. Checks showed that there was a problem with the 5V supply from the LM2940T5M regulator IC11, even when the unit was switched on from standby. The unregulated input was present, but the output remained at a sullen 1.2V or so. When the load was removed the output rose to 8.9V – not much of a regulator! A replacement produced the more acceptable result of 5V on load. **N.B.**

## **Philips FCD463 (CD module 30001, tray kit A)**

The CD section was dead. Easy enough, I thought: the 800mA T fuses were both open-circuit and the 5V regulator 6320 was short-circuit. Having sorted that lot out I was left with a unit which produced a readout but no audio. The supplies to the audio amplifiers, the decoder and the DAC were o.k., but there was no data – just noise on the link between pin 37 of the SAA7210 decoder chip and pin 3 of the TDA1541 DAC chip. The logical suspect was the RAM, which in fact had no 5V supply at pin 9 because the 4.7Ω fusible resistor 3338 had gone open-circuit. **N.B.**

### **ECONOMIC DEVICES**

Because of production difficulties it has not been possible to include this company's advertisement in the current issue. The company's full range of products continues to be available from Economic Devices, 32 Temple Street, Wolverhampton WV2 4AN – telephone 0902 712 083/773 122.

# Letters

## LESS GLOOM PLEASE!

I was sorry to read (letters, June) about the person whose business went under, and surprised about John Priest's friend who became a traffic warden. As a regular reader of *Television* for over ten years, I've noticed that the tone of letters about the state of our trade has remained consistently gloomy. Some seem to feel that servicing as we know it may be on the way out.

It may surprise some of you therefore that I am seriously planning to go into business myself by starting up a TV/VCR and electronics servicing shop and possibly selling second-hand and new equipment. In my area there do not at present seem to be many shops that provide this type of service. It may of course be that there is already adequate local servicing provision, and cowboys will naturally be in operation, but I feel that there is scope for someone prepared to offer an efficient, personal service. I am still quite young, and would hope that such a business would see me into old age. Huge profits or an easy time are not expected, but job satisfaction should be possible.

So how about some readers with successful businesses telling us of their experiences, say over the last five years? Or am I doomed to failure before I even begin? I'm at present employed in the servicing industry, and have been for several years, though not specifically in the TV/VCR field. To save possible embarrassment in this respect, I would like to sign myself as below.

*Name and address supplied.*

## CHANGING THE PIN CODE

Paul Charlton of Colorvision is not correct in saying (letters, July) that the PIN code cannot be changed when you don't know the current one. Put the set in the menu select mode and select PIN change. If you don't know the current PIN number, enter the unlock code, i.e. press the Fastext buttons red, green, cyan, yellow (hold). This will replace the original code so that a new one (0000 factory set or any other four-digit combination) can then be set.

*C.R. Taylor,  
Kendal,  
Cumbria.*

## VIDEO GAMES AND FRUIT MACHINES

I was delighted to see the article on an arcade video games monitor chassis in the June issue. A few years ago, at a time when business wasn't as good as it once was, I decided to divert my efforts to video games and fruit machines. I found that, compared to TV, video and hi-fi, servicing games monitors is easy – and fruit machines even easier.

Apart from the logic board the rest of a fruit machine is a piece of cake. After all, us TV engineers should have no problems with loom and power supply faults and the odd coin mechanism fault. These machines seldom use a switch-mode power supply and are thus very straightforward – well within our capabilities. Old-fashioned common sense will enable most faults to be fixed. Watch for dirty mechanisms: they won't take coins. Clean the sensor with methylated spirit and a rag and all will be well – I guarantee it! A faulty

logic board will probably have to be left to the digital engineer. But reel triacs and dry-joints can be handled without too much sweat. Logic boards don't go wrong very often. I'd say that 98 per cent of fruit machine faults are simple and can be put right in a few minutes. Try some. You'll be glad you did!

Video games are logically within our province – after all the monitor is a TV chassis without the front end. As Peter Hubbard said, most games monitors use the Hantarex 9000 chassis. Power supply outputs are usually 240V for degaussing, 130V h.t., +5V and –5V for the logic board, –12V and +12V for the bulbs and the coin mechanism.

Please have a go. You will soon get used to them. And once you've shown that a dead monitor can come to life again you'll be revered by the arcade staff.

*V. Holt,  
Worthing,  
Sussex.*

## BODGED INSTALLATIONS

Following a number of letters recently on the subject of those who pass themselves off as competent in this industry of ours, I thought you might like to hear about the following bodge. Someone I met socially told me that he was experiencing all manner of problems since he had had a satellite system installed. He had bought a Matsui (Cambridge) system which had been installed by a national company. Extra had been paid for an r.f. extension to his son's bedroom. There was a TV set and a VCR in the lounge, and the son had an Akai VCR and a nondescript 14in. colour set in his bedroom. All had worked fine until the satellite installation was carried out. Now the son couldn't record programmes because there was no E-E. When he switched the VCR on, the satellite signal became snowy. When one terrestrial programme was being watched downstairs it couldn't be viewed upstairs as it was very snowy, and vice versa.

The competent amongst you will have already guessed the cause of the problem. Yes, the resistive splitter used to split the r.f. input from the satellite had been fitted the wrong way round. I've seen these cowboys do it before – as the Y splitter connections don't fit they just turn it around. You end up with a horrendous mismatch. All that's required is a back-to-back connector or a couple of r.f. leads. They had also fitted the splitter at the VCR's output – pointless when there was a VCR upstairs. I had to retune the son's VCR because John Wayne had got it all off tune in trying to get some E-E. In addition the r.f. spacing wasn't set correctly: the problem was made worse by the fact that the local transmitter uses channels 30, 40, 43 and 46 and there were two VCRs and the satellite receiver between chs. 30-40. Talk about asking for trouble!

What continually amazes me is that if I'd done such a job for free the average customer would have hassled me until my dying day to put it right: when a cowboy does it and makes a charge the customer doesn't mind paying again to get it sorted out – is there a moral here?

*Nick Beer,  
Bideford,  
Devon.*

## INJURIES

Keith Cummins (letters, July) raised the issue of injuries sustained at work. Readers might like to know that injuries and illnesses caused by work can be officially recognised and registered – free of charge. Your local Department of

Social Security (DSS) office will provide form BI95 free on request.

After answering a few simple questions about how the injury or illness occurred you return the form to the DSS which decides whether you have suffered an Industrial Accident. It will then send you a record of the decision. This is called a Declaration. It will make life easier if you have to claim benefit at a future date because of your accident.

In addition to completing form BI95 you should of course enter your injury/illness in the accident book, report it to your manager and seek medical attention. What form BI95 does is to give you a safeguard should your injury or illness lead to problems at a later date. The DSS has a general, free helpline on 0800 666 555. You pay enough taxes: make the system work for you!

*Nigel Burton,  
Leicester.*

Fellow engineers may be aware that my family and I have been in dispute with Radio Rentals/Thorn EMI since I sustained a back injury in 1981 through lifting TV sets. Despite winning the case and liability, because of a technical hitch we have yet to receive a Personal Injury payment.

Our campaign has produced very good results, and the more we learn the better these will be. We now have official paperwork which confirms that there was full knowledge at the EEPTU and within the trade of the facts relating to lifting TV sets back in 1971. Do you know of an earlier dated case – perhaps your own? If you do we would love to know about it. So come on, can anyone beat 1971 for the earliest knowledge of the back problem in our once great trade?

*Harry and Pam Todd, c/o 12 Oakhurst Close,  
Snaresbrook,  
London E17 3PZ.*

## DISH NOISE

Andrew Sykes' dish vibration problem, mentioned by Roger Bunney in his July issue DX-TV column, might be alleviated by the use of rubber mounts. The use of car exhaust rubber mounts to support the whole mass of the dish etc. provides a mechanical low-pass filter. It works best when the mass is large and the spring rate of the rubber mounts is low. The type of mount used for the tailpipe of a Mini is the correct style, i.e. a threaded rod bonded to each side of a rubber 'cotton reel'. Some softer types were fitted to the exhaust systems in other small British Leyland cars. A local car parts supplier will have a choice of mounts in stock: it's best to buy four of the softest that can be found and then increase the quantity should wind shake become a problem.

Note that this technique will reduce only noise transmitted through the mounting structure, not that transmitted through the air.

*Ray Porter, M.Sc., C.Eng., MIEE,  
Stourbridge,  
West Midlands.*

## NEED FOR TECHNICAL SUPPORT

My customer was the proud owner of an Akai hi-fi system that contained a Model CD-M600 CD player. The latter had developed intermittent sound output from both channels. We decided to check it out on the bench, so the CD player and the amplifier/cassette deck from which its supplies etc. are derived was collected. We connected it to the mains supply, switched on and – nothing! Not even any lights or

displays. Yet it had worked less than an hour previously in the customer's home. Panic began to set in. We removed the amplifier's cover and checked voltages here, there and everywhere. There was nothing for it but to phone Akai.

I was surprised and delighted when the technical department didn't cut me short, as nearly all the other manufacturers do, after finding out that I wasn't an account holder. It was just as well that I phoned, because I would never have got the equipment working without Akai's help. The answer to the problem was simply that because the tuner and phono jack were missing the computer link between the items was not complete. To get the amplifier going you can press the play and power buttons simultaneously. When this was done the amplifier lit up ready for action. The CD player was next brought to life by pressing the display and forward buttons and plugging in the ribbon cable from the amplifier. Thanks a million, Akai. After all that it took only a few minutes to discover that there was a dry-joint at the digital optic signal lead socket.

This is one more example of the need for access to manufacturers technical information. Akai spent three minutes on the phone. In doing so it gained my recommendation for the firm's products because, should I need it, I can get technical information. I don't recommend the products of firms that won't help me. And after many years in the trade customers are always seeking my recommendation.

I can understand manufacturers' concern at time being wasted in answering calls from the technically incompetent – some no doubt not even in the trade. So why not allow access to service information via computers? Most firms, large and small, have them. I myself and all those I've spoken to would be prepared to pay a monthly subscription for 'on-tap' help. Then manufacturers wouldn't lose any more of those customers who change brands because of a fault that can be fixed only by their favourite repairers.

As time goes on and high tech becomes ultra high tech we'll be needing all the help and support we can get when repairing equipment. Manufacturers who help us will find it easier to keep customers loyal to their brands because the customers will know that they can get their equipment serviced.

*John Edwards,  
Welling,  
Kent.*

## CHOPPER CHIP PROBLEM

I have recently been caused some aggravation when fitting replacement Sanken STR451 chopper chips. This is a three-terminal device that produces a fixed output voltage, with no adjustment provided. In the first case there was a short-circuit STR451 in a Saisho Model CT142R. When the replacement, coded "19", was fitted the regulated h.t. was found to be 111V instead of the specified 103V. I had the same problem with a second small-screen CTV receiver.

Subsequently I had in for repair an Amstrad CTV1400 that didn't have a power supply problem. But it did have an STR451 that produced 103V, and was coded "25". When I fitted one of the devices coded "19" in the Amstrad set the h.t. rose to 111V.

It seems clear that there is an out-of-specification batch of SRT451 chips around, coded "19". So I warn any other engineers who might embark on a wild-goose chase. I'm also having difficulty in obtaining "good" examples of this device, which now costs around £15 plus VAT.

*David Hazell,  
Witney,  
Oxon.*

# Servicing the Philips CTX-E Chassis

John Coombes

The Philips CTX chassis was introduced in 1982 as a replacement for the KT3. Models fitted with it were introduced in the Philips and Pye ranges over the years 1982-1987. The chassis was designed to drive 90° tubes of the 570X type. In comparison with the KT3 chassis, the CTX has a lower component count and a considerably reduced power consumption – 39W average. In addition most of the components are mounted on a single mother board, in contrast with the mother-and-daughter board system used in the KT3. There were 14, 15, 16, 17 and 20in. models, large numbers being produced. Some models have VST (voltage-synthesis tuning) with remote control. Also there were two versions of the chassis, the original CTX-S which was manufactured in Singapore and the European CTX-E. Most models are fitted with the latter chassis. This fault summary is based on the CTX-E but should also be relevant generally to the CTX-S (note that there are some component reference number and value differences between the two versions of the chassis).

## Technical Features

There are one or two circuit features worth noting at the outset. First, the chopper circuit is of the series type, so the chassis is live. Secondly the BU508A line output transistor receives its base drive from a secondary winding on the chopper transformer, so there is no separate line driver stage. The chopper circuit produces a 17V supply for the audio output chip and the 125V h.t. supply which is used mainly for the line output stage. The other supplies (150V/190V, depending on tube size, for the RGB output stages, 26V for the field output stage, 12V, -20V, e.h.t. etc.) are derived from the diode-split line output transformer. For start-up purposes a separate 9V supply is derived from the rectified mains input.

The basic chopper circuitry, which is in discrete component form, is shown in Fig. 1. At switch on the driver transistor TR7353 is forward biased by R3319: it's driven by TR7322, which is forward biased by R3317 and is in turn driven by line-frequency pulses from pin 11 of the TDA2577 sync/pulse generator chip IC7375. The voltage error sensing transistor TR7323 controls C2319's charging rate, thus providing regulation by varying the on/off switching of TR7353/TR7355.

Excess current is sensed by R3337, which is in series with the efficiency diodes D6333/4. Should the voltage across R3337 move sufficiently negatively TR7330/TR7331 will conduct. This trip action briefly shorts out the pulse drive to TR7322 so that the power supply shuts down.

## Power Supply Faults

Quite a number of faults can produce the no results symptom. It's quite common to find that the mains on/off switch is open-circuit. The 2AT mains fuse F1291 can go open-circuit because of old age or poor fuse contacts. If the

fuse has blown, the first things to check for being short-circuit are the degaussing thermistor TH3292, the chopper transistor TR7355 (usually type BUX84 but sometimes type 2SC2738 in smaller-screen sets) and the mains rectifier's reservoir capacitor C2330a (200 $\mu$ F). Some sets are fitted with a single half-wave mains rectifier diode, others with a bridge rectifier – see note below. Other possibilities when the fuse has blown are the chopper transformer T5335 which can develop shorted turns, the h.t. smoothing capacitor C2330b (40 $\mu$ F) and the efficiency diodes D6333/4 (two BYV95C diodes or sometimes a single RGP10J) – check for shorts.

If the mains fuse is all right, the BY527 mains rectifier diode D6293 or the 4.7 $\Omega$  surge limiter resistor R3291 could be open-circuit. Check also for poor or high-resistance contacts or possibly dry-joints at plug/socket 4M9 or 2M9. Check whether the chopper transistor is o.k. If so, check for 9V at pin 16 of the TDA2577 chip. This is the start-up supply. If the voltage here is low or missing, check R3394 and R3395 (both 27k $\Omega$ ) and the 100 $\mu$ F smoothing capacitor C2395. The next suspect is the TDA2577 chip itself – check by replacement. The line-frequency drive pulse output at pin 11 will be missing if C2382 (120pF) is short-circuit – this capacitor, which is connected to chassis, is not present in all versions of the chassis.

If the power supply is still dead, check for 6.8V at the emitter of TR7353. This voltage is held stable by the two BZX79-B6V8 zener diodes D6323 and D6325. If necessary check TR7353 (BF422) and TR7322 (BC548).

If the chopper transistor keeps failing, check the damping capacitor connected in parallel with it. This is C2355 (470pF).

As previously mentioned, some sets have a single mains rectifier diode, D6293. This tends to go open-circuit. A KBP04-5004L mains bridge rectifier, D6292, is used in most Philips portables however. A short in this item will blow the mains fuse, which is not unusual. If necessary check the associated 1nF protection capacitors C2292/3/4/5 which can develop shorts.

A fault in the power supply can produce the no sound symptom. Check the continuity of winding 7-8 on the chopper transformer, the rectifier D6360 (RGP10G or BYV95A), the 2.2 $\Omega$  surge limiter resistor R3360 (if fitted) and the reservoir capacitor C2360 (470 $\mu$ F).

If the trip circuit is suspect it can be overridden for test purposes by shorting across R3337.

## Timebase Faults

Most line output stage faults will result in power supply tripping. Usually the line output transistor TR7562 goes short-circuit. It's type BU508A in the -E chassis, type 2SD350A in the -S version. Other possibilities are the EW modulator diodes D6564 (BY448) and D6482 (BYV95B) or a shorted diode on the secondary side of the line output transformer T5564. The transformer can short internally.

To check whether a fault condition that causes tripping

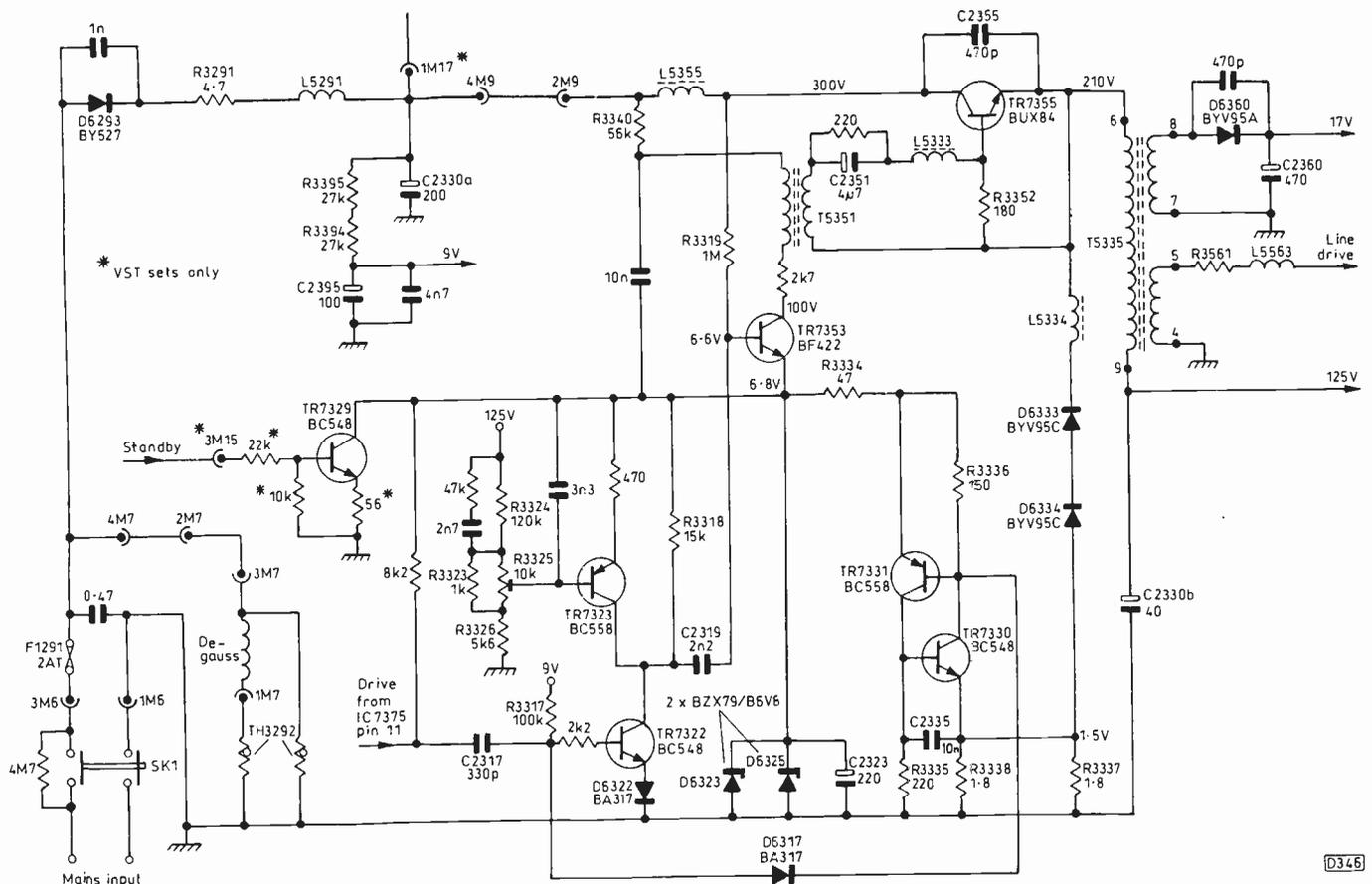


Fig. 1: The chopper circuit in the Philips CTX-E chassis. Minor variations in component details may be encountered. The line-frequency drive comes from pin 11 of the TDA2577 chip IC7375. R3338 is 4.7 $\Omega$  with 20in. sets; with the -S version R3337 is 1 $\Omega$  and R3338 is replaced with an RGP10G diode (D6335). Also with the -S chassis there's a single efficiency diode, D6333 being omitted and D6334 being type RGP10J.

is in the power supply or the line output stage, the power supply can be tested with a 60W bulb as the h.t. load. Connect it across C2330b, with L5486/R3486 lifted at one end to remove the supply to the line output stage.

Some line output stage faults give the dead set rather than tripping symptom. The output transformer may have an open-circuit primary winding. The resistor (R3561) in series with the base of the line output transistor can go open-circuit: it's 2.2 $\Omega$  with the BU508A, 4.7 $\Omega$  with the 2SD350A and 20in. models. The rectifier circuit connected to pin 5 of the transformer produces a 12V output which is used, amongst other things, for the TDA2577 chip. So loss of this supply will give no results. Items to check here are the safety resistor R3585 (2.2 $\Omega$ ), D6585 (BYV95A or RGP10G) and C2587 (1,000 $\mu$ F).

C2587 going open-circuit can lead to no results for different reasons: loss of the bias for the RGB output transistors and the supply for the signals stages.

Pin 4 of the line output transformer supplies the rectifier that provides the h.t. voltage for the RGB output transistors. If this pin is open-circuit excess beam current will trip the set. Alternatively D6583 may be open-circuit or C2330c (40 $\mu$ F) short-circuit. The type of diode used in the D6583 position varies between different models – usually RGP10G, BYV95A or BYV95B (20in. sets).

The TDA2577 chip can be responsible for loss of line sync or field sync. Other items to check for line sync problems are R3370 (36k $\Omega$ ) and the line hold control R3371 (47k $\Omega$ ). Alternative values are 33k $\Omega$  and 10k $\Omega$  respectively. For faulty field sync also check R3411 (1.8M $\Omega$ ) and R3412 (3.3M $\Omega$ ).

The TDA2577 chip can also be responsible for incorrect

height/width, but check that its 12V supply is correct (suspect C2587 if not). The line output transformer is also suspect.

### Field Collapse

The usual cause of field collapse is loss of the 26V supply to pin 9 of the TDA3651 field output chip IC7400. Check whether pin 3 of the LOPT or D6590 (BYV95A or RGP10G) is open-circuit, or C2588 (1,000 $\mu$ F) short-circuit. If the voltage at pin 9 is o.k., check for 26V at pin 6. No voltage here means that D6400 (BAX12) is open-circuit. There should be 11V at pin 8. If this voltage is missing or incorrect, check the chip by replacement. If the voltages so far are correct, check for 2.8V at the field drive input pin 3. The input comes from pin 1 of the TDA2577 chip, with direct coupling. So incorrect voltages here could mean that either chip is faulty – check by replacement – or that C2404 (100pF) is leaky. The field sawtooth is generated across C2413 (680pF or 1.2nF) which is connected to pin 2 of the TDA2577 chip. It could be faulty. Another possibility for field collapse is dry-jointed or open-circuit scan coils. Two rather remote possibilities are R3416 (10k $\Omega$ ) and C2402 (10nF) in the feedback circuit.

### No Raster, Sound OK

The first and quickest thing to do is to ensure that the tube's heaters are alight. The supply, to pins 6 and 7 of the c.r.t., comes from pins 2 and 8 of the LOPT. Check for

Continued on page 727

# Building a Personal Computer

## Part 2

David Botto

If you followed the instructions in Part 1 of this article the tower should be complete with all the panels in position and everything correctly wired up. It's a good idea to recheck your connections before going any farther.

It's now time to connect together the separate sections of the PC installation. There are two leads from the monitor. One plugs into the video port at the rear of the tower unit, on the graphics adaptor panel. The other one plugs into the power supply socket at the back of the tower case – see Fig. 1.

The 240V a.c. mains input lead plugs into the socket next

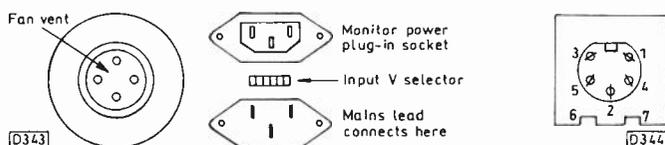


Fig. 1 (left): Arrangement of the power sockets at the rear of the tower case.

Fig. 2 (right): External view of the keyboard socket. Pin connections are as follows: 1 key clock; 2 key data; 3 RST; 4 chassis; 5 5V supply; 6, 7 shielding.

to it. There is also, visible from the rear, a round socket that's mounted on the motherboard (see Fig. 2). Plug the lead from the keyboard into this socket. Plug the mouse lead into the serial port socket (COM 1).

## Testing

The final step is to plug the mains lead into the supply and switch on. When you do this you should see the system running a visible memory check on the amount of RAM on the motherboard, displaying a message. If it doesn't, switch off and recheck your work.

If everything is in order the message "Hit DEL if you want to run SETUP" will appear. Press the keyboard key marked 'Del'. If the message disappears before you press Del, press the 'Reboot' button and start again.

The setup program's main menu should now appear – it will look like the display shown in Fig. 3. Use the up/down keyboard arrow keys to highlight individual items. When an item is highlighted, a short description of its function appears on the screen. Use function keys F2 and F3 to scroll through the different colour combinations available.

Highlight 'Standard CMOS SETUP' and press the Enter key. The message shown in Fig. 4 should appear. When any key is pressed the display shown in Fig. 5 should come up on the screen. The calendar setting will almost certainly be

incorrect. Note that the base memory size and extended memory size are shown, in kilobytes, at the top right-hand side of the display.

Set the date and time as follows. Use the arrow keys to move the cursor over the year in the left-hand table. Use the Pg up/Pg down keys to set the year to 1994. Move the cursor to the month and day, using the Pg up/Pg down keys to make the settings. The day of the week will then set itself automatically.

Move the cursor to daylight saving and disable this feature – it's a US setting. (When the PC is in use the time and date settings can easily be changed: you simply type either 'DATE' or 'TIME' at the DOS prompt and enter the correct figures.)

Move the cursor to 'Hard Disk C: type : '. Using the Pg up/Pg dn keys, scroll through the different types. Check the hard disc manual to find out the type number of your hard drive. What if none of the type numbers shown corresponds with your drive? In this case select type 47 and set Cyl, Head, WPCOM, LZONE, SECT and SIZE in accordance with the instructions in the hard disc drive user's manual.

Set Floppy drive A: to 1.44MB, 3.5 and Floppy drive B to "Not Installed". Set Primary display to the type of monitor in use – VGA if you've bought the monitor recommended.

When you are satisfied that the settings you've made are correct, press the Escape key. This will take you back to the main menu (Fig. 3). Press function key F10 to save the settings. Your PC will then reboot itself. Push the turbo button – if your tower has one – to make the LED readout indicate 33MHz.

## Other Checks

The power LED should light when the PC is turned on. The turbo LED should light when the turbo button is pressed. During the setting up procedure the loudspeaker should emit clicking noises or beeping sounds. When pressed, the reset button should reboot the PC. (You can also reboot the PC by pressing the CTR, Alt and Del keys simultaneously.) Don't panic if any of these functions don't work as they should. Switch off the PC, unplug the relevant lead from the motherboard and reverse it.

If a drive LED stays on continuously, you've connected its ribbon cable the wrong way round. Fortunately this won't damage the drive – just reverse the lead.

Now switch off the PC and disconnect the mains plug from the power socket. Fit the tower case cover and back and screw them in place. You may have to unplug the monitor, keyboard and mouse to do this, depending on the tower's design layout.

## Installing the Operating System

Your PC is no more than an impressive-looking unit with flashing lights and a LED readout until the disc operating system has been installed. Several different operating systems can be used. Perhaps the best known is Microsoft's MS-DOS 6.2, which incorporates its own anti-virus help utility. A good alternative is DR-DOS 6 (now upgraded to Novell DOS 7). You can't go wrong with either of these operating systems, both of which are good. If you intend to use Windows for Workgroups however I'd recommend MS-DOS 6.2. The MS-DOS 6.2 and Novell 7 programs both have disc compression utilities: MS-DOS has DoubleSpace and Novell DOS 7 has Stacker – the older version DR-DOS 6 had SuperStor. These hard disc compression programs enable you to increase the hard disc

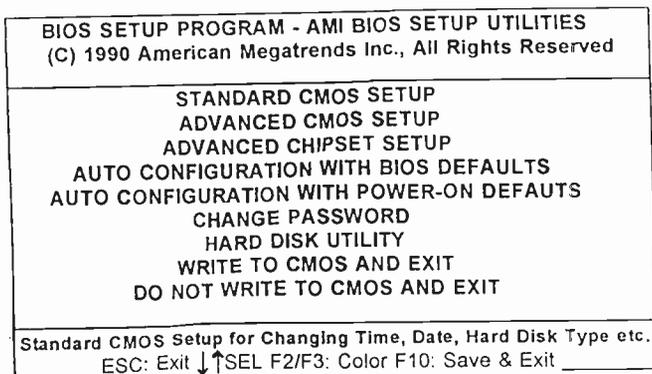


Fig. 3: BIOS setup program, main menu.

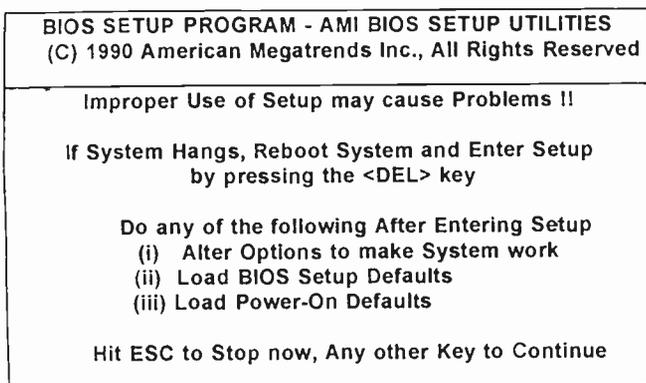


Fig. 4: BIOS setup program message.

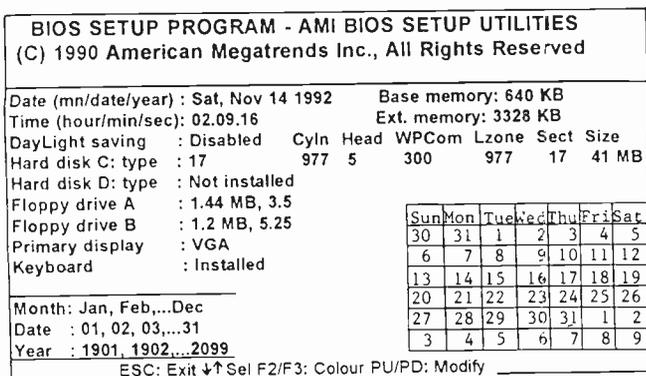


Fig. 5: BIOS setup program, with calendar display.

storage space from 211 Mbytes to over 400Mbytes. A section must be left uncompressed however to hold the operating system and certain overflow files. Both operating systems come with comprehensive instruction books that describe the installation techniques and operation.

The operating system comes on a set of floppy discs. The first thing to do is to format your hard disc. Formatting is the procedure that DOS uses to prepare a magnetic disc by inscribing magnetic markers on it. It's not difficult to format the hard disc if you follow the instructions that come with your chosen operating system. For example with MS-DOS 6.2 you first insert the start-up disc in drive A. At the command prompt you type "format c:". A warning message then appears. Type letter Y and press the enter key. All the format instructions required are in the MS-DOS 6 manual.

When the formatting has been done you need to install the operating system on the hard disc. The easiest way of

doing this is to use the simple MS-DOS Express Setup program contained in the manual. Start the PC up, insert the setup disc in the 3.5in. A: drive and type "a:setup". Then follow the easy instructions that come up on the screen. Take your time over this job.

Be sure to install DoubleSpace, which is easy enough with the Express Setup program. A section of the hard disc will not be compressed. This appears as a new drive (perhaps called drive D) that's used to store files that must not be compressed. These include the Windows permanent swap file that won't work correctly if it has been compressed. Drive D also stores vital system files that must not be deleted. To see these files, type "dir/D:" at the DOS prompt.

## The Mouse

Insert the mouse plug into the COM 1 serial port on the IDE board – accessible at the rear of the tower. Once the operating system has been installed the mouse software that comes with the mouse can be installed on the hard disc.

## Software Programs

It's advisable to shop around for prices before buying software. Check that the program is actually in stock however, and that it is the latest version. Some software suppliers are listed at the end of this article.

Decide whether you want to use a Windows system (GUI) or a DOS system (CLI). If you go for Windows, once you've installed the operating system you'll need to install Windows for Workgroups, version 3.11. Simply Computers has both MS-DOS 6.2 and Windows for Workgroups at £69 plus VAT (see Part 1). This is excellent value – I've checked various price lists.

Windows has the advantage when you need to run several different programs. With CLI, if you want to switch from your wordprocessor program to say a TV/video workshop program you have to unload the wordprocessor program then load the workshop one. With a GUI interface you can simply swap between several programs. This will save you a lot of time over the years. You'll need plenty of SIMM RAM capacity however to be able to do this.

It's easy to install Windows. Place disc 1 – marked setup – in the A: drive. Type "a:", press the enter key, type "setup" and press enter again. Then follow the on-screen instructions.

With Windows installed, you'll want a Windows word-processor. I believe that the best one is WordPerfect 6.0 for Windows. To run it properly at a decent speed your PC must have at least 8Mbytes of RAM.

If you don't want a Windows system, install WordPerfect 6.0 for DOS. This has a graphical interface and looks like a Windows program but isn't. It runs well with just 4Mbytes of RAM.

Both these programs contain a spell-checker, a Thesaurus and the Grammatik 5 grammar checking program.

For efficient workshop operation you should install one of the new workshop administration programs such as ServiceBase, Workshop Manager Plus or F4 on your hard disc. All have been reviewed in *Television*. Although they are CLI programs they can be run within Windows.

You'll probably want to install other software programs. A program that draws PCB layouts and circuit diagrams may be useful in some workshops for example. Don't buy a generalised program – get one that's designed especially for electronics and see it working first. But before buying additional programs it's best to get used to using your PC and

feel your way. Nothing is more annoying than to buy expensive software then discover that it's not what you need.

## **Printers**

You'll also need a printer to produce your documents. Buy the best one you can afford. After all, when you write to your customers a nicely printed letter will make a good impression. With a really good printer you can store your letterhead within your WordPerfect 6.0 wordprocessor. So you'll no longer need to have special paper printed.

A laser printer produces the best results but is the most expensive type. It's good to have a colour printer. Daisywheel printers are now virtually obsolete. A sheet-feeder printer is more convenient than one whose output consists of a continuous length of paper. With the latter type you'll forever be separating the sheets and tearing off yards of sprocket holes.

Do try to both see and hear your printer in operation before you buy it. Compare the prices for the same model from different suppliers.

The printer normally plugs into the parallel printer port (LPT1) on the IDE panel. This port is accessible at the rear of the tower.

## **EU Directives**

Some EU directives are listed elsewhere in this article. Your eyesight is precious, so it's worth investing in a screen filter. I've found that a mesh filter isn't really suitable with a colour monitor. For normal use an optically-coated, tempered-glass screen is best. Some monitors have flat screens while others are curved, so before you buy a filter make sure that the one you select will fit on your monitor.

## **Dust Covers**

It's a good policy to buy or make dust covers for your tower, keyboard, mouse, monitor and printer. They can be bought ready made but are expensive. Try to persuade someone who is handy with a sewing machine to make you up a set from fawn furniture covering plastic material.

## **Practice**

Once you've installed your PC and everything is running correctly you will need to master the software programs. Both the DOS and Windows versions of WordPerfect 6.0 have helpful and effective built-in tutorials.

You will almost certainly want to load other programs later. The Norton Anti-Virus or Dr. Solomon's Anti-Virus program will protect your PC against nasty viruses. A program such as WordPerfect's PlanPerfect Spreadsheet will keep your accounts in good order. But it's advisable to become thoroughly familiar with your PC and your business requirements before purchasing any of these.

## **Expansion Items**

A plug-in fax/modem PCB is useful, enabling you to communicate with other computers or send a fax to another company's machine.

CD-ROM drives are becoming increasingly popular for some uses. Installing one is not difficult – but to cover this subject properly would call for a separate article. Soundcards, such as SoundBlaster, with extra hardware add speech and music to your programs, including WordPerfect 6.0 wordprocessing. Your PC will then need a couple of external loudspeakers.

While these applications may not be necessary for running your service department, a knowledge of them will bring you in extra work and profit.

## **In Conclusion**

Once built, tested and set up your IBM compatible PC will be a real asset to your business. Properly used it can save hours of time, reduce paperwork to a minimum and save you no end of worry and frustration.

Thanks are due to Simon Walker of Simply Computers for supplying much technical information, and to Tony Evetts of Dominator Computers who lent me a tower unit, PCBs and disc drives. Action Computers kindly supplied information that explained the latest EU directives.

## **SUPPLIERS**

### **Printers:**

Action Computer Supplies, Alpertown House, Bridgewater Road, Wembley, Middx HA0 1BR. 081 903 3921. Ask for free catalogue of products.

Automated Office Systems Ltd., 868-870 Christchurch Road, Bournemouth, Dorset BH7 6DJ. 0202 417 878.

Simply Computers, 28 Walthamstow Business Centre, Cliford Road, Walthamstow, London E17 4SX. 081 523 4020.

### **Screen filters:**

The firms listed under Printers above can all supply screen filters.

### **Software:**

The firms listed under Printers above can all supply computer software.

WordPerfect UK, Weybridge Business Park, Addlestone Road, Addlestone, Surrey KT15 2UU. 0932 850 500 or 850 505.

### **Workshop programs:**

PC Control Systems Ltd., Hamilton House, 66 Palmerston Road, Northampton NN1 5EX. 0604 601 677. (ServiceBase program.)

Workshop Manager Plus, 3 Ladymeade, Ilminster, Somerset TA19 0EA. 0460 55 166. (Workshop Manager Plus program.)

xBase Computing, 19 Great George Street, Bristol BS1 5QT. 0272 290 846. (F4 program.)

## **EU DIRECTIVES**

The following directives in the Health and Safety (Display Screen Equipment) Regulations 1993 are relevant. The Law now requires that they must be observed on business premises.

The image on the screen should be stable with no flickering or other forms of instability. The characters shall be well-defined and clearly formed. The screen shall be free from all reflective glare and reflection liable to cause discomfort to the user. All radiation, with the exception of the visible part of the electromagnetic spectrum, shall be reduced to negligible levels from the point of view of the protection of workers' safety and health (this includes e.l.f. – extra low frequency – and v.l.f. – very low frequency – radiation).

To minimise these possible problems, use a suitable type of polarised or optically-coated glass screen filter in conjunction with a top-quality monitor. Ensure that the screen filter is fitted with an anti-static earth lead. Dust attracted by static can cause sore eyes and skin irritation.

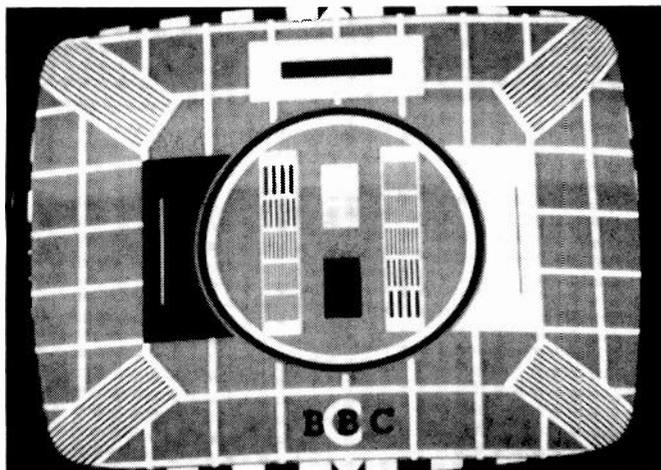
# Review: HS Test Card C Generator

Roger Bunney

Test Card C will remain as an affectionate memory for the more mature service engineer. It was our main alignment aid from the early Fifties to the early Sixties, when it gave way to the less impressive Test Cards D and E. The BBC transmitted it for much of the day – with interruptions for schools' programmes, horse racing, Andy Pandy and Messrs. Bill and Ben.

There is currently a lot of interest in the early days of TV, proved by the success of Andy Emmerson's *405 Alive* magazine which is devoted to 405-line matters from the Seventies back to 1936 when it all began.

HS Publications currently has available a test pattern generator that reproduces Test Card C complete with the



BBC Test Card C, generated in 625-line form by the HS Publications unit (with the height reduced to show the border castellations). The output is a composite video signal.

BBC identification. The pattern is generated digitally, in 625-line form. It's a reproduction of the 1948 BBC version of the card and is accurate in every detail. Being generated by an EPROM, the video image is extremely detailed. You could use it for setting up colour receivers (convergence, grey scale, linearity etc.). The output is a composite video signal.

## Evaluation

I had one recently for evaluation and cannot fault the unit. After unpacking it I fed the output via an r.f. modulator to a monochrome TV set. It worked instantly at switch on, with no observable sync drift. The accompanying photograph was taken with the height reduced (hence the non-linear circle) to show the border castellations. The full frequency gratings can be resolved easily.

Internally there's a neat PCB with just a handful of chips – think of the 19in. rack, full of valves, you would have required in 1948 to produce similar results! The generator measures 157 x 95 x 55mm and weighs 270 grams. There are no adjustments, the neat ABS black box that houses the unit having just two connections, the power input socket and

the 75Ω video output BNC socket. A separate power supply is provided. This plugs into a 13A mains socket and provides a stabilised 9V output at up to 500mA. It runs cool when used with the generator.

My only comment – not a criticism – is that it would have been nice to have had a test tone. That would have helped us to relieve those days in the DER workshop, a life of PCC84s, PCF80s and green mains droppers festooned with soldered-on wirewounds bridging open-circuit sections! The BBC has given permission for the use of its copyright in the card.

## Availability

The unit is available from HS Publications, 7 Epping Close, Mackworth Estate, Derby DE3 4HR (telephone 0332 381 699) at £185. The price includes the separate power supply and UK postage. HS Publications also has available various books, and equipment for DXing – a catalogue is available. I would recommend in particular *The Story of BBC Colour Television* and *This is BBC-TV – the First 30 Years of TV Graphics 1934-64*.

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# VCR Clinic

*Reports from Philip Blundell, AMIEE, Brian Storm, Richard Newman, Ronnie Boag, Denis Parsons, Terry Lamoon, David Belmont, Gerald Smith, John C. Priest and Graham Richards*

## Ferguson FV30

Playback was o.k. but there were no E-E or record signals – just snow. Checks showed that the 12V u.h.f. band switching voltage at pin 8 of the tuner was missing. TT06 (BC558) was open-circuit. **P.B.**

## Philips 2SB11

This machine wouldn't accept a tape. Although the cassette-in switch worked, there was no voltage change at pin 38 of IC7140. Fuse 1005 (250mA – looks like a diode) was open-circuit. **P.B.**

## Ferguson 3V44/JVC HRD140

The E-E picture and sound were present but on playback there was just a blank raster, the sound being o.k. Scope checks showed that there was no video output at pin 9 of IC102 and no sync output at pin 2. Voltage checks on the chip were inconclusive, the voltages at pins 2, 24, 27 and 33 being incorrect. I finally had to change the chip, thus proving that it was the cause of the fault. It's a small 'end-on' PCB, part no. PU22031A. **P.B.**

## Mitsubishi HS306

There was a problem with this old-timer's loading arms: when play was selected the left-hand moving guide didn't go into the V block fully unless you gave it a push with a pencil. I suspected wear in the plastic gear cams, but a new pair made no difference. Finally, to cut a long story short, changing the cast-alloy shuttle block itself (part no. 32 in the exploded view) restored normal operation. **P.B.**

## Ferguson FV30

There had been a power supply blow up. When the kit of parts had been fitted the 12V line could be set up correctly, so the the power supply was connected to the rest of the circuitry. But there was no clock or mechanism activity. Checks showed that the voltage on the 7V line was low, the other supply voltages being correct. The chopper transformer LP40 was faulty. **P.B.**

## Panasonic NVSD40

This machine would accept a cassette but refused to retain it. Everything seemed to be normal when the tape was being loaded, but after a pause it was ejected. My first checks were around the mode switch and the systems circuits, but nothing seemed to be amiss. After much hair tearing and grinding of teeth I discovered that the BA6439P capstan drive chip was faulty. Presumably the system control section checks for capstan operation before lacing up, to prevent tape damage. **B.S.**

## Panasonic NVG21B

About once every three months the mains fuse would part, apologetically, but no amount of testing enabled the cause to be established in the workshop. Our first clue came when

we noticed that the power supply whistled intermittently while the machine was on test. The switch-mode power supply normally operates at about 35kHz. A check on the ripple on the 45V line showed that it was operating at nearer to 25kHz. We eventually found that D1002 was slightly leaky, a replacement ERA22-08 diode restoring the life expectancy of the mains fuse. **B.S.**

## Panasonic NVV8000

The problem with this all-singing, all-dancing machine looked like dirty heads, but no amount of cleaning would restore the picture. Because of the price of the heads for these machines I checked for life around the head amplifier module, where the 5V supply was found to be missing because of a loose plug on the chroma/luminance board. Refitting P3001 restored a perfect picture. **B.S.**

## Panasonic NVD80

This machine would lose control over its mechanism, lapse into a sulk and power down. Moments later the fault would clear and everything operated normally again. The clue with this machine and indeed with most G mechanisms is that you should get a nice, satisfying 'clack' when a key is pressed – as the mechanism solenoid engages and the capstan motor moves the mechanism to the selected mode. With this machine the solenoid was intermittently sticking. The system control then became confused and powered down. A new solenoid, part no. VXA3735, cured the fault. **B.S.**

## Sanyo VHR350A

This newish machine suffered from bad horizontal jitter. A noise in sympathy with it came from the head drum motor. It was obvious that the drum servo wasn't quite locking. Unless you have extension leads, which we don't, it's not easy to work on this machine: you have to remove the deck to work on the main panel, which carries everything. After doing as many checks as we could we came to the conclusion that either the drum motor or the BU2890BK digital servo chip IC351 was the cause of the trouble. Neither prospect was attractive: the motor costs around £100 while the chip is a 44-pin surface-mounted device. As the chip is the cheaper item we ordered one and fitted it. This gave us a perfect, working machine. The replacement chip was suffixed DK, so it's presumably a later software version. **R.N.**

## Ferguson 3V24

There can't be many of these portable machines still around. The main problem with this one was the lamp, which we replaced. The machine then powered up and accepted a tape, but when play was selected the machine laced up then, after a few seconds, shut down with all the lights on the front panel strobing through. After this nothing would work until the machine was powered down and restarted. The cycle would then be repeated.

As the LCD counter wasn't working I checked for pulses at the right-hand turntable sensor. They were o.k. here and were also present at input pin 10 of the NJM2901M chip IC5 on the front panel. This chip produced no output at pin 13 however. A replacement cured the problem. **R.N.**

### **Philips VR6585**

This machine, which uses the Panasonic G deck, came in with a jammed mechanism. I fitted a new gear set then tested the mechanism by turning the capstan motor by hand. As it went through the various motions without a hitch I powered the machine. It went into turbo drive, accompanied by some nasty crunching noises, then promptly seized solid again (I hadn't inserted a cassette). Clearly there was a power supply fault that had caused the original failure.

I retimed the mechanism (fortunately no damage had been done) then borrowed the power supply from a known good machine. The result was perfect operation. I have to admit that I fitted a new power supply from stock. One day I may feel brave enough to repair the old one! **R.N.**

### **Ferguson FV22L**

The STK5490 chip in the power supply had failed. When a new one was fitted the machine worked for an hour then the picture and sound disappeared. A plain white screen with a faint field sync bar running up it was displayed. By tapping in the vicinity of the scart socket the picture and sound could be made to appear intermittently. IC103 (BX6385), which controls the video and audio switching and is like a small PCB with surface-mounted components on it, was very touchy. But no amount of resoldering with a small iron helped. A replacement restored normal operation. **R.N.**

### **Baird 8930/JVC HR7359**

You sometimes find that the loading arms fail to load up properly when the belt has been replaced. The cause is nearly always the fact that the mechanism which contacts with the loading motor gears has missed a couple of gear teeth. Thus the arms move forwards. Use elastic bands to pull the arms back (or use a Phillips 0 size screwdriver pushed through the service hole behind the PCB to the right of the motor, directly beneath the drum). This will stop the mechanism turning while the loading motor assembly is being replaced.

If you run out of belts or can't obtain one a trick is to use a file to elongate one of the holes that support the motor mounting, then shift the motor upwards by an eighth of an inch. This will tighten the loading belt slightly. Cover with Loctite. This shouldn't be regarded as a permanent cure – unless you can't get belts any more. Why don't they provide an adjustment? **D.P.**

### **Matsui VX1100**

No power was the problem with this new mid-mounted machine. A check on the voltages around IC501 showed that the operate voltage was missing. This comes from IC601 on the timer board. A replacement, which took quite a while to obtain, restored normal operation. **T.L.**

### **Matsui VX2500**

I thought that this would be a nice, simple repair. The customer said he could hear the sound of a previous recording and that there were coloured blobs on the picture.

I made a test recording and sure enough there was no erasure. This usually means a dodgy connection at the full erase head. But there was nothing wrong here, so more detailed checks were required. The voltage at the base of the bias oscillator transistor Q5002 was found to be incorrect, the result being that it was cut off. I then found that the 5.6k $\Omega$  bias resistor R5001 was open-circuit. A replacement restored normal operation: not so bad after all! **T.L.**

### **Amstrad UF20**

This is one of those centre-load machines. Whoever thought of the idea doesn't like repair technicians. The problems were no E-E or test signals and no playback. As the supply to the r.f. modulator was present it was a fair bet that the modulator had failed. It was replaced with some difficulty, but the fault remained. I then noticed that there's a power-on 12V line to this module. When checked it was found to be low. Tracing the source back brought me to Q01 which was leaky – it's in the power supply. A replacement restored normal results.

There's a lot of heat stress in this area of the UF20, so the fault could become a common one. **T.L.**

### **Panasonic NVSD40**

There were lines across the screen in the play mode. It looked as though the loading arms were misaligned but inspection in this area showed that there was a circlip stuck in the way of one loading arm. When it was removed the machine worked all right. It didn't take long to discover where the circlip had come from and fit a new one. **T.L.**

### **Grundig VS450**

This machine would switch off after a few seconds, with F1 flashing. Investigation showed that neither of the reel sensors produced a pulse output. The LED parts of the reel sensors are connected in series, together with the end-of-tape sensor LED, and are fed with a 12V supply that was missing. The cause was transistor Q537 which was open-circuit. A BC640 proved to be a suitable replacement. **D.B.**

### **Matsui VX1000/VX2000/VX2500**

If the complaint with one of these machines is that it won't go into the timer-record mode it could be that the customer has the wrong remote control unit. There are two. One has a power on/timer RFC and the other a separate timer-record button. **D.B.**

### **Akai VSF510**

The customer complained of a generally poor picture. I found that there was smearing on peak whites. Good results were obtained by playing back a known good recording of colour bars and adjusting the playback luminance level, then adjusting the carrier and deviation levels in the record mode. **D.B.**

### **Ferguson FV22**

Very intermittently the picture would go dark, with colour, as though the luminance signal had dropped out. When I could get the fault to remain for some time I found that a good video signal went into IC301 but very little came out. IC301 is a thick-film circuit. On removing it I found that a 390 $\Omega$  surface-mounted resistor was dry-jointed. Resoldering

this then reassembling IC301 provided a complete cure. But the machine came back with a deck mechanism fault: this time the screw on the deck PCB needed tightening. **D.B.**

### **Matsui VX1000/VX2000/VX2500**

Tuning drift can occur with these machines when R6045 (33k $\Omega$ ) has gone high in value. **D.B.**

### **Sony SLV353**

The tape went in but would only partially lace up because the post limiter had seized on its pivot. Dismantling it and relubrication cured the fault. **D.B.**

### **Panasonic NVL20**

This machine played back and recorded all right but in the forward search mode the picture broke into lines. The cause was a worn lower drum assembly. **G.S.**

### **Nokia 3783**

The complaint with this machine was that the sound was o.k. with its own recordings but when the recordings were played back via a friend's machine (not hi-fi) the sound didn't match the picture. We found that the linear sound on these recordings was from an old sound track. There was no erasure because the bias oscillator transformer T2001 was short-circuit. A replacement cured the problem. **G.S.**

### **Bang and Olufsen VHS66**

We don't get much B&O equipment passing through our hands and this machine in fact came from an engineer who gets even less! Its recordings played back all right on any other machine, but playback of its own and other recordings suffered from intermittent loss of colour, poor colour and patterning. On removing the case we saw that there was a definite Hitachi touch: apart from an extra audio panel and some differences on the main PCB, it looked very much like the Hitachi VT65.

As we were now on familiar ground we turned our attention to the Y/Chroma PCB. This has three Hitachi hybrid i.c. modules that are all frequent causes of trouble. We found that ICC203 (HT4509C) was very sensitive to disturbance testing, and after confirming that there were no dry-joints in the area we obtained and fitted a replacement (part no. 5374594). This cured the problem.

Incidentally Hitachi manuals dating from the mid-Eighties can cause some distractions. Apart from howlers like 'blightness', why would a Japanese company producing manuals for the UK choose to use Gothic script on the cover – and get it wrong?! In my copy of the VT65 manual the parts lists proclaims itself to be the 'tarts edition'. **J.C.P.**

### **Sanyo VHR3300**

The complaints with this machine were "picture jumping and tape damage". The first thing we noticed was that someone who shouldn't had been inside it – there were damaged screw heads and the audio/control head was way out of alignment. This was mainly because one of its leveling screws, the one that retains the coil spring, had been sheared off.

After rummaging through our box of worn heads to find replacement screws we carried out a rough realignment then tried powering up. Playback was fair, but there was no E-E

picture and no recording. At this point we phoned the customer, who told us that a friend had adjusted the machine to improve the sound! The lack of E-E hadn't been noticed as the machine was mainly used to play hired videos. After some discussion about cost we returned to the machine and carried out some scope checks. These confirmed that the tuner and i.f. sections were in good order: composite video was present at the output of tuner block VD1, and was traced around the board until it disappeared into the LA7223 chip IC001 at pin 7. It didn't reappear at pin 1. This is a video/audio switching chip that doesn't seem to be in any wholesaler's list. A replacement was obtained from Sanyo however (part no. 409-114-4407). Fitting it restored normal operation and a general clean, lubrication and realignment completed the repair. **J.C.P.**

### **Toshiba V65**

There was no playback or record colour. Checks around IC301 showed that there was a video input but no chroma output. Replacing the IC301 module cured the fault. **R.B.**

### **JVC HRD455**

This machine was dead because of a dry-joint at CN1 in the power supply. **R.B.**

### **Panasonic NVJ30**

There were no E-E, playback or test signals. After carrying out waveform and voltage checks we came to the conclusion that the r.f. converter module was faulty. A replacement restored the signals. **R.B.**

### **Akura VX140**

Failure to eject tapes and no functions was cured by replacing the BA209N chip IC601 and the 2.2 $\Omega$  resistor R601. **R.B.**

### **Sanyo VHR315**

This dead machine kept on blowing the N38 fuse PR511. By disconnecting the various 5V rails we discovered that there was an internal short-circuit in the tuner/i.f. unit. A replacement module restored normal operation. **R.B.**

### **Akai VS485**

There was no clock display because the d.c.-d.c. converter was faulty. If you get inside this and find that TR408, TR409 etc. are o.k. an economy repair can be achieved by replacing the electrolytic capacitors – all eight of them! They are C432, C434, C446, C447, C448, C449, C450 and C451. The problem is that they dry up because of the heat. **G.R.**

### **Philips VR6467**

After refurbishing the mechanism (rack slider kit etc., part no. 4822 403 53377) the machine displayed only a test signal, i.e. there was no playback or E-E video. The 10V supply was missing because the BC328-40 transistor 7607 was short-circuit base-to-emitter. A replacement restored the signals. Transistor 7304 on the chroma/video processor board causes a similar fault – it's also a BC328-40. Also check the electrolytic capacitor C2329. If transistor 7304 is faulty this capacitor will almost certainly be short-circuit. **G.R.**

## Philips CTX-E Chassis

continued from page 719

open-circuits and dry-joints along the path. There are two coils on the c.r.t. base panel, L5750/1.

If the heater supply is o.k., check for 1.4V at pin 17 of the TDA2577 chip – this is the sandcastle pulse output pin. The pulses should enter the TDA3560 (may be a TDA3651AQ) colour decoder chip IC7192 at pin 8. Check that operation of the brightness control varies the voltage at pin 11 of this chip between 0.8V and 4V – if not the chip is suspect (check by replacement). There should be 400V at pin 10 of the c.r.t. (first anode). Check for dry-joints at plug/socket 2M5 which earths the c.r.t. base panel. If the first anode voltage is incorrect, check R3751 (1.5kΩ), R3758 (910kΩ), R3757 (4.7MΩ), R3759 (3.3MΩ) and if necessary the focus control R3755 (by replacement).

If the tube's voltages are correct, suspect the TDA3560 chip. But first ensure that its 12V supply is correct at pin 1. If not, check R3222 (10Ω) and C2221 (100μF).

### Signal Troubles

The tuner unit could be faulty, but check that the aerial input is in order and that the 12V supply is correct at pin 6. The 150V supply is the source of the tuning voltage – it should be present at one side of R3101 (15kΩ). D6101 (ZTK33) stabilises the 33V supply. If all these items are o.k., check that the TDA2541 i.f. chip IC7151 is receiving its 12V supply at pin 11. The chip itself can be responsible for loss of the signals.

The earthy side of the e.h.t. system is decoupled by C2565 (39nF). This is the source of the beam limiting, which is applied to pin 7 of the TDA3560 chip via R3239 and D6238. C2565 can be faulty, the usual result being lack of contrast (a very dull picture).

### No or Low Sound

The TDA2611AQ audio output chip IC7181 should have a 14V supply at pin 1. Its source was mentioned under Power Supply Faults. There's a filter for this supply, consisting of R3170 (value varies) and C2179 (470μF). If the supply is missing or low and these various items are all o.k. the chip is probably faulty. If the voltage at pin 1 is correct, the chip can be checked by injecting a signal at pin 7. If this is not audible, check the audio output coupling capacitor C2182 (470μF), the loudspeaker switch and the speaker itself before suspecting the chip. If the signal is audible, check the chip's 0.1μF input coupling capacitor C2176.

The input comes from the TBA120S intercarrier sound chip IC7164, which should have a 12V supply at pin 11. It's derived from the 14V supply via R3169 with C2168 and C2169 for decoupling. If this supply is correct, check for 0V at pin 4. This is an inter-station muting input which comes from pin 13 of the TDA2577 chip via R3391 (47kΩ). If the voltage at pin 4 is incorrect, check R3391 and IC7375 by replacement. The voltage at pin 5 of the TBA120S chip should vary as the volume control is adjusted. Leakage in C2167 (22μF) will affect the voltage here. If all these voltages are correct, check the chip by substitution.

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NV600.....VXP 0515: FF/REW  
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NV730.....VXP 0581: FF/REW  
NV2000.....VXP 0331: PLAY  
NV2000.....VXP 0329: FF/REW  
NV7000.....VXP 0344: FF/REW  
NV7000.....VXP 0343: PLAY  
NV8600.....VXP 0245: REWIND  
NV8600.....VXP 0243: PLAY

### SAISHO PT. NO.

VR1000/2000.....006: TIRE

### SAMSUNG PT. NO.

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# Test Report: F4 Service Department Program

*David Botto*

Once upon a time every service department I visited seemed to have an office filled with piles of paperwork impaled on rusty spikes. Stacks of dusty files packed with customer information lined the shelves. It would take a long time to locate the details of any particular service job. Now, workshop software programs automate what were once long, weary paperwork tasks.

Two such programs were reviewed in these columns earlier this year. xBase Computing's F4 service package, version 1.2a has been released recently after being thoroughly 'Beta' tested by several service departments over four years. It has been developed for the trade by the trade. A copy was sent to me for evaluation.

## **Installation Requirements**

The program is supplied on 3.5in. floppy discs that contain a mass of highly compressed files. It will work with older PCs but may run slowly. As a database program such as F4 is resource hungry it makes sense to use the best hardware you can: a modern PC with a 386 or 486 processor will run F4 at high speed.

F4 requires at least 5.5Mbytes of free hard disc space and a 3.3 or higher DOS operating system. It also works well with DR-DOS 6. If you're not sure how much free space there is on your hard disc, type CHKDSK at the C DOS prompt and read off the figure. You'll need the statement FILES=80 (or a higher number) in your config.sys file. If F4 is to be run on a network, the workstation configuration file must again contain eighty or more file handles.

Installation is easy. Insert disc one. Type a: install at the DOS prompt then follow the on-screen instructions. You've a choice of three options: (1) load the data files and dummy records; (2) load the program and the empty data files; (3) install the program files and nothing else. The new user should choose option (1) to run the F4 tutorial program. Choose option (2) when you want to load only your own files. Option (3) is useful should a program file – as can happen – be accidentally erased and you want to replace the missing file(s) without destroying your customer data files.

A hefty 293-page manual, divided into nine comprehensive sections, is supplied with the program. It includes a well-illustrated, easy-to-understand tutorial.

## **Printers**

If your printer is already properly set up for use with your PC you should have no problem when printing from the F4 program. Each printed page is produced in A4 format with a header area clear of all customer paperwork left clear at the

top so that your company logo can be preprinted on the paper. Alternatively, if your printer is suitable xBase computing can scan your logo into a digitiser. Your logo is then automatically included on your paperwork as it's printed out. If with some jobs you don't want your logo printed you can turn this feature off. The xBase helpline can be contacted for help with printing queries.

## **F4's Features**

The F4 package has been designed as a practical day-to-day tool for use by service engineers and office staff. You don't need PC experience, though nowadays most skilled service engineers seem to have some knowledge of PCs.

F4 can be used by a sole trader or by up to twenty branches. A Transfers module deals with jobs that have been booked in and need to be sent elsewhere for service and jobs that have been completed and need to be returned to the originating branch. An update needs to be created with a job that's being done for another branch and a system master file must be transferred to that branch. An advantage of the Transfers module is that information recorded at one branch is instantly available at all the other branches.

The job record holds information such as customer details (name, address, telephone number), product details (manufacturer, model and serial number), whether the item was boxed and what accessories accompanied it, original date of purchase and whether the item is a TV set, VCR, satellite receiver, computer or whatever.

The system maintains a file for current jobs and one for archive jobs. In the full version each file may contain up to 100,000 records. There's a junior version of the program that's identical in every way but handles only five hundred current jobs and five thousand in the archive.

A feature that anyone who has had to search through piles of paper for job information will appreciate is the fast-index system. When you enter the job number, the customer's name or reference, the invoicing name or the spares order reference all information about the job is immediately displayed on the PC's screen. You can print it out if necessary.

Ordering spares is easy. The part's file does all the work. When you type the first letter or letters of the supplier's name on the parts browse table the supplier or manufacturer's name and address and your account number appear on the screen. This is useful when you phone for technical advice and need to quote your account number.

A full service report is stored, either in a free format or in IRIS (integrated repair information system) form. One nice thing about F4 is that you don't have to use the IRIS code unless you want to.

When you search through piles of service manuals you sometimes find that the one you want is missing. F4 service management helps you to locate the correct manual instantly. If it's missing, you can find the name of the last person to see it alive. If on the other hand the manual is one that you don't possess, you'll know this when the job is booked in. You can then order it right away rather than when you start the repair and get stuck. Where the manufacturer uses more than one brand name for the same item, F4 will cross-check to locate the manual you want.

## **Running F4**

Start the program by changing to the F4 directory and typing the command F4. Alternatively you can use your

PC's DOS Edit (editor) facility to write a short batch file. Here's one I called F4.BAT.

```
cd\F4
F4
```

If you now type F4 at the DOS prompt the program will load. The user sign-in screen then appears. Type in your ID – your initials will do nicely – then a password you've previously selected. Be sure to choose a password that's easy to recall or you could be locked out of the program. The password doesn't appear on-screen, being 'echoed' as a row of asterisks.

The main menu is now revealed, giving you a choice of six drop-down menus – jobs, transfers, maintenance, utilities, setup and quit. At the bottom of the screen there's a helpline that says: F1 = Help, select and run. Press the F1 function key and a screen of general help instructions pops up. Press F1 anywhere else in the program and help relating to that function appears. The accompanying list shows some handy F4 program terms.

The arrow keys give access to various menus and commands. A mouse would be a real help.

### **Booking in a Job**

To record the customer details press the enter key and use the arrow keys to highlight the jobs menu and run the new option. The new jobs append screen appears and the helpline at the bottom of the screen now reads F4 = Browse, F6 = Add/Edit customer. The first entry point on the screen is labelled owner ID. Next the program asks for the customer number that's been assigned to the owner of the equipment requiring service. If a number hasn't been assigned F4 creates one automatically.

If you've had previous dealings with the customer press key F4 and a further screen that's called a browse screen pops up. This lists all the names and addresses on current file. Move up and down this screen to locate the customer. This is not so clever if you have to select from hundreds or perhaps thousands of names and addresses. The F4 Speed-search feature solves the problem. Enter the first letter of the name or part or all of it. The name and address then pop up. Press enter and these are entered into the jobs sheet. This will save you many hours of typing.

If the customer is a new one you key in the details which are added to the browse screen automatically. Any time you're stuck, press F1 and a help screen appears, explaining the particular item you want to enter. The invoicing address, which might not be the same as the customer's address, can also be entered. If bills have been sent to that address previously it can be entered via the F4 browse table.

When the new job customer details are complete a drop-down action menu appears. The three options presented are accept, edit or cancel. Choose accept and the new job product screen appears. Enter on this the charge system, whether the repair is a callback, what the product is and its make and serial number. Also enter the name of the engineer, the fault and any comments.

Enter yes/no under the estimate heading. If it's an estimate, press F4 and a list of minimum charges appears. This can be placed in the document. If a customer is watching he will see that everyone is charged the same standard minimum fee. When the entries have been completed a job number is automatically assigned.

Press alt and an action menu appears. You can choose edit, print job cards, print customer receipts, print customer

records and job cards, accept jobs, add another job, enter manual job number, delete this job, view previous job and view the next job.

### **Calculator**

The large-screen, built-in calculator is an excellent feature. It appears at any point during the program when the Ctrl and Q keys are pressed simultaneously.

### **Service Report**

The service report retains all the job's financial details, the servicing carried out and information such as the spares used. You can also use it as a 'scratch pad' while the job is in progress: it's text area is then a source of information that can be used to keep the customer and staff members informed about the current situation.

To select the service report facility you enter via the maintain menu or by pressing key F10. A blank service report template then appears. Enter what you want to – things such as details of parts, repairs carried out, estimate details, general comments – in the large block in the middle of the screen. Press F10 to leave the service report screen.

### **Invoicing**

A function I really like is the recorded text keys function. When preparing invoices the same stock phrases tend to be used over and over again: this function saves you having to type stock words and phrases repeatedly. It contains a long list of these. Here are some examples: "check laser current and clean pickup lens", "clean audio and video heads, upper and lower cylinder, tape path, guides, capstan and pinch roller" and "prolonged testing of this equipment revealed no fault".

These statements are arranged alphabetically, the one required being selected from a browse screen by means of a fast-search facility. Invoices and bills can thus be produced without the need to think up suitable phrasing. You can add your own statements and record them for subsequent use.

The program works out the total charge to the customer and the amount of VAT. An unusual feature is that allowance is included for up to five different labour charge rates. This is useful if you undertake trade work or charge a higher rate for certain types of equipment. A customer maintain screen shows which rate was charged for a particular job.

### **Ordering**

Another time-saving function is provided by selecting 'parts' from the utilities menu. This enables you to choose between parts file maintenance and category file maintenance. Select the latter then press F4 and a browse table appears. Suppose that you choose from this 'drive belt for the loading tray of a Philips CD888'. Right away the part number, description, trade price, quantity in stock, reorder supplier and last price change date are all shown. Thus parts can be ordered or reordered using just a few keystrokes.

For ordering via fax F4 provides a bold print-out to ensure that the received fax is legible.

### **In Conclusion**

I've concentrated on the basic features of the F4 program in this review. There's not room to mention every-

thing, but I can say that there isn't much the service engineer might require that F4 cannot handle. You'll need to set aside time to study the comprehensive user's manual and to master the program if you decide to buy it.

My thanks to James Kilminster for supplying the review program. F4 can be obtained from xBase Computing, 19 Great George Street, Bristol BS1 5QT. Telephone 0272 290 846. Fax 0272 290 807. Prices, excluding VAT, are £495 for the full version and £99 for the junior version.

### **Some F4 Program Terms**

**Browse table:** A list that pops up on the screen. Items can be selected from the list and inserted into fields on the screen.

**Command line:** The DOS prompt at which you enter the names of the programs to run.

**Field:** A point on the screen where keyed in data is entered.

**Helpline:** Line at the bottom of the screen where basic help is provided for each screen of information.

**Menu:** A drop-down list from which functions are selected. The menu bar is line one at the top of the display: the drop-down menus all hang from this.

**OK box:** A windowed box at the top right-hand side of the screen where messages for the user appear.

**Read only:** Information that cannot be changed by the user. Usually a field on the screen containing information that's produced by the system, not by the user.

**Select box:** A single menu that lists options from which to choose.

**Shortcut key:** A single keystroke, usually a function key, that saves having to open a menu to reach a program feature.

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# Books

***World Satellite TV and Scrambling Methods, 3rd edition, by Frank Baylin, Richard Maddox and John McCormac, published by Baylin Publications.***

This book's subtitle is "The Technicians' Handbook", and that best describes it. Its first section covers the history and basics of satellite transmission, including receivers, aerials and signal transmission/reception. The various components are then dealt with in detail – dishes, feeds, LNBs, actuators and feeders, progressing through to the indoor parts of an installation. Each section of the satellite receiver is analysed – power supplies, video processing, audio systems – with complete, commercial receiver circuits being shown. As each section is dissected down to component level, typical fault conditions and repair procedures are outlined.

The next section deals with television formats, including digital audio, also encryption and decoding. One of the contributors, John McCormac, is well-known for his work and writing on scrambling, decoding and hacking. His section covers techniques from simple video inversion plus sinewave through to digital encryption, which is gone into very deeply. Are smart card systems immune from hacking? The answer given is no. The coverage of the methods used by broadcasters to deny access to their programmes and how they can be hacked is very extensive, with great detail including decoder circuits.

The final sections of the book go into receiver troubleshooting and the equipment needed in a repair workshop. Throughout there are numerous clearly drawn circuit diagrams and photographs. In the tradition of practical US books, great effort has gone into the latter. Both C and Ku band equipment is covered.

One subject I'd have liked to have seen explained, ideally with a circuit, is threshold extension. The results obtained are dramatic, many manufacturers now including TE as an extra (not unlike flywheel sync units for fringe-area reception in the Sixties!). It would also have been nice to have something on digital compression.

This worthy book has 388 well-illustrated 8.25 x 10 3/8in. pages. It's available at £29 (including UK postage,

more elsewhere) from Swift Television Publications, 17 Pittsfield, Cricklade, Swindon, Wilts SN6 6AN (0793 750 620).

**R.B.**

***1994 World Satellite Yearly by Frank Baylin, published by Baylin Publications.***

Since the first edition appeared last year, this work has become the definitive satellite reference book. The 1994 edition is visibly larger, with 674 pages of slightly under A4 size. Card markers have been included to divide the mass of data into four distinct sections. As with most US satellite publications, there's the usual primer on satellite communications. It covers frequency allocations, dish hardware and alignment, broadcasting standards and encryption. There's a useful tabulation of the various scrambling methods in use, also an extensive section on the theory and practice of video and audio digital compression.

The second section provides a summary of the TV programming to be seen on the various satellite downlinks. As this book is a worldwide guide, it's equally useful in Pontefract or Peking.

The beefy part is the extensive third section, in which all satellites that are in geostationary orbit are listed. The information provided on them includes the orbital position; a backgrounder on the owner, launch date, type, manufacturer, life expectancy, power etc.; the communications payload, i.e. transponder profile, coverage and frequencies etc.; and graphics. There are footprint coverage maps for each satellite: in some cases, where the satellite has various target regions, these are numerous. Even the footprint for Intelsat 1°W's Israeli spot beam is included, something that has been difficult to get.

The final section provides lists of addresses, programmers, satellite operators, manufacturers etc.

I'm impressed by this book, which is a massive collection of data and information. It will most certainly enhance the pursuit of satellite signals by enthusiasts, provided only that they can afford it. The price is £59 including UK postage (add 10% airmail elsewhere in the EU, 30% air mail to other parts of the world). It's available from Swift Television Publications, 17 Pittsfield, Cricklade, Swindon, Wilts SN6 6AN (0793 750 620), who is the official worldwide (outside Mexico and the USA) retail distributor for Baylin.

**R.B.**

# Satellite Fault Notes

*Reports from Chris Watton, Gerald White,  
Andrew J. Finn and Hugh Allison*

## Amstrad SRX200

The following faults are becoming common with this receiver:

(1) The LED display flashes like disco lights, or sometimes the receiver won't come on at all. The cause of this is ripple on the unswitched 5V rail. C504 (220 $\mu$ F, 16V) is usually to blame.

(2) With vertically polarised channels the picture is o.k. but with horizontally polarised channels a number of white stripes are present across the top of the picture, also on some channels a stripe across the bottom of the screen. For this one replace C508 (100 $\mu$ F, 25V).

(3) The set works all right for about ten-fifteen minutes then black bands appear on the picture and a high-pitched sound is present. The bands become stronger as time passes and the tone of the sound whistle becomes lower. The cause is another power supply capacitor, C505 (100 $\mu$ F, 16V).

It's not surprising that the electrolytics are failing as the sets run hot and the capacitors are close to the power supply heatsink. **C.W.**

## Ferguson SRV1

For no channels replace C413 (47 $\mu$ F, 16V) and C416 (2.2 $\mu$ F, 50V) in the tuner and C9 (1 $\mu$ F, 16V) in the power supply on the main panel. **G.W.**

## Pace PRD Series

The following information on this series (Models PRD800, PRD900, PSR800, PSR900, MRD950 and MRD960) has been released by Pace.

Should the chopper transistor Q1 fail U1, R1 and R8 should also be replaced. In addition C5, C7 and C8 should be changed to high-temperature rated capacitors. Details of the replacement capacitors are as follows: C5 22 $\mu$ F, 35V, 105° part no. 855-2263751; C7 and C8 both 10 $\mu$ F, 25V, 105° part no. 855-1063751. It's as well to replace these capacitors whenever a receiver is serviced. A power supply repair kit, part no. 265-7890PSU, is now available. It consists of FS1, Q1, U1, R1, R2, R8, R14, D10, D11, C5, C7 and C8.

For intermittent or total loss of VideoCrypt decoding and graphics check L20 in the 5V supply to the decoder. It's towards the front of the PCB and in early receivers was preformed and fitted above PCB level. This means that it is susceptible to vibration, with the possibility of track breaks or dry-joints.

A fault that can show occasionally is a tearing/rippling effect with some VideoCrypt encoded channels, particularly UK Gold. It's more noticeable in areas of high colour saturation, especially some advertisements, and can be cured by adding a 10k $\Omega$ , 0.25W, 5% carbon film resistor (part no.

140-1032501) between pins 3 and 20 of U24 (the DA converter chip).

## Finlux SR5100

There were numbers in the display and snow was present on the screen but there was nothing else. After fitting a new tuner (nasty design work here! – double-sided print with fine wires in ribbon cable) we had pictures on the customer programmable channels (P0 to P9) but none on the preset channels (1-48). We temporarily pinched a surface-mounted EEPROM (U100) from another receiver and fitted it. This restored pictures on all channels, but no H/V LNB switching took place. The cause of this was traced to the microcontroller chip U5. So we ordered these two chips, using the part numbers in the service manual (ICCS4748 and ICCS4566 respectively).

When these had been fitted there were no channels and the receiver wouldn't pass from P9 through 1, 2 etc. but instead went back to P0. After some more poking around we came to the conclusion that the new EEPROM chip had been supplied unprogrammed, though the correct part number had been used to order it. A phone call confirmed that this was the case, and a nice man at Finlux sent us another one. Once this had been fitted the receiver worked correctly. Two mysteries remain: why had everything connected to the main clock and data lines failed; and how do you know, when a memory chip is preprogrammed, that the correct one has been supplied? **A.J.F.**

## Sky VideoCrypt SVA1

For failure to decode, with large bars across the screen – even the unscrambled channels being affected – check CP01 (4,700 $\mu$ F). It's just below the mains transformer, on the left. **A.J.F.**

## Discxpress Receiver

I bought one of these at a car boot sale. The seller said that it had worked fine until he'd decided to 'readjust' it to receive the scrambled Sky programmes. Since the receiver doesn't contain a VideoCrypt decoder he was being a bit hopeful!

After the standard check on the mains plug wiring (excellent) I connected the receiver to the mains supply. The most obvious signs of distress were 5V instead of 17V at the LNB connector and a lot of heat in the power supply area. Avo checks showed that the 5V regulator was manfully producing its 5V output despite its input being 25V (hence the heat), while the 17V regulator (a 12V chip standing on a 5V regulator) had an input of only about 6V (hence the low LNB supply).

It took a moment for the penny to drop. The regulator chips are mounted on an off-board heatsink. They are both connected to the board by identical three-pin connectors. When 'readjusting' the receiver the previous owner must have inadvertently swapped them over – or perhaps this was the basis of his modification? Anyway putting the right regulator on the right rail certainly cheered things up, and fortunately the receiver showed no signs of permanent damage. **H.A.**

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**ANSWER PHONES** Returns with 2 faults, we give you the bits for 1 fault, you have to find the other yourself. BT Response 200's £18 ea REF: MAG18P1. PSU £5 ref MAG5P12.

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**PLUG IN PSU 9V** 200mA DC. £2.99 each REF: MAG3P9.

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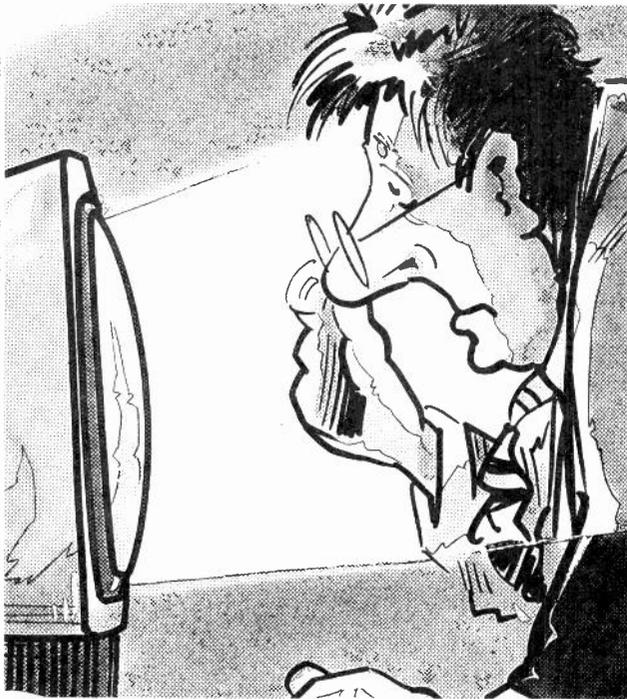
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# Service Notes on the Sony CCDF350 Camcorder

Keith T. Keeton

This camcorder is very similar to the CCDF335, for which servicing notes were published last month. It's a very sturdy and reliable unit that can take quite a few knocks. The U mechanism it uses is very easy to repair.

## Fault Diagnosis

In these servicing notes I sometimes refer to the EE picture. This is the signal from the CCD image sensor to the output socket or electronic viewfinder (EVF), not the feed to the record heads. As it doesn't, usually, go through any of the record circuitry a large section of the camera can be eliminated for fault diagnostic purposes.

Knowing that the playback signal is also unaffected enables you to eliminate from suspicion those sections of circuitry common to the EE and playback signals.

If the playback and EE signals are both affected the cause of the fault will probably lie in their common circuitry.

When record and playback are both at fault, the EE circuitry can be eliminated.

The more circuitry you can eliminate, the easier fault finding becomes.

Now to specific faults experienced with this camcorder.

## Camera Section Faults

**Camera won't turn on; flashes then goes dead:** The cause of this was a dry-joint at C946 on board PS263.

**Bottom of the EE picture dark, top has mixed colours. Playback o.k.:** All the control pulses were being applied to the CCD but the output was faulty. A new CCD cured the fault.

**The EE picture was distorted at the left-hand side only, the picture otherwise being o.k.:** When the CCD board was disconnected the EE display was, as expected, black – but with a light band down the left-hand side. The cause was easily traced back to HIC602 (MX7) whose board had a small crack. This chip is on panel CV9. A new MX7 cured the fault. On another occasion the same symptoms were present but the cause was dry-joints at pins 16-22 of HIC602.

**The EE picture goes dark and may flash black lines. The faults was sometimes intermittent:** C704 on panel CV9 was faulty.

**The EE picture was blue but playback was o.k.:** IC606 (CXA1072R) on board CV9 was the cause.

**There was no EE picture and white characters scrolled sideways on the data screen:** Q617 and Q619 (type 2SC1623) on panel CV9 were faulty.

**No power to the camera section and the EVF dead in the camera mode:** Cause of the troubles seemed to be low output from panel PS263P. Removing L939 restored the voltage however. C216 (10 $\mu$ F, 16V) on panel CV9 was defective, earthing the 5V video line.

**No power to the camera section, the VCR section being o.k.:** The voltages around Q939 on panel PS263P were wrong. Replacing Q939 and Q937 restored normal operation. IC935 sometimes causes this fault.

## Mechanism Faults

**No playback, stops in the playback mode. Mechanism tries to unload but stops before it gets half way:** A faulty encoder or broken flexiconnector (FP89) to the encoder can be responsible for this.

**Failure to load/eject. Arms move in and out continuously until the fault sign appears:** The take-up reel was jammed. Repair or if necessary replace it.

## VCR Section Faults

**No playback picture, EE o.k.:** IC203 (CXA1200BQ) on panel CV9 was faulty with no output at pin 45 (signal o.k. at pins 22/23). On another occasion IC201 (CXA1201Q) on the same panel was faulty with no output at pin 11 (input o.k. at pin 2).

**White screen in the PB mode, sound and EE o.k.:** We have come across several causes of this symptom. C451 (1 $\mu$ F, 16V) may be faulty, removing the bias at pin 11 of IC202. The same conditions can be caused by C235 being faulty. Another cause is IC202 (CXL1502M) – check the output at pin 11. All these items are mounted on panel CV9.

**Playback picture shakes, EE picture o.k.:** The capstan was juddering because the pulses to the capstan motor were wrong. IC510 on panel CO2P was faulty.

**Playback picture wavy, EE picture o.k.:** Sync signal is o.k. at pin 56 of IC203 but of low amplitude at Q216. Cause is C212 being open-circuit. Resolder or replace C212 as necessary. These items are on panel CV9.

## VCR/camera Faults

**Faint, coloured vertical line on the EE picture. The line can also appear on the playback picture:** The delay line on panel PJ20 was faulty.

**No characters in the EVF, playback and EE o.k.:** There was a dry-joint at connector CN802 on panel CV9.

**No playback, EE picture smeared:** There was no sync output at pin 11 of IC201 though the input was o.k. at pins 2 and 31. Disconnecting pin 11 restored the signal. The 1 $\mu$ F, 16V ceramic capacitor C218 was faulty. These items are on panel CV9.

# Review: The Pace MSS1000 Satellite Receiver

Ian Martin

This satellite receiver and Dolby Pro Logic decoder combination was first demonstrated at the 1993 Cable and Satellite Show, where it attracted a large crowd. Now that it is at last available in the shops, it appears to live up to the promises made at the show. Since its features include a 250 programme position memory, twin LNB inputs, twin VideoCrypt card readers, a VCR timer, a Dolby Pro Logic decoder and four-channel amplifier the unit is of great interest from the technical as well as the user point of view.

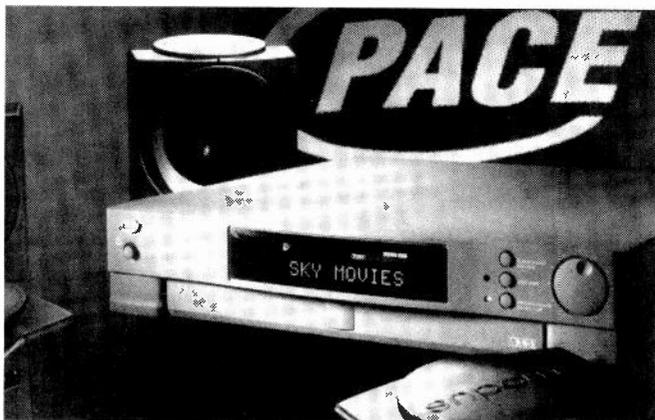
The MSS1000 is aimed at satellite viewers who wish to either upgrade their receiver or add Dolby Surround sound. The satellite part of the unit offers all the functions provided by Pace's previous models, plus a few more, while the audio part features the Pro Logic decoder and amplifier – some dealers are already packaging the receiver with a suitable loudspeaker set. A VHS video tape of Star Trek VI comes with the receiver. This demonstrates the Surround sound effectively – provided you have a stereo VCR.

You get the MSS1000 fully set up and ready to go in the Pro Logic mode, the programmes being preset to the usual Astra transponders. If you want to change the set up, reference to the operating manual is recommended. This is not meant as a criticism of the product. It's just that there are so many possible operating modes, speaker configurations etc. that a comprehensive manual is required to describe them adequately.

## Appearances

When the unit is unpacked the first unusual feature you notice, for a satellite receiver, is the 'jog-shuttle' style dial on the front panel. This, along with three push buttons, can be used to control the receiver in the absence of the remote control handset. Normally the dial selects the required satellite programme, but by pressing the volume button it acts as a volume control, setting the amplifier volume level and the scart output level. By pressing the Surround sound button you can cycle through the four sound modes: Pro Logic, three channel, simulated surround and normal stereo.

The centre of the front panel is taken up by a large fluorescent display. This indicates the current programme name, e.g.



The Pace MSS1000 satellite receiver whose features include a Dolby Pro Logic decoder and four-channel audio amplifier.

Sky Movies etc., or the current volume or sound mode setting. All displays are mirrored on the screen. In the standby mode the display dims, the word 'standby' appearing in large letters. The display also has symbols that indicate which LNB input or VideoCrypt card slot has been selected. The card slots themselves are hidden from view: pressing a button beneath the display causes a door to drop; the card holders then move forward within the case, for easy access. Cards may be assigned to different programmes. For example programme 8 (Bravo) is assigned to card one, while programme 107 (The Adult Channel) is assigned to card 2. Alas, cards were not included.

As the functions are all menu driven the remote control unit is relatively small and easy to use. Those who have operated a PRD800 or PRD900 will find the layout quite familiar.

## Connectors

The rear panel is fitted with the r.f. loop-through (tunable from ch. E21 to E69 via the remote control unit), the LNB inputs and four scart sockets. These are arranged for TV, VCR, AV1 and AV2 use. The VCR socket provides a recording output while AV2 can be used as an external decoder loop. The main function of these connectors however is as inputs to the Pro Logic decoder, as Pace has designed the MSS1000 as the heart of an AV system. Thus AV1 can be connected to a Laserdisc player, AV2 to a CDi player and so on. Both composite and S-video sources can be connected via the scart sockets.

The rear panel is also used for the audio connectors. There are four pairs of spring terminals, for the left, right, centre and surround speakers. With some speaker configurations the centre output can be used as a second surround output, the centre audio being fed to the TV set instead, via the scart or r.f. cable, to use the TV set's amplifier and speakers. There are five phono sockets beneath these connectors. These can be used to feed the decoded sound to external amplifiers if required.

The mains lead is a plug-in type.

## Operation

Operation of the receiver is quite easy, and anyone who has used an earlier Pace satellite receiver should have no difficulty in navigating through the menus. In the unlikely event of your getting confused, the operating manual has a 'menu tree' to indicate where you are.

The receiver comes with the first 64 programme positions preset to the Astra 1A-1D transponders. With normal remote control use all that you require are the programme number, on/off, volume and perhaps sound mode controls. These are all reached directly by single or multiple key depression. The on-screen menu system is used for other functions, such as editing the programme positions or setting the VCR timer.

Pressing the menu button calls up the front page of the menu. This provides the following choices: 1 parental lock; 2 VCR timer; 3 edit programmes; 4 set-up programme; 5 installation. Selection is by number. In each case a further screen is called up until the required option is found. When

an option has been changed, the store button must be used to commit the choice to memory and leave the menu. Pressing norm at any time exits the menu system without storing any changes.

## **Installation**

The installation menu is probably the most interesting one for readers of this magazine. It enables the LNB offset to be adjusted, one or both LNB inputs to be powered (useful for SMATV systems) and the LNBs' local oscillator frequencies to be set. The choices available for this last option include 10GHz (Ku band), 10.75GHz (triple band), 11.475GHz (DBS band) and 9.75GHz (Astra 1D, low Ku band) – for each LNB. There is also provision for the SES proposed tone switching signal for 9.75GHz LNBs. As the receiver's front end has a 2GHz bandwidth, it's possible to tune in the Astra 1D channels using a conventional 10GHz Astra LNB. The performance cannot be guaranteed however and will depend on the LNB's characteristics. RTL-V and Filmnet, the latter scrambled, were certainly pulled in on transponders 63 and 64 using a standard Astra LNB.

Pace is developing a dish positioner that can be fitted inside the MSS1000. This will add a ferro-magnetic polariser drive in addition to the actuator drive and sense inputs, making the receiver even more flexible as this will enable triple-band LNBs to be used with full polarity adjustment and actuator control. At present a blanking plate covers the place where the positioner board will be added. Other features that will suit the multi-satellite viewer include up and down search tuning, adjustable video contrast level and a C band option – this inverts the video.

The MSS1000 caters for satellite radio well. Programmes 65 to 105 are pretuned to Sky Radio, Asda f.m., MDR etc. When these programmes are being received the video is blanked and the word 'Radio' appears on the TV screen. The names of all the present programmes can be stored; they appear on the fluorescent display and also, momentarily, on the screen. This is particularly useful with the radio programmes as they can be difficult to identify.

When the swap or move commands are used to change programme numbers the names move with the programmes. So it's very easy to keep track of what's going on. Incidentally the initial programme order (1 = Sky One, 2 = Sky News, 3 = Sky Movies etc.) matches the VideoPlus programming codes. If, like me, you like to store programmes with some reference to transponder numbers (because you learnt them that way) the VideoPlus benefit will be lost.

In most situations you should find that the factory set-up conditions are perfectly acceptable and won't require alteration.

This may not be true of the audio side however as this will depend on your speaker arrangement, personal preferences and, ideally, the size of the room in which the system is installed. This last point is important when you remember that the optimum surround effect is obtained when the delay time between the front and rear channels is set to match the room dimensions. Pace presets the delay at 21msec, which is fine for a large room, enhancing the surround effects nicely.

There is a useful set of on-screen displays with the speaker configuration menu – they show the speaker arrangements that can be used. When despatched, the receiver is set for 'speaker configuration 1'. This is a four-channel arrangement (L + R + 2S), with the centre channel routed through the scart socket to the TV receiver, and is ideal if you buy four loudspeakers with the receiver. With no external speakers connected however and the receiver linked to the TV set via a scart lead only the centre channel will be

heard: in many cases this will amount to nothing – unless a Pro Logic source is in use. The solution in this situation is to change to 'speaker configuration 4', with normal left and right audio going through the scart socket (and mono through the r.f. lead).

Further options are available with speaker configurations 1, 2 and 3. One option, the 'speaker levels menu', sends a hissing sound to each speaker. This enables you to adjust each channel's volume, using the remote control unit, so that the levels are equal. Another option, 'listening position', enables the delay added to the surround channel to be adjusted – this in effect 'moves' the position of the surround speakers. Finally the 'TV effects menu' and 'VCR effects menu' enable a range of digital signal processor (DSP) effects to be added. These add preset acoustic characteristics (studio, cinema, club etc.) to the TV and VCR sources independently.

Pace has done the best that can be done in assuming the most common system configurations, presetting the receivers accordingly. But I suspect that with Dolby Surround sound there will be large numbers of users who will want to set things up differently – either because they need to or simply because this is possible. And as most people (including myself) don't read the manual thoroughly their first port of call may be the dealer's service department.

## **Performance**

I set up the MSS1000 with a 60cm dish and a Triax Astra LNB. A Pace PRD800 receiver was used for purposes of comparison. The picture quality with both receivers was very good, the MSS1000 having rather less of the horizontal line patterning ('line tilt') common with VideoCrypt encoded signals. When the dish was moved off beam to simulate adverse reception conditions there was an increase in line tilt, but it was still less than with the PRD800 – and much less than with an older receiver with a separate VideoCrypt decoder. Saturated colours often cause problems with some receivers. They didn't seem to bother the MSS1000 – apart from a slight twinkle on Bart Simpson.

Sound quality was also very good, again similar to that obtained with the PRD800 but a great improvement on receivers not equipped with Panda 1. This was especially true with Dolby Stereo encoded programmes, where the clarity resulting from use of the correct Panda de-emphasis circuit allowed accurate spatial positioning of the effects. In fact having become accustomed to listening to the Movie Channel via a non-Panda receiver for so long I found that the improved quality was reminiscent of Marco Polo days!

When the programme is changed the decoder locks to a scrambled channel very quickly, with no long delay. On-screen messages from the VideoCrypt decoder appear in a new, smaller typeface because of the newer generation chip set. Clear channels such as TNT are not temporarily scrambled by the decoder as programmes are changed.

To test the Surround sound I first set the MS1000 to 'speaker configuration 4' so that there were outputs from only the left and right audio channels and fed these via the scart socket to my Pioneer VSA730 AV amplifier. The AV amplifier was therefore doing the decoding, amplifying and loudspeaker driving: as expected, the speakers produced excellent results with both satellite and Laserdisc sources. I then set the MSS1000 back to the original preset 'speaker configuration 1' mode, connected the scart output to the TV set and my speakers to the MSS1000. The sound quality was similar, with perhaps a little less hiss than before with satellite programmes. I did find that the maximum volume that could be obtained was less, and that distortion set in earlier

at very high volume levels – but I was comparing a combination product with a hi-fi separate system. In its favour the MSS1000 had relatively more power to drive the surround effects, as all four channels are identical. This helps to emphasise (or over emphasise) the effects, which is always useful for demonstrating the system. Once set up to the customer's taste the levels can be backed off. Slight over emphasis of the effects can be useful initially, as many customers won't know what sounds to expect and subtle effects can be lost. This is why Star Trek VI is a good demo tape to include.

As a final test I used the TV set's speakers as the centre channel and reconnected the surround speakers so that each had a separate drive amplifier. This produced a little more volume and use of the MSS1000's volume control gave precise tracking of the TV and amplifier volume.

The best test of a receiver seems to be to let the family use it for a few days. I thought that there might be some complaints as they had been spoiled by a Panasonic TV set with a built-in satellite receiver and external VideoCrypt decoder. There were no operational difficulties and my wife commented on the improved picture quality (because of the reduced line tilt).

## Inside

To remove the receiver's top cover you release three screws on the back panel. The cover can then be lifted away – but watch out for the razor-sharp burrs on the metalwork! A look at the main panel revealed improved component spacing in comparison to the PRD800, particularly around the primary side of the chopper power supply. There are still a few small electrolytics close to heatsinks on the secondary side – this has been a source of drying-out problems with the PRD800. There are more ventilation slots with this model however.

The video processing and VideoCrypt decoding are carried out on the main panel, the main microcontroller chip and EPROM being on a small subpanel. In later production these items are to be incorporated on the main panel. Many of the i.c.s seem to be the same as in previous models, though the

VideoCrypt chip set is new.

The Dolby Pro Logic and amplifier panel is mounted on stand-offs, upside-down above the VideoCrypt decoder. It can easily be released by removing two screws in the rear panel and two more that pass through the amplifier heatsinks into the side panel. A plastic shield covers the rear of the PCB. When the shield has been removed you can see the surface-mounted Yamaha YSS215F Pro Logic DSP chip and its RAM on one side: the amplifier components, including the two Sanyo LA4280 power chips, are on the other side. As the whole audio section is on one PCB, it could possibly be incorporated in other models at a later date – or removed as in the new Pace Model MSS500.

The display panel is at the front, with a sliding panel that houses the two VideoCrypt card readers beneath. When the front flap is opened, this panel slides forward to present the card slots. The panel is connected to the main one via high-quality flexible ribbon cables – the same type is used for most of the other panel interconnections. This reflects the overall build quality, which is very high.

## Options

As previously mentioned an add-on dish positioner that fits inside the cabinet will soon be available. The software to drive this is already included in the receiver – all that the user has to do is to select the appropriate options.

On a visit to Pace's R and D facilities I was shown a MAC/EuroCrypt panel and a four-card reader. The modular design of the receiver would probably enable these to be added to the MSS1000, though a separate model is to be marketed for MAC territories.

## In Conclusion

Until now it has been impossible to buy a single satellite receiver that features 'all the options'. The MSS1000 however offers quality Astra reception with an upgrade path to multi-satellite operation. Add to this the Dolby Pro Logic Surround sound and Pace has a winner. For those who already have or don't want Surround sound the MSS500 should fit the bill.

## Publications

RS Components has released the *RS Electronic Catalogue on CD-ROM*. It contains a colour image and technical data for every RS product – all 2,000 pages from the RS catalogue plus data sheets from the RS Data Library – on a single disc. Fast search facilities enable you to find the product you need, Microsoft Windows software being used to make the system user friendly. The disc is available free to all RS account holders who register with the company. To find out more, contact RS Components UK, PO Box 99, Corby, Northants NN17 9RS (0536 201 234).

*The Sound and Vision Yearbook 1994/95*, edited by Andrew Emmerson, has just been published by the Sunrise Press, 2-4 Brook Street, Bampton, Devon EX16 9LY

(0398 331 532) at £3.50 including postage. It's published in association with the National Vintage Communications Fair, being a new hobby and heritage directory for collectors of sound and vision technology. Help on sources of all sorts of obscure things is provided.

If you are seeking an out of print book, you can get help from the Out of Print Book Service, 13 Pantbach Road, Birchgrove, Cardiff CF4 1TU (0222 627 703). Write initially for an explanatory leaflet, enclosing a stamped, addressed envelope.

## Developments

Sony has developed a technique that doubles the storage capacity of compact discs. The positions of the leading and trailing edges of equally spaced pits are separately modu-

lated, each edge being used to code a three-bit number. With one pit every 1.67 microns, the storage density is 0.28 microns per bit in comparison to 0.59 microns per bit with a standard CD.

One problem with holograms is that the images don't move. Researchers at NTT, Japan believe that they have overcome it by using a highly selective and responsive recording material based on europium-doped yttrium silicate. This can store a picture every nanosecond, allowing ten million still pictures to be recorded on a single film – the equivalent of one hundred hours of TV broadcasting. The material has to be used in conjunction with a precision-controlled dye laser: full-motion images can be recorded by continuously changing, in 1kHz steps, the frequency of the laser that illuminates the object.

# Help Wanted

The aim of the Help Wanted column is to assist readers who require a part, circuit etc. that's not generally available. Requests are published at the discretion of the editor. Send them to the Editorial Department – do not write to or phone the Advertisement Department about this feature.

**Wanted:** Circuit diagram for a Secam-to-PAL transcoder. S. Bradshaw. 061 343 7991 (fax).

**Wanted:** LOPT for the Network Model NWC1410R. P.M. Greene, 33 Bure Way, Aylsham, Norwich NR11 6HL. 0263 733 172.

**Wanted:** TDA2655B field output chip. J. Mudford, 9 Greenhill Place, Midsomer Norton, Avon BA3 2TF. 0761 416 245.

**Wanted:** AN247P or equivalent i.c. D. Perry, 1 Lyndhurst Road, Corringham, Stanford-Le-Hope, Essex SS17 7SJ. 0375 677 419.

**Wanted:** CS3842A 8-pin i.c. used in switch-mode power supplies. A. Rand, 19 Norwood Park Road, London SE27 9UB. 081 670 2617.

**Wanted:** Complete working chassis for the Tatung Model TN1617 (160 series chassis). T. Prytherch, 82 Craig-y-don, Amlwch Port, Anglesey, North Wales LL68 9DW.

**Wanted:** Vertical preamplifier unit X73-1320-00 and sweep unit X74-1220-00 for the Trio CS2100 scope, suffix A model – or a scrap scope. K.L. Davis, Keiley, 27 Meadowbrook, Ancaster, Grantham NG32 3RR. 0400 230 595.

**Wanted:** Does anyone know a source of manuals/circuit diagrams for Ford car radio-cassette units, especially type 2005. C.M. Jones, 134 Hassell Street, Newcastle, Staffs ST5 1BB. 0782 712 726.

**Wanted:** Line output panel for the Philips G8 chassis, or would purchase complete set and collect. W.A. Eaves, 234 Broad Lane, Coventry, Warks CV5 7AU. 0203 715 697.

**Wanted:** Circuit diagram for the Amstrad MP3 V/UHF receiver. Also manual for the Zenith Supersport 286 laptop computer. V.J. Thompson, 2 Mount Avenue, Barton-upon-Humber, South Humberside DN18 5DW.

**Wanted:** Circuit diagram or copy for the Marantz PM80 amplifier and Philips CD850 (not the Mk. II) CD player. Mike Rosenstein, 82 10th Street, Orange Grove, 2192, South Africa.

**Wanted:** Working battery back-up board for the Hitachi VT17E VCR. D.R. Webster, 37 Eemins Place, Bishopmill, Elgin, Moray, Grampian IV30 2PA.

**Wanted:** Tuner/i.f. board part no. TNP107701AG, complete if possible, working or faulty, for the Panasonic TV Model TX25A2. V. Holbrook, 84 Haddon Street, Derby DE23 6NQ. 0332 768 122.

**Wanted:** ITT chip for Viscount organ, SAJ110 (Y16). D.A. Firth, Lee Lane, Millhouse, Penistone, S. Yorks S30 6NN.

**Wanted:** LOPT for the NordMende Model 3636 (F14 chassis). LOPT is marked 'Hitachi 2434451'. P. Smith, 16 Hillview Park, Newtownabbey BT36 8HW. 0232 843 779.

**Wanted:** Capstan motor for the Ferguson 3V43 VCR. D. Carter, 38 Tremlett Grove, Upper Holloway, London N19 5JY. 071 281 7574.

**Wanted:** SPC circuit board for the Yamaha CDX700 CD player. A. Corr, 32 Park Avenue, Grange Park, Gosforth, Newcastle upon Tyne NE3 2LD. 091 284 6800.

**Wanted:** Field timebase and decoder panels for the Philips G11 chassis. H.E. Chamberlain, 68 Valley View, St.

Keyne, Nr. Liskeard, Cornwall PL14 4QJ.

**Wanted:** LA4220 chip for the Sanyo CTP6132. Also an STK027 chip. New or used or equivalents. W.A. Harris, Aztec Video, 73 Harold Road, Southsea, Hants PO4 0LS. 0705 811 268.

**Wanted:** LOPT (part no. 2432241) and circuit diagram for the Hitachi Model CWP300. Also servo PCB (part no. F0575GE) for the Sharp VC3300H VCR. Derek Atkinson, Derwent Electronics, 16 Causeway Road, Seaton, Workington, Cumbria CA14 1PJ. 0900 64 922 (day), 0900 68 661 (evenings).

**Wanted:** Blackstripe tube, type 370HFB22-TC03(PYD), for the Decca DN1231 RGB monitor (Tatung/Decca 120 chassis). Also the relevant tube base and a circuit for the RGB board. P. Redpath, 47 Corbett Road, Waterlooville, Hants PO7 5TA. 0705 253 595.

**Wanted:** LOPT (part no. 140 17053) and a voltage doubler (part no. 218 27295 – five-lead type) for the Philips Model G18C570. Paul Hardy, 43 Sheridan Avenue, Caversham, Reading, Berks RG4 7QB. 0734 475 869.

**Wanted:** Front tube surround, in good condition, for the Sony KV2216UB. Or will purchase complete cabinet from scrap set. Steve Nicholls, 122 Waterside, Peartree Bridge, Milton Keynes, Bucks MK6 3DQ. 0908 232 102.

**Wanted:** Following items for the Goodmans 110 receiver. MJE2955 transistor in TO126 package. Tuning scale pointer. Tuning scale drive cord diagram. Andie Wilkes, 34 Tideswell Road, Great Barr, Birmingham B42 2DT. 021 605 0720 (evenings).

**Wanted:** Teletext panel for a Sanyo VHRS240E/Granada VHSGS5 VCR. Will buy whole machine if teletext panel o.k. P.K. Osborne, 29 Shirecroft Road, Westham, Weymouth, Dorset DT4 0NH.

**Wanted:** M58476-141P chip for the Sharp CB4470 transceiver – or name of supplier. K. Partington, 14 Napier Road, Monton, Eccles, Greater Manchester M30 8AG. 061 789 2088.

**Wanted:** Service data for the JVC-Nivico PV4500 VTR, JVC CR6600 low-band editing U-matic, JVC TK60 camera, National/Panasonic NV8030 and 3085 VTRs and WV3085, WV220 and WV1450 cameras, and the Philips PM5508 pattern generator. Also scrap Sony C9 VCR (+ remote) and VO3800 (U-matic) for spares. Quantity of Technicolor/Funai 1/4 video cassettes. T. Martini, 6 Levant House, Mile End Road, London E1 4RB. 071 790 6807.

**Wanted:** Service information for the Tester TG2402 TEM78/2 distortion analyser, Decca EP685AGB colour bar generator and Commodore 64 computer. Also any books with pin connection diagrams for the chips of this era. L.H. Singleton, 87a Bryngwyn Road, Dafen, Llanelli SA14 8LH.

**Wanted:** Service manual for the Panasonic Model RF4900 radio receiver. Will 'stat and return. T.M. Norton, 6 Kingsley Drive, Leftwich, Cheshire CW9 8AZ. 0606 46 902.

**Wanted:** Complete front display panel for the Panasonic NVD48B VCR (part no. VEP07450B/VJB07450). Also the front plastic case, part no. 07182332. A. Goulding, 1 Furnace Street, Beaufort, Ebbw Vale, Gwent NP3 5NP.

**Wanted:** Manual/circuit or any other information on the Super Tech Sound and Vision portable TV Model TVP002. Hugh Tamney, Portumna, Co. Galway. 0509 41 324.

**Wanted:** HV block (with H. stat. control) for the Sony Model KV2062 (XE3 chassis). Ian Purves, Tellyman, 9 Overbrook, Hythe, Southampton SO4 5BE. 0703 845 476.

**Wanted:** Service manual/diagrams or DIP switch settings for the Wang PM015 daisywheel printer. D. Benyon, Marshland View, St. Annes Hill, Bude, Cornwall EX23 0LT. 0288 353 373.

# What a Life!

**Donald Bullock**

There has been a lot of comment in these pages recently on the increasing tendency of TV and video manufacturers to stop providing technical help to those of us who land up with the job of repairing their products. It's certainly a problem that's getting worse. And, when all things are considered, the policy strikes me as being a short-sighted one. Some might say a ruinous one.

When we were dealers, every set we sold was British. Some manufacturers – Bush, Murphy and Ekco amongst them – were proud of their products and would appoint, after a great deal of vetting, an official dealer in every large locality. These dealers were provided with sales leads and the fullest back-up service imaginable. In return, the dealers were expected to observe Price Maintenance, i.e. not to undercut their competitors, and to attend to the needs of their Agency customers promptly and cheerfully, whether there was a profit in an individual job or not. This meant that customers invested in their sets rather than merely buying them – in the confident knowledge that a first-class back-up service would be provided. It ensured, amongst other things, that piffing little faults with a high nuisance value to the user but no profit to the dealer were attended to quickly – things like obtaining and fitting a new control knob.

Agents were kept posted with servicing notes and details of modifications. They were required to implement the latter where thought necessary, for the common good of the manufacturer, the dealer and the customer who, after all, paid for it all and thus kept the manufacturer and dealer in business. In my salad days I worked for such Agency dealers. I still remember the air of quality and self-esteem that permeated their shops and service departments.

What a difference today! The Agency system is no more – despite what one or two of the more expensive and toffee-nosed distributors might claim – and the wide diversity of highly-complex products that come our way from everywhere constitutes a servicing nightmare. Never has there been a greater need for the fullest

technical back-up from every manufacturer and distributor in our trade.

Yet each week another one seems to stop providing it. There was a time, not long ago, when Mitsubishi could be relied upon to provide the fullest help whenever we were struggling. We would be sent sections of circuits by fax, and could enter into helpful technical discussions. Once a couple of chips were popped into the post to help us get a local Special school's recorder right.

The other day we called for help again. The technical boys, some of the nicest people around, had to refuse help because we're not an official dealer. "It's all a matter of money" we were told. "It costs money to employ someone to sit here dispensing help."

It does, of course. But isn't economising on this a short-sighted policy? Here's what the outcome was. After a few more attempts to help the customers, a young couple, we had to reassemble their set and tell them that we had tried, but failed, to repair it. Their faces fell, then they looked thoughtful.

"That's the last Mitsubishi we'll buy" the man said.

## **Mr Loon's Colour Set**

Mr. Loon called in the other day with a 20in. Goodman's colour set – Model XRT20. He complained that there was uncontrollable brightness with flyback lines. When I opened the set up it looked like the Fidelity ZX3000 chassis – only it wasn't. There were obvious differences, and the component numbers were not the same.

After making a few telephone calls we found a source for the manual and were quoted £24.50 plus VAT for it. So we decided not to bother. Using the ZX3000 circuit as a rough guide, we made a start by checking the voltages around the TDA3562A colour decoder chip. They were much the same as those shown in the circuit diagram. For want of any better idea we then replaced the chip. This made no difference.

We subsequently learnt that the set was one that had been produced for Comet. So I lifted the phone and had a

word with my old friend Peter Ambrose, who always knows the answers with Comet stuff.

"There are a couple of 100k $\Omega$ , 0.5W resistors from the collector of the BU508 line output transistor TR5" he said. "On our sheet they are R406 and R418. They go high."

He was right. One was open-circuit and the other was very poorly indeed. Fitting replacements cured the trouble, and I then studied the ZX3000 circuit to see how it compared.

It was similar in this section. The two resistors are shown as R98 and R99, their job being to feed line pulses to the timebase generator chip which in turn supplies sandcastle pulses to the colour decoder chip. Thanks again Peter!

## **A Dead Mitsubishi**

There's no nonsense with Mrs. Sensibull. She strode in with a Mitsubishi CT2144TX and plonked it down on the counter. "Here's your chance to make a few bob out of me. Dead as mutton it is. Not even the beacon light. I'll pop in tonight to see how you're getting on with it."

The set is fitted with the Euro 4 chassis, which has one or two unusual features. There are for example two chopper circuits, one to provide the supplies for the control circuitry so that the standby system works. If this circuit is faulty, removing the micro-controller chip's 5V supply, nothing happens. Sure enough there was no 5V output from IC951, which receives its input from the standby chopper circuit. The relevant rectifier D956 and its surge limiter resistor R957 had failed. Replacing them cured the trouble – but only for five minutes, after which the set died again.

Once more there was no 5V supply. This time we found that the 2SC4004 standby chopper transistor Q951 was short-circuit base-to-collector. We fitted a replacement and, whilst at it, renewed its two 330k $\Omega$  base bias resistors R973 and R952. But the set was still dead. Further checks showed that there was no supply to Q951. In our set this came via a 270 $\Omega$  resistor which is not shown on the circuit diagram we had. It was open-circuit. A replacement produced a beacon display and the welcome rustle of e.h.t. when we switched on again. There was a really excellent picture when we connected the set to an aerial.

Incidentally John Coombes wrote about the chassis back in the July

1991 issue of *Television*. We found the article a great help in sorting this set out.

### **Mr Bloat's Sony**

Mr. Bloat puffed in carrying his Sony KVM14TU, with the screen away from his chest. He placed it on the counter gingerly then opened his mouth to speak. But no words came out, only a strangled noise. He sat down on the chair that's usually full of junk. After a few minutes he tried again.

"Hohh wohh ffuh" he said. We nodded understandingly and wrote 'Sony TV' on the job card. Then we plugged the set in, using a flylead that Steven had begun to wire above the counter. A picture came up, but it had a green tinge. And there was a thick

red fringe around everything. Then it all went twisted and drifted away, taking the sound with it.

"That it?" I asked. He nodded and opened his mouth.

"Ffuh wohh hohh" he said. So we smiled, waved him out and opened his set up.

In this model the i.f. circuitry is contained in a can. Tapping it with a screwdriver affected the symptoms. So we took the can out, opened it, sucked the solder from every joint with solder braid then remade all the joints. When we refitted the can and tried again the picture and sound were stable.

The green cast was caused by loss of blue and red gun emission in the c.r.t., the red fringe by a sadly poisoned red cathode. We set up the grey scale as well as we could, which reduced the overall brightness, so we

advanced the setting of the first anode (screen) potentiometer to compensate. This improved the picture quite a lot, and as we were boxing the set up Mr. Bloat returned.

"Sorry about earlier" he wheezed. "Carrying that set nearly done for me. Managed to do it?"

"Sure thing Mr. Bloat" I said. Then I asked him over to the bench to see the picture while Steven went on hoisting his new aerial flylead over the counter: its purpose is to enable us to show customers the picture at the counter instead of dragging them through the obstacle course to the bench.

Mr. Bloat was delighted and paid up. I decided to avoid another show by carrying the set out for him. "Follow me, Mr. Bloat" I said as I strode out and popped the set into his car.

---

# **Camcorder Casualties**

**Brian Storm**

When I returned from my holiday I was greeted by a small pile of camcorders. The first, a Panasonic NVMC30, had also returned from its holiday. The job card said that a tape was stuck inside – "imperative that we rescue it". When I held the lens assembly a large quantity of sand fell on to the work surface. So this was why the tape was imprisoned!

An estimate for repair in a case like this is usually a waste of time. The customer will probably deny ever being anywhere near a beach and go off to a large multiple to obtain a replacement after refusing to pay an estimate charge. I removed his tape though, hoping that this would be considered during the ensuing fracas.

The next machine was a small Sony palmcorder which came with the comment "no picture". It accepted a cassette with some difficulty and then refused to produce a playback picture – there were just faint lines and patterning. I checked the cassette housing which seemed reluctant to sit correctly. The reason for this soon became obvious – there was a small plastic soldier jammed beneath the mechanism. Not only that: the soldier had been jammed in hard enough to produce a neat crack across the main board, probably breaking several thousand minute printed tracks.

Great! Two out of two jobs beyond sensible repair cost – the main PCB costs about £350 trade plus VAT while you can get the palmcorder new for £399 at any multiple.

With my heart steadily sinking I reached for a full-sized Panasonic NVM10 camcorder. No sign of sand, and it's unlikely that one of these would be damaged by a small plastic soldier! When I switched the unit on it whirred, clicked, paused then switched off. After removing the side casing I checked the power supply voltages. This revealed that the switch off was because the camera section supplies were not being established. A small d.c.-d.c. converter stage produces 16V and -8V supplies for the camera. The drive transistor was inactive: it produced reasonably correct readings in circuit, but I removed it to try another one just in case. Then, horror of horrors, I found that the normally dull grey legs were bright green! This was also the case with the components in quite a large area of the board and the print on the reverse side.

The price of Panasonic main boards is similar to that of Sony main boards, so here was another machine for the estimate shelf and an interesting debate as to how liquid could possibly have got in and dripped on to

the power supply when the camcorder had never ever been near any form of water, e.g. lake, river, sea, rain etc. Sigh. Three out of three turkeys!

### **One that could be repaired**

I hardly dared unwrap a small Panasonic NVS1 palmcorder. The unit was apparently dead, though unstained by sea water and unblemished by sand. When I removed the side covers I soon saw why the machine was dead – the operations panel had been snapped clean off at its plug to the main board. Fortunately the operations panel is not expensive. A new one restored normal working and, hopefully, a happy customer.

### **Common damage**

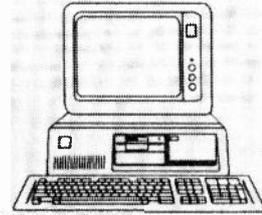
On checking through the repairs awaiting collection I find that three out of four of the camcorders I've repaired recently have been damaged by their owners. It's particularly common to have to replace lenses and cassette housings, to have to unjam small palmcorder mechanisms because of foreign particles – grit, assorted bits of plastic, etc. – getting in, and to have to replace various parts of fractured and split casings.

Recently a local comedian brought in a Canon camcorder that had been dropped two hundred feet down a cliff and been rescued by divers! Needless to say my estimate was unacceptable, as was his language.

I think I might send out my camcorders to Steve Beeching. It would save me a lot of trouble!

# TELEVISION INDEX & DIRECTORY

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Version 2 of the computerised index to *TELEVISION* magazine, covering volumes 38 to 43 (1988 – 1993), is now available. There are over 5000 references to TV/VCR fault reports and articles, with synopses. A TV/VCR spares guide, an advertisers list and a directory of trade and professional organisations are included. The software is easy to use and very quick. It runs on any IBM or compatible PC with 512K RAM and a hard disc. **Price: £30 (specify 5.25" or 3.5" format)**

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## Answer to Test Case 380

– see page 711 –

The cause of line jitter can be difficult to track down. CR had made a very good start with his oscilloscope tests, and all his subsequent checks and substitution tests had been sensible and reasonable. But a more experienced technician – Sage sorted the problem out in the end – may have had other suspicions.

In any TV receiver make or model this sort of trouble is often caused by defective decoupling of the d.c. supply to the chip. And so it proved to be on this occasion. Sage replaced C403 (470µF, 16V) which decouples the 12V

supply at pin 12 of the chip. He also replaced C505 (22µF, 25V) which decouples pin 15. The supply at this latter pin is fed to a zener diode within the chip. When the set was tested anew, up came a rock-steady picture. All that was then required was a tweak of the line hold and phase presets to get the sync in the middle of the range and a picture that was perfectly lined up on the screen.

When they were tested with a meter both electrolytics showed a marked loss of capacitance – which was perhaps nothing to be surprised about after their ten-year stint in a warm set. It's likely that there are other dried-up capacitors in that set, so maybe we'll see it again. Cathode Ray won't forget about it, and no doubt the matter was discussed in depth at the college – which sets great store on feedback from the real world!

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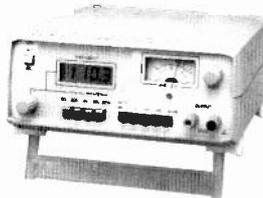
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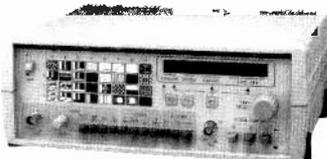
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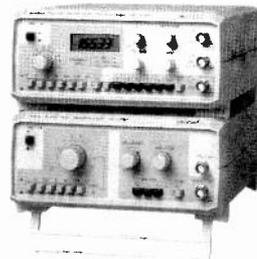
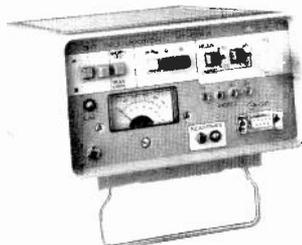
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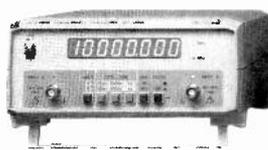


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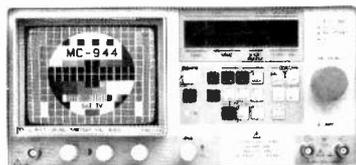
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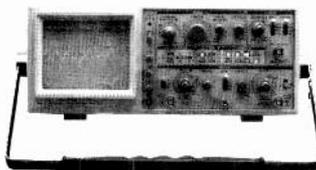
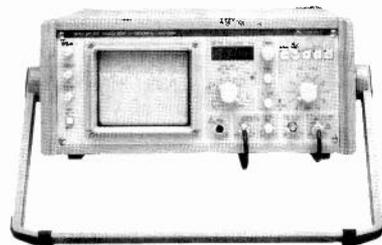


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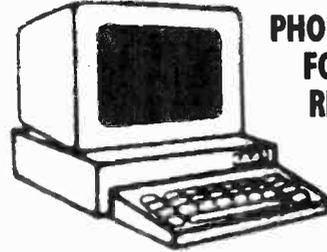
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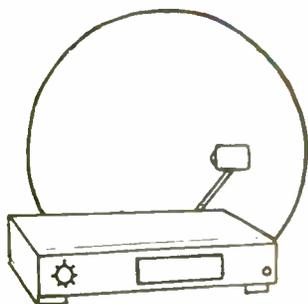
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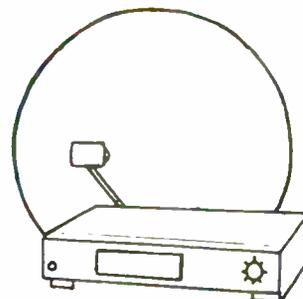
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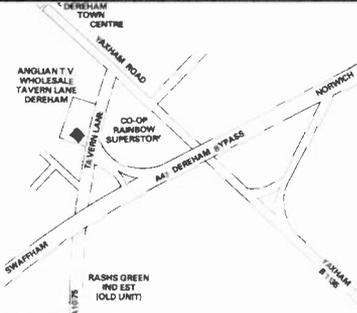
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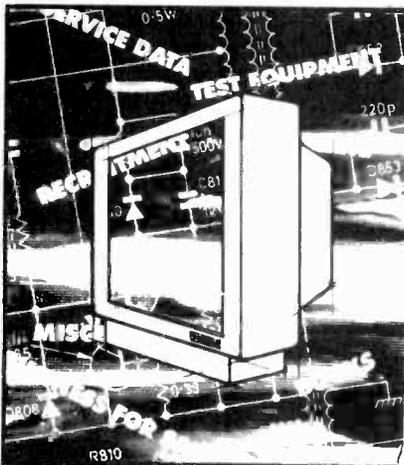
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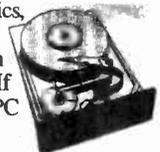
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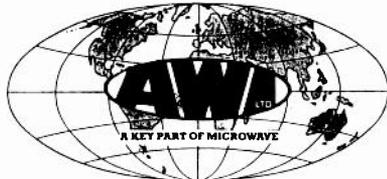
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# TELEVISION SERVICING 1991-92

Covers 247 Models From 43 Manufacturers. ISBN 0 951 3897 7 7 - £89.00

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SMALL SATELLITE TUNERS (950 to 1750 MHz). L.F. frequency 4000MH ..... £9.00 each VHF/UHF S. BAND TUNER ..... £3.00 DAM MAINS CHASSIS AMSTRAD MONITOR C ..... £10 UNIVERSAL TRIPLER. NEW TYPE ..... £4.00 VIDEO LEADS ..... 80p AMSTRAD Line O.P. Transistors with Diode 2SD/453 ..... £1.00 VIDEO LAMPS. Long Lead ..... 24p HITACHI & GEC FRAME. Thick Film ..... £6.00 FIDELITY SPLIT DIODE ..... FCC2215AE ..... £20 FCC2015BE ..... £10 FCC2215BE ..... £10 K30 FRONT PANEL TEL-TEX TYPE ..... £5.00 NEW G11 LINE OP PANEL ..... £8.00 PHILIPS YEARS AHEAD THE CREDIT CARD CALCULATOR Solar Powered ..... £3.75 NEW PHILIPS SBC 1833 Solar & Battery Powered Calculator ..... £8.00 THORN PANEL TX9 REC & REMOTE PANELS with Mains Trans ..... £5.00 TX10 REC & REMOTE PANELS with Mains Trans ..... £5.00 TX100 FRONT PANEL ..... £5.00 TX10 TUBE BASE ON PANEL ..... £3.00 TX91F ..... £2.00 THORN PANEL No.515-353, 548-02, 565-01, 509/102, 515/173, 508/161 ..... £5.00 THORN TX STEREO SOUND O.P. PANEL (I.C. TA7227P) ..... £1.00 THORN VIDEO AERIAL AMP 01 M4-597-001 ..... £6.00 ULTRASONIC TRANSDUCER ..... 15p				<b>CAMCORDER SANYO NP22</b> 6v 1300mah Rechargeable Battery Pack <b>£6.00</b>		<b>SATELLITE UNIT Video Out/Audio Out, L and R Polariser ± 35M/A and Decoder Socket</b> <b>£10</b>		Gas Soldering Irons New Type £10.00 Variety Nickel Cadmium Batteries from Telephone Type to Sub-C 50p per cell. Mainly in packs of 6 to 8. THORN FRAME IC TX100 etc IC TDA 3652 IS OBSOLETE REPLACEMENT TDA 3654 £2.00							
<b>TX100 REMOTE PANEL No.56413IC M293B/and SAA5012 £10 etc</b>				144MHz Changed Over Relay Aerial 50p 625I FRAME O/P THICK FILM HITACHI GEC £9.00 THICK FILM HITACHI HM9205A £4.00		PHILIPS UNIVERSAL BATTERY TESTER SBC 1695 £3.00 NEW DETECTOR £10.00 PHONE HOME TO CHECK WHETHER YOU HAVE AN INTRUDER SEND FOR DATA WITH TELEPHONE £20.00		TX100 SWITCH MODE TRANS 5157/48 £5 AND 00D4252001 06D3082001							
<b>TX100 REMOTE PANEL IC £10</b>				<b>TX10 REMOTE PANEL £5</b>		REGULATED PWR. SUP. 500MA 1.5V-12V DC switched + & ..... £5.00		STEREO SOLAR RADIO VHF AND MW £10.00							
NICAM UNIT — Ferguson made for ICC5 Chassis — home market and export — has circuit diagram and can be converted to most sets — £15. TOSHIBA Nicam panel & IF export only has the Toshiba chip set £7.00				<b>TX9-TX100 FRONT PANEL £5 WITH REMOTE £10</b> NON REMOTE 8 push button £10		<b>MADE BY PLESSEY — MADE IN ENGLAND</b> New public telephone exchange original price cost £299.00 Network exchange line (at home or in a small business) has two telephones and cables and NSS107 control unit <b>SPECIAL PRICE £40</b> Send for data		G11 470 MFD 250v £1.35 3V33 HAND SET £10							
LARGE Foacs Pots. Fits Pye, GEC, ITT, Decca 75p				<b>PHILIPS NEW TYPE U/V HANDSET £10</b>		PULSE CAPACITOR 20 for a £1 mixed (1500V to 2KV) 56420A 20A/600V THYRISTOR £1.75		12 Volt Relays 20p with D/P changeover							
<b>BSB SAT/REC NEW. CHASSIS, TUNER AND MOD £5 + Post £3</b>				<b>MIXED TOSHIBA HAND SETS FIVE FOR £12</b>		<b>DECODER C-CAM PHILIPS MADE FOR K40 CHASSIS IC No. TDA 3590 £5.00</b>		PHONO I/O LEADS 30p LEAD SCART TO D PLUG 50p							
G11 LOPT Panel £4.00 G11 Tip Switch £20.00 G11 IF Panel £3.00 G8 Push Button Unit £2.00 G8 Con/Panel New Back Type £4.00				Have you got Acid Rain in your garden? PH METER £5.00 Post £5 Actuator Antennmotor £15.00		BRIDGE RECTIFIER Mixed BR-31 to 34 2 Amp to 5 Amp ..... 8 for £1.00		1 METRE SCART LEAD £1.00							
LATEST VIDEO For Latest Philips, GEC, Pye and Hitachi. Front panel with memory chip and push button and LED's £6.00 NEW				<b>TX100 FRONT PANEL £5 8 Button</b>		ITT BG2032-642A TRIPLER £5.00		BURGLAR ALARM USE INFRA RED DETECTOR WIDE AND SHORT ANGLE WALL MOUNT £8 WITH RELAY							
<b>FERGUSON CHASSIS IKC-2000 £15 TX86 Chassis £14</b> NEW TX100 CHASSIS TX90 CHASSIS WHITE SPOT £20 Post each, £6 TX80 CHASSIS £15				<b>SALORA SAT RECEIVER CONVERSION KIT</b> For models 24M60, 25M90, 28M90, SB1206E, SB1365 <b>£15</b>		IT'T/KOKIA HF IF MODULE 24K No 5828-04-10 £15.00		TUNER U/V 616 £10							
LNC 11GHZ NOKIA — LNB FOR OFFSET DISH £13.00 ELECTROMAGNETIC POLARIZER 10.95 — 12.75 GHZ £9.00 11GHZ LOW NOISE BLOCK DOWN CONVERTER SCE 975 MADE BY MASIPRO £14.00				<b>TX90 TO TX100 8 BUTTON UNIT £4.00</b>		TERE 7-008A — 115-B-2010 ECC-2885PLE TEEF 1-030A UHF, VHF TUNER — SMALL TYPE £4 EACH		POWER SUPPLY KIT 0.28 volts 1 1/2 amps with 2 meters ..... £12 Printed circuit board and components							
5 Mixed AMSTRAD VIDEO MOTORS £5.00				SATellite TUNER UNIT 2427611 with Base Band, Video Out £8.00		BRIDGE RECTIFIERS — MIXED 10 FOR £1		MODULATOR KIT ..... £5 5v to 12v for all cameras etc							
TX10 8 way button unit £8.00 24v O 24v 3amp MAINS TRANSFORMER £3.00 MSH1FCF09 £7.??				SATellite TUNER 950MHz-1750MHz £5.00		TVK 186-5 TRIPLER TVK 76-5 £1.50 EACH									
2433752 £20 2432984 2432981 2432801 2435016 2433952 2434393 2432211 T9088A DSTR5H243 TFB3069D K41 O.P.T. K40 2433452 2432904 2434451 £14		<b>SPLIT-DIODE</b> 2433752 £15 TX100 Green Spot £15.00 TX100 Yellow Spot L.O.P.T. £10.00 TX90 White Spot L.O.P.T. £15.00 Split Diode 110P £12.50 Orion 65-3M GEC RS-9793-6 TX9 Thorn 2432101-2 £5 2434141 EACH 2434492 2434493 <b>£10</b>		DST 81N243 TFB4023AD £10.00 MSH1FPT131 £12.00 MSH1FBW27 £12.00 DST 186N243 £10.00 3220029 £10.00 TOSHIBA DST 186N243 £10 TFB-023AD £10 CP90 Philips Split Diode £10.00 2435141 £15 2434491 £10 2435065 £15		36761 36881 2692120/10 37051 CTR Lopt 36212 36251 36072 36362 36482 36761 36831 36832 36833 3692179 3692279		<b>TX85</b> 2435701 2434393 2435016 2435014 <b>£10</b> 2436797 2434494 <b>£15</b>		<b>TRANSFORMERS</b> 24357/01 £10 2435012 £10 FERGUSON 470013481 £10 AMSTRAD TVR3 LPT'S £10 TFB3069D EQU TFB4009AN		AT2036/00 AT2076/55 AT2048/11 AT2076/71T AT2055 RCO ST C3325 AT2076/35 OT2041 AT2076/38 FB165KA Orion AUL076/51 2076/51 CVC 820 2432461 2433451 CVC 800		SHARP MSH1FCF09 <b>£10</b> FIT MOST SETS EACH New Thorn 0004-235 Hand Set 002-01 Type u/v (£10)	
2433752 £20 2432984 2432981 2432801 2435016 2433952 2434393 2432211 T9088A DSTR5H243 TFB3069D K41 O.P.T. K40 2433452 2432904 2434451 £14		<b>BURGLAR ALARM £2.00</b> with siren 9 VOLT		<b>PHILIPS HAND SET G11 HAND SET G11 TEXT ULTRASONIC £10</b> <b>INFRA RED DETECTOR (for outside use) with Time Control &amp; Distance Control £12</b> Sensitivity Adjustment Control High Adjustment Time Delay Adjustment		TUNER UNITS Small V Cap Mitsumi — UHF £4.00 — VHF £3.00 Portable & Rotary Tuners Saeco & Mitsumi UHF Mesfit UHF/VHF (new type) £8.00 UHF- VHF V/Caps on panel £6.00 HITACHI 20 Turn Pot U321 ca panel £3.00 U/V 615 £6.00 U/V 616 £10.00		<b>U/V 6, DIODE TRIPLERS £2.00</b> 4600 TO 8600 AMSTRAD VIDEO HAND SET WITH LCD £10							
TTT PANEL CMC 301 CMC 113 CMC 302 CMC 115 CMC £5.00 303 CMC 96/4		<b>BRIDGE RECTIFIERS 10 FOR £1.00</b> 4 Amp for Video Power Supply		<b>TRV3 Amstrad Cassette Mechanisms. New with 2 motors and sound head. £15</b> £5. Amstrad Television Tuner UHF. Small, Fits most Amstrads. £6.		FERGUSON SAT HAND SET SR D1 £2 SR D2 £2 SR D3 £2 SR D4 £2		FERGUSON ICC5 STEREO O.P. PANEL ICs TDA8405 TDA8421 TBA1204 £10							
SEL ITT HFB254F2 Front Panel £15.00		<b>25 Way Plug and Socket with Case £1.50</b>		<b>SENDZ SEE BACK PAGE</b>		BURGLAR Alarm Has time delay to set £2 Mains Transformer £4.00 240v in 110v to 120v out 1 amp post £3		NICAM MHK KIT MODULE £20.00 with data							

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