

10/88

SEPTEMBER 1994

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ACLAND NEWS
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TELEVISION

SERVICING·VIDEO·SATELLITE·DEVELOPMENTS

A REED BUSINESS PUBLICATION

**Servicing the
Panasonic
Z 4 Chassis**

LNB Supply Tester

VCR Fault Reports

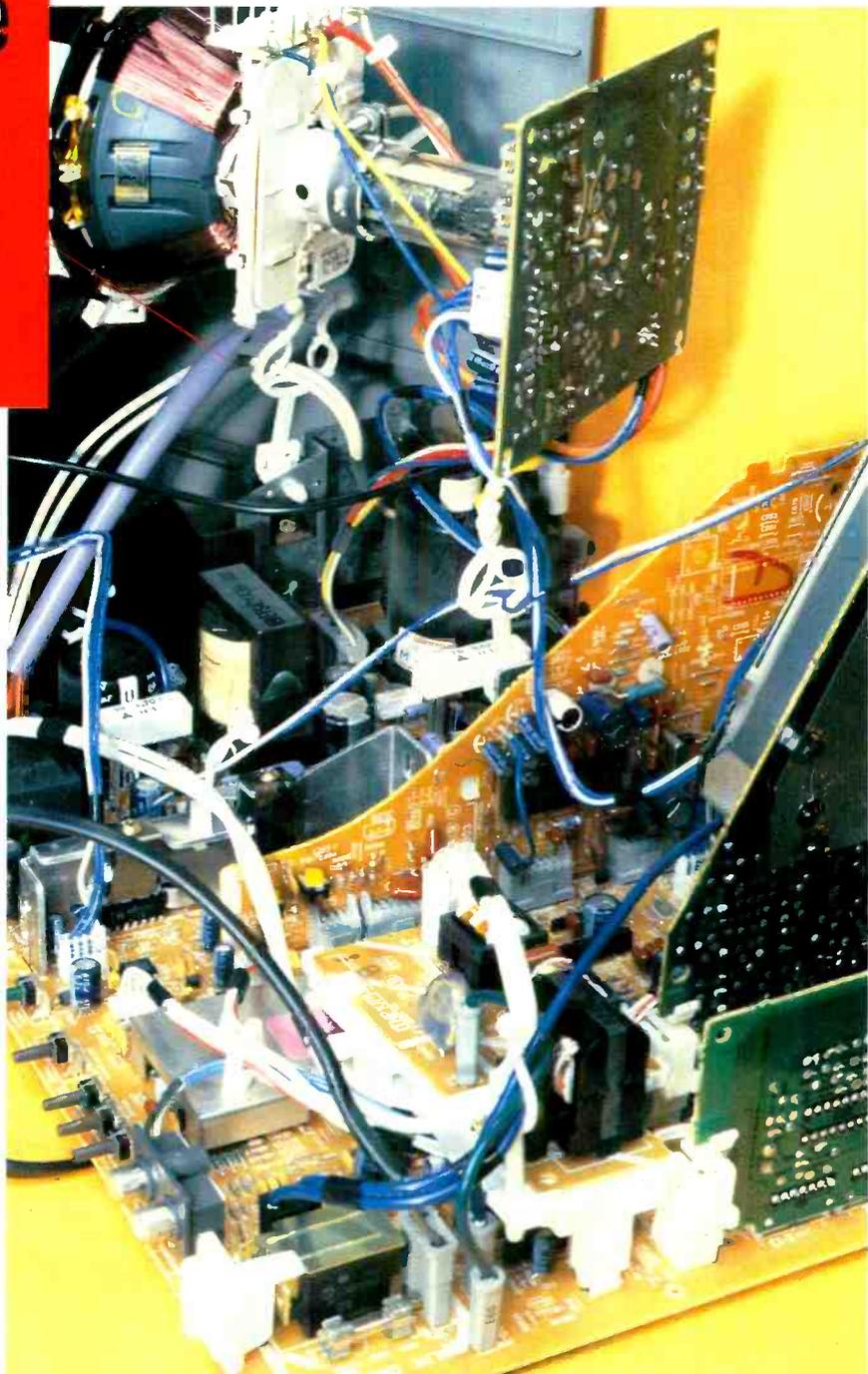
Test Report

HP54600A

Oscilloscope

**Analysis of
Fault Types**

Long-distance TV



CD PLAYER SERVICING



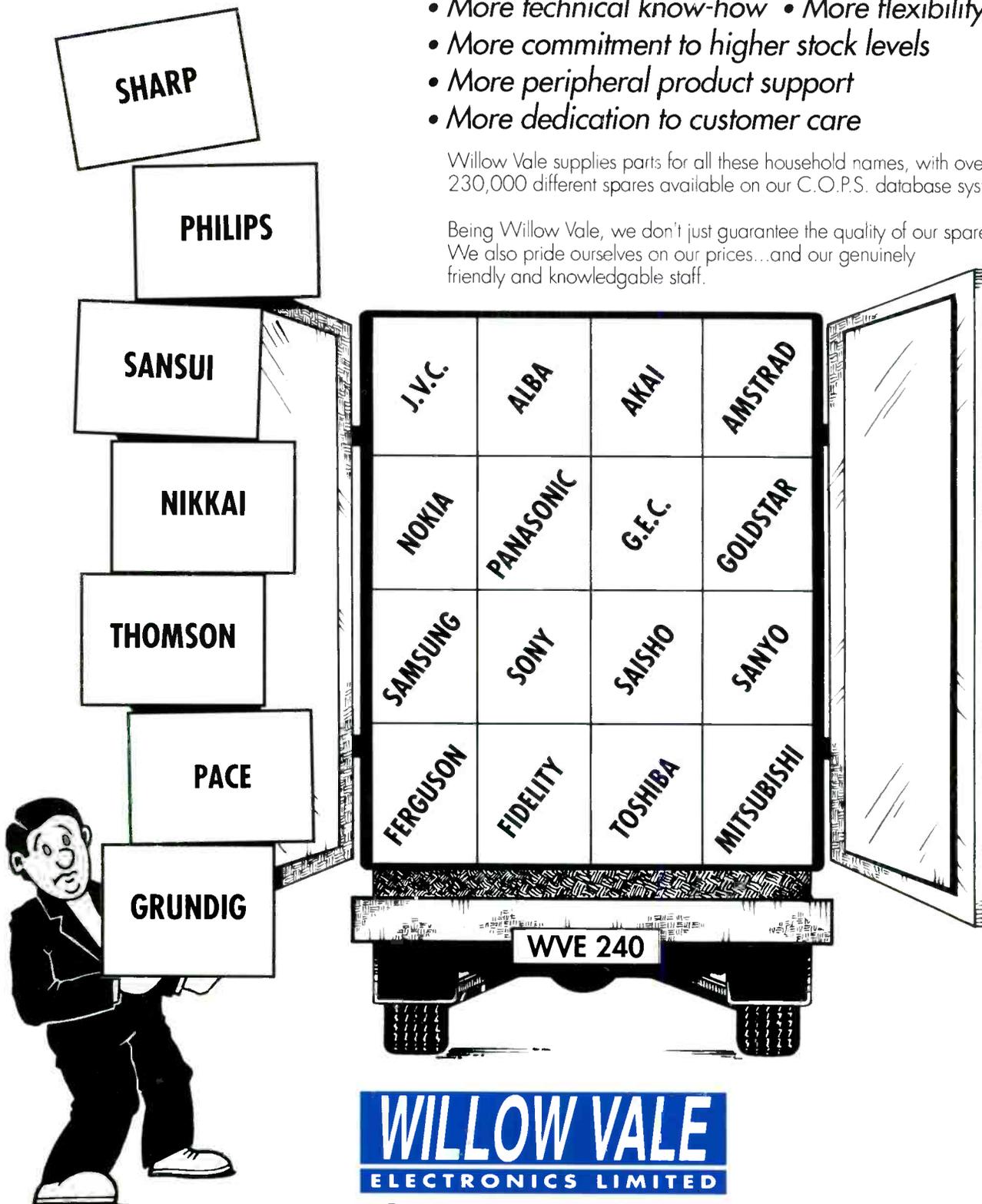
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TELEVISION

SEPTEMBER 1994

On Sale
August 17th

Vol. 44, No. 11

Issue 527

774 LNB Supply Tester Ian Rees

This aid to satellite TV fault finding enables the supply to an LNB and its current consumption to be checked.

776 Recharging Dry Cells Dave Locke

A timed charging circuit to reactivate AA and C batteries.

777 S Connector Details

783 Book Reviews

784 The Panasonic Z4 Chassis, Part 1 Ray Meadows

An introduction to the techniques used in this sophisticated small-screen chassis, starting with an overview and the operation of the power supply circuitry.



788 European Consumer Electronics Manufacturing
George Cole

Visits to Nokia and Philips plants to see some of the latest European products and developments in the TV/video field.

802 What Goes Wrong? Ray Porter, M.Sc., C.Eng., MIEE

An analysis of the frequency of common fault conditions in TV sets and VCRs, and the conclusions that can be drawn – in particular for parts stocking.

804 CD Player Servicing Les Austin

Mainly on the basic servo setting up adjustments.

807 Test Report: The Hewlett-Packard HP54600A Scope David Botto

This leading edge of the technology scope should do for your servicing needs for the foreseeable future. Function selection is mainly by means of on-screen menus.

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The October issue will be published on September 21st.

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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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BC109C	10p	B0436	30p	BU124	60p	MPSA93	20p	2N3055H	50p	7824	25p	BR252	165p	8226	240p	BA402	50p	KA2412	350p
BC140	20p	B0437	28p	BU126	60p	MR510	20p	2N3442	85p	7924	30p	BR252	165p	8251	200p	BA511	145p	KA2512	125p
BC141	20p	B0438	36p	BU180	100p	MR556	36p	2N3702	9p	7906	30p	BR252	165p	8251	200p	BA514	160p	KA2512A	150p
BC142	20p	B0439	40p	BU184	100p	OC28	35p	2N3703	9p	7908	30p	BR252	165p	8253	200p	BA516	150p	LA1130	240p
BC143	20p	B0440	40p	BU204	65p	OC29	35p	2N3704	9p	7912	30p	BR252	165p	8257	220p	BA521	100p	LA1150	150p
BC147	8p	B0441	40p	BU205	70p	OC35	250p	2N3705	9p	7915	30p	BR252	165p	8271	340p	BA524	240p	LA1185	150p
BC149	8p	B0533	38p	BU206	100p	OC36	250p	2N3706	9p	7918	30p	BR252	165p	8279	270p	BA526	180p	LA1201	75p
BC159	8p	B0534	38p	BU208	70p	OC45	70p	2N3707	9p	7924	30p	BR252	165p	8283	400p	BA527	95p	LA1210	140p
BC160	30p	B0535	38p	BU208A	75p	OC200	180p	2N3710	12p	78L05	24p	BR252	165p	8284	400p	BA527	95p	LA1212	140p
BC171	10p	B0536	38p	BU208AT	200p	R2008	100p	2N3711	12p	78L08	24p	BR252	165p	8287	260p	BA534	220p	LA1230	130p
BC172	10p	B0537	40p	BU208D	130p	R2018B	100p	2N3771	85p	78L12	24p	BR252	165p	8288	260p	BA536	150p	LA1364	200p
BC177	14p	B0538	40p	BU209	90p	S2000A3	175p	2N3772	90p	78L15	24p	BR252	165p	8748	700p	BA546	160p	LA1365	120p
BC178	14p	B0643	50p	BU225	120p	S2000AF	175p	2N3773	100p	78L18	24p	BR252	165p	8755	800p	BA612	120p	LA1368	220p
BC182	7p	B0645	50p	BU225A	120p	S2055A	175p	2N4403	12p	78L24	24p	BR252	165p	8758	95p	BA656	110p	LA1385	170p
BC182L	7p	B0647	50p	BU312	90p	S2055AF	175p	2N4404	12p	78L24	24p	BR252	165p	8758	110p	BA656	110p	LA2000	150p
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BC328	7p	B0933	60p	BU508DF	115p	TIP42A	22p	2N4425	12p	79H12KC	800p	BR252	165p	8758	110p	BA656	110p	LA2000	150p
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BC446	8p	B0D94	50p	BU536	100p	TIP48	40p	2N4429	12p	79H12KC	800p	BR252	165p	8758	110p	BA656	110p	LA2000	150p
BC477	18p	B0Y92	100p	BU546	125p	TIP50	60p	2N4430	12p	79H12KC	800p	BR252	165p	8758	110p	BA656	110p	LA2000	150p
BC516	22p	BF137	35p	BU608	120p	TIP51	80p	2N4431	12p	79H12KC	800p	BR252	165p	8758	110p	BA656	110p	LA2000	150p
BC537	25p	BF167	35p	BU626	120p	TIP52	80p	2N4432	12p	79H12KC	800p	BR252	165p	8758	110p	BA656	110p	LA2000	150p
BC546	8p	BF181	35p	BU705	130p	TIP54	80p	2N4433	12p	79H12KC	800p	BR252	165p	8758	110p	BA656	110p	LA2000	150p
BC547	8p	BF183	35p	BU706DF	150p	TIP105	60p	2N4434	12p	79H12KC	800p	BR252	165p	8758	110p	BA656	110p	LA2000	150p
BC548	8p	BF195	7p	BU706F	150p	TIP106	65p	2N4435	12p	79H12KC	800p	BR252	165p	8758	110p	BA656	110p	LA2000	150p
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M53712	140p	ETK2155	900p	ETK6822	500p	STRD4412	500p	TC1149	225p	TDA2040	140p	TDA4025	250p
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M53722	250p	ETK3041	370p	ETK6981B	600p	TA7066	120p	TC9156	300p	TDA2148	350p	TDA4220	300p
M53730	160p	ETK3042	375p	ETK6982	600p	TA7078	300p	TC9157	350p	TDA2151	375p	TDA4220	300p
M53731	220p	ETK3044	400p	ETK7216	425p	TA7119	150p	TC9158	250p	TDA2170	200p	TDA4220	300p
M53756	160p	ETK3052	500p	ETK7217	400p	TA7120	55p	TC9172P	300p	TDA2220	250p	TDA4220	300p
M53759	200p	ETK3082	550p	ETK7225	500p	TA7137	60p	TC9940	100p	TDA2220	250p	TDA4220	300p
M53759B	360p	ETK3102II	530p	ETK7226	600p	TA7140	100p	TCEP100	100p	TDA2320	80p	TDA4220	300p
M54555	45p	ETK3152II	900p	ETK7251	500p	TA7157	100p	TCEP100	100p	TDA2501	400p	TDA4220	300p
MC1496	65p	ETK3156	500p	ETK7308	350p	TA7193	320p	TCEP100	100p	TDA2503	400p	TDA4220	300p
MC3401	45p	ETK4017	480p	ETK7328	400p	TA7200	200p	TCEP100	100p	TDA2504	200p	TDA4220	300p
NE555	20p	ETK4021	380p	ETK7329	400p	TA7205	80p	TCEP100	100p	TDA2505	300p	TDA4220	300p
NE555	40p	ETK4021	380p	ETK7330	400p	TA7207	150p	TCEP100	100p	TDA2506	500p	TDA4220	300p
NE555	80p	ETK4024II	550p	ETK7356	425p	TA7208	125p	TCEP100	100p	TDA2510	450p	TDA4220	300p
NE555	110p	ETK4025	530p	ETK7358	440p	TA7214	225p	TCEP100	100p	TDA2511A	500p	TDA4220	300p
NE557	115p	ETK4026	480p	ETK7402	550p	TA7217	125p	TCEP100	100p	TDA2515	450p	TDA4220	300p
NE571	290p	ETK4029	280p	ETK7403	400p	TA7218	280p	TCEP100	100p	TDA2515	450p	TDA4220	300p
NE592	200p	ETK4032II	510p	ETK7406	650p	TA7220	220p	TCEP100	100p	TDA2515	450p	TDA4220	300p
NE593P	140p	ETK4036	470p	ETK7408	675p	TA7222	210p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA41006	300p	ETK4038	680p	ETK7410	900p	TA7225	300p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA41008	450p	ETK4040II	650p	ETK7554	600p	TA7226	290p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA41010	400p	ETK4042II	800p	ETK7561	650p	TA7227	170p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA41024	250p	ETK4044	800p	ETK7562	650p	TA7227	170p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA41025	250p	ETK4046	800p	ETK7563	800p	TA7232	95p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA41075	350p	ETK4048	1280p	ETK8050	750p	TA7233	120p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA41124	200p	ETK4060	510p	ETK8250	500p	TA7237	300p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA41250	280p	ETK4065	650p	ETK8260	1200p	TA7238	400p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA41251	380p	ETK4101	500p	ETK8280	1850p	TA7238	400p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA41274	280p	ETK4111	500p	ETK8280	1850p	TA7240	160p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA4206	500p	ETK4123	500p	ETK73410I	400p	TA7241	160p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA43004	400p	ETK4121	480p	ETK73605	375p	TA7242	190p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA45000	200p	ETK4122	560p	STR370	300p	TA7245	225p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA45010	220p	ETK4131	600p	STR371	400p	TA7267	220p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA45012	400p	ETK4132II	600p	STR380	350p	TA7268	280p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA45020	400p	ETK4133	600p	STR411	420p	TA7269	280p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA45030	440p	ETK4142	530p	STR383	410p	TA7271	220p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA45040A	280p	ETK4151	680p	STR384	350p	TA7272	260p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA45040B	400p	ETK4152	650p	STR440	700p	TA7273	300p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA45050	650p	ETK4161	650p	STR450	520p	TA7274	210p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA45053	300p	ETK4162	550p	STR541	600p	TA7280	280p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA45243P	200p	ETK4171	750p	STR452	600p	TA7281	280p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SAB2301	200p	ETK4172II	680p	STR453	600p	TA7282	180p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SAB3035	600p	ETK4181	680p	STR454	400p	TA7283	200p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA101A	200p	ETK4182II	750p	STR455	500p	TA7288	220p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA401A	220p	ETK4191	700p	STR456	470p	TA7299	200p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA403A	270p	ETK4192	700p	STR457	600p	TA7310	100p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA405A	240p	ETK4201	750p	STR470	400p	TA7312	120p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA4A31A	250p	ETK4241	1050p	STR1096	275p	TA7313	170p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA4A32A	220p	ETK4241V	1250p	STR1195	350p	TA7314	175p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA4A34A	270p	ETK4272	500p	STR1229	325p	TA7315	200p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA4A35A	270p	ETK4273	550p	STR2005	400p	TA7317	120p	TCEP100	100p	TDA2515	450p	TDA4220	300p
SA4A41C	220p	ETK4301	500p	STR2012	400p	TA7321</							

REPLACEMENT VIDEO HEADS

Model	Price	Model	Price	Model	Price	Model	Price	Model	Price				
AWA AV66/AV77 G700 G900	1200p 1100p 1500p	VCR8103, VCR8107 VIP300A MKII	2200p 1900p	VR3833, 3912, 3913, 3914, 3963, 3975, 4913, VPR3833 VR3888 VR3826, 3906, 3916, 3926, 3946, 3948 VR3927 VR3976 VR3977 VR3984, VR3994 VR3995, 3997 VR3917 VR3930 VR3937, VR3973, VR3974 VR3918, VR3919, VR3938 VR3520, 3701, 3719, 3720, 3721, 3759, 9720 VR3907, VR3908 VR3968	850p 2000p 1550p 1400p 2300p 2700p 2300p 1800p 1400p 2500p 1500p 2000p 1600p 700p	NVM1, NVM3, NVM5 AG2100, 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 NVH70 NV688 NV600 AG6800, AH6810 AG6100, AG6200, AG6300 NVG7, NVG9, NV230 NV780 NVG15, NVG400 NVMT7, NVMC20 NVF70	4200p 700p 1100p 1550p 1850p 2300p 2900p 2900p 2750p 3600p 2000p 1650p 2000p 2650p 2000p 3600p 2400p 1600p 2600p 2800p 1200p 2800p 2600p 3800p 5200p	VHR1100, VHR1200 VHR1500, VHR2500 VHR2700 VHR7900	1500p 2100p 2450p 3000p				
AKAI VS105, 112, 115, 116, 125, 126, 201, 202, 205, 220, 240, 244, 245, 247, 248, 250, 301, 303, 304, VSP8, VSP82 VP7100, VS9300, VS9500, VS9800 VP77, VP88, VP7100, VP7200, VS9700, VS9800 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 VSX9 VSF600, VSF650 VS155, VS165 VS20, 22, 24, 25, 26, 27, 422, 426, 427, VSF10, VSP9 VSR9 VS109, VS603, VS606, VS607 VS75	1350p 1400p 1400p 1350p 2400p 2800p 2600p 1400p 1500p 2500p 2500p	FISHER 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, 5010, 5075 VBS3500, 7100, 7500, 7600, 9900, VBR330 VBS7000, VBS7100, VBS9000 FVHP500, 711, 715, 721, 722, 730, 830, 5100, FVHD720 FVHP725, 830, 980 FVHP990 FVHP975 FVHD40, FVHD140, FVHP1, FVHP10, FVHP20	2000p 2000p 1150p 1100p 2500p 2700p 2400p 2400p 1150p	J. V. C. & FERGUSON HR2200, 3300, 3320, 3330, 3350, 3360, 3660, 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, HRS100, 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, HRS10, 8947, 8948, 3V42, 3V44, 3V45, 3V46, 3V47, 3V52, 3V54, 3V55, 3V56, 3V57 HRD154, 170, 171, 210, 211, 217, 320, 321, 304, 521, 522, 525, 526, 527, 550, 8950, 8951, 3V64, 3V65, FV10, FV11, FV20, FV21, FV26 HRD565, HRD566, 3V48 HRD755, HRD755, 3V43, 3V53 8930, 8931, 8933, 8940, 3V29, 3V30 8945 3V00, 8902, 8903, 8909, 8912, 8922 FV21 FV37, FV43H, HRD860 BR7000E, BR7000S HR7200, 7300, 7350, 2650, BR6200 HRD455 HRD520 HRD300, 400, 580, 600, 620, 650 HR4100 HRD750, HRD830 HRD250 3V32, 8942, 3V47, 8955 HRD180, 190, 230, 610, 3V59, FV12L, FV208, 26, 30, 32, 33, VC141L HRD370, HRD430, HRD470, 3V58, FV13H HRD530, HRD700, FV14T GRC1, GRC2, 3V41 HRD300, 337, 440, 637, 641, 660, HRFC100, FV44L	850p 2000p 1550p 1400p 2300p 2700p 2300p 3700p 2300p 2450p 2300p 3100p 2800p 2100p	NVM1, NVM3, NVM5 AG2100, 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 NVH70 NV688 NV600 AG6800, AH6810 AG6100, AG6200, AG6300 NVG7, NVG9, NV230 NV780 NVG15, NVG400 NVMT7, NVMC20 NVF70	4200p 700p 1100p 1550p 1850p 2300p 2900p 2900p 2750p 3600p 2000p 1650p 2000p 2650p 2000p 3600p 2400p 1600p 2600p 2800p 1200p 2800p 2600p 3800p 5200p	VHR1100, VHR1200 VHR1500, VHR2500 VHR2700 VHR7900	1500p 2100p 2450p 3000p				
ALBA VCR4000, VCR5000, VCR6000	1650p	FIDELITY HQ5200, VCR600, VCR6100, VR900, VR9100 VCR100 VTR1000	1500p 1100p 1100p	GOLDSTAR 8000 3HSSDB GHV81, GHV122, 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	N.E.C. N9011, 9012, 9013E, 9014E, 9014G, 9015, 9016, 901A, 902A, 9033, 9034, 9040, 9053, 9054, 9065, 9063, 9065, 9066, 906, DX1000, 1600 N91A, 914C, 915A, 916A, 917, 9110, 9120 PVC600, 740, 744, 754, 763E, 764, PV2300, 2400, 760, 794, 770, 774 N380, N381, N383, N831, N832, N833, N834, N835, N836 8261, AH1 (for model DX3000), DX4000, N9810 N895 N9052, N9530, DX2000 VCP1 PVC2300, 2400, 740, 744, 760, 764 1400p 3500p	1400p 2400p 1650p 700p 1250p 2000p 1500p	SIEMENS FM350, FM352, FM355, FM361, FM362, FM363 FM364 FM391, FM392, FM411 FM394, FM464 FM462, FM561 FM468 FM484, FM485, FM602, FM604, FM622, FM624 FM585 FM600	2750p 4200p 1800p 2800p 1600p 2450p 1800p 1425p 1900p				
AMSTRAD VCR4500, VCR5200, VCR9000, TVR1 VCR7000 VCR8000, 6100, 6200, 8600, 8602, 8700, DB8900, 8904, TVR4 TVR2, TVR3, VCR4600, VCR4600 MKII, VCR4700	1100p 1100p 1200p 1150p	G.E.C. 4000H, 4001H, 4002H V4001H, V4004 V4005H	1200p 1200p 1500p	GRANADA CS1, DS2 VHS4H1 VHS4H3 VHS4N3 VHS4Y3 VHS5H1, VHSCH1 VHSBP1 VHSBY3 VHSDE2 VHSHE2 VHSF1, VHSFE2 VHSFG2, VHSFG4 VHSF1, VHSF2 VHSTJ1, VHSFJ2, VHSTJ3, VHSWJ3, VHSYJ2 VHSYH4, VHSWH1, VHSXH1, VHSYH2 VHSWJ1, VHSXJ3	1600p 1100p 2400p 800p 1200p 2100p 850p 2600p 1600p 1400p 1300p 1300p 700p 1600p 700p	KENWOOD KV901, KV903, KV905 KV917	850p 2450p	LOGIK VPR96 VPR95	1500p 1400p	PHILIPS VR6460, VR6520, 64VR60, VR6340, VR6711 4 HEAD 8920, VR6440 VR6441, VR6540, VR6541, VR6640, VR6642	725p 1800p 2500p 1300p	SONY DSR-19R (FOR SL-T9ME) DSR-21R (FOR SL-C8-C9) DSR-35R (FOR C20, C30, C40, SLF118, SLF152, PIN SL-C2APS, SL-C23E, SL-C4APS, SL-F30PF, SL-F60PS, SLK85, SLT20ME, SLT30ME DSR-43R (FOR SLCT RANGE, SL5000, SL5100, SL3000) 1 PIN SL-C6E, SL36E5, SL37E SL3000, 8000, 8080, SL-C5E SLT7ME SLK201, 202 SLK95, SLT50ME SLV373VB	3100p 2800p 1500p 2800p 1500p 1300p 1600p 2000p 2900p 2600p
AWA ATV1	800p	GRANDSTAR 8000 3HSSDB GHV81, GHV122, 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	J.V.C. & FERGUSON HR2200, 3300, 3320, 3330, 3350, 3360, 3660, 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, HRS100, 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, HRS10, 8947, 8948, 3V42, 3V44, 3V45, 3V46, 3V47, 3V52, 3V54, 3V55, 3V56, 3V57 HRD154, 170, 171, 210, 211, 217, 320, 321, 304, 521, 522, 525, 526, 527, 550, 8950, 8951, 3V64, 3V65, FV10, FV11, FV20, FV21, FV26 HRD565, HRD566, 3V48 HRD755, HRD755, 3V43, 3V53 8930, 8931, 8933, 8940, 3V29, 3V30 8945 3V00, 8902, 8903, 8909, 8912, 8922 FV21 FV37, FV43H, HRD860 BR7000E, BR7000S HR7200, 7300, 7350, 2650, BR6200 HRD455 HRD520 HRD300, 400, 580, 600, 620, 650 HR4100 HRD750, HRD830 HRD250 3V32, 8942, 3V47, 8955 HRD180, 190, 230, 610, 3V59, FV12L, FV208, 26, 30, 32, 33, VC141L HRD370, HRD430, HRD470, 3V58, FV13H HRD530, HRD700, FV14T GRC1, GRC2, 3V41 HRD300, 337, 440, 637, 641, 660, HRFC100, FV44L	850p 2000p 1550p 1400p 2300p 2700p 2300p 3700p 2300p 2450p 2300p 3100p 2800p 2100p	NVM1, NVM3, NVM5 AG2100, 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 NVH70 NV688 NV600 AG6800, AH6810 AG6100, AG6200, AG6300 NVG7, NVG9, NV230 NV780 NVG15, NVG400 NVMT7, NVMC20 NVF70	4200p 700p 1100p 1550p 1850p 2300p 2900p 2900p 2750p 3600p 2000p 1650p 2000p 2650p 2000p 3600p 2400p 1600p 2600p 2800p 1200p 2800p 2600p 3800p 5200p	VHR1100, VHR1200 VHR1500, VHR2500 VHR2700 VHR7900	1500p 2100p 2450p 3000p				
BAIRD 8900, 8901, 8902, 8903, 8906, 8922, 8928 8904, 8923, 8924, 8925, 8929, 8935, 8943, 8944 8909, 8912 8930, 8931, 8933, 8934 8942 8945 8947, 8948 8950 VC141L VH582	650p 800p 800p 2300p 2000p 1600p 1700p 3000p 700p	GRANADA CS1, DS2 VHS4H1 VHS4H3 VHS4N3 VHS4Y3 VHS5H1, VHSCH1 VHSBP1 VHSBY3 VHSDE2 VHSHE2 VHSF1, VHSFE2 VHSFG2, VHSFG4 VHSF1, VHSF2 VHSTJ1, VHSFJ2, VHSTJ3, VHSWJ3, VHSYJ2 VHSYH4, VHSWH1, VHSXH1, VHSYH2 VHSWJ1, VHSXJ3	1600p 1100p 2400p 800p 1200p 2100p 850p 2600p 1600p 1400p 1300p 1300p 700p 1600p 700p	KENWOOD KV901, KV903, KV905 KV917	850p 2450p	PHILIPS VR6460, VR6520, 64VR60, VR6340, VR6711 4 HEAD 8920, VR6440 VR6441, VR6540, VR6541, VR6640, VR6642	725p 1800p 2500p 1300p	SONY DSR-19R (FOR SL-T9ME) DSR-21R (FOR SL-C8-C9) DSR-35R (FOR C20, C30, C40, SLF118, SLF152, PIN SL-C2APS, SL-C23E, SL-C4APS, SL-F30PF, SL-F60PS, SLK85, SLT20ME, SLT30ME DSR-43R (FOR SLCT RANGE, SL5000, SL5100, SL3000) 1 PIN SL-C6E, SL36E5, SL37E SL3000, 8000, 8080, SL-C5E SLT7ME SLK201, 202 SLK95, SLT50ME SLV373VB	3100p 2800p 1500p 2800p 1500p 1300p 1600p 2000p 2900p 2600p				
BLAUPUNKT RTV100, 200, 202, 211, 214, 222, 224, RTX100, 200 RTV301, RTX250, RTV333 RTV306, 307, 309, 311, 315, 316, 520, 707 RTV310, 311A, 312, 317, 319, 320 RTV324, RTV325 RTV328 RTV424 RTV434, RTV444 RTV460, RTX720, RTV330 RTV454, RTV740 RTV478 RTV520, RTV530 RTV535, RTV560, RTV570 RTV635, RTV660, RTV670, RTV730 CR1000, CR1200, CR1500 CR1800 RTV321, RTV322 RTV338 RTV404, RTV414 RTV640 RTV750, RTV800, RTV900 RTV810 RTV910	800p 800p 1500p 1850p 3500p 3900p 2300p 5000p 3700p 1800p 2000p 3000p 3500p 4400p 4600p 3500p 2700p 2000p 3000p 3500p 4400p 4600p	GRANDSTAR 8000 3HSSDB GHV81, GHV122, 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	J.V.C. & FERGUSON HR2200, 3300, 3320, 3330, 3350, 3360, 3660, 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, HRS100, 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, HRS10, 8947, 8948, 3V42, 3V44, 3V45, 3V46, 3V47, 3V52, 3V54, 3V55, 3V56, 3V57 HRD154, 170, 171, 210, 211, 217, 320, 321, 304, 521, 522, 525, 526, 527, 550, 8950, 8951, 3V64, 3V65, FV10, FV11, FV20, FV21, FV26 HRD565, HRD566, 3V48 HRD755, HRD755, 3V43, 3V53 8930, 8931, 8933, 8940, 3V29, 3V30 8945 3V00, 8902, 8903, 8909, 8912, 8922 FV21 FV37, FV43H, HRD860 BR7000E, BR7000S HR7200, 7300, 7350, 2650, BR6200 HRD455 HRD520 HRD300, 400, 580, 600, 620, 650 HR4100 HRD750, HRD830 HRD250 3V32, 8942, 3V47, 8955 HRD180, 190, 230, 610, 3V59, FV12L, FV208, 26, 30, 32, 33, VC141L HRD370, HRD430, HRD470, 3V58, FV13H HRD530, HRD700, FV14T GRC1, GRC2, 3V41 HRD300, 337, 440, 637, 641, 660, HRFC100, FV44L	850p 2000p 1550p 1400p 2300p 2700p 2300p 3700p 2300p 2450p 2300p 3100p 2800p 2100p	NVM1, NVM3, NVM5 AG2100, 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 NVH70 NV688 NV600 AG6800, AH6810 AG6100, AG6200, AG6300 NVG7, NVG9, NV230 NV780 NVG15, NVG400 NVMT7, NVMC20 NVF70	4200p 700p 1100p 1550p 1850p 2300p 2900p 2900p 2750p 3600p 2000p 1650p 2000p 2650p 2000p 3600p 2400p 1600p 2600p 2800p 1200p 2800p 2600p 3800p 5200p	VHR1100, VHR1200 VHR1500, VHR2500 VHR2700 VHR7900	1500p 2100p 2450p 3000p				
BOSCH BAUER VRH50 VRP20 VRP25 VRP30	1000p 1000p 1000p 3350p	GRANDSTAR 8000 3HSSDB GHV81, GHV122, 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	J.V.C. & FERGUSON HR2200, 3300, 3320, 3330, 3350, 3360, 3660, 3750, 3860, 4100, 3292, 8900, 8901, 8902, 8903, 8906, 8922, 8928, 3V01, 3V06, 3V22 HR3660, 7600, 7610, 7650, 7700									

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	Models & Description	Order Code	Price	
HRD540, 550, 580, 660, 860, 960,	130p	VR6020, VR6022, VR6023, VR6028, VR7730	75p	UNIVERSAL VIDEO LAMP 9V	VL#1	25p	
NEWWOOD		VR6024	75p	80mV (310mm WIRES)			
KV901	70p	VR6520, VR6540, VR6560	90p				
KV903	80p	VR6710, VR6720, VR6735, VR6720	130p				
LDWEWE		VR6720, VR6730, VR6760, VR6775, VR6780	160p				
CC11, CC40	95p	SAISHO		PANASONIC VIDEO LAMPS	VLJ2	35p	
CC410, CC420, CC440, CC460	130p	VR2000, VHL3	90p				
CC50, CC55, CC60, CC65, CC70, CC75	120p	VR3800	75p				
LOGIK		SALORA		SHARP VIDEO LAMPS	VLJ2	35p	
VR955	180p	SV8500	100p				
LUXOR		SV6600	150p	HITACHI 5381682 (VT63, VT64)	VLJ4	135p	
S245, 9251	130p	SV8000	120p	VIDEO LAMPS			
S252	140p	SV8100	80p				
S253	140p	SV8500, SV8520, SV9500	150p				
S254	100p	SV7400, SV8400, SV8420, SV8550	120p				
S255	130p	SV6700, SV8710, SV8760, SV9700	120p				
S256	115p	SV6800, 6900, 8810, 8820, 8870, 8910, 8920, 8970	95p				
S270, 9271, 9273, 9274	140p	SV8600, 8620, 8700, 8720, 8830, 9600, 9810	130p				
S272, 9280	140p	SAMSUNG		AIWA, AKAI, ALBA, AMSTRAD, VLD5	150p		
S281, 9284, 9285, 9292, VR3701, 3721, 3731, 3761, 3781	95p	SV716, 717, V1616, V1621, V1626, VX616, VX617, VX619, VX626, VX627, VX629	85p	BLAUPUNKT, FERGUSON, FIDELITY, FISHER, FUJITSU, FUNAI, G.E.C., GOLDSTAR, GRANADA, GRUNDIG, HINARI, HITACHI, ITT, JVC (HRD SERIES), MATSUI, MITSUBISHI, NEC, ORION, NATIONAL, PHILIPS, SAISHO, SALORA, SAMSUNG, SANYO, SHARP, SIEMEN, SONY, TELEFUNKEN, THOMSON, TOSHIBA			
MATSUI		VB520, 510, 610, 616, 617, 619, 620, 626, 627, 629, V1510, 520, 611, 616, 621, 626, VX610, 520	100	AKAI, GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 8912, 8922, 8925)	VL01	25p	
VX850	75p	VB900, VB910, V1900, V1910	110				
MITSUBISHI		FX980, 981, 982, SE9001, SV9001, SVX307, 319, 322, V8770, 8220, 8225, V1770, 790, 8220, 8225, VK8220, VPX31, VX760, VX790, 8220, 8225	135p				
HS200	200p	VX810, 520, V1730, 710, VX712, VX720, 730, 970, 971, 972	230p				
HS300, 301, 302, 307, 310, 337, 338, 347, 349, 411, 412, 421, HSB10, 20, 30, HSE10, 20, 30, 70	150p	VX9800	110p				
HS303, HS304, HS306, HS307, HS330, HS400, HS700	150p	SANYO					
HS318, HS319, HS410	130p	VTC5000, 5150, 6000, 6500, VTCM10, 11, 20, 21, 30, 31, 50	75p				
M.E.C.		VTC5300, VTC5350, VTC5400, VPR5800	100p				
NB30, NB31, NB32, NB33	100p	VTC5500	95p				
NB95	80p	VTC9100, VTC9300	220p				
PVC2300, PVC2400	180p	VTC1100, 1300, 1500, 1100, 1150, 1200, 1300, 1500	90p				
DX1000, 1600, 2000, 3000, N9012, 9013, 9014, 9016, 9033, 9034, 9053, 9054, 9055, 9066, 9110, 9120, 9510, 9520, 9530, 9510	95p	VHR180, VHR2300, VHR2500, VHR2700	150p				
NATIONAL PANASONIC		VHR3100, 3300, 3310, 3400, 3700, 3800, VHRD500, 700	110p				
NV300, NV332, NV333, NV340, NV366	125p	VHR4100, 4150, 4200, 4300, 4350, 4770, 5100, 5200, 5300, 5350, 5700, 7100, 7200, 7500, 7530, 7540, 7800, 7810, 8100, 8200, 8250, 8500, VHRD4400, 4410, 4500, 4600, 4610, 4710, 4890, 6700	90p				
NV777, NV788	100p	SHARP					
NV2000, NV2010, NV3000	130p	VC200, 384, 385, 386, 388, 390, 9300, 9500, 9700	100p				
NV7000, NV7200, NV7800	95p	VCT300, VC7700, VC7750, VC7800, VC8000	150p				
NV8600, NV8610, NV8620	145p	VC9000, 387, 471, 473, 481, 482, 483, 486, 488, 496, 8481	80p				
NV230, 250, 280, 430, 431, 433, 450, 480, 485, 470, 730, 770, 810, 870, 890, AG1000, 1050	125p	VC402, 500, 671, 573, 581, 582, 583, 584, 585, VCSF3	70p				
NV370, NV380, NV480, NV630, NV780, NV830, NV850	100p	VC600, 661, 682, 684, 685, 693, 783, VCS3, VCS283	80p				
NV600, NV688, AG6010, AG6015	110p	VC772, 779, 781, 782, 785, 786, 793, 900, 7810, 7822, VCA100, VCA102, 104, 131, 140, 170, 202, 203, 234, 501, 602, 5011, VCD806, 810, 815, VCH80, 865, 910, VCS1000, VCT310, 410, VCT1314, VCT5312	115p				
NV67, 10, 12, 14, 15, 18, 30, 130, 400, NVH70	70p	SIEMENS					
NORDMENDE		FM350, FM352, FM355	80p				
V100, V140	70p	FM484, FM485	55p				
V1000M, 1005M, 1205, 1215, 1235, 1245, 1305, 1403, 1405, V1500P, 1503, 1505K, 1805K, 2000D, 2405, 2500H, 3000H, V3405H, 3105, 4405H, 5000, 8005, 900, 905	85p	FM391, FM392, FM394, FM482	100p				
V1001, 1005, 1015, 1025, 1035, 1041, 1055, 1065, 1105, 3005, 304, 5005, 502, 603	80p	FM461, FM464, FM468, FM561	150p				
V101, V102, V103, V112, V141, V142, V301, V302	90p	FM361, FM362, FM363, FM364	120p				
V110, V333	110p	SONY					
V1500T, V2000B, V2000P, V400H	95p	SLC8, SLJ10, SLT6ME	140p				
V250, V460, V9460, V20035542, V20035543	130p	SLC5, SLC7, SLJ7, SLJ9	140p				
V300, V303, V380	75p	SLC9, SL8000, SL8080, SLT50	165p				
V500	75p	SL8000E, SL8080E, SL8200, SL8600, SLV255	175p				
ORION		TELEFUNKEN					
COMBI15000, 16000, NEVHM, TVP230RC, 900MVH1012, VH1030, 1040, 1060, 1070, 1100, 1120, 1440, 1500, 1660, 1800, 2150, 2368, 2400, 2500, 2600, 2700, 2980, 300, 358, 380, 382, 4010, 4015, 4016, 4020, 4300, 5010, 5015, 530, 535, 536, 830, 635, 640, 730, 735, VP220, 225, 245, VR1032, 2966, 2980, 821, 925, VXL25	30p	VR400, VR440, VR449	130p				
NEVHL VCP, VH1204, 2004, 2204, 3050, 3060, 4008, 400, 4012, 412, 512, 600, 686, 744, 774, 7905, 800, 820, 900, 974, VP200, VR2949, 2965, 2957, VXL20	90p	VR520, VR529, VR620, VR920	70p				
VC150, 180, VH1000, 200, 201, 205, 212, 250, 254, 288, 300, 303, 3030, 312, 33, 3312, 404, 555, 700, 704, 708, 712, 770, 780, 844, 900, VHF2, VH3	80p	VR530, VR535, VR539, VR660, VR630, VR660	75p				
VH1, VH2A	150p	A940, VR1926, 1930, 1940, 1950, 2960, 325, 930, 940, 950	90p				
PHILIPS		A920, VR1970, 1980, 2920, 2925, 2930, 2970, 7921, 7926, 7931, 7970, 7971, 7980, 970, 7981, 975, 980	85p				
VR640, VR6820	170p	A1200, 930, 932, 935, 980, 980, 990, VR2931, 2935, 2941, 2971, 3935, 3945, 3950, 3965, 3975, 4935, 4940, 4942, 4945, 496, 5VR4870, 6000, 7932, 7959, 7979	65p				
VR6540	100p	VR1935	80p				
DV186, 286, 291, 292, 468, 471, 562, 571, 761, VR201, 202, VR20DV1, 20DV2, 20RW7, 25B01, 25B02, 302, 303, 305, VR30DV2, 35B02, 35B03, 635B7, 715B4, 715B5, 715B8, VR865B2, 915B2, 925B3, VR6180, 6185, 6285, 6290, 6291, 6293, 6367, 6390, 6391, 6393, 6467, 6468, 6470, 6561, 6570, 6581, 6670, 6676, 6760,	85p	THOMSON					
VR685B4, 865B1, 925B3	85p	SV1000, V410, 430, 450, 510, 520, 530, 540, 620, 630, 640, 4240, SV5540	85p				
VR6442, VR6542	100p	TX8000, V309, V357, VK411	75p				
VR2025, VR2580	100p	TX8000, V242, 343, 351, 352, 353, 360, 364, 368, 4210, 4230, 4260, 4400, 5500, 6000, 8564	90p				
VR445B9, BR445B920, VR445B922, BR6843	100p	V320, V321, V323, V326, V4200, V4300	90p				
VR6548, VR6648, VR495B620, VR644895	110p	V340	100p				
SABA		V4100, VK308, VK309, VK410	120p				
VR6420, 6435, 6440, 6460, 6480, 6620, 6770, 7200, 8420, 2A10, 70, 2820, 3820, 4A10, 4B20, 6A10, 6A70, 6B20, 8B20	85p	VK300, VK301, VK302, VK303, VK305, VK3301	135p				
VR6004, 6005, 6011, 6014, 7004, 7011, 7014, 8011, 8014, BERLIN	90p	VK312	85p				
VR2000, VR6000, VR6012, VR7000, VR7720, VPR8066	130p	TOSHIBA					
VR5005, VHR7000	135p	V55, V57	85p				
VR6006, 6007, 6008, 6009, 6015, 9018, 9018, 6038, 7006, 7007, 7016, 7018, 9006	85p	V3, V31, V61, V63, V9600, V9880	85p				
		V81, V83, V85, V86, V87	150p				
		VD80B, VD80D, V71, 73, 74, 75, 81, 83, 85, 86	120p				
		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, 0351/1, 0361, 0361/1, 9350, CT0500, 0500/1/1, 0500T

PRICE: £3.25
PART NO: LFC 005
USED ON: CVC40
PRICE: £3.00

MATSUI/SAISHO
USED ON: MATSUI-2190, SAISHO- PST2130TX

PRICE: £3.50

PHILIPS
USED ON: K30, K35, K40, KT3, KT4

PRICE: £1.00

SONY
PART NO: (POWER SWITCH + REMOTE SWITCH)
USED ON: KV1612 MK1, KV1612 MK2, KV1614, KV2052, KV2056, KV2062, KV2068, KV2212, KV2216, KV2252, KV2256, KV2704, KV2705, KV2706, KV2752PE3, KX20PS1, KX20PS2, KX27PS1

PRICE: £3.50
PART NO: (POWER SWITCH + REMOTE SWITCH)
USED ON: KV2022, KV2024

PART NO: (POWER SWITCH)
USED ON: KV1810 MK1, KV1810 MK2, KV1820, KV1822, KV2000 MK1

PRICE: £8.00
PART NO: (POWER SWITCH 26mm)
USED ON: KV1400, KV1440, KV2040, KV2060

PART NO: (POWER SWITCH 21mm + REMOTE SWITCH)
USED ON: KV2020

PART NO: 2 PIN (FUNCTION SWITCH)
USED ON: KV1612 MK1, KV1612 MK2, KV2052, KV2056, KV2212, KV2215, KV2216, KV2252, KV2256, KV2704, KV2705, KV2706, KV2752PE3, KV2756PE3

PART NO: (4 PIN FUNCTION SWITCH)
USED ON: VARIOUS

PRICE: £0.45
PART NO: VARIOUS
USED ON: VARIOUS
PRICE: £0.50

REPLACEMENT IDLER TYRES

AKAI	M132773	IT01
	MZ366960J2	IT02
GOLDSTAR	VXP0521	IT17
HITACHI	6861471	IT03
	6861482	IT04
	6868971	IT05
JVC/ FERGUSON	PU 48967B	IT06
	PU 51380	IT07
	PU 51402A	IT08
	PU 55373	IT09
	PU 55374	IT10
NATIONAL PANASONIC	VXP 0329	IT11
	VXP 0343	IT12
	VXP 0344	IT13
	VXP 0401	IT14
	VXP 0433	IT15
	VXP 0463	IT16
	VXP 0521	IT17
	VXP 0581	IT18
SANYO	1430662T15620	IT19
SHARP	NIDL005GEZZ	IT20
	NIDL006GEZZ	IT21
	NPLY0107GEZZ	IT22

PRICE 22p EACH
18p EACH FOR A PACK OF 5 FOR EACH MODEL
15p EACH FOR A PACK OF 10 FOR EACH MODEL

PANASONIC MODE SWITCHES

NV2000, 2010, 7000, 7200, 7800 (VSS0048)	£2.25
NV230, 260, 430, 810, 870, 2300, 4300 (VSS0110)	£2.25
NV830 (VSS0091)	£2.10
NV300, 333, 340, 366, 688, 777, 778 (VSS0060)	£3.75
NVG21, 25, NVH65, NVD80 (

VIDEO SERVICE KITS

AMSTRAD
VCR700
Contents
BELT SET, PINCH ROLLER, REEL IDLER, VIDEO LAMP
Order Code: SK41 £5.50

FERGUSON & JVC
3V42/43
HRD455/HRD725
Contents
BELT SET, PINCH ROLLER
CLUTCH MECHANISM, TENSION BAND
Order Code: SK37 £17.50
Economy Kit Contents
BELT SET, PINCH ROLLER
SUPPLY CLUTCH, TAKE UP CLUTCH
Order Code: SK38 £9.50

3V58/59/64/65
HRD170/180/210/230/300/320/370/400/430/530/700/750
HRS5000
Contents
BELT SET, PINCH ROLLER, IDLER ARM, TENSION BAND
Order Code: SK44 £8.50

3V29/3V30
HR7200/7300/7350
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
Order Code: SK05 £6.00

3V35/36/38/39/49
HRD110/111/120/225
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
Order Code: SK04 £5.50

3V31/3V42
HR7600/7610/7650/7655
Contents
BELT SET, T/U REEL TABLE
TYRE, PINCH ROLLER, REEL IDLER, T/U CLUTCH, T/U IDLER, TENSION BAND, VIDEO LAMP
Order Code: SK33 £12.00
Economy Kit Contents
BELT SET, T/U REEL TABLE
TYRE, PINCH ROLLER, REEL IDLER TYRE, T/U IDLER TYRE, T/U CLUTCH
Order Code: SK34 £5.50

3V35/36/38/39/49
HRD110/111/120/121/225
Contents
BELT SET, T/U REEL TABLE
TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, T/U CLUTCH, T/U IDLER, REEL IDLER, TENSION BAND
Order Code: SK35 £10.50
Economy Kit Contents
BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, T/U CLUTCH, T/U IDLER TYRE, REEL IDLER TYRE
Order Code: SK36 £5.80

3V29/3V30
HR7200/7300/7350
Contents
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
Order Code: SK31 £11.00
Economy Kit Contents
BELT SET, T/U REEL IDLER TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, REEL IDLER TYRE, T/U IDLER TYRE, T/U CLUTCH
Order Code: SK32 £5.10

3V44/45/48/53/54/55/57
HRP50/HRD140/150/158/160
HRD250/257/565/566/755
Contents
BELT SET, PINCH ROLLER, CLUTCH MECHANISM, TENSION BAND
Order Code: SK39 £15.00
Economy Kit Contents
BELT SET, PINCH ROLLER
Order Code: SK40 £9.50

FISHER
FVHP905/906/907/908/910/911/916/918
Contents
BELT SET, PINCH ROLLER, IDLER, GEAR IDLER UNIT, TENSION BAND
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Economy Kit Contents
BELT SET, PINCH ROLLER, IDLER TYRE
Order Code: SK58 £5.80

FVHP615/618/620/622/710/711/715/716/720/721/722/725/
730/830/840
Contents
BELT SET, PINCH ROLLER, IDLER, GEAR IDLER UNIT, TENSION BAND
Order Code: SK68 £12.50
Economy Kit Contents
BELT SET, PINCH ROLLER, IDLER TYRE
Order Code: SK69 £3.66

HITACHI
VT11/VT33
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
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VIDEO SERVICE KITS (Cont.)

VT11/VT33
Contents
BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, FF/REW IDLER, CLUTCH PLATE, TENSION BAND
Order Code: SK45 £14.00
Economy Kit Contents
BELT SET, PINCH ROLLER, FF/REW IDLER TYRE, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE
Order Code: SK46 £4.50

VT52/61/62/63/64/65/85/86/640
Contents
BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLATE, TENSION BAND
Order Code: SK49 £14.00
Economy Kit Contents
BELT SET, PINCH ROLLER, FF/REW IDLER
Order Code: SK50 £3.25

VT400/405/410/13/14/15/18/420/25/26/28/430/31/35/48/450/498/
510/520/25/26/530/35/36/540/545/46/48/570/75/576/580/85/88
Contents
TIMING BELT, PINCH ROLLER, FF/REW ARM, CLUTCH BASE, TENSION BAND
Order Code: SK52 £11.50

VT100/110/111/113/115/118/120/125/128/130/135/138/145/150/
175/220/225/250/255/258/260/VTL30
Contents
BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLATE, TENSION BAND
Order Code: SK51 £14.00

PANASONIC
NV2000/NV2010
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
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NV7000/NV7200/NV7800
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
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NV300/NV330/NV333/NV340/NV366
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRE
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NV2000/NV2010
Contents
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Economy Kit Contents
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Order Code: SK14 £4.50

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Contents
BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND
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Economy Kit Contents
BELT SET, PINCH ROLLER, IDLER TYRE, CLUTCH TYRE
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Contents
BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND
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Economy Kit Contents
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NV18/NV30/NV6120/NV130/NV400/NV485 (PX/AC)
AG1810 (PK)
Contents
LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLER TENSION BAND
Order Code: SK27 £8.00
Economy Kit Contents
LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLER TYRE
Order Code: SK28 £4.00

NV332
Contents
BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND, FF/REW TYRE
Order Code: SK29 £12.00
Economy Kit Contents
BELT SET, PINCH ROLLER, PLAY IDLER TYRE, FF/REW IDLER TYRE
Order Code: SK30 £5.10

NV230/250/260/280/430/450/460/470/650/810/890/
AG1200PK/AG1500PK
Contents
BELT SET, PINCH ROLLER, IDLER, TENSION BAND
Order Code: SK23 £6.00
Economy Kit Contents
BELT SET, PINCH ROLLER, IDLER TYRE
Order Code: SK24 £3.50

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Contents
BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND
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Economy Kit Contents
BELT SET, PINCH ROLLER, PLAY IDLER TYRE, FF/REW IDLER TYRE
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Contents
SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER UNIT, TENSION BAND
Order Code: SK19 £6.50
Economy Kit Contents
SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER TYRE
Order Code: SK20 £4.00

NV370/NV380/480/630/780/830/850/AG2100PK/AG2200PK
Contents
BELT SET, PINCH ROLLER, IDLER, TENSION BAND
Order Code: SK21 £6.00
Economy Kit Contents
BELT SET, PINCH ROLLER, IDLER TYRE
Order Code: SK22 £3.00

NV777/NV788
Contents
BELT SET, PINCH ROLLER, IDLER UNIT, TENSION BAND
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Economy Kit Contents
BELT SET, PINCH ROLLER, IDLER TYRE
Order Code: SK18 £4.00

VIDEO SERVICE KITS (Cont.)

SHARP
VC381
Contents
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Economy Kit Contents
BELT SET, PINCH ROLLER, REEL IDLER TYRE
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BELT SET, PINCH ROLLER, REEL IDLER, TENSION BAND
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Economy Kit Contents
BELT SET, PINCH ROLLER, REEL IDLER
Order Code: SK61 £6.50

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VCA100/VCA102/VCA104/VCA202
Contents
BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND
Order Code: SK64 £13.50
Economy Kit Contents
BELT SET, PINCH ROLLER, REEL DRIVE UNIT TYRE
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Contents
BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND
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BELT SET, PINCH ROLLER, REEL DRIVE UNIT TYRE
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Replaces Philips Part No's:
138-10229, 2.4V - 90mAh 200p

REPLACEMENT FERGUSON NI-CAD BACKUP BATTERIES
Replaces Ferguson Part Nos:
00E6-066-001, 2.4V
Used on: 3V35, 3V56, 3V58, 3V65 200p

REPLACEMENT LINE OUTPUT TRANSFORMERS

Description	Price	Order Code
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ORION 3714002	1500p	LOT02
FIDELITY ZX300	1500p	LOT03
FE TX100 90 DEG	1500p	LOT04
SABA 490007182	1500p	LOT05
FE TX90 WHITE	1600p	LOT06
ITT D30737 EQ	1600p	LOT07
BLAUPUNKT 210	1600p	LOT08
GRUNDIG 29220*0	1600p	LOT09
ITT CVC800/173	1500p	LOT10
ITT D218/37 EQ	1600p	LOT11
NORMENDE 5255	1600p	LOT12
SABA 81000 200	1600p	LOT13
SALORA T236 EQ	1600p	LOT14
SABA 811 50-24	1800p	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 CT45 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 5910110	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
TC1851, TC2051, TC2081, TC2253, TC2263, TX5500		
HINARI	1600p	LOT43
Used On: CT15		
HITACHI 2434274	1400p	LOT44
CPT2174, CPT2176, CPT2178, 2434274		

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REMOTE CONTROLS

Description	Order Code	Price	Description	Order Code	Price
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TP160E	RC 107	900p	RC38	RC 301	875p
TP200, TP300	RC 380	800p	KT3 TEXT	RC 5301	800p
TP400	RC 401	800p	RC5352	RC 5352	800p
TP590-600	RC 600	850p	RC5375	RC 5375	850p
TP390, TP610	RC 610	850p	RC5 STANDARD	RC 5534	850p
TP621	RC 621	850p	RC5901	RC 5901	850p
TP630, TP650	RC 650	850p	RC5903	RC 5903	800p
TP660	RC 660	850p	SABA		
TP661	RC 661	850p	T6772	RC 149	900p
HITACHI			TC319-320	RC 328	875p
CLE800-CLE830	RC 140M	850p	TC356	RC 356	875p
A617402/655602	RC 192	875p	TC358	RC 358	850p
A512120/230	RC 900	800p	TC360	RC 360	800p
A514790	RC 901	850p	TC365	RC 365	800p
A5088470	RC 902	800p	SALORA		
A518612	RC903	900p	SERIES L	RC 190	875p
SCL002	RC904	850p	86173	RC 882	850p
C2096	RC 905	850p	SANYO		
A511940	RC 906	800p	RC218, RC222, RC228, RC238	RC 140M	850p
655602H	RC 907	850p	JXGE	RC 878	850p
ITT			JXDE	RC 884	850p
IFB13, 14, 15	RC 143	875p	VHR2300	RC 890	850p
FS4	RC 148	850p	RC628	RC 865	900p
RG305	RC 305	825p	SHARP		
RG306	RC 306	825p	G0121CESA, 123CESA, 204, 251	RC 140M	850p
FS9/1-10/1	RC 307	850p	SIEMENS		
VS5 RUK	RC 308	825p	FC616	RC 130	850p
VS4-1	RC 310	850p	FC631	RC 132	850p
MULTICONTROL (17C20)	RC 311	800p	FC742	RC 164	900p
KORTING			SONY		
18279, 18396, 18460, 18521 SE	RC 108	850p	RM604, RM605, RM606	RC 140	850p
40540 VTS	RC 108	900p	32 CHANNEL	RC 140M	850p
LOEWE			RM613	RC 141	850p
DC11	RC 146	850p	RM632, RM636	RC 160	850p
MATSUI			TATUNG		
010270601	RC 889	850p	FXA	RC 877	850p
VX770	RC 892	850p	RC70	RC 883	750p
METZ			FX70 FASTTEXT	RC 894	850p
JAVA COLOR (6890)	RC 166	850p	TELEFUNKEN		
COLOR (7156)	RC 183	850p	FB632	RC 632 ST	850p
JAVA (7180)	RC 184	850p	FB639	RC 639 ST	850p
MITSUBISHI			THORN/FERGUSON		
939P/03607, 939P/03609	RC 140M	850p	3V35-42	RC 342	850p
NOKIA			3V31-32	RC 344	850p
SATELLITE	RC 550	850p	3V57-58	RC 628	900p
NORDMENDE			TX10 TEXT	RC 732	750p
TC2336	RC 351N	850p	TX10 STEREO TEXT	RC 738	750p
CMC1, TC3519	RC 356	875p	TX9-90-100	RC 740	750p
OCEANIC			3V55, FV11	RC 783	900p
390C9500	RC 339	900p	TX100 FASTTEXT	RC 785	800p
ORION			TX100 STEREO FASTTEXT	RC 789	800p
RC53	RC 892	850p	PROFESSIONAL	RC 790	800p
PANASONIC			TOSHIBA		
EUR51200	RC 200	850p	CT937	RC 950	850p
TC2200	RC 201	850p	CT9117	RC 951	850p
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PHILCO			Controls up to 4 different devices which use infra red remote controls including TV, audio, VCR and satellite. (need original remote control TC program)		
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CONTAINS:

SET OF 7 HEAD & TAPE PATH ALIGNERS	SET OF 8 ALLEN KEYS
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* RCA TYPE BACK TENSION TOOL	* 1.27mm
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* VCR ADJUSTMENT TOOL	* 1.60mm
	* 2.00mm
	* 2.40mm
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3 Reversible Screwdrivers Circlip Pliers
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Order Code: **TOOL10** Price: **3000p**

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315mA	FUSE03	75P	FUSE19	60P
400mA	FUSE04	75P	FUSE20	60P
500mA	FUSE05	75P	FUSE21	60P
630mA	FUSE06	75P	FUSE22	60P
800mA	FUSE07	60P	FUSE23	60P
1A	FUSE08	60P	FUSE24	60P
1.25A	FUSE09	60P	FUSE25	60P
1.6A	FUSE10	60P	FUSE26	60P
2A	FUSE11	50P	FUSE27	60P
2.5A	FUSE12	50P	FUSE28	60P
3.15A	FUSE13	55P	FUSE29	50P
4A	FUSE14	55P	FUSE30	50P
5A	FUSE15	60P	FUSE31	50P
6.3A	FUSE16	60P	FUSE32	50P

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ICPF20	ICPF75	ICPN20	ICPN75
ICPF25	ICPN5	ICPN25	

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Amstrad Original No: 153154
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Also fits: Antitec, Boadstec, Casio, Crown, Fidelity, Goldhead, Granada, Hinari, Marguant, Omega, Protex, Schneider, SEG, Sentra, Siptom, Tashiko, Tatung, Towada, Universum
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	1450	AN5921	2.30	M4915B1	8.50	STK7226	8.00	TD41521	3.50	UPC1470	2.00	Z8882	0.80
	1480A	AN5921	2.99	M4941	1.50	STK7290	4.25	TD41720	4.00	UPC1481	3.00	Z8881	1.40
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Success for the BBC

The government's White Paper on the BBC, entitled "The Future of the BBC – Serving the Nation, Competing Worldwide", comes at the end of a three-year period during which the Corporation has been under detailed scrutiny. From it the BBC has emerged intact and with its traditional purposes underlined. Good. We can rest a while. The wreckers have been shown the door, though the announcement in the House was accompanied by some jeers. A new royal charter will come into effect in 1997 and will run for ten years.

For the vast majority in the UK, the BBC is something that has been there throughout their lives. Yet broadcasting is not that old. Its roots date back to experimental transmissions carried out in early 1920. The British Broadcasting Company was set up in 1922 – with a staff of four! Things had progressed considerably by 1927, when the BBC became a public corporation – its first charter came into effect on January 1st that year. Broadcasting has been with us a mere 72 years, but the BBC has been there from the start.

There have been vast changes since the Twenties of course: massive increases in the bands available for broadcasting and radical changes in the types of service that can be provided. This has led to repeated questioning about the role of the BBC, particularly when the charter has come up for renewal. The BBC is in a difficult position, being funded by the revenue from the broadcasting licence (with increasing contributions from its

commercial activities in recent years). Should the BBC be involved in all aspects of broadcasting and transmission, including research and development? Should it widen its sources of revenue by taking advertising? Should it simply be sold off as something that's outlived its original purpose?

The case for leaving the BBC much as it is rests on its achievements and the role that it has established for itself. Its output may not be to everyone's taste, but its independence has enabled it to set standards that would not otherwise have been achieved. There can be no doubt that we would be very much worse off without it, and now that there is so much competition we need no longer be concerned about its tendency to dictate in matters of taste. We can take it or leave it. The important thing is that it is there. It underpins the whole broadcasting set-up in the UK. Would the ITC be an effective institution if the BBC was not there to show what can and should be achieved?

The case for the BBC's continued involvement in R and D is rather weaker. In the early days this was essential for the development of services. Now that the technology has advanced so far and companies are better able and prepared to invest in broadcasting it's not so evident that the BBC needs to continue in this role. What one can say is that the BBC's considerable success in technological development and setting technical standards does provide a case for its continuing involvement in this aspect of broadcasting. The fact that the ITC has

successfully subcontracted most of its technological work to NTL rather undermines the case for the BBC's continued involvement however. On balance it all depends on costs and what the BBC can come up with.

Costs are of course at the heart of the debate. Unlike the previous government, which didn't seem to be able to understand the purpose of public service broadcasting, the present one has turned its attention to whether the BBC provides value for money in its activities. Fair enough, as the public pays. The BBC has come out of its cost investigation successfully, though it does seem that staff morale has suffered considerably in the process. This is all part of the growing commercialism of the Corporation.

In its White Paper the government gives considerable encouragement to the BBC in developing commercial TV and radio services around the world. The main concern here seems to be that there should be no cross-subsidy between the licence fee and the grant that funds the World Service and the Corporation's commercial activities, both in the UK and world-wide. The Corporation has the expertise and is developing the contacts to be able to make a success of all this. The only cloud on the horizon is the fact that the licence fee will be reviewed, in the light of changing technology and other developments, in the year 2001. Quite a lot could change by then, but there will still be the need for the BBC as a cultural institution. The Corporation should be around for a long time yet.

EDITOR

John A. Reddihough

PRODUCTION EDITOR

Tessa Winford

EDITORIAL OFFICE

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COVER PHOTO

This month's cover photograph shows the Panasonic Z4 Chassis. See article on pages 784-787.

LNB Supply Tester

Ian Rees

An Amstrad SRD400 satellite receiver I was called to see recently suffered from the following fault: the horizontally-polarised channels would occasionally be lost.

Normally I'd expect the cause of this fault to be in the receiver. A lot of red herrings later however the cause became clear. In wet weather rain would seep past the rubber sealing ring and collect in the bottom of the LNB's case. Because of this the LNB would draw a higher current than the receiver could supply. The LNB didn't break down as severely in the vertical mode, continuing to work with these channels. Horizontal operation would be regained during dry spells.

To help with the investigation I built the unit described in this article. It enables me to check both the receiver supply and the LNB's power requirement.

Circuit Description

Fig. 1 shows the circuit diagram. The unit was mainly made from odds and ends available in the workshop. I obtained the F connector sockets from CPC: they came complete with their chassis mounting nuts. They were fitted into a small metal diecast screening box. Chokes Ch1 and Ch2 consist of ten turns of enamelled wire threaded through a standard ferrite bead. Solder them directly to the F connectors, with as short a lead as possible. C1 is soldered between the connectors. Apart from this the layout and wiring can take any form.

Function switch S1 provides alternative powering arrangements. The LNB can be supplied by the receiver in the normal way, or alternatively a separate vertical or horizontal supply can be provided by the unit. In the RX position the mains feed to the internal power supply is switched off – a neon provides indication.

C1 maintains the signal feed from the LNB to the receiver whatever the source of the LNB's supply. The two chokes prevent loss of signal as a result of loading by the test circuitry while maintaining d.c. continuity. Fuse FS1 is included to protect the supply in the event of a short in the coaxial lead.

The forward-biased silicon diodes D1 and D2 provide the voltage lift required to raise the output from the 12V regulator IC1 for LNB operation in the vertical mode. With S1

in the H position these diodes are disconnected and the 5.6V zener diode takes over, increasing the supply for LNB operation in the horizontal mode.

Most recommended circuits for 78 and 79 type regulators show two small 0.1µF capacitors which should be mounted as closely as possible between the regulator's input and output pins and its centre, chassis-connected leg. Omitting them has not caused me any problems, but I suggest that they should be fitted if instability is experienced.

Switch S2 enables meter M to record the supply voltage or check the current via the calibrated shunt resistor RI. If only standard single LNBs are to be checked the meter can be calibrated for a maximum f.s.d. of 200mA: twin type LNBs will need an f.s.d. of 300mA. RV is selected to give an f.s.d. of 20V. RI and RV will need to be calculated in accordance with the meter's sensitivity. A 1mA f.s.d. meter or better is o.k.

LNB Only Test

After checking that the tester provides 13.2V and 17.6V outputs and that the meter is correctly calibrated, connect a known good working LNB to the unit.

With S1 in the V position and S2 in the E position, check that the correct voltage is delivered to the LNB.

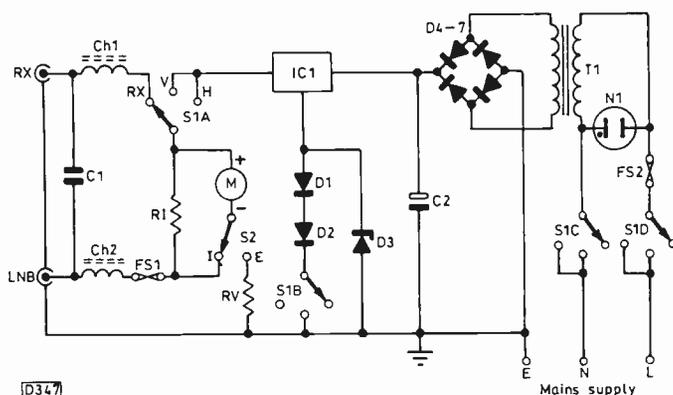
Switch S2 to position I. The meter should produce a reading of not more than 200mA for a single or 300mA for a double LNB (Marconi Solo etc. LNBs generally draw about 120mA).

Set S1 to position H. Although the LNB now receives the higher horizontal mode voltage the current consumption should be the same as in the vertical mode. The horizontal mode voltage supply can be confirmed by setting S2 to position E.

LNB/Receiver Test

Connect the unit to an installed dish, with a fly-lead from socket RX to the receiver.

Turn S1 to position RX and switch on the receiver. Set



0347

Fig. 1: Circuit diagram of the LNB supply tester.

Parts List

C1	4,700pF, 100V mica
C2	1,000µF, 35V electrolytic
RI/RV	See text
D1/D2	1N4148
D3	5.6V, 400mW zener diode
D4-7	Four BY127 diodes or a 1A bridge
IC1	78L12
S1	4-pole, 3-way rotary switch
S2	1-pole, 2-way toggle switch
T1	20V, 500mA transformer
FS1	20mm 500mA quick-blow fuse
FS2	20mm 100mA quick-blow fuse
Ch1/2	See text
M	See text
N1	Neon indicator

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S2 to the E position and step the receiver through its channels. The meter should read between 11.8V and 13.4V in the vertical mode, and between 16.4V and 18V in the horizontal mode. For quick and easy comparison it's useful to have the meter scale marked with acceptance bands. The current drawn (S2 in the I position) should be the same in both modes.

Satellite Finding

When my Satellite Finder's battery fails half way through an installation I find it much better to send power up the line from the tester rather than use the receiver's supply. No more surprise shocks from the coaxial cable, and little damage should the line be shorted accidentally because I've

bent the F connector's inner over while trying to prevent myself falling off the ladder.

That Fault

A final note on the repair that sparked off this project. With the LNB connected to the test unit, hot air was blown on to the front of the LNB's casing. There was an almost immediate drop in the current consumption. When the rivets were removed and the case was opened the tell-tale signs of water corrosion could be seen. The inner screen casting was then unscrewed and the PCB was given a blow with the dryer. This brought the LNB back to life.

The LNB was put back into service after resealing with silicone sealant.

Recharging Dry Cells

Dave Locke

Note that recharging dry cells can be dangerous. Read this article carefully and pay particular attention to the warnings given.

While sorting out the workshop I found that I had a large quantity of AA cells which were all too weak for the kid's personal stereo but could not be regarded as totally dead. As they'd been discarded, I had stashed them away in a box. Most of them read 'low' when checked with a commercial battery tester, indicating that they were next to useless for anything.

As this is an environmentally conscious time, I decided to see if these cells could be 'recycled'. The obvious thing to do would be to recharge them. Some investigation showed that this was possible, the result being the circuit described here.

Most cells have a warning on them stating that they cannot be recharged. Now I'm not saying that this is wrong: if you try to recharge an AA cell using a NiCad or a car

It's best to stick to the 'Leakproof' type of cell from a reputable manufacturer.

The cell must not be too flat to start with. One that has a terminal voltage of less than 1.35V will not recharge very well. Thus it's important that you select cells before they are completely exhausted. A cell with a terminal voltage between about 1.35V and 1.4V will recover well and should make a full charge to its original capacity. A cell with a low terminal voltage, say 1.2V, will recover only in part and will not reach full capacity.

Principles

Slowly does it! The process of charging a dry cell must be carried out over a long period of time at a very slow charge rate. You can forget the twenty-five minute 'zap' charge.

A cell with a terminal voltage of about 1.4V will take about five hours to reach full charge. Having tried recharging cells from a variety of sources, I've found that cells from different manufacturers recharge at different rates. Cheap, non-leakproof types seem to be the fastest to take a charge, but then have a short shelf life. The more expensive cells from better known (and recognisable!) manufacturers seem to take longer but will retain the new charge to give a longer shelf life.

Circuit Operation

The basic circuit used for the recharging is shown in Fig. 1. It will recharge an AA cell in about five hours at a charging current of 50mA. There's no protection against overcharging or overloading. The circuit will work, but could be dangerous in use if you forgot to monitor it at regular intervals.

To get around this what's needed is a timer circuit that will run for up to about nine hours, and some sort of over-load protection so that the cell doesn't draw excessive current.

In the original prototype the timer I used was a mechanical central-heating switch that happened to be lying around in the junk box. The circuit shown in Fig. 2 uses a timer chip and a relay. It provides a timed period of some three to nine hours, selected by the rotary switch S3. The ZN1034 timer i.c. is versatile and can provide accurate delays over

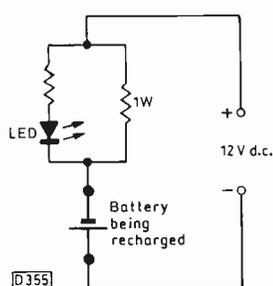


Fig. 1: The basic charging circuit.

battery charger you are asking for trouble! If the charge is done very slowly however, so that the cell does not gas or overheat, most cells will recover their charge – and the charger, the user and the cell will be none the worse for the experience. Most of the cells I had were AA ones, but the circuit presented here will charge both AA and C types (given the right type of holder).

Selecting Suitable Cells

Cell selection is important. Some of the cheaper types of cell may leak or overheat while being recharged. This could result in damage to the charger and, much worse, the user!

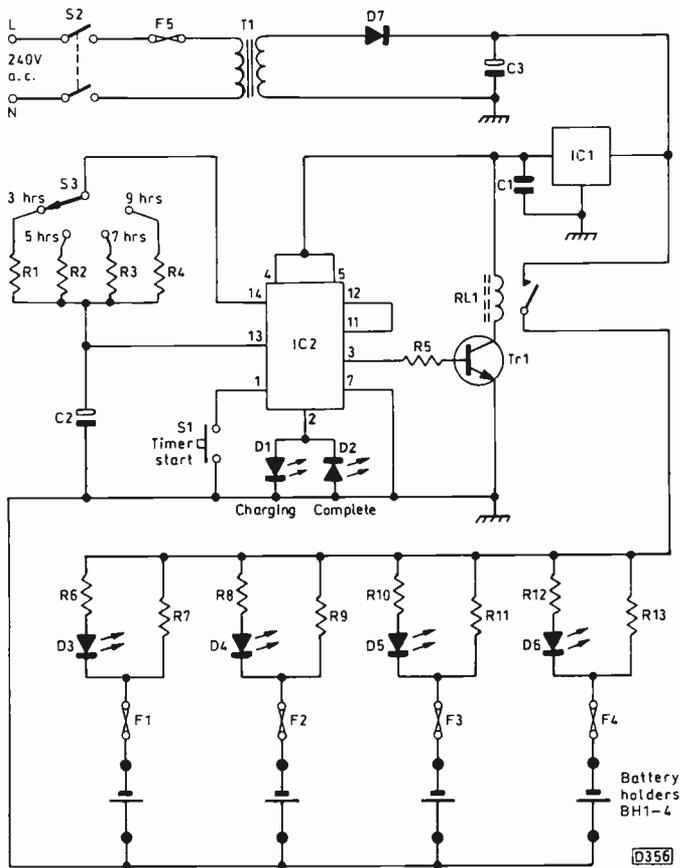


Fig. 2: Complete circuit of the charger.

long periods. I found that the optimum time is five hours for an AA cell, nine hours for a C cell.

The timer is started by pressing switch S1. The charging LED will then light, transistor Tr1 will operate the relay and power will be connected to the cells to be recharged. When the selected time period has elapsed, the relay will release and the completed LED will light, indicating the end of the cycle.

To protect the unit and the user a 100mA fuse is included in series with each cell being recharged. Should something untoward occur the fuse will blow, disconnecting the cell.

I originally used my bench power supply, which produces a smooth, stabilised output, as the power source, thinking that this would give the best results. But on trying the system out I found that several cells seemed to 'stick' at a terminal voltage just below 1.5V, refusing to go any further. This did not happen when the supply had some ripple, so a simple half-wave power supply (T1, D7, C3) was built and attached. As a result the number of cells that refused to budge was reduced to about one in ten. Some still refused to respond, but I feel that this is acceptable when you consider that the cells would otherwise have been thrown away.

Construction

I haven't suggested a case for the unit since this will depend on the user's requirements – and what's available! I housed the circuit, with the power supply, in a plastic box that measured 6 x 4 x 2 in., with the LEDs mounted through the lid. The four battery holders were mounted on the top of the lid, the wires being taken down through small holes. If you use a metal case it must be earthed for safety.

The ZN1034 timer chip is available from Maplin and

Electromail. Any other parts required should be available from these sources.

In Conclusion

The cells I've experimented with have all responded well. A cyclic life of about five-eight hours appears to be about the norm.

Do remember that charging dry cells can be dangerous.

Test your charger carefully before you commit it to a five-hour run. Make sure that each cell is in fact drawing about 50mA. An open-circuit or very flat cell will not light the LED in the relevant position. Such a cell cannot be recharged and should be discarded.

Components list

Resistors:

R1	39k Ω	R8	1k Ω
R2	68k Ω	R9	220 Ω 1W
R3	92k Ω	R10	1k Ω
R4	120k Ω	R11	220 Ω 1W
R5	470 Ω	R12	1k Ω
R6	1k Ω	R13	220 Ω 1W
R7	220 Ω 1W All 0.25W unless otherwise stated.		

Capacitors:

C1	0.1 μ F	C2	100 μ F 16V
C3	1,000 μ F 40V		

Semiconductor devices:

D1, D3-6	General-purpose red LEDs
D2	General-purpose green LED
D7	1N40C1
IC1	7812 voltage regulator chip
IC2	ZN1034 timer chip
TR1	BC108

Switches:

S1	Push-to-make switch
S2	DPST mains on/off switch
S3	One-pole, four-way rotary switch

Miscellaneous:

T1	6VA mains transformer with 0-12V secondary winding
RL1	SPST relay, 12V d.c. working voltage
BH1-4	AA battery holders
F1-4	100mA fuses
F5	500mA fuse
Fuseholders to suit fuses. Case.	

S CONNECTOR

The S-video socket is increasingly found on TV sets and VCRs where provision is made for separate luminance (Y) and chroma signal feeds. Fig. 1 shows the pin configuration.



Fig. 1: S socket pin arrangement, viewed from the front. Pin 1 Y earth, pin 2 C earth, pin 3 Y signal, pin 4 chroma signal.

VCR Clinic

Reports from Graham Richards, Mike Leach, Terry Lamoon, Andrew J. Finn, Steve Cannon, Keith Evans, Chris Avis, Chris Watton Michael Dranfield and John Edwards

Amstrad VCR8800 (4 x 8 Nicam)

"Nothing" was the complaint. And that was all it did! The machine was dead because the 5V regulator IC651 had gone open-circuit. A replacement restored normal operation. **G.R.**

Akai VSF200

The customer thought that this machine was faulty. In fact it was in the child-lock mode. Nothing then works, with just 'L' showing in the display. Press the handset's play button for ten seconds to return to normal operation. **G.R.**

Panasonic NVG21

This machine had come into the workshop on several occasions, each time with a report of a different, niggly fault, none of which were ever really cured. Very rarely could we get the machine to show one of these faults. This time the complaint was of no playback colour and lines on the screen. We confirmed that there was no playback colour and found that the drum speed was varying slightly, as a result of which the picture shifted a little on the screen. The cause was easily found with the aid of a hairdryer and freezer: C23 (1,000µF, 10V) in the power supply was leaky. Replacing this cured the latest problem and all the other ones that plagued the customer seem to have gone away. **M.L.**

Pioneer VR727/Philips VR6870

This machine had given trouble for some months. The first complaints were of intermittent functions and going into play and rewind by itself. On that occasion we were unable to find anything wrong, and after a long soak test returned the machine to its owner. It came back the following day with the complaint of no results at all. We switched it on and after half an hour it sprang to life and carried on working. So we replaced various components in the start-up circuit and returned it, once more with a nominal charge. It was recently back with the same complaint.

This time there was a tape in the machine, in the stop position. So we plugged in and waited. As the machine sprang to life half an hour later it started to do some strange things. The clock display came on first, then the carriage tried to lift the tape about an inch or so then plonked it down again. It did this several times before going into rewind by itself. Then it was all right for the rest of the day.

We switched it off for a few days and pretended that it wasn't there, like you do. Unfortunately it didn't go away. The next time I switched it on I monitored all the supply lines. Except for the 6V and 5.1V supplies they were all correct. The 6V supply was low at 4.2V while the 5.1V supply was down at 4V. A look at the circuit diagram showed that three 680µF capacitors smooth the input to the BD434 transistor Q7008. They had dried up. Replacements rated at 25V rather than 16V were fitted. After this the machine worked perfectly. **M.L.**

Amstrad UF20

When a cassette was loaded this machine would power down with the display flashing erratically. Checks on the

supplies showed that the voltage on the 12V rail was low. The cause of the trouble was the 12V regulator IC01 which was breaking down. A replacement restored normal operation. **T.L.**

JVC HRJ205

The customer said that when he inserted a tape and pushed play the machine would stop working and the display would "go peculiar and disappear". I'd seen this one before and went straight to the ICP fuse in the power supply. Sure enough it was open-circuit, a replacement restoring normal operation. This is becoming a common fault. When I phoned JVC Technical for advice I was told that the cause is being looked into. Until they come up with something, keep a good supply of these ICPs handy in your kit. **T.L.**

Hitachi VTM770

There was a tape jammed inside this machine. When switched on it powered down within seconds. Investigation showed that the 1.6AT fuse had blown. When this had been replaced and the tape had been wound out manually the machine remained on. A cassette was then loaded, but it was noisy and sluggish because the capstan was stiff. When the shaft had been cleaned and lubricated the machine was as smooth as silk. **T.L.**

ITT Nokia VR5720

These machines tend to suffer from a very poorly lit display. The cure is to replace C447 (47µF, 6.3V) on the main board. It needs to go down by only 9µF to cause the problem. **A.J.F.**

Sharp VC8581H

This may sound silly but it caught one of us out. The machine would accept and eject a cassette but there were no deck functions. Although the lights on the front panel lit up correctly for the operation selected nothing else happened. The cause of the trouble was the small 2.5A fuse protector IP901 in the power supply – not the wrongly diagnosed microcontroller chip! **A.J.F.**

Mitsubishi HSM16

"Warble on music" it said on the ticket. Sure enough this was the case. A look around the servo section showed that one leg of the 1µF capacitor C4D3 had failed to pass through its hole and was bent back on itself. This had obviously missed quality control. **A.J.F.**

Logic VR950/Samsung VI611

This machine worked well for about a quarter of an hour. The drum would then speed up and nearly take off! The capstan motor would run flat out and the machine would shut down. As both motors were affected we decided to check the power supply. In the fault condition pin 6 of plug

F02 (5V output to the servo) was at 2.4V. When this pin was removed the voltage returned to 5V. As there were no shorts across this supply a 6V battery was connected. This restored normal operation, so the 2SC1008 5V regulator transistor Q5 was replaced. After a long soak test the machine was returned to its owner. **A.J.F.**

Philips VR6462

This machine appeared to be dead, with no clock display or deck functions. But the customer had noticed that it worked perfectly with remote control. A new TMS1934 clock display/function chip on the front panel put matters right. **A.J.F.**

Sanyo VHR135E

"No operation" it said on the ticket. Although the drum was stationary, all the lines to the motor said go. A replacement stator winding board from Chas Hyde got the drum going. But although the machine laced up it wouldn't play and there was no rewind/fast forward. Checks were made around the microcontroller chip but there was nothing obviously wrong. Stalling the head motor failed to shut the machine down however. The conditions at pin 85 of the chip appeared to change with the head stalling, but the chip did nothing about it. So we changed the micro (a one inch square surface-mounted device with 94 pins).

Although the machine now played, the pictures were virtually non-existent. We checked the whole head amplifier and changed the chip. Hair pulling started! Then it suddenly dawned: the heads were mistracking by 180°. As the head rotor had been replaced, we turned the rotor magnet by 180° and refitted it. Success at last! **A.J.F.**

Sony SLV425

This machine would sometimes fail to power up and play correctly. If the power switch was pressed when the fault was present the fluorescent display would light, giving the impression that the machine was powered up, but the power LED would remain red rather than glowing green.

The green power LED is controlled by the +5VF line, which comes up only when the +12VF line is active. This line is controlled by T108, CT110, CIC130 and the syscon chip CIC200. Basically, when the +12VF line goes high this feeds to the power supply and brings up the +5VF line which powers the rest of the machine. T108 and CT110 are controlled by pin 7 of CIC130: the conditions at this pin didn't alter when the power switch was pressed. A check was then made on the inputs to this chip from CIC200. These did seem to alter when the power switch was pressed. As CIC130's supply and chassis lines were intact, we found and fitted a replacement. It's a surface-mounted chip, and care has to be taken as there are quite a few surrounding components – hot-air soldering guns are becoming essential for successfully and safely removing such devices. With the new chip fitted the machine worked perfectly. After spending the afternoon on test, it was pronounced fit. **S.C.**

Samsung VI710

We had two of these machines in the workshop recently. The first one wouldn't work in the record mode. Investigation showed that the REC 9V supply to the preamplifier on the luminance/chrominance panel (at the top) was missing. The reason for this was that diode DO305 at the front left of this panel was open-circuit.

The second machine displayed all the symptoms of a defective video head, but fitting a replacement made no difference. It was beginning to look as though the lower drum may have been the culprit – until we learnt about the machine's history. It had spent a lengthy period at another workshop and had eventually been retrieved by its disgruntled owner who had brought it to us for assessment. We put off changing the lower drum and concentrated on the head amplifier module. When we unplugged the unit to check the rotary transformer connections and continuity we soon realised that the module could easily be reconnected in the wrong position. A sigh of relief was breathed when this proved to be the case. After a clean and service, the machine was returned to its grateful owner. **K.E.**

Sharp VC582

The complaint with this elderly machine was that it wouldn't play tapes. When a blank test cassette was inserted we saw that the capstan didn't rotate. After eliminating the motor we turned our attention to the servo and motor drive amplifier section. As the voltages around the motor polarity switching chip IC701 didn't look right we fitted a replacement. It sits on the main PCB, under the deck mechanism, so it's not easy to get at. Lifting the deck is probably better than trying to hinge up the main PCB.

Fortunately the replacement restored capstan rotation, but we then found that there was hum on playback and the recorded sound and picture – the E-E signal didn't seem to be affected. Checks in the power supply showed that the 15V feed to the 9V regulator was low at 11V. A replacement reservoir capacitor (2,200µF) produced only a marginal improvement, so resistance checks were carried out on the bridge rectifier diodes (be warned – they are buried beneath the mains transformer). They appeared to be normal but as the transformer's secondary winding provides about 12V a.c. we decided to replace them anyway. This provided a complete cure, restoring all voltages to the correct levels. **K.E.**

JVC HRD620

Playback suffered from four equally-spaced horizontal noise bars, and there was poor or no sound. Having had this problem with several of these machines recently we checked the tape wrap alignment around the drum. Sure enough the tape was sitting high near the exit slant post, indicating that the guide roller had moved. The small locking grub screws beneath the guide posts tend to work loose. Then each tape loading turns the roller minutely out of alignment. Adjustment of the roller and tightening the grub screw did the trick. It's worth checking both the entry and exit roller screws. **K.E.**

Ferguson FV42L

This machine seemed to be dead but was all right when the top cover was removed. All then seemed to be well – until our trusty PCB whacking tool was brought to bear on the main board. We soon established that the regulated 5V supply would go missing. This comes from TT64 (BD435), which is fed with a 7V supply. TT64's three legs were all dry-jointed. **K.E.**

NEC N9120K

If the drum motor runs very slowly during play and the capstan motor 'chugs' lazily, check the 4.43MHz subcarrier

signal at pin 1 of the servo chip IC601 – its amplitude should be 3-4V p-p. If it's present, replace IC601. If it's missing, replace crystal X1401 adjacent to the chroma chip IC1401. The correct crystal, part no. 64004143 from SEME, must be used. A standard 4-43MHz crystal will oscillate but there will be no colour. C.A.

Samsung SI1240

The owner complained that recording was very intermittent – just the fault for Monday morning! Fortunately he supplied a sample tape, which showed an apparent loss of signal rather than recording. The suspect tuner was eventually persuaded to go intermittent in the E-E mode by being tapped. So we removed it and wired it back to the PCB temporarily for easier access and checking. The cause of the fault was then found to be a hairline crack around one of the SAWF's pins in the tuner/i.f. section. C.A.

Hitachi VTM822

The rewind action was very poor because the rewind gear actuating slide didn't travel far enough to engage with the gear correctly. It took us a while to discover that the mecha-state switch was responsible for this. Although this would be an easy part to remove and replace, it's supplied only as part of the whole 'loading block assembly'. Good old Hitachi! C.A.

Panasonic NVG12

When this machine was brought in the loading arms were out. Then it unloaded, leaving the supply reel turning slowly – all this with no cassette inserted. Replacing the deck mode-control switch restored normal operation. C.W.

Amstrad VCR6100

When eject was requested a small loop of tape was left outside the cassette. This caught on the lift and broke. Tape reclaim works in two ways in these decks. From the play to the stop mode the tape is drawn back into the cassette by reverse rotation of the supply reel turntable, driven by the rewind drive gear assembly. The drive for the final reclaim is at the take-up reel, operated by the half-loading wind gear. If this is either loose or sticks on the pillar the tape won't be drawn back in: it turns only about twice, and unless it engages instantly a small amount of tape is left hanging out of the cassette. The item to replace is no. 613 in the service manual. C.W.

Akai VS2

There was loss of both the E-E and playback pictures. The on-screen display was working however and the sound was o.k. The cause of the loss was the 2SC536 transistor TR15, which had a collector-to-emitter short-circuit. A BC547 with its legs crossed makes a suitable replacement. C.W.

JVC HRD720

This machine was dead with a fully-loaded tape inside. There was no clock display, no nothing, though there were outputs from the power supply. We didn't have the manual, but did find one for the Ferguson FV45X which seems to have the same power supply. Armed with this we soon found that the unswitched 12V supply was missing because circuit protector CP2 (N20) was open-circuit. A meter check

showed that the maximum current being drawn was 400mA. A replacement CP cured the fault. M.Dr.

Samsung SI3240/3260

This machine would load a tape but when play was selected it would unlatch, leaving the tape hanging out of the cassette. Fast forward and rewind were o.k. however. Very low capstan motor torque was the cause of the trouble. The torque control circuit consists of Q102, D108, D109 and D110. In the play mode power is fed to the motor via the three diodes. In the fast forward and rewind modes the three diodes are switched out by Q102. The cause of the trouble was D109, which introduced a voltage drop of about 4V though it tested o.k. on an ohmmeter. All three diodes are type 1N4001, and I suspect that they came from the same bad batch that affects Models SI1240/1260. Replace all three to avoid comebacks. M.Dr.

GoldStar GSE1290IQ

The customer complained about a poor playback picture and tape chewing. We replaced the pinch roller and arm assembly and gave the deck a good clean/service. After a soak test the machine was returned to its owner. A couple of days later it came back, again because the playback picture was poor. After several tries at loading and unloading we found that the back-tension arm sometimes stopped before it reached the play position. As it is mechanically linked to the main cam we decided to replace the mode switch. This cured the fault for good. M.Dr.

Philips VR201

This machine wouldn't erase the previous sound when a new recording was made. A check on the BC337 erase bias oscillator transistor Tr7252 showed that it had base-collector leakage, a replacement curing the fault. J.E.

Aiwa G700GPS

This model uses the same deck as the Amstrad VCR4600. The one we had would accept a cassette but nothing else worked because the belt between the capstan motor and the intermediate idler had fallen off. A new belt kit cured that, but while the machine was on test it began to crinkle the tape. So in went the modified clutch/pinch roller kit. When the machine was put back on test there was a reasonable playback picture for about half an hour after which the colour suddenly flickered on and off a few times then disappeared. I didn't panic, honest! Memory took over: the colour was restored when I'd resoldered all the pins of the chroma module HCI201. Unfortunately the customer had been quoted for only a belt. Oh well, what's new!? J.E.

Hitachi VT33

The complaint with this machine was that it wouldn't eject a tape – there was a cassette in the machine to prove the point. No matter what mode the machine was in, pressing the eject button wouldn't release the cassette. In fact pressing the button would sometimes change the function, for example if the machine was in the play mode pressing eject might put it into the fast forward or some other mode. Usually however pressing the button had no effect at all. The cause of the trouble was the eject switch itself. It measured all right out of circuit when checked with an ohmmeter, but a replacement from a scrap machine cured the fault. J.E.

Test Case 381

It was a stormy night. Sage tossed and turned in his bed, unable to sleep because of the humidity, the sporadic bangs and rumbles, and the brilliant lightning that lit up the curtained room every few minutes. Tomorrow will be a busy day at the workshop he mused.

Sure enough next day was chaotic. The phone hardly stopped ringing all morning. By nine thirty every available set of wheels and pair of hands was on the road with a bunch of calls. Even Service Manager was afield, with a hastily improvised service kit in the boot of his posh car. Some of the breakdowns could be cured by replacing the mains fuse or resetting a microcontroller chip, but at the end of the day the in bench was overflowing with electrocuted tellies and VCRs.

One, a Samsung VCR, was as dead as a stone. It found its way to Roger's hastily rigged-up bench - he had been drafted in to help cope with the work overload. Quite undaunted by the fact that he'd never been in a Samsung VCR before, he got the service manual and set to work. It soon became clear that this machine was in deep trouble. After replacing its shattered fuse and carrying out sundry repairs in the power supply, Roger found that there was still no response from the controls while the display panel failed to light up. Tests proved that the microcomputer control chip had gone to sleep forever. Amazingly, there was a new one in the stores. When he went to fit it Roger found that his soldering iron was stone cold, the primary winding of its mains transformer being open-circuit. More storm damage? Service Manager unearthed an iron from the depths of his

office: when a mains plug had been fitted, and its tip had been filed down to form a point small enough to deal with the chip's pins, it was pressed into service.

The new chip was soon installed - up and running too. It was certainly functioning because there was now a crystal heartbeat and a display on the fluorescent panel. But what was this? At switch on the head drum turned and the supply spool rotated backwards, with no cassette inserted and the deck mechanism in the eject position. Roger decided to check that the deck sensors were producing the right messages: they were. Guided by the manual, he then checked the conditions at the chip's output ports. These were incorrect, hence the strange symptoms produced by the mechanics. Puzzled by this, our hired help checked that the new chip received a reset pulse at switch on, that its clock oscillator was working at the right frequency, and that its d.c. supply was correct and free of hash and ripple. As these conditions were all correct, Roger ordered another microcontroller chip. He should have ordered a new transformer for the bench soldering iron as well, but that could wait.

The new chip didn't take long to arrive. Now experienced at removing and replacing this device in the Samsung machine, Roger had it installed within minutes. This time all was well - except that the machine shut down after about twenty minutes while being soak tested! It was reset and told to play again, but the wretched thing turned itself off once more - this time after five minutes. . .

Exhaustive testing indicated that the new microcontroller chip was responsible. Could a faulty one have been sent? It was returned for replacement under guarantee, and a new one was supplied free of charge - but in fact this was an unwitting fraud! Why? The solution will be found on page 811.

RECESSION - RECESSION - TIRES - TIRES

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NV2000	VXP 0331: PLAY
NV2000	VXP 0329: FF/REW
NV7000	VXP 0344: FF/REW
NV7000	VXP 0343: PLAY
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NV8600	VXP 0243: PLAY

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Teletopics

CHANNEL 5

The saga of Channel 5 continues with the government's announcement of compromise proposals. These would allow Channel 5 analogue TV transmissions to go ahead on ch. 37, with ch. 35 reserved for the launch of four digital TV services. Limiting Channel 5's analogue transmissions to ch. 37 would reduce its potential coverage from 74 per cent of the population to around 50 per cent. Unless other frequencies were found, which would involve international agreement, substantial areas that would have had a Channel 5 service under the previous plan would be deprived of it. These areas include Lancashire/Cheshire, most of Ulster, much of Scotland, the South West, parts of the Midlands and Home Counties and the Southampton/Portsmouth area. The ITC is considering whether the plan forms a "basis on which it can proceed to readvertise the licence and, if so, when and on what terms". Channel 5 would be given one of the digital channels for simulcasting, giving it coverage of 95 per cent of the country in digital terms.

BROADCAST NEWS

The European Union has officially terminated development of an analogue HDTV system. Instead, ministers have approved the start of a new research programme to agree upon a digital TV standard. The Eureka 1187 Advanced Digital Television Technologies (ADTT) project is expected to run for two and a half years and is being funded with a 250m ECU grant (around £190m). It will cover production, transmission, reception and display equipment. A prototype HDTV system based on specifications devised by the European Digital Video Broadcasting (DVB) group will be developed, tested and demonstrated. Members of Eureka 1187 include Philips, Thomson and Nokia.

The BBC is working on a technical specification for terrestrial digital TV and plans to introduce such services by the autumn of 1997. The government's White Paper on the BBC (see leader) gives the go-ahead for the start of experimental transmissions next year.

The BBC and ITV began a four-

month trial of the Audetel system in July. It uses a digital signal to provide a spoken commentary on what appears on the screen, to help blind people to follow programmes. About three hours of 'described programmes' a week will be broadcast during the trial period. Spare capacity in either the Nicam or teletext signal can be used for the purpose – the tests are making use of the teletext system. A special decoder is required to make the commentary available. Audetel has been developed by a number of companies and organisations including the BBC, the ITC, the ITV Association, Motorola and the RNIB.

DISPLAY TECHNOLOGY

Sharp has produced a prototype 21in. TFT (thin-film transistor controlled) colour liquid-crystal display panel. Until now the largest such display panel, also developed by Sharp, was a 17in. one produced in 1992. The new panel increases the prospects for the use of this type of display in TV sets. Sharp claims to have overcome some of the main technical problems that had previously prevented the production of very large TFT LCDs but has not suggested when commercial displays might become available or at what cost. Key technical features of the display include the use of new electrode materials that give it a response rate as fast as that of smaller devices while producing high-contrast images; the interposition of a new film material between the TFT source and drain electrodes and the amorphous silicon substrate, enabling the transistors to operate at high on/off current ratios; and the use of new techniques that produce a uniform liquid-crystal film over a large surface area. To drive it Sharp has developed a 240W, high-speed digital source driver that uses a new grey-scale drive system. This operates with a single 5V supply.

Sony is developing a large flat-panel display device but is unwilling to say more than that it uses "non-standard technology". A company official said that a commercial version of the display is expected to be available next year.

BUSINESS/TRADE NEWS

Korean manufacturers Samsung and GoldStar are both increasing their UK

production capacity. Samsung is to invest £11m over the next three years at its Billingham, Teeside TV manufacturing plant. Production capacity will be increased to a million sets a year. GoldStar is to invest £26m in building a new factory for the production of colour TV sets and microwave ovens at Washington, Tyne and Wear. The plant should be operational within a year, and by 1999 should be producing 580,000 colour TV sets and 600,000 microwave ovens annually. The company's microwave oven plant at Jarrow, set up in 1989, will be transferred to the new site. Both developments will receive Regional Selective Assistance from the Department of Trade and Industry (£2m and £4m respectively).

If you come across Minoka brand sets and wonder about their origin, they are produced at the Luks plant at Cumbernauld, Scotland. Some have been sold through Makro stores and use a chassis also found in Akura sets.

Nokia is to cease production of picture tubes. Its Esslington plant will be closed at the end of the year.

Following its merger with Electrue, HRS Electronics Ltd. has moved to Electron House, 100 Great Barr Street, Birmingham B9 4BB. Orders/enquiries phone 021 766 6668, customer accounts 021 766 2205. Fax 021 766 2219.

DISH INSTALLATIONS

Research carried out by marketing services group GfK indicates that 2.632m UK households had satellite TV installations at the end of May. Growth has slowed down since September 1993, when most of BSkyB's channels became available on subscription only. GfK's research also reveals that there is considerable 'churn' in dish ownership – each year around ten per cent of dish owners return or stop using their dishes.

CONFERENCES AND EXHIBITIONS

The BATC's annual Convention on Amateur Television (CAT 94) is being held at Shuttleworth College, Old Warden, near Biggleswade, Bedfordshire on September 10-11th. The theme of the Convention will be very much the future of Amateur Television. For further details phone 0522 703 348 or write to Paul Marshall, G8MJW, BATC CAT 94 Organiser, Fern House, Church Road, Harby, Newark, Notts NG23 7ED.

Our sister magazine ERT is to host a London, Olympia brown goods trade show at the end of March or the beginning of April next year. Further details next month.

Live 94, the consumer electronics show, is being held at Earls Court, London on September 20-25th.

MULTISTANDARD EQUIPMENT

GoldStar has introduced a 28in. multi-standard receiver with Nicam, Model CF28C22F, at a suggested price of £580. It can receive five PAL standards, SECAM and NTSC and has scart, S-video and Hi-8 sockets. Features include a 60-channel memory, Fastext and on-screen displays.

Grundig's GV469M VCR, at a suggested price of £630, can record and play back nearly all TV systems in use - PAL, MESECAM, SECAM L and NTSC. It's a six-head, Nicam hi-fi model with a host of features including high-speed drive for fast rewind.

PCTVs

Two computer companies have developed models that can display live TV broadcasts. Packard Bell's Spectra range of Multimedia 486 PCs, launched in the USA earlier this year and due for release in the UK around November, include a built-in monitor and CD-ROM drive with optional radio, TV, stereo and a fax/telephone answering machine. Prices are expected to range from £850 to £2,500. Apple Computer has announced the Macintosh 630 series with optional TV tuner and tele-

text decoder. Models will be launched later this year, a TV-equipped machine costing around £2,000.

CD-i NEWS

Philips has launched two low-cost CD-i players in the USA, aimed at users in the 16-21 age group. Both are top-loading models and come with bundled software. The CD-i450 is priced at \$300 (about £200) while the CD-i550, which includes a digital video cartridge, is priced at \$500 (about £333). The 450 is to be launched in the UK later this year, probably at around £300. Philips also plans to launch a CD-i mini hi-fi system, a CD-i/TV combi and a seven-disc CD-i changer.

GoldStar plans to launch two CD-i players internationally later this year. There are also plans for a CD-i PC card.

CES & VIDEO GAMES

For twenty five years there has been a summer Consumer Electronics Show (CES) at Chicago. It has seen the launch of many new developments and products, but this year's was the last and was dominated by multimedia and video games displays. Next year there will be the traditional winter CES at Las Vegas followed by CES Interactive at Philadelphia in May.

What about the games then? Virtual reality in the home came a step closer with the introduction of the Forte Technologies VFX1 headset, which is to be launched internationally in October at around \$900/£600. It has independently focusable lenses for each eye, a help to those of us who wear glasses, and

weighs less than 2lb. In use the headset measures the user's head movements in all three planes to calculate where you are looking.

Nintendo provided details of its 64-bit Ultra 64 video games system, previously called Project Reality. While most new games systems use a CD for storage, Ultra 64 will stick with a solid-state memory cartridge which the company points out has a hundred times faster access time than a disc. The cartridge stores images as three-dimensional models which are manipulated in position and perspective to suit the game situation. In contrast CD-based systems store pre-processed animation which is retrieved as required. Ultra 64 is expected to be launched in the USA as an arcade system this autumn, with a domestic version that has identical games and graphics becoming available at "under \$250" a year later. Prototypes were demonstrated. Nintendo also showed upgraded technology for its current games systems.

CORRECTION

A transcription error occurred in the Astra 1D article last month. Use of a block converter as mentioned in the second paragraph, right-hand column on page 710 should have said that the band 700-950MHz (not 700-1,800MHz) is moved to the 1,800-2,050MHz spectrum. The reference to i.f. characteristics under the heading Basics was perhaps less than clear: narrowband receivers have a 950-1,750MHz i.f. bandwidth, wideband receivers a 700-1,750MHz or 950-2,050MHz i.f. bandwidth.

Books

Newnes Guide to Satellite TV by Derek J. Stephenson, B.A., I.Eng., 3rd Edition, published by Butterworth-Heinemann Ltd. at £18.95.

The new edition of this book has been substantially revised and updated. With two new chapters and extra appendices, it's significantly larger (372 pages). One of the new chapters is devoted to digital TV. This excellent addition goes into the subject in some detail, explaining all one really needs to know about the techniques involved. The other new chapter covers satellite i.f. distribu-

tion. As elsewhere in the book, there's a wealth of practical information and guidance. The link budget chapter has been completely rewritten. It now includes a far more detailed calculation method that allows for operational losses and digital extensions.

The main aim of the Guide is to provide the knowledge required to specify, install and maintain reliably both fixed and polar-mount dish systems and small i.f. distribution systems for blocks of flats and hotels. In this it succeeds admirably. If you want to get involved with satellite TV you couldn't do better than invest in a copy of the book. It can be ordered from Reed Book Services Ltd., PO Box 5, Rushden NN10 9YX. **J.A.R.**

Hands-On Guide to Oscilloscopes by Barry Ross, published by McGraw-Hill at £17.95.

If oscilloscopes confuse you, this book will make everything plain and straightforward. It's an essentially practical guide, as the title implies, starting at the simplest level - how a signal waveform is displayed - then going on to describe the various types of oscilloscopes and what you can do with them. Its coverage is up-to-date, including digital storage, sampling systems, cursor measurements and computer interfacing. The author has spent over thirty years in the oscilloscope industry, first as a design engineer and now as a technical manager for Hameg Instruments (UK). **J.A.R.**

The Panasonic Z4 Chassis

Part 1

Ray Meadows

Back in 1991, at a time when most setmakers were introducing spartan, low-cost chassis for their smaller-screen models, Panasonic introduced the Z4 chassis. It was designed to form the basis of a range of high-quality, feature-rich smaller-screen models, complementing Panasonic's then current Alpha 3 large-screen chassis. Indeed the Z4's modular construction makes it look like a miniature Alpha 3.

Basic Features

The chassis has some interesting features for a small-screen TV. These include a fifty-position programme memory, front-mounted composite AV input, a rear-mounted scart connector with RGB inputs, extensive on-screen displays that include a calendar, calculator and 'mood light', and a 'top-dome' speaker. From the technical viewpoint the chassis uses modular construction, with mainly Japanese, non-I2C bus devices and an isolated, synchronised power supply. The 15in. models are fitted with a Philips invar-mask FS tube; 21in. models have 90° iron-mask tubes from either Philips, Panasonic or Toshiba.

The first models to appear were the TC15M1R and the TC21M1R. Both have all-plastic cabinets with textured paint finishes. The smaller set was available in a black, grey or white finish. It had a very attractive appearance with its monitor styling. The larger set has a similar appearance but is larger and doesn't have the hand-lift recesses. There were also versions with teletext, the models numbers being TX15M1T and TX21M1T. These also have rear-mounted S-video input sockets.

When the sets first appeared the on-screen displays (calculator etc.) came in for some criticism as being costly and unnecessary. In fact however from the hardware point of view the displays cost nothing to add as they simply use up spare capacity in the main microcontroller chip's ROM, while the selectable colour-screen 'mood light' provides a handy workshop purity test pattern.

The features and styling should have made these models more popular than they were. But alas they appeared at a time when the main demand was for 'cheap and cheerful'

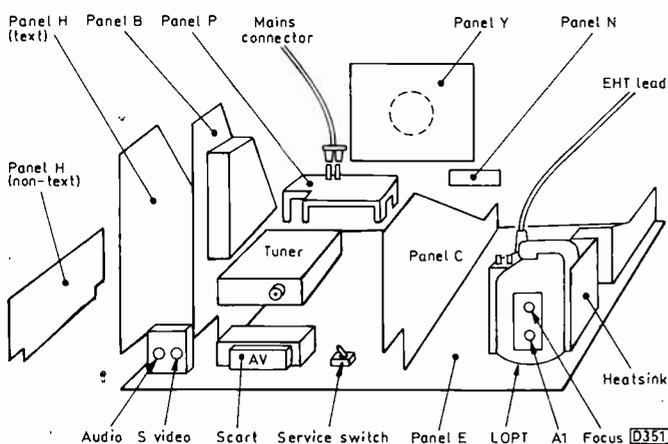


Fig. 1: Rear view of the Panasonic Z4 chassis.

sets. Subsequently various cost-cutting features were introduced: an iron-mask tube was used in 15in. models, there were various circuit changes and a matte (more hard-wearing) paint finish was adopted. These economies are used in the more recent M2 versions.

The chassis has performed well from the reliability point of view, though there have been a few problems with the field sync and the e.h.t. regulation – and of course the usual Panasonic small-capacitor problems. The modular construction makes the sets easy to service however.

Dismantling the Set

The complete cabinet back, including the top-dome speaker, must be removed to gain access to the chassis. This is easily accomplished by removing five screws – two near the top of the cabinet, two near the bottom and one near the aerial socket. It's not necessary to remove the two most obvious screws, those above the rating plate: these provide access only to the speaker.

Don't forget to disconnect the speaker lead when the back cover is withdrawn. If you intend to take the chassis right out you also have to remove the connector from the remote control receiver (panel N) which is mounted inside the cabinet front. There is one more screw to be released. It's fitted in the recess above the front-mounted AV connectors. The chassis can now be withdrawn. Take care when removing the tube's anode cap: I've inadvertently broken the spring clip in at least one of them – it's not as strong as you might expect.

As usual with Panasonic chassis, panel E forms the main part of the chassis. The signals and option panels plug into it. To improve access, a service cable kit (part no. TZS1EM001) is available from Panasonic UK. It enables the set to operate normally with the B, C or H panel removed.

Once the chassis has been removed the main panels can be easily identified, see Fig. 1. Their functions are as follows:

Panel E: Power supply, line and field output stages, RGB switch, main microcontroller chip, audio amplifier, front AV input, rear scart input, user controls.

Panel B: Tuner, vision and sound i.f. sections.

Panel C: Video processing and timebase generators.

Panel H: Sync separator, TV/AV switch.

Panel N: Remote control receiver.

Panel P: Mains filter.

Panel Y: Tube base panel with RGB output stages.

Text-equipped models have a larger H panel that houses the teletext decoder and the S-video connector. Continental variants have a similar E panel but different B and C panels to provide for a multiband tuner and Secam colour. Top

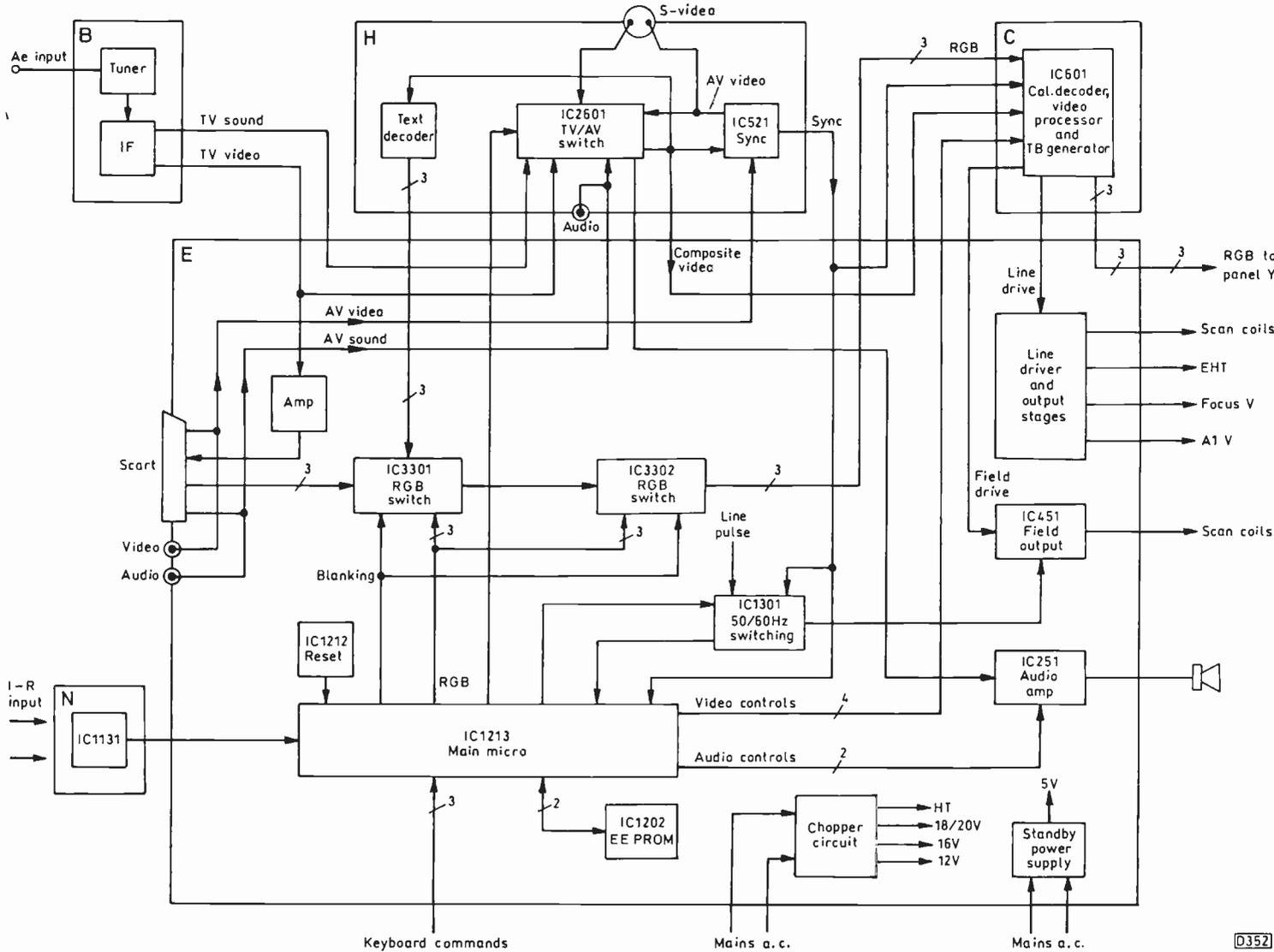


Fig. 2: Block diagram of the Panasonic Z4 chassis.

text equipped models also have a different H panel

Fig. 2 shows a block diagram of the chassis, indicating the main components. The basic chip complement is as follows:

IC101	M51362SP	Vision and sound i.f.
IC251	AN5265	Audio amplifier
IC451	LA7837	Field output
IC521	AN5650	Sync separator
IC601	AN5603K	Video/chroma processor and timebase generator
IC801	STR54041M	Chopper chip
IC1131	SBX1610-46	Infra-red receiver
IC1202	ST24C02A	EEPROM
IC1212	MN1280R	Main microcontroller reset
IC1213	MN1872419TZA	Main microcontroller
IC1301	AN5560	50/60Hz switch
IC2601	LA7222-TV	TV/AV switch
IC3301	AN5860	RGB switch for AV/text (including non-text models)
IC3302	AN5862K	RGB switch (IC3301 output/on-screen display)

Teletext models have the following additional chips:

IC3501	SAA5246P	Teletext decoder
IC3506	MN4464-08	Static RAM
IC3507	MAB8461PW216	Teletext microcontroller

We'll look at each section of the receiver in turn, starting as usual with the power supply.

Power Supply Circuit

The mains a.c. supply goes first to panel E on which the mains switch is mounted. It then goes off to the mains filter on panel P, which sits piggy-back over part of panel E. This enables separate mains filters to be used on both panels to enhance the interference immunity – the arrangement had been used successfully on the Alpha 3 chassis to meet the improved German FTZ test requirements, though the E panel filters were not fitted in UK models. The mains supply returns from panel P to the main panel where it goes three separate ways: to the chopper circuit, to the standby transformer and to the thermistor in the degaussing circuit. All this is conventional, being very similar to the arrangement used in the Alpha 2 chassis. See Fig. 3.

We'll look next at the chopper circuit.

The mains input is applied to bridge rectifier D801, which produces about 300V across its reservoir capacitor C807. This is applied to one end of the chopper transformer T801's primary winding (P1-2), whose other end is connected to pin 3 of the Sanken STR54041M chopper chip IC801. The chip provides the chopper action and stabilisation. It operates as follows.

Q3 within the chip is the chopper transistor, which is connected as a blocking oscillator. At switch on Q3 is forward biased by resistors R803 and R804. It thus switches on, and a rising current flows through the primary

winding of the transformer. As a result a voltage is developed across winding B1-F2. This is fed back to Q3's base via R812 and C809. Q3 is thus rapidly driven to saturation. At this point the drive ceases and the charge on C809 reverses, the voltage at pin 2 of IC801 becoming negative. The current flowing in the transformer's primary winding falls, and C809 discharges itself via R812, R803 and R804. When the voltage at pin 2, i.e. Q3's base, is sufficiently positive it switches on again and the cycle is repeated.

Regulation and Stabilisation

Regulation is achieved by adjusting the d.c. conditions at Q3's base. Q1, Q2 and the associated components are used for this purpose. A negative voltage that's proportional to the chopper circuit's output is produced by the rectifier circuit D807, C808. The input is from winding F1-F2, the -42V or so developed across C808 being applied to pin 1 of the chip where it biases Q1 via the internal zener diode. Q1 drives Q2. As the voltage across C808 varies with load variations so the conduction of Q1/Q2 varies, adjusting the voltage at pin 2 of the chip and hence the switch-on time of the chopper transistor to match the load requirement.

There is also automatic stabilisation against mains voltage variations. Should the mains voltage increase, Q3 will conduct more heavily and the voltage across R811 will rise. This adjusts the base bias applied to Q1, which also conducts more heavily. As a result Q2, being a prp device, passes a greater current and the voltage at pin 2 falls. The

opposite occurs when the mains voltage falls.

There is no h.t. preset.

Overload Protection

R811 is also used to provide overload current protection. Under excessive load conditions the voltage across R811 will rise to the point at which Q801 switches on. This earths pin 2 of the chip so that the chopper circuit is shut down.

Over-voltage protection is provided indirectly. If the h.t. generated by the circuit rises to the point at which the protection zener diode D854 (see Fig. 4) conducts, the current overload will shut down the power supply as before.

Synchronous Operation

The circuit operates in synchronism with the line output stage, sync being achieved by feeding pulses from an isolated winding on the line output transformer via R810 and D809 to pin 2 of IC801. Operating the circuits in sync has the advantages of maximising the power output and minimising the interference generated.

Standby Operation

In normal operation the output at the main microcontroller chip's power on/off pin 40 is high. Q1251 is thus forward biased, operating the light-emitting diode in the optocoupler D811. The phototransistor in the optocoupler is

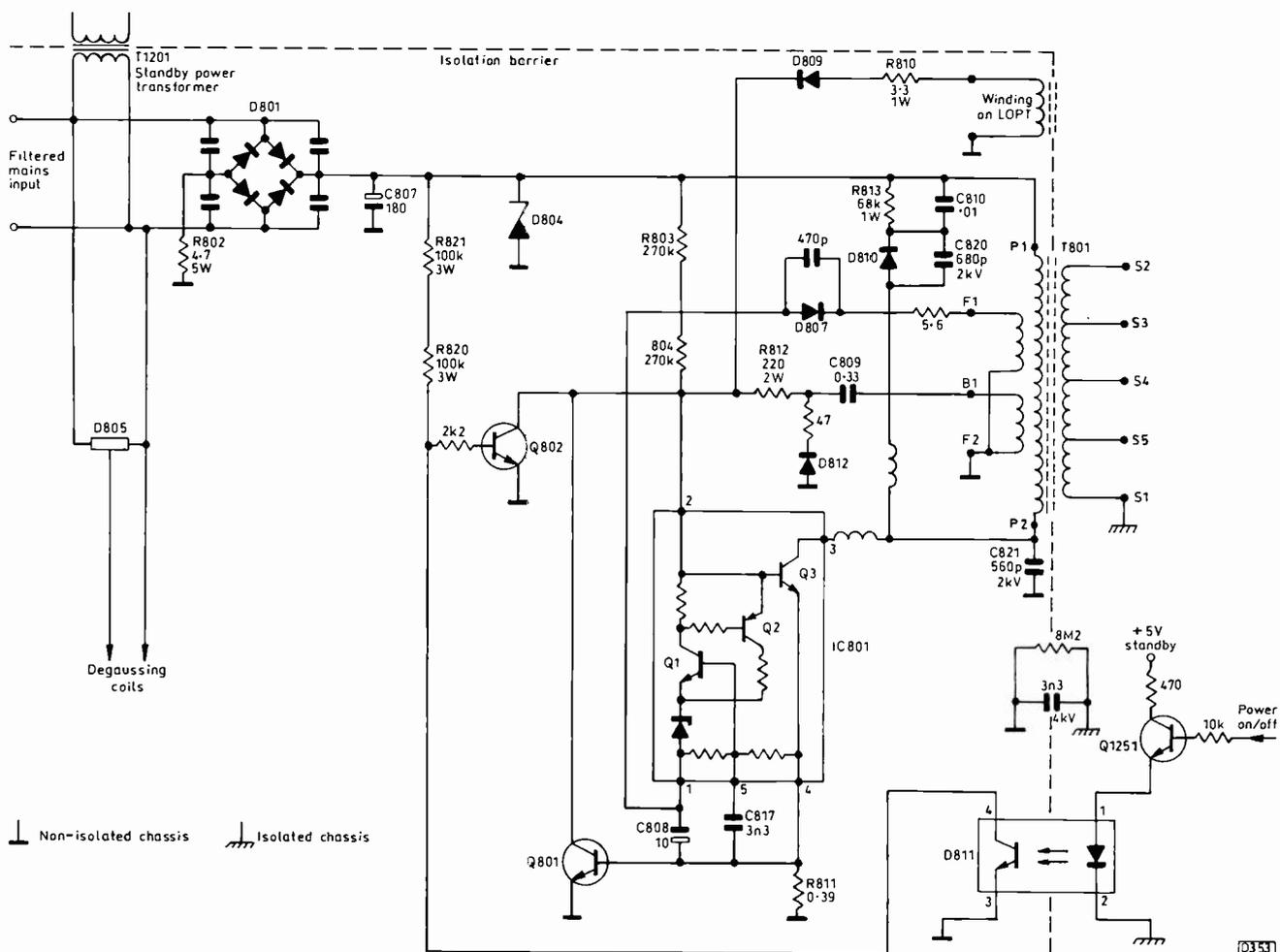


Fig. 3: The chopper power supply circuit.

of the chip and the chopper supply is held inactive.

The Cold Side

Fig. 4 shows the secondary side of the power supply. Transformer T1201 with bridge rectifier D1208 and regulator IC1204 produce a 5V supply for the main microcontroller chip which is thus – with the tuning memory and the remote control receiver – operational whenever mains power is applied. The secondary winding taps on the chopper transformer produce the following voltages:

108.5V/123.5V (15/21 in. sets) for the line output stage.

18.5V/20V (15/21 in. sets) for the audio amplifier.

16V for a protection circuit operated by Q851.

12V via regulator IC851 for the field timebase chip (this device also requires a 25V supply), the AV switches, the sync and timebase switches, the vision and sound i.f. circuits and the timebase generator/video decoder/processing chip.

The 33V tuning voltage supply is derived from the h.t. line via R070 and IC070.

A few other supplies are derived from the line output transformer. These include an h.t. line (150V) for the RGB output stages and a 25V supply for the field output stage. A regulator on panel H produces a 5V supply for the teletext decoder in text-equipped sets. We'll look at all this in more detail next time.

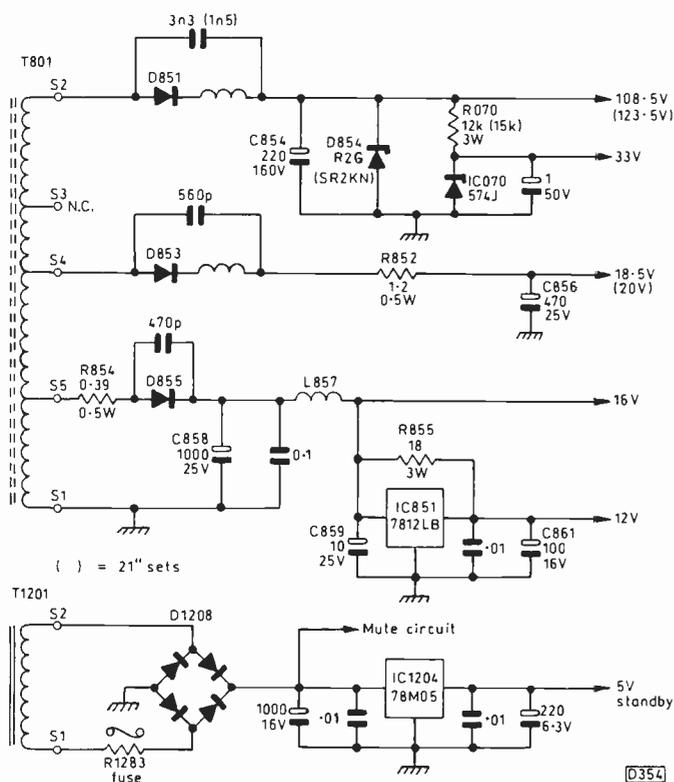


Fig. 4: Cold side of the power supply circuit.

thus switched on, earthing the base of Q802. When standby operation is requested Q1251 is switched off, pins 3-4 of the optocoupler change to a high-impedance state and Q802 is forward biased via R820 and R821. Q802 thus earths pin 2

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European Consumer Electronics Manufacturing

George Cole

During June I visited Nokia's TV factory at Bochum, Germany and Philips' video plant at Szekesfehervar, Hungary. Both companies had new products to demonstrate and interesting views on the way in which they see the consumer electronics market developing.

Nokia

Nokia's CTV production arrangements have undergone big changes recently, four TV plants having been closed within the past two years. Almost a year ago Nokia moved portable TV manufacture from the Far East to Europe – a pleasant change! TV production is now concentrated at two sites, Bochum and Turku in Finland. In 1993 Turku produced some 300,000 sets and Bochum around 850,000.

The TV chassis range has been streamlined, just three versions at present being in production. These are Mono Plus, which includes small-screen sets; Stereo Plus for 21-28in. models; and Feature Stereo for sets with PALplus, 16:9 screens, 100Hz field scanning, an integrated satellite tuner and Dolby Surround sound. The latter chassis also has a new on-screen graphics display which looks similar to the Windows system used with many IBM and compatible PCs. A graphics chip called Megatext generates the display: it's also used for the teletext pages. Other new features include a multimedia demonstration mode which uses text, pictures and graphics to describe the various TV functions, and Automatic Programme Search, Sorting and channel identification (APSi) which automatically programs all the channels available in a given area.

PALplus

As mentioned in Teletopics last month, Nokia plans to launch the first PALplus sets in the UK this autumn. The PALplus consortium began in 1988 as an association of mainly German, Austrian and Swiss broadcasters and manufacturers. Other PALplus members include Philips, Sony and the BBC. PALplus is an enhanced version of PAL, offering widescreen, 16:9 aspect ratio pictures, CD-quality

sound and ColourPlus, a system designed to remove PAL imperfections such as cross-colour and cross-luminance. It works by transmitting 432 active lines and a digital 'helper' signal. Conventional sets simply display a letterbox picture: PALplus sets use the helper signal to display a widescreen picture with 576 active lines.

The PALplus decoder has seven main components, as follows:

(1) The helper-decoder which demodulates the helper signal, converting it to the baseband part of the frequency spectrum.

(2) An AD converter which converts the analogue Y, U and V (luminance and weighted colour-difference) signals to digital form for processing.

(3) A RAM that holds one frame: this is a 6Mbit store for the digitised Y, U and V signals.

(4) A Sequential Line Video Processor (SVP). This is a real-time processor that converts the 432 active lines to 576 lines. It works by adding the information provided by the digital helper signal.

(5) A Programmable Timer Controller. This contains programmable timers that generate control signals for the memory and SVP chips.

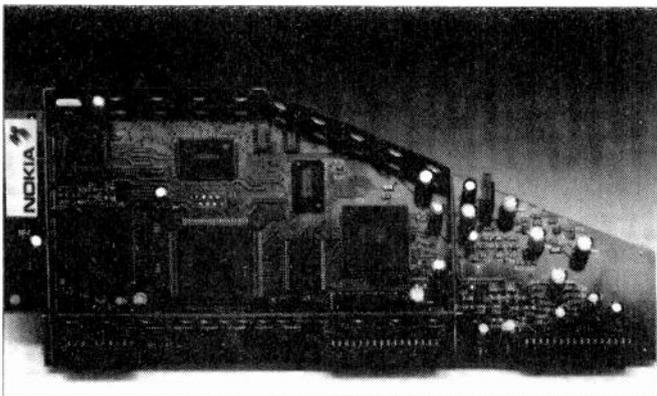
(6) A Widescreen Signalling Decoder (WSS). This is an 8-bit processor that uses a control signal contained on line 23 of the vertical blanking interval. It tells the set whether a 4:3 or 16:9 signal is being transmitted, initiating automatic format switching. A freeze-frame facility has been added to the processor. This stops the flow of digital data to the RAM, enabling the set to display a still picture.

(7) A Display Processor. This is a DA converter that changes the Y, U and V signals back to analogue form.

Nokia has not included ColourPlus in its first PALplus set because of cost considerations. ColourPlus requires two SVP chips and a 13Mbit RAM. Nokia argues that improved transmission systems and the use of a digital comb filter will greatly reduce effects like cross-colour.

As things stand, PALplus adds around £300 to the price of a set. Because the PALplus standard was not finalised until late 1993, Nokia's decoder uses a chip set developed by Texas Instruments (it's called TI SVP). Nokia says that its first in-house PALplus chips will be produced by the end of the year, with mass production starting in the latter half of 1995 and the first products to use them appearing by 1996.

Germany has already taken to PALplus in a big way. The first PALplus broadcasts began in January, from a Pay-TV channel. By the end of the year there could be six German channels transmitting up to 2,500 hours of PALplus programmes. Switzerland, Portugal and Spain are expected



Nokia's PALplus decoder, which uses Texas Instruments chips – the type numbers have been erased!

to begin PALplus transmissions in August, with the UK starting this autumn. At the time of writing the identity of the UK broadcasters is not known, though Channel 4 seems likely. The Netherlands, Austria and Italy are expected to begin broadcasts next year. There are problems with using PALplus in Scandinavia because it interferes with subtitling. France uses SECAM of course.

Interest in PALplus has been stimulated by a 228 million ECU (around £175m) European grant for the production and broadcasting of PALplus programmes. With around 75 countries that use PAL around the world, there are export prospects for the system.

Nokia's first UK PALplus set, Model 7296, has a 28in. screen and three picture modes: 4:3 aspect ratio; 14:9 (for expanding 4:3 pictures); and 16:9. On the sound side it offers f.m. mono, A2 Stereo (the German stereo TV system), Nicam and Dolby Pro Logic. Other features include digital picture effects such as PIP, still pictures, POP, 99 channels and a lift facility that moves subtitles higher up the screen. The suggested price is expected to be around £1,500. Nokia plans to launch a 32in. model next year and a PALplus decoder for the 150,000 widescreen sets currently in use in Europe. Ordinary VHS decks cannot record the helper signal (though some S-VHS decks can): PALplus-compatible VCRs are under development.

PALplus and Digital TV

With digital TV systems due to come into use in the not very distant future some people feel that PALplus will inevitably be an interim format. Not so, says Nokia. The company claims that digital TV will be like satellite TV or video – an additional feature that plugs into existing analogue TV sets. Digital TV will add new channels and services like home shopping. PALplus sets will be used to watch the digital broadcasts.

Nokia points out that there are no immediate plans to start terrestrial digital TV, and adds that PAL is likely to be around for another ten-fifteen years at least. It's a persuasive argument, but one wonders whether viewers will see things this way – and whether broadcasters will continue to support PALplus when the EU funding runs out.

Digital TV

Nokia demonstrated a digital integrated receiver-decoder (IRD) which will be launched at next year's IFA (also known as the Berlin Show) along with the start of some digital TV services. It consists of the following items:

- (1) A tuner with a 950-2,050MHz frequency range.
- (2) A demodulator for the QPSK (quadrature phase-shift keying) modulation system that has been adopted by the European Digital Video Broadcasting Group (DVB) for satellite digital TV transmissions.
- (3) A channel decoder for transmission rates up to 55.3Mbits/second.
- (4) A demultiplexer that complies with the MPEG-2 digital video standard and has a variable bit rate.
- (5) Decompression units for MPEG-2 video and two-channel audio (MPEG-2 or Musicam).

The IRD also has slots for two smart cards or for one smart card and one PCMCIA memory card. It has three

scart sockets and connections for a modem, an r.f. modulator, an MPEG-2 transport stream interface, an RS232 port for low-speed data transmission, and an optional SCSI interface for linking to a CD-ROM drive. Set-up is automatic, because the service provider will insert start data in the programme data stream – this will be processed by the IRD automatically.

The IRD's dimensions are 38 x 24 x 6.2cm (width, depth, height), weight being around 2kg. Users will be able to select programmes via an on-screen guide, by subject (e.g. sport) or age (children's channels etc.).

By the looks of things, 1995 will be an interesting year for the TV industry.

Philips

Philips is one of the many companies that has set up TV and VCR production plants in Eastern Europe. It owns 65 per cent of a company called iR3 (this stands for Image Reception, Recording and Replay) which has a factory at Szekesfehervar in Hungary. The plant employs around 900 people and covers 22,000 square metres. Production of TV/video combis and VCRs started this year, just two years after the factory was first planned.

A number of companies, including Sharp and Aiwa, have TV/VCR combis in their ranges and Philips is about to join them. Combi units aren't new of course, but Philips says that improved quality and reliability, coupled with the increasing number of homes that have a second and third VCR, has led to improved sales. Last year around 1.5 million combi units were sold in the USA: around two million are expected to be sold this year. Seventy per cent of the systems have a 14in. screen, and they are used mainly in kitchens, bedrooms and holiday homes. In Japan, where combis have screen sizes from 14-26in., they tend to be used in the living room.

Philips showed us two combis. Model 14TVCR240 has a 14in. screen, a single 60-channel tuner and a VCR with long play, VISS and NTSC tape playback. Other features include remote control, scart, r.f. and headphone sockets and a one-month, six-event timer. Dimensions are 365 x 402 x 360mm (width, height, depth), the weight being 13kg. It will go on sale in the UK this September at around £400. Model 21PT351A is a 21in. combi with teletext and two tuners, but Philips has no plans for a UK launch so far.

Philips sees much potential for sales of combi units, and I agree. Though you can buy a 14in. TV set and a VCR for less than the suggested price of the 14TVCR240, I think that many people will be attracted by its ease of use. Philips demonstrated this clearly by getting two journalists to set up the 14TVCR240 and a separate TV/VCR system to play a video tape. The one with the combi simply plugged it into the mains supply and inserted the tape. The second journalist struggled with two power leads, an r.f. lead and an aerial cable.

Philips also showed several new VCRs. Model VR447 is a four-head LP VCR with VideoPlus, a turbodrive deck mechanism, front-mounted AV connectors, synchro-edit and a one-month, seven-event timer. Model VR747 includes Nicam, hi-fi sound, LP, VideoPlus, a jog-shuttle dial and NTSC playback. No price details for either of these models were announced. Model VR948 is an S-VHS edit deck whose features include Nicam, hi-fi sound, VideoPlus/PDC/Startext programming options, a jog-shuttle remote handset, a flying erase head, LANC, new edit and synchro edit connections and microphone and headphone sockets. The suggested price for this model, when released, is £800.

TV Fault Finding

Reports from Philip Blundell, AMIEE, Chris Watton, Terry Lamoon, Michael Dranfield, Steve Cannon, John Edwards, Ian Rees and C.W.H. Jones

ITT CT3326 (Monoprint B/NN Chassis)

This set would work normally for about ten minutes then the channel display would flash a few times and the set would go into the standby mode. If the mains switch was operated the set would come back on, but the tuning information for the channel that was being watched before the fault occurred would be lost. A blow with the hairdryer in the direction of the SAA1296 tuning chip would bring on the fault, so scope tests were carried out around this chip while heat was being applied. We found that when the fault occurred the 5V supply at pin 40 would pulse in sympathy with the flashes of the channel LED. The TDD1605 5V regulator (IC1405) for the tuning chip was failing when warm, a replacement putting an end to the trouble. **P.B.**

Ferguson A36F (TX80 Chassis)

If the set is dead you'll probably find that DP65 (BY397) is short-circuit and fuse FB072 open-circuit. **P.B.**

Sharp C1421

If the sound is low, L301 in the i.f. unit could be faulty. When this coil is defective the action of the volume control changes – as you turn the control up above the half-way point the sound actually becomes quieter. **P.B.**

Salora J Chassis

Only the top half of the picture was displayed, with the scan stretched at the top. Replacing CB400 (1,000 μ F, 40V), the reservoir capacitor for the 25V supply to the TDA2653A field timebase chip, cured this one. **C.W.**

Luxor 18056989

This set would start up, run for a few minutes then trip with a rattle from the chopper transformer. We've had this fault before: it's usually caused by dry-joints in the snubber network connected to the collector of the chopper transistor but can also be caused by a poor connection between the PCB and the transistor's heatsink. You can usually tap the panel to instigate the fault, but you can never knock the set back on again as the action of the crowbar trip can be reset only by switching off and on again. **C.W.**

Luxor 18066151

The width and EW shape of the raster varied all the time. The cause of the trouble was a loose core in transformer LH05. Superglue came to the rescue! **C.W.**

Saisho 2190

The power supply wouldn't start up unless the on button was pressed and held for some time. This was accompanied by a loud motor-boating from the speakers. When the set

eventually came on the picture-in-picture display was present. A faulty capacitor – C801 (100 μ F, 25V) – in the power supply was the culprit. Experience has proved that it's best to replace all four electrolytics in the power supply – C801, C803, C807 (all three 100 μ F) and C808 (1 μ F). They are all rated at 63V. **C.W.**

Matsui 2580

For height variations before the set has warmed up check the 24V supply. A small fluctuation here will result in height alteration. D804 (ZPY24) is usually responsible. **C.W.**

Philips 2A Chassis

The h.t. was low at only 25V instead of 140V. When the power supply was unloaded the h.t. rose to 140V but any load, for example a lamp or leaving the line output stage connected, reduced the reading to 25V. I changed all the transistors and replaced the optocoupler, but this made no difference. Eventually I found that the 82 Ω safety resistor R3690, which links the chopper transistor's switch-off circuit to chassis, was open-circuit. **C.W.**

Loewe MS124

The field scan was up at the bottom of the screen, even more at the top with people's heads sticking right out of the top of the set! The culprit was C581 (47 μ F, 63V). **C.W.**

Goodmans 145TT

This set wouldn't come on, even though the standby light went out and the channel display number lit. There was no 103V h.t. supply. The STR50103 chopper chip IC501 had 320V at its input, but there was no voltage at pin 2. One of the start-up/bias resistors R502/3 was open-circuit. I decided to replace the two of them – they are both 330k Ω . **C.W.**

ITT Monoprint B Chassis

There was a switch-on problem with this set. Initially it wouldn't come on although the supplies, including the e.h.t., were present and the heaters were alight – the standby LED was on. After a few minutes the set would get going, after which it worked normally. No reset pulse could be measured at pin 12 of the MDA2061 memory chip IC1403, while the 8V supply at the cathode of D1429 was low at 7.4V. Replacing the supply's 470 μ F, 16V reservoir capacitor C722 brought it back up to 8.6V, after which the reset pulse was present at every switch on. **C.W.**

Finlux 2000 Chassis

Sets that are dead intermittently can be a trial – this one certainly was. It would come on then go dead; sometimes it

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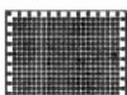
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Grey Scale



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Audio Signal



1KHz Sine Wave

Outputs

Phono socket:
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 in:)
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

wouldn't start at all; on other occasions it would start up, number 1 would appear in the display, off it would go with the standby segment lit then it would work for days, showing no fault symptoms at all. The cause of the trouble was finally traced to the BY299 diode D20, one of the power supply's output rectifiers. **C.W.**

Hitachi CPT2158

There was a blank raster but no sound or picture, with the supplies all o.k. The cause of the fault was the TDA4505 chip. Make sure you get the right one: some can give no sound or no field sync. **C.W.**

ITT Pico 1 Chassis

There was good sound and the colour was correctly registered but the picture was very dark. The tube's first anode supply was o.k., and the TDA3561 colour decoder chip's brightness and contrast voltages were correct and controllable. A new TDA3561 chip restored full brightness, though the ageing tube produced a pinkish picture. **C.W.**

Philips K40 Chassis

At switch on there was a loud trumpeting and no picture. Checks in the power supply showed that the BY299 diode D6154 was open-circuit. A replacement restored the picture and put an end to the fanfare. **C.W.**

Philips CP110 Chassis

Although there was e.h.t. and the tube's heaters were alright

there was no raster. The cause of the fault was in the field output stage, the tube blanking system being in operation. R3570 (8.2kΩ), the field output stage biasing resistor, was open-circuit. **C.W.**

Toshiba 175T9B

There was a good picture when this set was switched on, so I left it running. After a few hours there was field collapse: not the normal straight line but a nice wavy one, a clue that even Inspector Clouseau couldn't miss. I went straight to the field scan section and found a perfect dry-joint on the scan coil plug connector. After some surgery the set was given a lengthy test and proved to be o.k. **T.L.**

Matsui 1455

When this 14in. portable was powered up it displayed a rather strange pattern: if you turned the brightness and contrast down the pattern disappeared and you could see a rather nasty hum bar. Taking a look at the inside I noticed that the mains bridge rectifier's 100μF, 400V reservoir capacitor C604 had put on weight: when touched, with the set switched off of course, it was extremely hot. As it measured strangely when removed from the circuit I decided to replace the BA10G bridge rectifier BR601 as well. At switch on there was a perfect picture. **T.L.**

JVC C140

The customer complained that the set would switch off occasionally, go off tune or change its volume level without being asked. A likely tale: probably the horrible kids

playing with the remote control unit. But after being on test for a couple of hours the set started to do all those things. So I took a look inside and spied a little subpanel with a micro-controller chip and a crystal on it. When this was examined with a magnifying glass the crystal was seen to be dry-jointed – wiggling it made the set go crazy, with LEDs flashing etc. After resoldering the crystal the set was put on soak test again. There was not a flicker of trouble. Sometimes the gods seem to smile on us. **T.L.**

Matsui 1420

If field clamp develops with one of these sets after it has run for two-three hours, replace C412 (1 μ F, 25V) in the linearity feedback circuit. It's one of those nasty tantalum capacitors. **T.L.**

Boots CTV14

If the sound is very low and distorted, don't rush in and replace the audio output chip. We found that R613 (100k Ω) was open-circuit. **M.Dr.**

Hitachi CPT2176 (G6P Chassis)

There was no station memory. Before condemning the memory chip IC1102 we decided to check its supplies and found that the -30V rail was low at only -2V. Tracing the source back brought us to R772 (1.2k Ω) which had risen in value to over 900k Ω . A replacement put matters right. **M.Dr.**

Tatung TUV9734 (170 Series Chassis)

When this set was switched on from cold there was a very poor picture with a yellow tint. Attempts at setting the grey-scale were fruitless. It looked as though the c.r.t.'s heater voltage was low, but it wasn't. Maybe the tube's emission was low, but after about a quarter of an hour the picture righted itself. This was a red herring however. After wasting much time we decided to replace the tube. This cured the fault – good thing that the set still had four months of its four-year guarantee to run.

The set uses auto grey-scale correction. A good test is to measure the voltage at clamp capacitor pins 10, 20 and 21 of the TDA3562A colour decoder chip. A difference of more than 0.2V from the specified figure (7.5-7.6V) means that the chip is compensating very heavily for a worn electron gun. **M.Dr.**

Hitachi CPT1444 (NP84CQ Chassis)

There was no audio output. We found that the audio output stage was working when we touched the input with a finger. Most of the sound circuitry is contained within the big TDA4503 multi-function chip IC203 however. We decided not to replace it immediately, as we've done in the past for many different faults only to find that the chip was not the cause. After various checks we applied 12V to pin 11, the d.c. volume control pin. This brought the sound up, but turned out to be a red herring. The sound was restored by fitting a new TDA4503 chip. **M.Dr.**

Cascade TV511

When we switched the set on we found that it was tripping. After many other checks we stopped this by disconnecting the scan coils. Quite by chance we noticed a tiny spark between two of the copper wires on the scan coil yoke – the

insulation between them had broken down. One carried the line scan current, the other the field scan current. When they were separated the set worked, though with field collapse: the AN5521 field output chip was running red hot. New scan coils and a replacement AN5521 chip put matters right. **M.Dr.**

Samsung CI5322T

Be careful when replacing the width coil L401. The service manual gives the part no. for the 14in. version of the chassis. If you fit this in the 21in. model you get a tuning/i.f./a.g.c. fault – very strange! The correct part numbers are 32449-412-603 for the 14in. model and 32449-412-650 for the 21in. model. **M.Dr.**

Panasonic TC21M1R (Z4 Chassis)

At switch on his set would kick up for a second then become lifeless. We monitored the h.t. voltage and found that this appeared for an instant at switch on. There's some quite complex protection circuitry which includes transistors Q558, Q541 and Q542. It monitors the conditions in the line output stage and other sections of the circuitry. We established that the trip action occurred even with the h.t. feed to the line output stage disconnected, so it seemed likely that there was a fault in the protection circuit. Q558 is a pnp device that monitors the h.t. voltage at its emitter. Its collector should be at some 0.2V but a check here showed that the voltage rose to about 50V, though its base and emitter voltages were correct. At this point we switched off. It seemed that Q558, which is type 2SA879, was leaky but it tested all right out of circuit. Nevertheless we decided to try a substitution test. When a new 2SA879 had been fitted the set worked perfectly. **S.C.**

Sony KVM2140

The contrast level was very low and would hardly adjust. I checked the voltages around the video chip IC302 and found that pin 19, which controls the contrast, was stuck at 1.5V. It should vary between 1.4V as the contrast is adjusted. The beam limiting circuit is also connected to this pin, so I checked back to the beam sensing point in the line output stage. The voltage at the junction of R817 and R818 was -6V. It should be negative only when there's an awful lot of beam current, which of course there wasn't. R816, which is connected to the h.t. line, prevents this point going negative under normal conditions. It was open-circuit. A new 150k Ω resistor put matters right. **S.C.**

Philips G90AE Chassis

This set had been looked at by a dealer who, the fault being intermittent fuse blowing, had replaced many semiconductor devices – repeatedly by the look of the enclosed packet of defunct components. He hadn't fitted a Philips G90 SOPS repair kit however. So the first job was to fit one. It consists of a chopper transistor and most of the other semiconductor devices on the primary side of the power supply, some of them surface mounted. This done I used a variac to wind up the input, with a dummy load connected across the 95V h.t. line. The set regulated beautifully.

I then reconnected the line output stage, switched on and to my horror witnessed a flash from the mains fuse. A quick check across the BUT11AF chopper transistor showed that it had gone to a better place. After fitting another BUT11AF and checking other components on the primary side of the

power supply I again disconnected the line output stage and wound the set up. Perfect! Full h.t. Rather than look for a fault in the line output stage I thought that it would be an idea to switch on the set with the full mains voltage applied. Whammo! Another BUTIAF was needed. So the set would operate when wound up, but certainly didn't like full mains voltage at switch on.

A fault on the secondary side of the power supply was now suspected. D6649, D6615 and D6616 were all replaced as we've had trouble with them before. In fact I checked most if not all the semiconductor devices on both the primary and secondary sides of the power supply, a wise move with a fault condition like this. But nothing was amiss.

Quite by accident I then discovered that D6645's anode didn't go anywhere. Sometimes empiricism succeeds where theory fails! It should be connected to pin 18 on the secondary side of the chopper transformer. But a check from this pin to the diode confirmed that there was an open-circuit. The print was checked and was fine. The only other item is a surface-mounted jumper link in position 3645. Out it came and when checked was confirmed as being open-circuit. A replacement was fitted, also another SOPS kit in case the malfunctions had upset anything. The line output stage was reconnected and the set was then switched on. No bangs or flashes this time, just a full raster and sound. The set was finally soak tested, switched on and off repeatedly and pronounced fit. **S.C.**

Sony KVX2532U (AE-1B Chassis)

There was poor field linearity: the top third of the screen displayed alternate scanning lines, the centre section had an almost normal display while the bottom third was blanked. We found that the field scan coupling capacitor C531 had fallen in value from 680 μ F to only 2 μ F. **J.E.**

Philips CTX-E Chassis

The on/off switch arced and spluttered but the set remained dead after fitting a new switch. We found that the BU508A line output transistor had failed. When we switched on again after fitting a replacement the fault was field collapse. A new TDA2577 chip put that right. **J.E.**

Hitachi C2509T (G7PSL Chassis)

There was just snow: the channels couldn't be tuned in even though the on-screen graphics indicated that search tuning was taking place. A check at pin VT of the tuner showed that the tuning voltage was missing. The usual cause of this is failure of the 33V regulator (ZD002), but this time R044 (12k Ω) in the tuning voltage integrator network was open-circuit. We discovered this when we found that Q003 had no collector voltage. **J.E.**

Goodmans CTV20XRT

This set was dead because the 2.2 Ω surge limiter resistor R313 was open-circuit. As there didn't seem to be any other fault we fitted a replacement and switched on. Fortunately the set sprang to life. After a two-day soak test we decided that all was well. **J.E.**

Ferguson A59F (ICC7 Chassis)

If the line driver transistor TL17 dies as soon as the line output stage gets going, replace DF16 (BA157) in the field output stage. You will find that it's short-circuit. **I.R.**

Bush 2720 (11AK03 Chassis)

We've had the following faults recently with this model.

Brightness control not working though the on-screen display says that it is: Transistor TR901 (BC558) on the tube base panel short-circuit.

Lack of height: Zener diode D2801 (33V) short-circuit.

Uncontrollable brightness with flyback lines: R901 (220 Ω) on the tube base panel open-circuit. **I.R.**

Ferguson TX85 Chassis

This set would intermittently go into the standby mode or appear dead. We found that the BD385 9V regulator transistor TR901 on the remote control and sweep-tune board was dry-jointed. **I.R.**

Hitachi CPT2016 (NP81CQ Chassis)

Intermittent loss of height can be caused by a break in the print to the upper transistor on the thick-film field output module. You can sometimes repair the module. **I.R.**

Bush 2321T

There was no picture or sound and the standby colons faded a few seconds after switching on. The chopper transistor's base drive coupling capacitor C802 (100 μ F, 16V) was faulty. **I.R.**

Philips K35 Chassis

This set would intermittently go off or into standby when lightly tapped anywhere. The degaussing thermistor had a broken disc loose inside its cover. **I.R.**

Sony KVX2521U

There was intermittent loss of picture and sound, the 12V supply being lost when the chassis was flexed. Q608 at the front, centre of the chassis was dry-jointed. **I.R.**

Sanyo CEP7100

For field foldover at the top replace C440 (4.7 μ F, 250V) which tends to go low in value. **I.R.**

Philips BM7502 (Green monitor)

Loss of field scan is usually caused by TS431 and/or TS432 having failed with R434 going open-circuit. For reduced height check C521 (47 μ F, 25V) which can be leaky. **I.R.**

Some Quickies

Philips KT4/K40 1001 with later SOPS power supply: If the picture is distorted, with hum bars, for about two minutes after switch on replace C2128 (100 μ F, 50V).

GEC 20AX Mk. 2 chassis: If there's no width control or EW correction check the d.c. resistance of L601. Replace if below 3 Ω .

GEC Model C2067H, also Philips G11 chassis: For no red or no colour, check/replace the thermistor in the degaussing circuit. **C.W.H.J.**

Long-distance Television

Roger Bunney

At last some good news: DX conditions during June were extremely active. There has been plenty of Sporadic E (SpE) reception – not so many exotic signals, but lots within a skip distance of 1,000 miles.

Tropospheric conditions have also been active, with intense openings across the UK. June 26-28th was the most active period, with signals from Germany, France, Denmark and the Benelux countries being received in southern and eastern England, Band III and u.h.f. signals from RTE (Ireland) being received in the west and Spanish signals being received in the south. On the 28th NOS (Holland) was received to the west of Plymouth and there was some reception from Scandinavia along the east coast. Two minor tropospheric peaks, on the 12th and 17th, produced Band III and u.h.f. signals from the Benelux countries in favourable locations and TVE (Spain) in the south west along with some signals from Ireland.

Though neither wonderful nor intense there were many SpE openings and a just few excitements. A collated log of SpE reception is given below. Because of the confused conditions in the region I'll use YUG to refer to the old Yugoslavian area, also CIS to refer to the old USSR unless a more definite identification can be made.

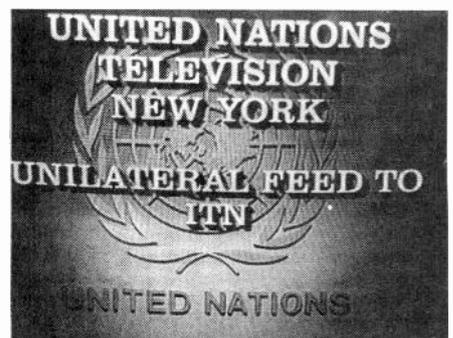
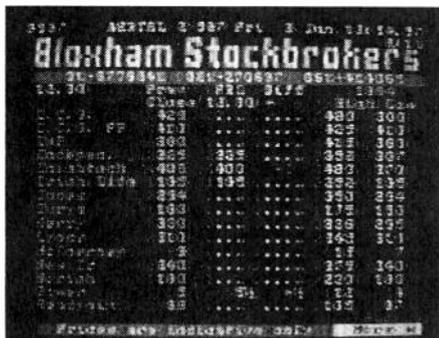
6/6/94	Russia ch. R2; RTP (Portugal) E3; TVE (Spain) E2, 3.
7/6/94	RAI (Italy) IA.
9/6/94	RAI IA; TVE E3, 4; RTM (Morocco) E4; C+ (Canal Plus) L4; TVP (Poland) R2; Czechoslovakia R2; YUG E3; YLE (Finland) E3; SVT (Sweden) E2, 3, 4; NRK (Norway) E3; CIS R1, 2.
10/6/94	TVE E2, 3, 4; TVE-2 E2; RTP E2, 3; DR (Denmark) E3.
11/6/94	TVE E3.
12/6/94	RAI IA.
15/6/94	TVE E2, 4; CIS R2.
16/6/94	ETV (Estonia) R2; SVT E2, 3; TVP R2; DR E3; NRK E2; Czechoslovakia R2; ORF

17/6/94	(Austria) E2a; C+ L2; RAI IA, B; YUG E3, 4. ARD (Germany) E2; TVE E2, 3, 4; TVE-2 E2; RAI IA, B; YUG E3; TVA (Italy) IA; ORF E4; NRK E2, 3; SVT E2, 3.
18/6/94	C+ L2, 3; TVE E2, 3, 4; RAI IA, B; TVA IA; YUG E3; MTV (Hungary) R1; TVR (Romania) R2.
19/6/94	RAI IA, B; TVA IA; TVE E2, 3, 4; RTP E2, 3; ARD E2; YUG E3.
20/6/94	TVE E2, 3, 4; RAI IA, B; YUG E3; ORF E4; TVR R2.
21/6/94	RAI IA.
22/6/94	TVE E2, 3, 4; RTP E3; TVP R2; C+ L4; SVT E2. Also chs. A2, 3 see later.
23/6/94	TVE E2, 3, 4; Canary Is. E3; YUG E3; NRK E2, 3, 4; RAI IA; DR E4; RUV (Iceland) E4.
24/6/94	RTM E4; C+ L3; TVE E2, 3, 4; RTP E3.
25/6/94	TVE E2, 3, 4; RTP E2, 3; MTV R2; SVT E2, 3; RAI IA; C+ L2; Chs. A2, 3, 4 (see later).
26/6/94	TVE E3, 4; RAI IA, B; YUG E3; C+ L2.
27/6/94	TVE E2, 3, 4.
28/6/94	TVE E2, 3, 4.
29/6/94	TVE E2.
30/6/94	TVE E4.
1/7/94	RAI IA.
3/7/94	RAI IA, B.

On the 22nd and 25th Cyril Willis (King's Lynn) received 525-line NTSC signals from the west. There were weak ch. A2 and 3 signals at 2245 on the 22nd. The 25th however, from 2057, produced the following on ch. A2: a male announcer over classical music with a documentary about 17th century life, buildings etc., followed at 2145 by a female presenter and a weather forecast that mentioned Chicago. Unidentified ch. A3 and A4 vision signals were also present. The signals are likely to have come from Canada – we hope to be able to identify the source of the ch. A2 programme. They faded by 2200.

An alternative TVE offering, i.e. not a Spanish mainland broadcast, was seen by Tim Anderson (St. Leonards) on the 23rd. The transmitter must be Izana ch. E3 on the Canary Islands, with 350kW e.r.p. On the 18th an intense short-skip opening produced Canal Plus at high levels on all channels: the fact that two ch. E2 transmitters were received – confirmed by scanner offset measurement – suggests that some low-power relays were being received.

All in all then an excellent month. My thanks to the following for sending in reception reports: Tim Anderson (St. Leonards), Dave Oliver (Birmingham), Peter Schubert (Rainham), Roger Fussell (Torpoint), Cyril Willis (King's



Left: Teletext from Gort, Ireland (ch. IB) via short-skip SpE propagation. Received by Tim Anderson in East Sussex. Centre: A shaky sound-in-syncs news feed test from Cape Town during the South African elections. Seen from Eutelsat II F4 at 7°E. Right: A one-way news feed from the USA to the UK via Intelsat K at 21.5°W – and John Locker's dish at Wirral.

Lynn) and Ian Beckett (Buckingham) who has been DXing for nearly 36 years.

Satellite Sightings

There were three main satellite links during June into early July. Most craft in the satellite belt, even PAS-1 at 45°, were involved in the D Day remembrance events. All the Eutelsat craft carried feeds, Eutelsat I F4 at 25.5°E being particularly active with cross-Channel circuits. From about June 2nd the US networks were transmitting back to the States information such as old newsreel footage, using Ku band for the uplink and C band for the downlink. The circuits were too numerous to mention here. Most UK activity occurred on the 5th at Portsmouth, with French participation on the 6th.

World Cup football was present everywhere, with many American Teleport identifications being seen. As football arrived from the west, so Wimbledon was linked back to the west. Sports enthusiasts must have had a field day.

A very moving broadcast was logged on June 5th, relating to a little-remarked event at Ben Gurion Airport, Israel when a mercy flight landed carrying children from Chernobyl with radiation contamination. It was carried by Eutelsat II F3 (16°E) in the telecom band.

A new channel appeared on test on the 10th, at 16°E: GS-TV is an Asian channel transmitted at 11.16GHz with horizontal polarisation. Late June saw the start of a new shopping channel, La Chaine Info. This French service (SECAM of course, though the test transmissions were also in PAL) started on the 24th via Telecom 2B at 5°W, the carrier frequency being 12.584GHz.

On July 1st we saw Palestinian leader Yasser Arafat enter Israel and the Gaza Strip after 27 years in exile. There were scenes of chaotic celebration from Gaza City, with CBS using Eutelsat II F3 (16°E) to link back to the States.

Intelsat 702 should be in service at 1°W from late August. Test transmissions have been seen from a parking slot at 37.5°E – this is a favourite position for testing newly-launched Intelsat craft.

News Items

Egypt: The BDXC reports that there are two transmitters in operation at Dumyat, using channels E2 and E4 with 900W e.r.p. Ch. E2 is used for ERTU-2, with an 8P vision offset. English-language programming is shown, with Arabic subtitles. Programme start is at 0700 local time, preceded with text pages and the PM5544 pattern (EGYPT at the top, ETV at the bottom). A corner identification, "TV2", is present in the evenings only. The ch. E4 (zero offset) ERTU-1 service is in Arabic. As with the ERTU-2 channel, text pages are shown between close down and the following day's opening.

Iran: The BDXC reports that there are two ch. E2 IRIB transmitters that carry the TV1 service, both with 8P offsets, while two ch. E4 transmitters are used for TV1 and TV2 with 8P and zero offsets respectively.

Israel: Canal Plus is to be made available throughout the country.

France: Canal Plus plans to start digital transmissions via satellite by the end of 1995. Decoder manufacture could start this autumn.

Poland: 117 regional radio station licences have been awarded and there are plans for four regional commercial TV networks, each with up to forty transmitters.

Vietnam: A trial third network is in operation, with afternoon programmes to test audience and advertiser reactions.

Czechoslovakia: There have been moves to privatise the remaining state broadcaster Ceske Televize, which currently

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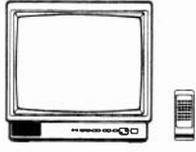


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transmits as CT2 on the channels previously used by the Russian forces to transmit Moscow TV. Ceske is upgrading and expanding the network, and hopes for 77 per cent coverage by the end of the year.

UK: The Civil Land Mobile Radio Committee is seeking more spectrum space in the 30-960MHz region. It suggests that up to 100MHz will be required to cater for increasing demand.

The DSS has signed a contract with Kenwood for 2,500 vehicle and 2,500 handsets for use by the fraud investigation department over nearly 200 regional communication systems.

Satellite TV

The Czech cable service Cable Plus, which previously used the Gorizont satellite at 11°W, appeared briefly via Eutelsat II F4 at 7°E, amongst the EBU news feeds, before moving to the Gorizont craft at 40°E (11.525GHz). The Reuters Moscow bureau news feed has moved from 14°W to the old Cable Plus transponder at 11°W.

CBC (the Canadian Broadcasting Corporation) is considering an international satellite-delivered news service to rival CNN and BBC-WSTV. A start will be made in September with a US service. If successful it will be extended to Europe, the Far East and Australasia.

The BBC is to offer Orbit International, a digitally compressed Arabic version of BBC-WSTV, in the Middle East. Test transmissions were carried out in late June to Rome via Eutelsat I F4 at 25.5°E (11.660GHz horizontal), the plan being to retransmit via the Arabsat craft at 30°E. Digital decoders could cost around £6,000 each. Following the ban on domestic dishes in Saudi Arabia however there

are doubts about the viability of the service.

Both Malaysia and Intelsat have applied to use the orbital slot at 91.5°E. Malaysia has a dish ban at present. Vietnam TV (VTV) has booked Ku band transponder facilities aboard the Thaicom 2 craft which is due for launch this August. The satellite's footprint will extend well into Europe, covering east and south-east Asia and points between.

Echostar, perhaps best known for satellite receiving equipment, intends to launch two DBS craft via a Chinese Long March rocket by the end of next year. Orbital position will be 119°W. By using a 3:1 compression ratio Echostar hopes to be able to transmit over ninety channels for reception using 18in. dishes. By that time DirectTV plans to be on air with up to 150 channels.

The Japanese PTT is developing digital compression/transmission technology, the aim being to transmit fifty channels via Jsat in early 1996 with terrestrial services starting by the year 2000.

Colin Grellis (Bridport) tells us that NASA runs a daily TV service, with live space coverage when applicable, via Spacenet 2 at 69°W. The vision carrier is at 3.880GHz with the audio subcarrier at 6.8MHz. Though the position is very low in the sky in the UK, readers in the west country and Ireland could stand a chance of reception. Signal amplitude would be very low however as Spacenet 2's footprint covers North America.

The Sri Lankan government has been pressing the German authorities to end the World Tamil Television uplink from Berlin via Eutelsat II F3 at 16°E: it's thought that the service is used for anti-government propaganda amongst Tamils in Europe.

In the May issue (page 503) we featured Bandula Gunasekera's simple u.h.f. satellite receiver circuit for use with the 714/754MHz transmissions from the Ekran craft. It has proved to be very popular in Sri Lanka and India. If any other readers have made simple satellite receiving equipment we'd be pleased to include the details in this column with the aim of inspiring other potential sat-zappers.

The Super D100

HS Publications, 7 Epping Close, Mackworth Estate, Derby DE3 4HR (telephone 0332 513 399) tells us that a super version of the D100 DX converter is now available. It's based on the well-established D100 but has in addition an integral a.g.c. circuit to avoid overloading with strong signals and give freedom from manual gain control operation, and an auto bandwidth circuit that reduces the bandwidth with weak signals, widening it with strong ones. The u.h.f. output is now at ch. E65 instead of around ch. E35. The units are hand-built to order, at about £125 inclusive.

The Squashed Quad Aerial

In the July issue we provided details (page 665) of the squashed quad aerial that Brian Williams uses. He has pointed out that we didn't show the feeder connections correctly – see Fig. 1 this month for further elaboration. The loft-mounted aerial provides a gain of typically 1.5dBd. He has also provided details of an improved design with the feed point at the upper corner. At a centre frequency of 52MHz 19ft 4in. of wire is required, proportioned at approximately 2.5:1 (side to end dimensions). The feed is taken via a quarter-wave section of 75Ω balanced feeder to a 75Ω downlead which can be balanced or coaxial. Brian prefers the performance of balanced feeder. To connect this to a 75Ω unbalanced aerial socket or preamplifier input a balanced-to-unbalanced transformer or cable conversion is required. This design provides omnidirec-

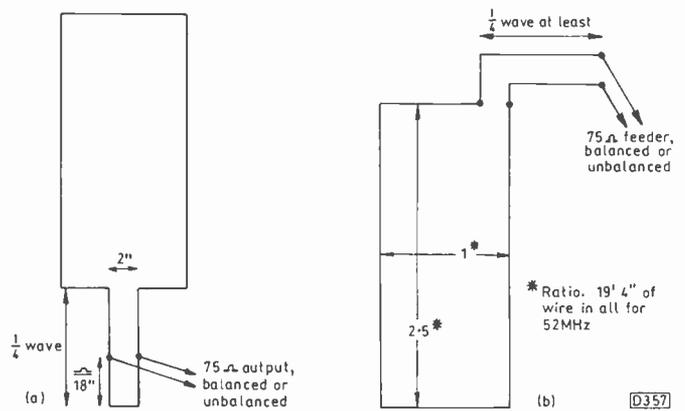


Fig. 1: The squashed quad aerial. (a) Original version, showing correct connection details. (b) Improved version with feeder connection at the corner.

tional pick-up in the vertical plane and is ideally suited to SpE reception in Band I. Use the formula $1,005/f(\text{MHz})$ to calculate squashed quad dimensions (in feet) for other frequencies.

Canary Wharf

Residents in the East End of London took property developer Canary Wharf Ltd. to the High Court on July 25th to claim damages for "public nuisance" following the loss of good-quality TV signals after the construction of the 242m high, stainless-steel clad block – the claim includes compensation for dirt and noise during the construction period. Ghosting is severe in the area and the BBC has installed a relay transmitter to help overcome the problem. South Poplar and Limehouse are the areas most affected by the office block.

Previous court action in the UK (Bridlington Relay v Yorkshire Electricity, 1965) ruled against the right to good-quality TV reception following loss by building works, though Canadian law (1978) has upheld the right to quality reception. Arsenal Football Club paid for viewers who lost good signals following construction of its new North Bank all-seater stand to have new aerials pointing at another transmitter installed.

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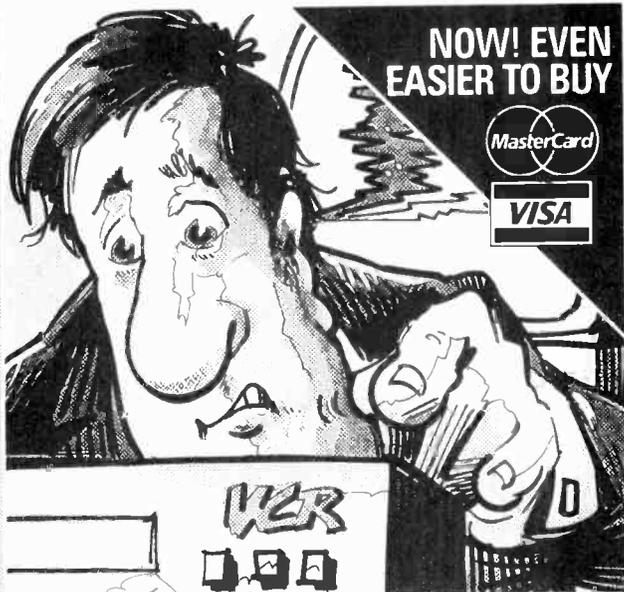
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Letters

BUSINESS PROSPECTS

In answer to the reader (letters, August) who is thinking of starting his own business, my advice is not to be put off by the doom and despair merchants. So long as TV sets, VCRs etc. break down there will be a requirement from the public to have them repaired. Similarly there is still a market for second-hand equipment: while the demand may not be as great as some years ago, it can nonetheless provide a supplementary source of income.

The pessimists will tell you that equipment is more reliable these days and that when things do go wrong diagnosis is more difficult. True, but there are more TV sets and VCRs per household, and it's more interesting to see two or three different items from the same household than the same item three times. The fact that fault-finding is not so straightforward means that the 'swift-buck' cowboys are diminishing in number with each new model. Other engineers are retiring early or declining certain work. Add to this the number of people who now own rather than rent, and the shops that no longer employ their own engineer, and you have a large customer base – which of course is the first ingredient to success.

The ultimate aim of your new business is to make a reasonable profit. The greatest influence on how much the customer will contribute to this profit is the cost of a replacement for a defective piece of equipment. A TV set today costs much the same as it did twenty five years ago. Repair bills have to reflect this negative inflation. Thus to survive your overheads must be kept to a minimum and your turnaround of repairs must be swift.

Your reader appears to be contemplating the rent or lease of a shop outlet. Be warned: this will be the largest drain on profits. It's better to consider an industrial unit or suchlike – one engineer I know runs a successful operation from farm buildings. Once the public learns that you offer a reliable service, charge reasonable rates and guarantee your repairs they will travel from miles around.

You will also find it beneficial to liaise with other engineers in your area – for the purpose of swapping manuals, advice, etc. I started my own business just six years ago and appreciate the help given to me by others in the trade. I've also experienced at first hand the power of the public voice. Do a good job for Joe Bloggs and soon you'll have the Bloggs family, his friends, workmates and neighbours treading a path to your door – no matter where you are. These are the best customers you can get.

I hope that this optimistic viewpoint will counterbalance those that appear to be so bleak. Go for it, I'd say. If not you'll look back in years to come and think "if only. . ."

Paul S. Smith,

Vision-On Repairs and Service, Newtownabbey.

CLEANING LASER LENSES

In his article on CD Player Repairs in the July issue Les Austin mentioned a method of cleaning the optical block lens. He stated that Sony recommends the use of isopropyl alcohol for the purpose. This is a gross error. As far as I am aware Sony has never suggested the use of isopropyl alcohol, which

can result in irreparable damage to the lens.

We recommend the use of only a special fluid, Sony part no. J-250-100-0A. This is mentioned in a publication entitled "CD Optical Block Checking Procedures", part no. S-795-202-11. We also recommend the use of a special swab, part no. J-250-102-3A, specifically produced for the purpose. Those with authorised Sony service accounts can obtain these items through the normal spare parts ordering systems.

If readers have any further queries on this subject they can contact me on 0635 875 348.

David Meyer,

*Technical Training and Technical Information Manager,
Sony Consumer Products Company UK, Newbury, Berks.*

LASER POWER ADJUSTMENT

In his article on CD laser power adjustment (July, page 630) Les Austin omitted to mention that all consumer CD players are Class 1 laser products. As such, the laser unit must meet the Accessible Emission Level (AEL) requirements for a Class 1 device.

It's possible for the AEL to be exceeded when laser output power adjustments are made without sticking to manufacturers' recommended procedures and without the necessary test equipment or full technical information relating to the laser unit and associated components. The laser diode in the Philips CDM4 pick-up for example is capable of producing an output power of 5mW. Always follow the advice given in the service documentation – it's there for a reason. Restoring the CD player to its original condition gives the service engineer some degree of protection even if it does mean the need for a new pick-up assembly.

On the subject of laser power meters, we've found from experience that no two meters give identical readings, even when they are correctly calibrated. Most laser power meter manufacturers, including Advantest, Leader and Anritsu, give the accuracy of their meters as ± 5 per cent. So an error of ten per cent is possible between two meters. This means that with an output of say 0.250mW readings of between 0.225mW and 0.275mW could be obtained when comparing meters. Add to this a factor for human error when attempting to position the optical sensor directly over the lens of the pick-up assembly (a couple of millimetres either way can make a big difference) and you see that there is no way in which a laser power meter can be described as an accurate measuring device.

I would agree with the manufacturer's engineer, mentioned by Les Austin, who said that laser power meters have limited use. Philips Industrial in Hasselt, Belgium rarely use a laser power meter when checking laser output power. Measuring the current through the pick-up diodes is a much more accurate technique. When the characteristics and electrical specification of the laser diode are known, it's simply a matter of mathematics to calculate the laser output power.

Les mentions the laser power adjustment with Philips RAFOC units and the different measured values with different discs. The safest way to do this is to play track 1 of Philips Test Disc 5 or 5A (available from Willow Vale) as this has a standard surface reflectivity. Scratches and damage to the transparent coating will obviously make a difference. So handle it with care. Incidentally the upper surface of the disc (label side) is more susceptible to damage than the lower surface (track side). The protective coating on the upper surface is much thinner and, when scratched down to the reflective surface, serious errors will occur during playback. Hands up all service engineers and hi-fi aficionados who still

place the label side down to prevent damage when changing discs etc.!

One further safety point. Most service manuals tell engineers not to look at the laser beam directly (always examine it at an obtuse angle). The reason for this is simple. Under normal operating conditions the focal length of the beam is fairly short, usually up to 1cm, around where the disc would sit. The beam then diverges (defocuses) the farther it travels. The more defocused it becomes, the less energy it possesses per given area.

Under certain fault conditions involving the focus servo and laser driver circuitry however the focal length of the laser beam can alter to several centimetres from the lens – up to 10cm has been quoted. If this focal point coincides with the retina of the eye the total laser energy available will be enough to cause severe damage to the service engineer's vision. It's also worth considering the effect of wearing glasses while examining a laser pick-up in operation.

I feel that it's worth mentioning these important safety points as service personnel rarely enjoy the benefits of the training facilities available at large manufacturing organisations – and after all you can never have enough service information, can you?!

*Marcus Jones, VCR/CD Production Engineering Dept.,
Sharp Manufacturing Company of UK Ltd., Wrexham,
Clwyd.*

GOODMANS MODEL 147TT

M. Stansfield correctly diagnosed the fault with one of these sets (TV Fault Finding, August) but there is something to add. I've also had the problem. As I had the service manual however I was able to discover that C911 (47 μ F, 50V) had been inserted the wrong way round. My findings have been confirmed by Goodmans' technical department: a limited production run had the incorrect polarity marked on the main PCB. The capacitor will work for a period of time, perhaps eighteen months, but being under stress will eventually break down.

Goodmans has no record of the batch serial numbers. But if you find that ZD402 (12V, 1W zener diode) and R425 (5.6 Ω , 3W) have failed it's highly likely that the polarity of C911 is incorrect.

*M. Regan, Techtronics Southport,
Southport, Merseyside.*

WHAT A DIGIRIDO!

I haven't had much to do with ITT Digi 3 TV sets, and as those I have encountered have had routine faults I've not needed a service manual. Until now, that is. One came in with no green in the display. The fault was cleared by replacing the storage chip IC1402, but the picture dropped by about two inches. Now to adjust the vertical shift you use the remote control handset with an overlay placed over the buttons. How this little piece of plastic converts it to a Service Processor I don't know, but it does. Normally, that is, if you have the original handset. Most sets I've seen are on to a replacement. I tried the overlay panel upside down and sideways, but no way would it fit the Konig handset. So I half-heartedly consulted my very expensive international fault-finding system. Once again it proved its usefulness – for reaching things on high shelves. Instead I found a picture of the original FS9/1 handset in an old SEME catalogue and was able to cross-reference:

Prg. 1 selects vertical shift, Prg. 2 amplitude and Prg. 3

geometry. Use the volume + and – buttons to adjust, and the 'Restore Pic from Text' button to load the new values. This is all done with the switch at the top of the digi board in the service position.

The next set in was an Akura portable with a very similar circuit. Good job it didn't need adjusting!

*Phil Barry, Teletechs TV and Video,
Bedale, North Yorkshire.*

IR INTERFERENCE FROM BULBS

I was interested in the letter from D.J. Maxfield (July) on IR interference experienced with an energy-saving lamp since I have experienced r.f. interference over a wide spectrum from this source. I'd taken the matter up with GE Lighting, being concerned that increased use of such lighting could wipe out medium- and long-wave radio reception as well as reception in the lower-frequency amateur bands, i.e. 160m and 80m.

The RSGB EMC committee is now collecting data on such interference and would welcome any information from users. Anyone able to help should write to R.M. Page-Jones, G3JW1, via the RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE.

*J.F. Greenwood, G3ZJY,
Milford on Sea, Hants.*

TALE OF A VIDEO REPAIR

The story of the repair of my Panasonic NV430 VCR reflects badly, to say the least, on the trade. As the loading mechanism had been increasingly rejecting attempts to load a cassette we took the machine to an apparently respectable high street shop for repair. After some delays, running to a few weeks, we collected it and paid. The fault was still present despite alleged inspection, testing, replacement of the mode switch, belts and jockey wheel kit, and lubrication. When we returned to complain we found that the firm had gone into official receivership. I have strong reason to believe that nothing had been done to the VCR.

So we took it to another apparently respectable high street shop. When it came back it was still rejecting cassettes.

Fed up with this, I decided to look at it myself. To be fair it took me some time. I had the whole cassette loading mechanism out and checked its action minutely. I tried adjusting the mode switch position through its entire range before concluding that it was not responsible. Finally I came to suspect the drive. Perhaps the motor was weak, or it was some other aspect of the drive? By this time I had discovered that pressing the upper surface of the cassette just before it seated increased the chances of it loading correctly – this 'helped' the drive to do its job. Then for some reason I had the inspiration that fixed it. Could the loading drive belt be slipping? It shouldn't of course, as it was allegedly new. But any lubricant on it could cause slippage. So I took a small child's paint brush, dipped it in methylated spirit and wetted the belt while it was running. The meths was centrifuged off at the pulleys, cleaning them and the belt. Result: instant, lasting success. Not a single tape has been rejected for months, and the machine is a pleasure to use again.

Isn't it a disgrace to the trade that two firms couldn't between them come up with a single drop of meths, judiciously placed? I feel that I could be forgiven for not recognising the cause of this simple fault, as I've no training or experience with these machines. But proper repair shops?

*Andrew Churchley, B.Sc. (Tech.), Ph.D., C.Eng.,
Appleton, Cheshire.*

What Goes Wrong?

Ray Porter, M.Sc., C.Eng., MIEE

Engineers tend to form their own opinions about the faults that occur most frequently in the equipment which comes into their workshops. It's good management practice however to maintain an accurate analysis of the nature of the faults in the work throughput. This helps with stock control, investment in test equipment and with employee training.

In order to determine the relative frequency of various types of fault, I carried out an analysis of the reports published in the TV Fault Finding and VCR Clinic sections of *Television* during the first quarter of 1993. A total of 117 VCR Clinic and 124 TV Fault Finding reports were analysed. The results are presented in this article. Although the sample is not a large one, it was nevertheless sufficient to provide useful information.

VCR Faults

Table 1 shows that most VCR faults reported consisted of power supply failures (21 per cent), and that all the mechanical faults combined didn't quite equal the power supply faults. It should be remembered however that much mechanical servicing with VCRs is of a routine nature and thus doesn't get into the fault reports. The faults that are

Table 1: VCR fault percentages.

<i>Fault area</i>	<i>Percentage</i>
Power supply	21
Mechanical	20
R.F.	11
Syscon	10
Record circuitry	9
Playback circuitry	9
Drum (electrical)	6
Loading (electrical)	4
Capstan (electrical)	3
Audio (electrical)	3
Reel (electrical)	3

reported however are the ones which cause the most workshop disruption and the greatest customer charges if they aren't handled efficiently.

A look at Table 2 shows that the reel mechanics caused the largest proportion (39 per cent) of mechanical faults.

Table 2: VCR fault percentages – mechanical.

<i>Fault area</i>	<i>Percentage</i>
Reel system	39
Capstan	26
Loading	17
Audio	13
Drum	4

This section of a VCR also seems to be responsible for the largest proportion of routine problems. Capstan and pinch roller troubles came second (26 per cent). Poor drum performance was more likely to require an electrical repair, but loading problems were as likely to be caused by a mechanical as an electrical failure. It's worth noting that only reel and capstan faults are more likely to be solved by mechanical rather than electrical repair: intermittent faults in this area are similarly most likely to have a mechanical cause.

TV Faults

Table 3 shows that power supply faults are also the most common ones with TV sets (35 per cent). Perhaps manufacturers need to devote more design attention to this area. It's not surprising that line timebase faults are the next most common ones, at 29 per cent. The highly-stressed e.h.t. generating system must be a contributory factor here.

Table 3: TV fault percentages.

<i>Fault area</i>	<i>Percentage</i>
Power supply	35
Line timebase	29
Field timebase	13
Tuning	9
Chroma	6
Tube/base PCB	3
I.F.	2
Audio	2
Luminance	2
Remote control	1

Chroma circuits are complex, but as they run at low power and use large-scale integration their reliability is good. The complexity of modern tuning systems could be the reason for their occupying the fourth place. Many customers may find it frustrating that their sets almost work but won't tune in a station! They'd probably prefer to have a completely dead set.

Conclusions

The above information enables the significant problem areas to be identified. With TV sets about half the faults are in the power supply or line timebase (surely, in practice, 80 per cent or more? – editor): with VCRs the majority of the faults relate to the power supply and the mechanism, with reel and capstan/tape pinch problems predominating on the mechanical side. You can learn a lot, economically, about power supply topics by reading articles in *Television*. Training courses run by manufacturers can provide even experienced engineers with extra knowledge.

Investing in servicing equipment that's relevant to the most common tasks makes sense. Some of it may be essential anyway for safe working. An hour a week is easily

saved by having the right equipment to hand: over a couple of years, several hundreds of pounds in labour costs can be saved. To deal with TV faults you'll need a mains isolating transformer, a variac, a line output transformer tester and an e.h.t. meter (as well as the standard multimeter and scope). For VCR work you will need in addition a means of measuring reel torque and tape tension, and a variable power supply with adjustable current limiting. The latter will enable you to provide a substitute source for a dead or suspect section in a multiple power supply and run motors out of circuit.

TV spares to keep in stock include power supply electrolytics, line output stage high-voltage capacitors, fuses,

rectifiers, regulator chips, power transistors, zener diodes and optocouplers: line output transformers and mains switches are worth stocking when you handle models in which these commonly fail. With VCRs, belts and sensors are obvious things to stock. Reel drive and control items and capstan/tape pinch parts will be required: these are often specific to particular decks/models, though some parts can be used with a number of machines. Stocking motors is advisable only when regular failures are known and come your way.

Remember that it's often quicker to find a faulty component by substitution – and that when you do this you will have cured the fault at the same time!

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: Complete working tuner and vision/sound i.f. board (A board, part no. TNP65132AZ) for the National Panasonic Model TC361GM. S.J.M. Sharpe, 3 Limetree Way, Apley Park, Wellington, Telford, Shropshire TF1 3PJ. 0952 256 235 after 6 p.m., 0952 244 986 daytime (leaving message only).

Wanted: I.C. part no. GB19001 for the Hioki Model 3208 Calcu Hi Tester – or advice on where it can be obtained (with price) or any equivalent. Norman Donnelly, PO Box 1113, Strand 7140, South Africa. 024 854 8337.

Wanted: Operating instructions (or photocopy of them) for the De Graaf Model WHSJS1 video recorder. Also source for the remote control handset. W. Lenton, St. Judes, Hackensall Road, Knott-End, Fleetwood, Lancs FY6 0AY. 0253 810 870.

Wanted: Capstan motor for the Nokia ITT VR3731UK VCR. M.B. Wilson, 1 Playwell Court, Glanton, Alnwick NE66 4BL. 0665 578 437.

Wanted: MC1552 wideband amplifier i.c. for the RCS counter-timer Model 801A. B. Little, 87 Kenn Moor Drive, Clevedon, Avon BS21 5AY.

Wanted: Sony a.c. adaptor type CMA100CE as used with the HVC2000P camera etc. R. McGrath, 41 Belvedere Place, Dublin 1, Ireland.

Wanted: LOPT and circuit diagram for the Contec Model KTN3732. Also alphanumeric keyboard for an Ace Telecom Viewdata/Prestel terminal – the one that fits in the 'keyboard 2' 5-pin DIN socket at the rear. A. Tebbutt, 34 Coronation Road, Loftus, Saltburn by sea, Cleveland TS13 4SL. 0287 643 614 (after 8 p.m.).

Wanted: Handsets for the JVC HR7700/Ferguson 3V23 VCR and the Salora 190-9570 satellite receiver. A. Clifford, 9 Broadfield Avenue, Blackpool FY4 3RA.

Wanted: Service sheet for the Alba Model CTV10RC. H.S. Downing, 16 Mayfield Crescent, Lower Stondon, Henlow, Beds SG16 6LF. 0462 850 244.

Wanted: Kit to convert 18 Superjack HARL-3018 from reed switch to pot type control, or details of an adaptor. Also service manual or circuit for the Connexions CX8520R receiver/positioner. C. Thorne, 27 Edgcombe Green, St. Austell, Cornwall PL25 5EE. 0726 67 585.

Wanted: LOPT for a 26in. Decca set fitted with the 30 series chassis. R.A. Bashford, 3 Venn Crescent, Hartley, Plymouth PL3 5PJ. 0752 771 520.

Wanted: Grundig SVR4004/4004EL or Philips N1700/1702, working or not. Adrian Bird, Timbertops, Longdown, Nr. Exeter, Devon EX6 7SR. 0392 811 735.

Wanted: Service manuals for Panasonic Models NV8170, NV8150, NV8200/8400/8600. Cabinet parts (scrap machine would do) for the Akai VS9700. Service manual for the Sony SLC6. T. Martini, 6 Levant House, Mile End Road, London E1 4RB. 071 790 6807.

Wanted: Service manual or circuit diagram (copy would do) for the Cossor CDU110 oscilloscope. Ray Palmer, 5 Hawkey Close, Leigh Park, Havant, Hants PO9 5EL. 0705 451 544.

Wanted: SECAM-to-PAL converter circuit diagram. H.S. Jeetley, 75 Hamsteadhall Road, Handsworthwood, Birmingham B20 1HU. 021 523 8992.

Wanted: TDA1470 field timebase chip. John Moir, Manna House, 50 Parliament Hill, London NW3 2TL. 071 431 1225.

Wanted: VU meter for the Goodmans Module 90 tuner-amplifier. Brian Francis, Bob Francis and Sons, Colebrook Road, Plympton, Plymouth PL7 4AA. 0752 336 988.

Wanted: Manual/circuit diagram for the Philips PM5320 signal generator and Eagle PA400 PA amplifier. Could copy and return. S. Cox, 35 Lansdowne Way, Hailsham, East Sussex BN27 1LU. 0323 846 167.

Wanted: Manual for the Amstrad FX9600 series fax machines, with or without phone facilities. Particularly need the circuit diagram and the scanning element setting up details. Copy would do. David Willoughby, Barcaldine, Pell Green, Wadhurst, East Sussex TN5 6EF. 0892 783 859.

Wanted: Circuit diagram for the ITT TV Model FRA5/1, serial no. 7245. E.H.B. Williams, 60a Birmingham Road, Alcester, Warks B49 5EG. 0789 763 455.

Wanted: Type AN239 chip (IC102) or i.f. panel from a scrap receiver, National Panasonic Model TC361GM. John R. Langley, 125 Station Road, Burton Latimer, Kettering, Northants NN15 5PA. 0536 723 411.

Wanted: Teletext board for the Finlux 1000 series TV (early version). Robert Philpot, 36 Kingsley Close, St. Leonards-on-Sea, East Sussex TN37 7BX. 0424 850 539.

Wanted: Ferranti ZN401E chip and circuit diagram for the Sinclair Microvision TV. M. Levers, Waverley, Independent Hill, Alfreton, Derbyshire DE55 7DG.

Wanted: Video head for the Sony Model SLV401 VCR, also Sony a.c. adaptor Model CMA100CE for Betamax camera. I.A. Comisky, 33D North Clarence Street, Dublin 1, Ireland.

Wanted: Circuit diagram/service manual for the Welson Globetrotter electronic organ. Nigel Burton, 63 Salcombe Drive, Glenfield, Leicester LE3 8AG.

Wanted: LOPT type LCE CF82 for the Binatone Model 01/9014. G. Cash, 9 Northbank Road, Walthamstow, London E17 4JY. 081 531 5051.

CD Player Repairs

Les Austin

A dealer friend of mine, Richard, has recently started to repair the occasional CD player. He had a couple of Sony machines on his bench but had not yet got the manuals. He had however read my bit in the May issue on setting up the Aiwa CX800E and rang me for some clarification. If he hadn't made complete sense of it, perhaps I should go into the matter in greater detail.

The Scope

In the first of these articles I discussed scope specifications and mentioned that for the past couple of years I've been using a Tequipment D67. This has a bandwidth of 25MHz, a vertical sensitivity of 10mV/division and a maximum time-base speed of 200nsec/division. Richard has a D67 so, assuming that you've all now acquired such a scope, how do you use it?

When I'm in the 'CD Player Mode' the scope is always switched on and ready for use. The settings are as follows: Y amplifier d.c. coupled, trace centred, sensitivity 10mV/division; probe setting 10:1; timebase speed 2msec/division; trigger input switches at normal and internal, trigger mode 'auto'.

Typical Setting Up

I've mentioned some setting up procedures before. This time I'll include more detail and, to avoid problems, we'll assume that the players are all in working order. Once again we'll consider players that use a typical Sony chip set: the CXA1081M r.f. chip, the CXA1082 analogue servo processor chip, the CXD1130 digital servo processor chip and the CXD1140 digital-to-analogue converter (DAC) chip. The Samsung RCD1000 ghetto blaster is an example: you'll find the identical deck in this company's SCM7700 midi system and in some versions of the SCM6000, while at least one Goodmans ghetto blaster, obviously manufactured by Samsung, uses it. The same set of chips is used, with more or less identical circuitry, in many other makes of player, though I've found that the Sanyo LC7880

DAC chip seems to be more common than the Sony one.

Focus Servo Adjustment

Right, so we have a Samsung RSD1000 on the bench. Clip the probe's common lead to TP4 (V ref., pin 14 of the CXA1081 chip). Since this model has only a positive supply voltage (8.5V) V ref. is not at chassis potential but at approximately 2.5V. Connect the probe tip to TP3 (FE, pin 19 of the CXA1081 chip). Switch the player on, with a disc loaded but without pressing play. Observe the position of the trace: if necessary, adjust VR1102 (focus bias) to position the trace two divisions above the centre line, thereby setting the d.c. level at +200mV.

Transfer the probe to TP2 (r.f., pin 2 of the CXA1081 chip) and switch the scope's input coupling to a.c., with a vertical sensitivity of 20mV/division and a sweep speed of 500nsec/division. Press play. This particular player will read the table of contents (TOC) and immediately begin to play the first recording. The scope's trace will display the familiar 'eye pattern'. If necessary, readjust the focus bias preset RV1102 to optimise the display. What this means in practice is adjust for the maximum possible trace amplitude, though strictly speaking you should adjust for the clearest looking result where the crossovers occur in the central part of the display. These two conditions should coincide, being the point of minimum 'jitter'. If you are fortunate enough to have access to a jitter counter you probably don't need to be reading this.

Transfer the probe back to TP3 (FE), set the vertical sensitivity to 10mV/division with d.c. coupling and the sweep speed to 2msec/division. The focus error servo trace will now be seen: it can be used to adjust the focus servo gain. VR1103 is the focus gain control, its effect being as follows. Rotation of the control to increase the gain will 'sharpen' the trace, its mean d.c. level falling. This will be accompanied by an increase in the amount of noise generated by the optical pickup. Rotation of the control in the opposite direction, to

reduce the gain, will initially reduce the trace sharpness after which it will develop a slight but definite low-frequency wobble. At the same time the d.c. level will rise and the pickup noise will lessen. The correct gain control setting is the point where the wobble is just evident. It normally occurs at a d.c. level of about +100mV. If this doesn't sound too clear, a few minutes spent playing about with a working deck – after noting all the control positions for your peace of mind – will soon give you an understanding of the method. Once you have this you'll find that adjustment is very quick and reliable.

Tracking Servo Adjustment

Having set the focus servo correctly we can move on to the tracking servo. Note that with this particular deck there's no tracking offset adjustment. Transfer the probe to TP5 (TE, pin 20 of the CXA1081 chip) and change the vertical sensitivity to 100mV/division. With the disc still being played you will now see the tracking error servo waveform. The display should be more or less centred vertically, with most of the action occurring within a 1V peak-to-peak envelope, the larger individual excursions generally not exceeding about 2V p-p. Rotation of the tracking gain control VR1104 will vary this amplitude: adjustment to obtain the conditions just described is all that's required. Too low a setting will result in loss of tracking: the audio will either skip or disappear altogether. With too high a setting there will in addition be increased noise from the pickup.

Finally we come to the most difficult but probably the most important adjustment, the EF (tracking) balance. Leave the probe connected to TP5 and the vertical sensitivity and sweep speed as before. Alter the triggering however: rotate the trigger control from auto to a setting where the trace remains on the screen as before, then a little farther until the sweep just stops, with the screen remaining blank. Press the fast-forward button and hold it in. A fresh trace should be seen, with a higher-amplitude section at the left-hand

side and the rest of the trace the same as the previously displayed tracking error servo waveform.

If the EF balance adjustment is correct, the higher-amplitude portion of the waveform at the left will be symmetrical above and below the central zero axis. If this is not so, careful adjustment of the EF balance control VR1101 will be required to achieve the correct condition. This is a simple and elegant adjustment. Any difficulty experienced with it will almost certainly be because the trigger control has been incorrectly set. If the trace is not displayed or if, instead of being located at the left-hand side, the higher-amplitude portion of the trace dances about all along the screen, readjustment of the trigger level will produce the required result. This EF balance adjustment method will usually work with any three-beam laser player and is much easier to carry out than some of the methods described in manufacturers' service manuals.

Fault Finding

This concludes the static and dynamic optical servo adjustment, using simple scope techniques. Had any fault finding been required, in the power supply for example, use of the scope with d.c. coupling and a vertical sensitivity of 200mV/division would give readings as quickly as a DVM but with more information and the extra bonus of going straight on to digital waveforms if necessary without having to connect more leads or equipment. If you are not sure about scope techniques remember this: use the scope all the time and it will have few secrets.

Abbreviations

In this and previous articles I've referred to r.f., FE, TE and EF balance. One of the problems with CD player servicing is to know what these and the many other alternative abbreviations mean. To list all the abbreviations in use would call for rather a lot of space. I'll restrict myself to clarifying those listed above. But it's important to appreciate that there is little common ground in this area between different chip manufacturers. Indeed sometimes a manufacturer seems to use two different abbreviations to mean the same thing. Thus in some players that use the Sanyo chip set JP (jump pulse, I think) becomes KP (kick pulse) when it reaches its destination!

The abbreviations used by Sony are also used by Samsung with its own chips. Some of the abbreviations are also used with the Yamaha chip set, and a few of them are used by Sanyo. Toshiba mostly uses its own terminology and abbreviations, while as usual Philips differs totally from everyone else.

What then about those used here? FE is Focus servo Error. It relates to the focus servo amplifier's output to the optical unit's focus coil, the output that keeps the light beam focused exactly on the plane of the reflective disc.

TE is the Tracking servo Error. It relates to the tracking servo amplifier's output to the optical unit's tracking coils, the output that keeps the laser beam centred on the spiral line of pits and lands, enabling these to be read to provide the off-disc data.

R.f., also commonly known as h.f., is the signal produced by the laser beam after reflection from the disc layer that contains the pits and lands. At the appropriate test point where you can view it on your scope it will have been amplified by the r.f. chip. The display you should see is the well-known 'eye pattern'. It may be referred to as the EFM, though this abbreviation, which stands for Eight to Fourteen Modulation, is usually reserved for the digital output obtained from the r.f. signal after further amplification and limiting.

Finally, EF balance. The correct conditions with a three-beam laser unit are as follows: the main, central beam must be centred on the spiral track of pits and lands, as mentioned above; the two side beams must be centred on the edges of spiral track, thereby ensuring that the main beam is in the correct position.

Within the optical unit there are pickup diodes that are referred to as A, B, C, D, E and F. The outputs from diodes A, B, C and D are used, after comparison and addition, to correct the focusing and thus the data recovery. Diodes E and F are the ones that receive their inputs from the side beams. After amplification their outputs, when the side beams are correctly positioned, must be equal. The EF balance adjustment provides this equalisation. Alternative names for the adjustment are Tracking Balance (TB) and Radial Balance (RB).

The Soap, Episode 3

Well, with the help of an excellent article by Andy Denham in a 1976

issue of this magazine I did learn to repair those Grundig sets with thyristor line output stages. In fact I was able to build up a small but successful business that concentrated on these sets. Until, after nearly ten years, I was fool enough to sell it.

This brings us to 1988 when various friends suggested that my home of nearly twenty years was a valuable asset, something that I'd never previously thought about. Easily swayed by such good-sounding promises of riches, the lure of that pleasant little island in the middle of the Irish Sea was awakened. Assuming that I could easily sell my home/valuable asset I sold my business, borrowed more from a willing Bank Manager, bought a cottage a hundred yards from the sea on the west coast of the Isle of Man and waited for the rich buyer of my valuable asset to appear. I am still waiting.

I should of course have known that the property market would collapse, that interest rates would climb through the roof and that I would end up owing Loadsamoney to the Bank Manager in his expensive suit.

After the first six months of waiting I applied for a job vacancy on the island. During the interview Alan asked me if I understood how CD players worked. Joe Cieszynski had started his series of articles on CD player servicing in the magazine, and since I didn't understand any of it I assumed that no one else would. Also it seemed that Alan didn't read *Television*. On the basis of these assumptions I said "no, does anyone understand them?" "Well" said Alan, "I think I do." I had always been an expert at putting my foot in it, and here I was at it again!

It seemed that the other candidates had even less to offer, since a few days later I found myself employed as an audio engineer. More next time!

Correction

It seems that no one spotted my deliberate (!) mistake in the May issue. For the first of the two Aiwa players, the DXM740 that uses the Sanyo chip set, I quoted the focus bias setting as +200mV. Not so, the correct figure is zero. For the second player, Model CX800E, I again gave the figure of +200mV for the focus bias setting. This time I was not trying to catch you out: it's the correct figure.

Panasonic NVG1

The complaint was of intermittent loss of colour. According to the owner the loss would occur after filming for ten minutes. Inspection on the bench revealed two significant factors. First the loss didn't affect the burst vectors. Secondly the luminance had a high contrast level and was clipped. If the camera PCB was moved the fault came and went. Then it stayed.

During the period when the fault was intermittent, I noticed that the luminance level at pin 11 of IC314 dropped when the fault occurred. The output at pin 5 was overloaded and clipped: there was no overloading at pins 7 and 3. I couldn't verify these changes now however as the fault was permanent. There was only one thing to do, to follow the colour signal path. IC314 had a colour signal at output pin 33, but the following buffer transistor Q311 didn't produce an output. In fact it seemed to be cut off. Q311 feeds a hybrid delay line chip, IC318, so it seemed that this was loading down Q311. But the fault did once respond to PCB movement. When I checked around IC318 I found that it has more than one supply line – in fact it has four! Pin 18 was without any voltage because L303 was dry-jointed. Phew!

S.B.

Sony CCDF250

This camcorder is very similar to the F335, which I covered in the July issue (page 667), but doesn't have a digital titler. The auto-focus is sometimes slow. Otherwise, these camcorders are very sturdy and reliable. They use the easy-to-repair U mechanism. We've had the following faults.

Black E-E picture, playback o.k.: DT73, which is a hybrid i.c. on board CV9, was faulty. A replacement (part no. A7068150A) restored normal operation.

No zoom. Focus and E-E operation o.k.: IC801 (TK10500M) on board CV9 can cause this fault. Part no. 875923123. We've also had to replace the zoom motor. Part no. 370756201.

Interference at bottom edge of playback picture: C161 (47µF) on board CO2P was faulty. Part no. 112620411.

Playback picture jumps: IC501 (CXP80116099Q) on board CO2P was faulty. Part no. 875280908.

E-E o.k., playback produces white screen: The usual cause is dirty or worn heads – the picture is blanked when the signal is very poor. Part no. A7049215A.

The E-E and playback pictures were very dark though the EVF display was o.k.: A check at IC201 on board CV9 showed that the output (pin 8) was clipped. C214 was faulty.

K.T.K.

Sanyo VMD9P

The record and playback pictures were fine but the playback sound was intermittent. The effect was random sound cut-out for a fraction of a second at a time. We found that the

problem was worse with some tapes than others, and was most noticeable where picture dropouts were visible. The audio chip is IC201, on the main board. C2001 (0.01µF) is connected between pin 2 and chassis: it forms part of the mute detect system and was open-circuit. Because of this the mute threshold operated incorrectly. A replacement cured the fault.

D.C.W.

Sony CCDF380E

The cause of no camera picture with playback o.k. was traced to IC3651 on board CK19P being faulty. A camera picture was available with the back-up battery removed. When it was fitted the picture remained until the camera was de-powered. On power-up the fault returned.

D.C.W.

Sony CCDTR105E

This camcorder had two faults: it wouldn't accept a tape, and the picture disappeared intermittently. The cause of the tape problem was incorrect positioning of the back-tension guide pole – the pole was in the play position when the cassette housing was fully open. Normal operation was restored when cam and guide arm TG1 were replaced. A dry-joint at connector CN801 on the camera PCB was the cause of the intermittent picture.

D.C.W.

Sanyo VMD6P

Poor battery contacts seem to be a problem with this model. Recent experience suggests that when you have the case off for servicing it's worthwhile checking the soldering to the main PCB – saves having to remove it all again later!

D.C.W.

Sony CCDF500E

There was a noise band across the bottom of the playback picture. Tape path fault we thought, and we were right. On examination we found that the supply side roller guide (TG2) was missing! A replacement cured the fault of course, but where had it gone?

D.C.W.

JVC GRC7E

Intermittent playback luminance was the problem with this camcorder. The luminance playback signal path (YC PCB) is via Q3, at the junction of R44 and R45. On investigation we found that one end of R44 had a crack across it. A replacement cured the fault, but unfortunately these components are all under a large blob of JVC goo!

D.C.W.

JVC GRS77E

When record or play was selected the machine would lace up normally until tape transport began: the capstan motor would then take off at full speed! The cause of the problem was a faulty Hall effect chip on the motor assembly – it produced a capstan FG signal of reduced amplitude. The motor has to be replaced as the chip is not available separately.

D.C.W.

Test Report: Hewlett-Packard HP54600A Scope

David Botto

Hewlett-Packard's Model HP54600A is a high-tech, 100MHz dual-trace storage oscilloscope that is capable of providing a vast range of measurements. Advanced computer circuitry has helped to produce a powerful instrument that's claimed to be unrivalled for general fault finding power and value.

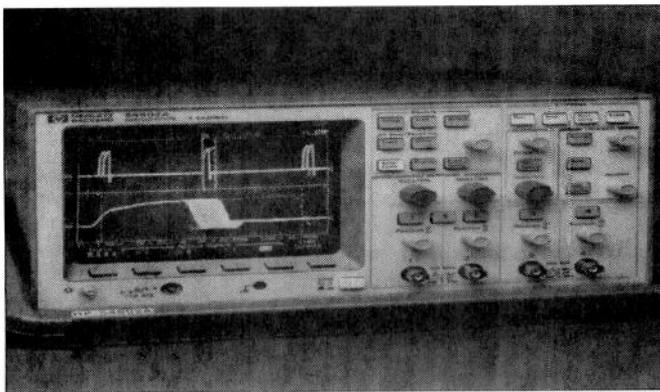
Two custom-made chips ensure fast display updating while a dedicated central microprocessor chip executes measurement and control tasks at impressive speeds.

The attractive control panel (see photograph) has clearly labelled push-buttons and menu softkeys (beneath the screen), making function selection simple. The time/division sweep (horizontal timebase) control knob doesn't require calibration markings on the panel as the sweep speed is clearly shown in figures at the top of the c.r.t. display. Sweep speeds cover the range 2nsec to 5sec in a 1-2-5 step sequence.

Use of the HP54600A gives you the comfortable feeling of analogue equipment with the power of digital processing. The 'analogue feel' means that you have a familiar front panel layout, with the knobs you'd expect to find for all the major functions and a real-time display. Added to this there's the measurement power of a digital scope combined with accurate automatic measurements and waveform storage.

As we have to test an increasing proportion of digital circuits, the older types of scope may fail to keep up with our needs. The HP54600A enables you to carry out more accurate timing measurements and view low-repetition rate signals and events ahead of the trigger pulse.

The operator's manual is comprehensive and easy to



The Hewlett-Packard HP54602A oscilloscope. This is the top-of-the-range model. The HP54600A tested in this report has a similar layout. Note the 'keyboard' of softkeys beneath the screen, for selection from menu displays.

follow – one of the best I've come across in fact. A quick-start guide provides a brief overview of the scope. A series of exercises then gently guide you through its operation.

There's a section especially for the service engineer: it describes performance checks, adjustments, trouble shooting and the replacement of assemblies in the scope. A handy glossary of oscilloscope terms is included.

Although the HP54600A is sturdily built, its total weight is only 6.2kg (14 lb). This is good news for the field service engineer who often needs to climb up long flights of stairs and may occasionally have to park his vehicle a fair distance from the customer's location. Measurements are 172mm (6.8in.) high, 322mm (12.7in.) wide, 317mm (12.5in.) deep. The solidly-made carrying handle doubles as a multi-angle tilt stand.

The heart of an oscilloscope is its display. The HP54600A has a 7in. (raster size) c.r.t. with a resolution of 255 vertical by 500 horizontal points. You can select either an electronically-generated eight by ten graticule grid or a frame display. Crisp, easily-viewed bright green waveforms and readout figures are produced by the tube.

Connecting a Signal

There's no need to fumble with an attenuator slide when a Hewlett-Packard scope probe is attached. The attenuation ratio can be keyed in by means of a softkey that enables you to select a ratio of 1:1, 10:1 or 100:1. When the autoscale button is then pressed the scope's major parameters are all set automatically to produce an immediate, stable display. A front panel test point enables you to adjust each probe to match the scope's characteristics.

To avoid damage the input voltage signal must be no greater than 400V: this is the d.c. level plus the peak a.c. voltage signal. When d.c. coupling is used, the signal's d.c. component is shown by its distance from an on-screen earth symbol.

Trigger Facilities

This scope's trigger facilities are exceptionally good, making it extremely user-friendly. Turn the trigger level knob and the trigger level voltage is shown on the screen. To change the trigger set-up, press the source button and a menu appears on the screen for softkey selection. The choice of trigger sources is channel 1, channel 2, external and line.

Press the mode button and another softkey menu appears, offering you a choice of five trigger modes: autolevel, auto, normal, single and TV. There's also a holdoff knob that enables you to stabilise exceptionally complex waveforms over a range of 200nsecs to about 13.5secs. The value is shown briefly, in inverse video, near the bottom of the screen.

Roll Mode

The roll mode moves data across the screen continuously, from right to left. Its advantage is that you can see dynamic

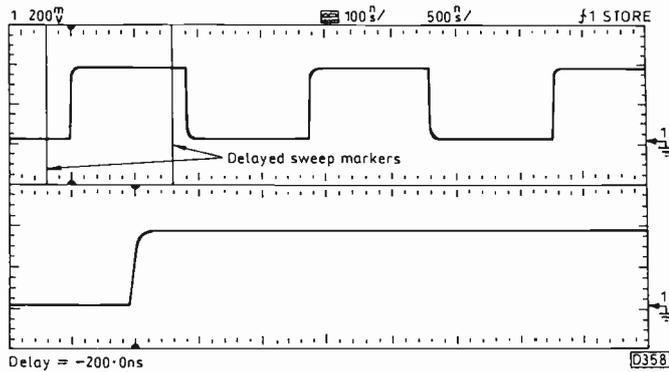


Fig. 1: A typical delayed sweep display. The lower sweep is a horizontally enlarged section of the upper waveform, between the delayed-sweep markers. Time reference set to left.

changes, for example when adjusting a potentiometer, on low-frequency signals. This is excellent when checking power supply circuitry.

Delayed Sweep

The delayed sweep is a magnified portion of the main sweep. You use it to find and to expand horizontally part of the main sweep so that a more detailed, high-resolution examination of the signal is possible. There's a time reference function that can be set to the left or to the right. See Fig. 1. This function is useful for VCR servicing. Rotating video head signals can for example be given an accurate examination to determine the state of the heads.

X-Y and Z Axes

The X-Y presentation displays a graph of two signals; you can for example observe the phase shift between two signals at the same frequency. Z axis operation enables an external signal to control the intensity of the beam.

Storage Operation

Once a stable display has been obtained you can press the autostore button. The word "store" then appears on the status line at the top of the screen, with the stored waveform displayed at half brightness and the most recent trace at normal brightness. This mode is used to display extremes of varying waveforms, to capture and store a waveform, to measure noise and jitter and to capture events that occur infrequently. To clear the display you simply press the erase button.

The one criticism I have of the HP54600A is that it

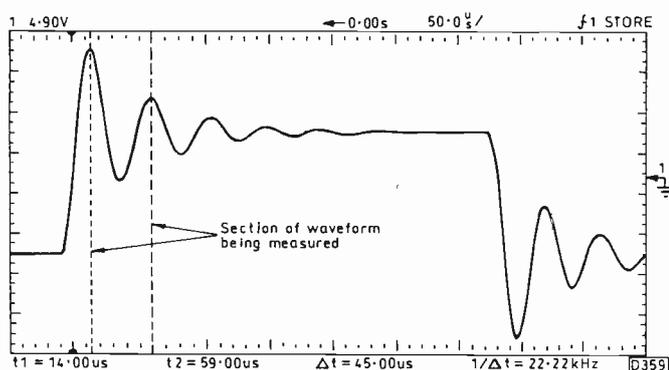


Fig. 2: Use of cursors to measure the ringing on a pulse.

dosen't have a component tester. The De Luxe component tester (see the July and August 1990 issues of *Television*) works well with the HP54600A however. When you switch the scope to the storage mode you can see the waveforms produced by several different components simultaneously. This is particularly useful when checking a number of transistors or i.c.s.

Save or Recall

The HP54600A has sixteen memory locations for storing front-panel set-ups. This saves time when several set-ups are frequently used. You just press the set-up button, then select the desired memory location by using a softkey or panel knob. Press the save softkey to save a front-panel set-up, and the recall softkey to recall it.

Frequency and Time Measurements

It's simple to measure a signal's frequency. Display the signal then press the time button. Yet another softkey menu appears. You can now read off in figures the frequency, time period and duty cycle. Press the voltage button and you can measure the peak-to-peak, average and r.m.s. a.c. voltage.

When I held the scope's probe a few inches away from the mains lead I got the following readings: frequency 50.00Hz, period 20.00msecs, duty cycle 50.5%, voltage 368.7mV p-p, average voltage 2.8μV and peak voltage 127.0mV.

Use of the delayed timebase facility with the frequency mode makes it possible to isolate an event for a frequency measurement.

Cursor Measurements

These are horizontal and vertical markers that appear on the display so that custom voltage and time measurements can be made. Press the cursors button and another softkey menu, with six choices, appears. Now check the signal's time or voltage. Fig. 2 shows how the cursors' function can be used to measure the frequency of the ringing on a pulse.

Print/Utility

An interface socket at the rear of the scope can be used with Hewlett-Packard's parallel interface module to print out what you see on the screen.

ScopeLink Software

The ScopeLink Software package brings the power of your PC to the scope. You can use it to transfer scope traces to a PC for viewing, storage or printing – it's simple to do. The traces can be combined into reports, technical papers and service data, and everything can be stored on a standard computer disc. Computer stored set-ups can be loaded back into the scope to restore a previous set-up.

Test and Interface Modules

For design and other advanced work several interface modules are available. They plug into the scope's interface socket. Module HP54651A is an RS232 interface, module HP54650A an HB-1B interface and module HP54652A a parallel interface. The HP54657A and HP54656A are test automation modules.

Power Requirements

There's no mains input voltage adjustment: the scope adjusts itself automatically to suit any a.c. input between 100V and 240V and any mains frequency between 45Hz and 440Hz.

Reliability and Safety

As service engineers know only too well, any piece of electronic test equipment can fail. The HP54600A has been designed with high reliability in mind however: it passes the rugged environmental requirements of the US military MIL-T-28800D specification, which includes EMI levels. There's a standard three-year warranty that can be extended to an optional five years, and in addition you can self test all the functions and calibration on your own bench.

Press the SelfTest and keyboard softkeys and a pictorial diagram of the front panel appears on the screen. Press each key in turn and if all is well a corresponding block on the screen turns dark green. Rotate each knob and an arrow on the screen points in the direction you rotated the knob. There's also a SelfTest function to check the RAM and ROM.

Safety standards conform to the following design and product specifications: IEC 348/HD401. UL1244. CSA-C22.2 No. 231 (Series M-89). These are tough-to-meet US standards. The instrument also meets the requirements of the EU's EMC directive 89/336/ECC. During operation a barely audible built-in fan keeps the scope cool, as with a PC.

The Range

There are two other models in the HP54600 range. The HP54601A is a four-channel, 100MHz version while the HP54602A has a 150MHz bandwidth with channels 1 and 2 and 250MHz with channels 3 and 4. The accompanying photograph shows the HP54602A, but all three models are similar in appearance. Unless you want the scope for some highly specialised purpose, the HP54600A will fully satisfy the needs of the service engineer.

Conclusion

These scopes are not cheap, but they are good value for money. They are beautifully constructed and without exaggeration represent the leading edge in advanced technology. The user can expect many years of satisfactory service. Another advantage is the built-in computer circuitry that enables you to check quickly or adjust the calibration of each range.

The HP54600A is perhaps the most powerful oscilloscope I've ever handled. It was a real wrench when I had to return it to Hewlett-Packard. It's suitable for all types of TV, VCR, digital and computer servicing work, and is especially useful when seeking the cause of intermittent faults. The 100MHz bandwidth enables it to check virtually every signal section of a TV set, a VCR or a high-tech computer.

The HP54600A is priced at £2,054, the Model HP54601A at £2,469 and Model HP54602A at £2,801 (all plus VAT). Many thanks to Debbie Scope who arranged for the loan of the HP54600A for this test. Any enquiries should be sent to Hewlett-Packard Ltd., Cain Road, Bracknell, Berkshire RG12 1HN (telephone 0344 362 764).

Next Month in TELEVISION

TV/VIDEO SPARES GUIDE

Free with next month's issue of Television, the latest updated edition of our Spares Guide, listing brands, manufacturers' spares departments and spares suppliers.

INSIDE THE FERGUSON ICC6 CHASSIS

Although the ICC6 chassis is intended as a 'simple' one aimed at the 'popular' section of the market it's loaded with features and employs state-of-the-art technology. Next month Mark Paul takes a look at the techniques used in this recent chassis from the Thomson stable.

IMPROVED CARRIER TAKE-OFF FOR NICAM

The use of a separate Nicam decoder can cause problems when the receiver that provides its input has a standard i.f. strip. Keith Cummins discovered that the only way of avoiding interference from vision harmonics, and intermodulation, was to convert the receiver to parallel i.f. operation, i.e. use a SAWF with separate sound and vision outputs to drive separate i.f. circuits. Fortunately his Sony receiver was suitable for this modification, but the added sound i.f. module devised for the purpose might well be adaptable for use with other chassis.

JVC GR45 FAULT NOTES

Keith T. Keeton provides a fault run-down on this camcorder.

MICROVITEC GAMES MONITOR

Peter Hubbard describes servicing experiences with the Microvitec LCCD02/03 games monitor (a version of the Cub).

A SATELLITE TV MODIFICATION

Brian Ewan describes a modification to the Uniden 7007 satellite receiver to enable it to be used with the standard- or bullet-type Marconi LNB.

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What a Life!

Donald Bullock

The bell went early one morning, as I was taking a shower. It kept on ringing. I half dried myself, scampered into some things and ran to the front door. There I met Mr. Sickener for the first time.

"It's my Sharp microwave" he said. "I know what's wrong with it, and it isn't much. I've opened it of course. There's a D-shaped plastic thing under the turntable and it's cracked. How long would it take you to get the spares and do it?"

"A couple of days" I said.

On hearing this he clasped his hand to his bald pate and spun round on his heels. "How will I manage without it for that length of time? Give me your card and I'll decide. There are a few other dealers keen to do it."

So I had to find my keys, walk to the workshop and open it to get a card for him. I didn't like the look of him, and hoped that it showed. I mentioned that Snoddies does microwaves, and that Crubbs Foodstore doesn't but sells new ones very cheaply. At that he left.

He was back with the machine a few minutes later, and I had to go out to the workshop again and unlock it to book the oven in.

"Can we try it?" he asked, picking up the plug and looking around for a socket.

"No" I said, "we aren't open yet."

So he opened its door and began to dismantle the turntable assembly. "Oh, by the way, there's a burning smell when you switch it on." He gazed at my shirt, then my feet. "I . . . er, I'll be going now" he said.

I went back to the house and looked in the mirror. My shirt was on backwards. Then I looked at my feet – I was wearing sandals: there were odd socks, one dark grey, the other maroon.

A little later I took a look at his microwave. It was ancient. On the side, near the back, there was a Snoddies' sticker. "Not worth repairing" it said. Cripes, if they'd passed up the chance of a fast quid, there must be something wrong. We soon found that the machine had been badly pulled about, and that the nasty smell when it was switched on was because it was filthy inside.

When Mr. Sickener returned we told him the bad news and placed the

machine on the counter in front of him.

His reaction was fast. "I suppose you want another fifteen quid, just to tell me to clear off?"

"Eh?" I said.

"That's what Snoddies just did."

"No charge" I said. He grabbed the machine and fled.

Mr Runty's Sony

The next caller was Mr. Runty. He's tiny, and apparently to compensate for this he indulges in circumlocution.

"Ah, Mr. Bullock, my – ah – Sony television has I fear developed a malady. I have it in my vehicle. It has shrugged off its mortal coil."

I had to struggle to get it out and on to the bench – it was a KV2090 series receiver (XE4 chassis). As he left I checked and smelt the mains switch, which was all right. So, having had several of these sets in before, I studied the underside of the main panel. Sure enough there were some dry-joints. There are five 10W wirewound resistors in two batches. The first batch consists of R621 and R622. They both stand upright and the centre lead of each one was dry-jointed. The same applied to the other batch – R637, R640 and R601. I removed them all in turn, cleaned and tinned the leads and resoldered them in. The set then worked a treat. When Mr. Runty returned he was delighted.

"Ah, Mr. Bullock, my gratitude is unbounded. How can I indicate my indebtedness to you?"

I tapped my finger on the bill. "By remunerating me and perhaps adding an honorarium." Then I added "I got that little lot off a sauce bottle".

Warder Phil

Warder Phil was our next caller. He had brought along a Toshiba set. "Belongs to old Mrs. Downe" he said. "She's bedridden. Her stupid son looked after her until he got himself put into our place for a month for kicking up a rumpus after a night out. I'd like to get his ma's set fixed though."

Typical of Phil. The Toshiba set's beacon light came on when the on-off switch was pressed, but went out when

standby was touched. We didn't have the circuit but opened it up and turned the chassis on its side to examine the print around the line timebase. I soon found transformer T401 so dry-jointed that I was able to lift it off the panel. Cleaning the pins and resoldering the transformer into the panel restored normal results, though the tube was a bit low.

"How much do I owe you?" Phil asked when he called back.

"What do you get for doing the running about?" I asked.

"Well, nowt" he grinned.

"And that's our charge too."

A Radio-cassette Player

Then Mrs. Suet rolled in and plonked a Pye 9014 radio-cassette player on the bench. She opened her mouth and a noise like a saw on a sheet of tin emerged.

"Can you mend these?" she asked.

"When we do, it's sheer luck" I replied. "What's up with it?"

"The radio is all right, but when I play my Shirley Bassey tape there's a loud whining noise followed by a sharp tapping. What does that tell you?"

"That there's a midget in there with taste" I said. We later found that the 'knocking' was a harsh crackling caused by the cheap two-pin mains plug not gripping the socket properly while the 'whining' was caused by an up-ended resistor lead that rubbed against the capstan.

"I've let the little fellow out, Mrs. Suet" I said when she called back. "And boy did he go. If I were you I'd swap that cassette of yours for a Bing one."

Amstrad PCWs

I was telling Steven that there's something up with my Amstrad PCW8512 monitor – the one I keep in Spain. I'm not sure whether the tube has become muzzy or whether the main board that provides its supply voltages is in trouble. I could do with a redundant one for spares – say one with a useless disc drive. One that's perhaps not worth mending.

Just then Mrs. Scribe came in. She's a housewife who does some writing and was carrying her Amstrad PCW82512.

"I know you use Amstrads" she said. "Can you repair mine? The second disc drive won't boot up when I put a disc in. If the drive's finished you can keep the machine for spares – I'll get another." And off she went.

When I slipped a disc in nothing happened. So I pressed the little disc release button and the machine didn't give it back. I opened the monitor, took the second disc drive out and opened it. The release mechanism was dry. So I cleaned and lubricated it, floating a spot of thin oil on a drop of water and using a fine screwdriver to apply, sparingly, a film of oil to it. After that the release mechanism worked well. While we were at it we treated the other moving parts, including the worm drive.

The disc drive now worked, but the screen remained blank. I saw that although the drive motor was running the disc didn't revolve. There's a spring lever with a felt pressure pad that presses on the surface of the disc. When I gently lifted it to reduce the pressure the disc spun and the machine booted up. Was the pressure too great then? I checked and it wasn't.

Perhaps the drive was weak? I unplugged and swung open the PCB that hides the mechanism: the thin belt that couples the drive motor to the disc drive hub was perished and no longer supple. We found an identical one and fitted it. The machine then worked well.

When I'd reassembled it and set it up I typed a four-word sentence. Steven glanced over as I printed it to test the printer. "This was nearly mine" it read.

Mrs. Scribe was delighted that her Amstrad had been so easily and cheaply repairable. "By the way" she said, "my hubby reads me all your tales of woe about telly servicing. Is it true that the local BBC was after you

to talk about your funny experiences in the trade?"

I nodded.

"Why not write a proper book about them? You ought to, you know."

"I've a mind to do just that" I replied.

A Samsung Portable

Our next caller was Councillor Glorie. He's bulky and scruffy and winks every time he speaks, as though it's only just him and you. He brought along his 10in. Samsung set, a CI212R, which you also come across as the Nikkai Tara 10. The manual, which refers to the set as the 3ZSMC1 210R, can be obtained from either firm. Take my tip and get it from Samsung - it'll cost you a lot less than from Nikkai.

It's a complex little set. This one was dead though the Councillor reckoned that sometimes, after it had been switched on and left for an hour, it would burst into life for a minute. He had taken it to Snoddies and, to give them their due, they had tried, having added a pound of solder to the print and replaced a number of 2SC1685 transistors in the power switching circuit with 2SC945s, which have a better specification.

There should have been 15V or so across C516, the 10,000µF reservoir capacitor for the bridge rectifier D213, but the voltage here was very low. Disconnecting the series regulator transistor Q131 and its driver Q130 promptly restored the voltage and I spent a long time, as Snoddies had, looking for a switching circuit

fault: without success. I replaced C516, which made no difference, then suspected the TMP47C433AN microcontroller chip IC105. One had to be ordered of course. When it arrived and was fitted there was again no difference.

I stared at the chassis and thought hard. What could be pulling the voltage down? And if disconnecting Q130 and Q131 restored the voltage, why couldn't I find a nice hefty short? And why did the set sometimes come to life for a minute after being switched on for an hour?

And another question. Why was I a TV engineer when all around me other chaps were doing much better at less wearisome jobs? Too late to remedy that I reflected. Then I thought even harder about the Samsung set and got an idea. Rather than being pulled down by a short, the low voltage could be caused by lack of charge. I'd cleared the reservoir capacitor, but suppose that the bridge rectifier was providing an only niggardly current flow? Enough to charge the capacitor but not enough to keep it charged when the regulator circuit was connected. This would also explain why the set could spring to life briefly after being left switched on for an hour: there could be enough charge in the various capacitors down stream for a quick burst of operation. Enough of theory I decided. Time to check it out, by replacing the bridge rectifier. It's type RS602. When this had been done the set sprang to life every time. So there's one for the records: a delinquent bridge rectifier.

And another satisfied customer.

Answer to Test Case 381

- see page 781 -

Even as this is being written casualties from that electrical storm are still lying in the workshop - waiting parts, waiting decisions and waiting diagnoses. The poor old Samsung video is not among them however: it's back at home, functioning perfectly well with its third microcomputer chip firmly in

control so that all the right things are done. The chip was fitted at one of the regular repair benches, using a low-voltage soldering iron and a conductive wrist strap, both earthed. And that is the key to the whole story!

You'll remember that Roger was working at a temporary work bench with no static-charge precautions, using an ancient mains-powered soldering iron. Either of these, or his rushing to and fro across the lino-clad floor, could have been responsible for the demise of the sensitive CMOS

microcontroller chips, which had come carefully packed in conductive foil and special anti-static bags. It really does pay to follow the recommended precautions against punch-through by a static charge when replacing a chip of this type. The effect of static damage is not always immediately obvious: trouble can develop days, weeks or months after carrying out a careless replacement.

The old soldering iron has been chucked out. A gleaming new soldering station has taken its place!

Published on the third Wednesday of each month by Reed Business Publishing Ltd, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Filmsetting by Marlin Graphics, 2-4 Powerscroft Road, Sidcup, Kent DA14 5DT. Printed in England by BPC Magazines Division, Carlisle Web Offset, Cumbria. Distributed by IPC Marketforce, King's Reach Tower, Stamford Street, London SE1 9LS (071 261 5000). Sole Agents for Australia and New Zealand, Gordon and Gotch (Asia) Ltd.; South Africa, Central News Agency Ltd. *Television* is sold subject to the following conditions, namely that it shall not, without the written consent of the Publishers first having been given, be lent, resold, hired out or otherwise disposed of by way of Trade at more than the recommended selling price shown on the cover, excluding Eire where the selling price is subject to currency exchange fluctuations and VAT, and that it shall not be lent, resold, hired or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever.



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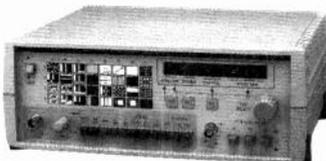
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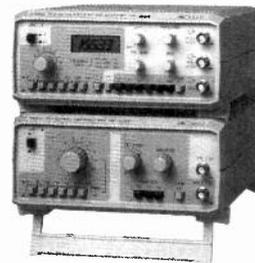
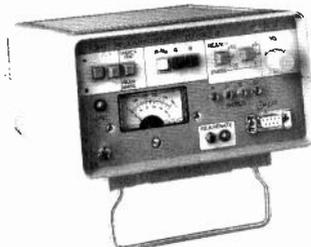
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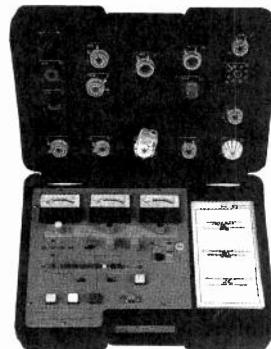
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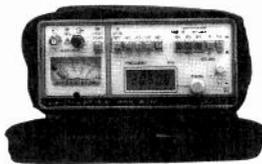
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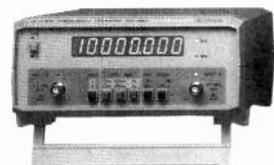
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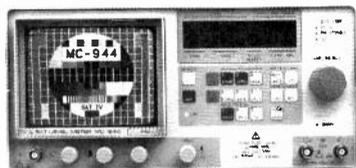
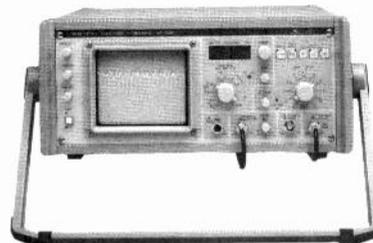


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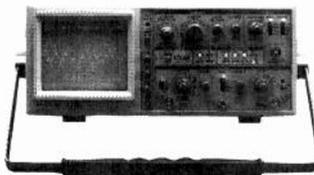
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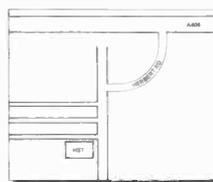
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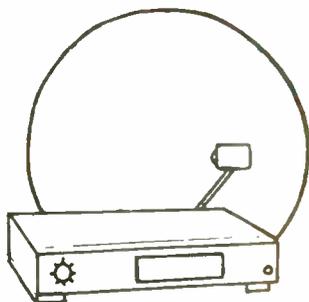
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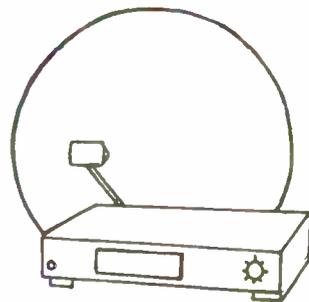
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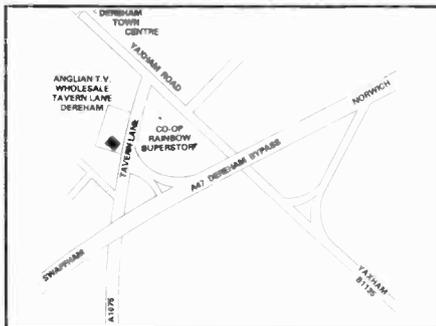
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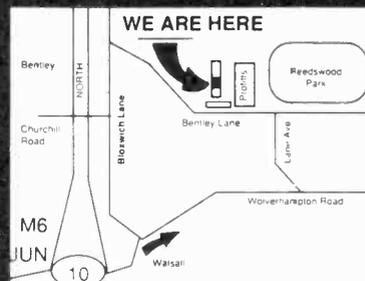
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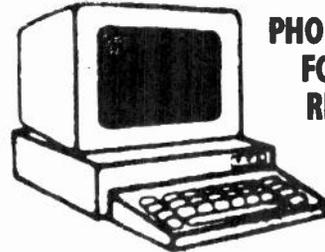
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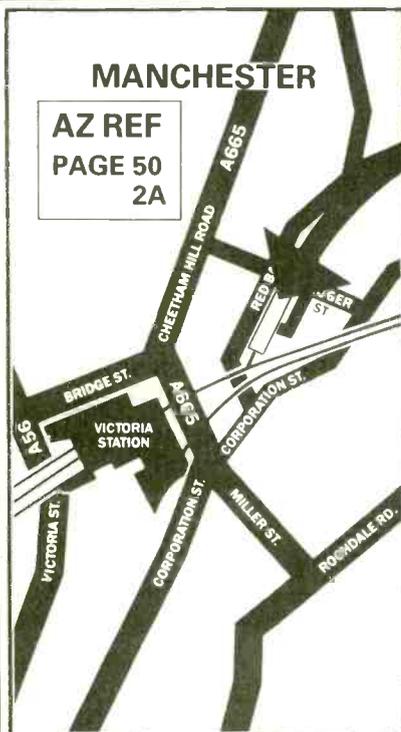
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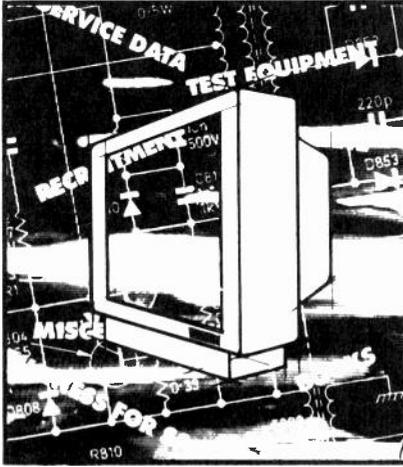
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